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TRADEMARK PROTECTION AND INTERNATIONAL FIRMS

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Trademark Protection and International Firms
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ABSTRACT

We examine how trademark protection—a prevalent but underexplored intellectual property right—affects international firms and market outcomes in an emerging economy. Exploiting the unexpected introduction of China's 1923 Trademark Law and digitized microdata from Shanghai linking firms, workers, intermediaries, trade, and prices, we show that stronger protection reduced information frictions: private anti-counterfeiting efforts fell, authentic foreign firms expanded, and imitation-prone firms contracted. By lowering brand-dilution risk, the reform deepened foreign integration with Chinese intermediaries. Increased entry and heterogeneous price responses indicate improved market efficiency rather than increased market power, distinguishing trademarks from patents and copyrights.

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1 Introduction

Trademarks are the most pervasive yet least understood form of intellectual property shaping modern market economies. Long described as "the neglected intangible asset" behind the rise of the modern corporation (Wilkins, 1992), they account for the majority of intellectual property activity worldwide: in 2024, trademarks represented 63 percent of all global IP filings, and trademark-intensive industries produced 37–50 percent of GDP in advanced economies.[1] In low-income and developing economies, by contrast, domestic trademark-intensive activity remains limited and foreign firms account for much of the participation. Yet trademark protection in these settings remains uneven and weak and has been a persistent source of trade and investment frictions, from WTO disputes to bilateral negotiations and retaliatory tariff actions.[2] This disconnect between the central role of trademarks in international trade and investment and the incomplete institutions that govern them raises first-order questions about how trademark protection shapes firm organization, market integration, and consumer welfare in developing economies. Despite its importance, systematic empirical evidence remains scarce, especially relative to the extensive literatures on patents and copyrights (e.g., Moser 2013; Giorcelli and Moser 2020).

This paper investigates how the introduction of trademark protection reshapes international firm behavior, market organization, and welfare in an emerging economy where modern institutions governing producer identity were previously absent. Identifying the economic effects of trademark reform is challenging because contemporary institutional changes are typically endogenous to domestic political economy forces, trade negotiations, and concurrent reforms. We exploit a rare quasi-natural experiment: the abrupt introduction of China's first trademark law in 1923, which shifted the economy from fragmented and weak protection to a unified, enforceable regime in one of the world's most contested markets for brand identity. Using newly digitized microdata from Shanghai—a global center of trade, investment, as well as counterfeiting—and from the wider Chinese economy, we examine how authentic foreign firms, counterfeiters, and domestic intermediaries adjust along multiple margins, including entry, employment, intermediation, and prices. Because the law was created essentially from scratch while administrative and judicial capacity already existed, this episode provides an unusually clean setting to study how international markets reorganize when information about producer identity becomes legally enforceable. The analysis speaks directly to core questions in international economics and development concerning how understudied institutions influence market access, foreign firm behavior, and domestic integration.

A defining feature of trademarks that distinguishes them sharply from other forms of intellectual property is the market failure they are designed to address. Whereas patents and copyrights protect inventive or creative outputs by granting temporary monopoly rights, trademarks mitigate asymmetric information about

[1] See WIPO (2025), USPTO (2020), EUIPO (2022a), and EUIPO (2022b).

[2] See, for example, U.S. International Trade Commission Section 337 trademark infringement investigations and the USTR Special 301 Reports.

product attributes and producer identity (Nelson, 1970; Akerlof, 1970; Shapiro, 1982, 1983).[3] In markets where consumers cannot verify authenticity or quality at the point of purchase—conditions frequently confronting international firms—trademarks function as reputation-bearing assets that enable exchange among anonymous buyers and sellers. Their effectiveness, however, depends critically on institutions that prevent counterfeiters from free-riding on that reputation. Weak enforcement erodes the informational content of trademarks, depresses demand for authentic products, distorts competitive entry, and pushes firms toward costly private enforcement strategies such as defensive advertising or vertically integrated distribution (Grossman and Shapiro, 1988a).

The introduction of an effective trademark regime reshapes the behavior and organization of firms and, in turn, consumer outcomes through three central economic forces. First, by making brand signals credible, stronger trademark protection reduces information frictions and increases demand for authentic goods, raising consumers' willingness to pay for authentic producers. Second, by curbing deceptive counterfeiting, it reallocates demand and market share toward authentic firms and alters competitive dynamics along the extensive margin. Third, by lowering the risk that intermediaries serve as conduits for imitation, it encourages authentic firms to rely more heavily on domestic intermediaries, particularly when those intermediaries reduce distribution and market-access costs.

These forces generate predictions that differ sharply from those associated with innovation-oriented intellectual property. Competition may intensify as authentic entry and product variety expand, even as counterfeit activity contracts. Prices may rise or fall depending on the relative strength of higher willingness to pay, reduced defensive expenditures, and increased competitive pressure. At the same time, intermediated distribution may deepen as firms reorganize supply relationships in response to a lower dilution risk. The welfare effects are therefore theoretically ambiguous and decompose into gains from improved information, expanded authentic variety, and equilibrium price adjustments. Our empirical analysis provides direct evidence on these mechanisms by observing how international firms and domestic intermediaries respond when an economy transitions abruptly from minimal trademark protection to a functioning trademark system.

Empirically identifying the economic effects of trademark protection poses several challenges. Cross-country comparisons are difficult because countries with weak trademark institutions differ systematically from those with strong protection in both observable and unobservable dimensions. Within countries, large and plausibly exogenous changes in trademark regimes are rare: reforms are typically gradual, bundled with other legal changes, shaped by domestic political economy, or implemented alongside trade and foreign investment liberalization.[4] Measurement presents an additional obstacle: counterfeiting is deliberately con-

[3]The USPTO defines a trademark as "a word, phrase, symbol, or design, or a combination thereof, that identifies and distinguishes the source of goods and services of one party from those of others." In contrast, patents protect inventions and copyrights protect original creative works. As Besen and Raskind (1991) note, "patents require novelty; copyright requires originality; the counterpart of these terms for trademarks is distinctiveness."

[4]For example, in China, the world's largest market for counterfeits, post-1949 trademark reforms, including the first Trademark

cealed, legal disputes capture only a small fraction of infringements, and firms' private deterrence activities are rarely observable. Finally, credible analysis requires rich micro-level data linking firms, intermediaries, employment, and prices over time, data that are typically unavailable in settings where trademark institutions experienced fundamental changes.

We address these challenges by exploiting the introduction of China's first trademark law in 1923, which provides a rare quasi-natural experiment with several distinctive advantages. First, the reform constituted a large and plausibly exogenous institutional break. Prior to 1923, China lacked any domestic legal basis for trademark protection, and foreign trademark laws did not apply within Chinese territory. The law abruptly introduced enforceable territorial trademark rights. Crucially, its enactment was not driven by the commercial interests of affected firms but by the central government's political objective of signaling legal modernization in negotiations over the abolition of foreign extraterritorial rights. Both authentic producers and counterfeiters opposed the law, albeit for opposite reasons; yet once enacted, low registration costs and intense competitive pressures led firms to register en masse to avoid losing control of their brands, rendering the reform effectively irreversible.

Second, Shanghai provides an unusually well-suited empirical setting for studying the economic consequences of trademark reform. As China's largest treaty-port city and principal commercial hub, Shanghai concentrated foreign producers, intermediaries, and counterfeiters and was the epicenter of trade, investment, as well as trademark conflict. Prior to 1923, the absence of a legal regime generated an extraordinary volume of disputes within the city's concession areas. Unlike most jurisdictions in Republican-era China, however, Shanghai possessed functioning courts and professional police forces capable of enforcing trademark rulings, as confirmed by our digitized records of disputes and verdicts. This institutional setting ensures that post-reform outcomes reflect changes in legal protection.

Third, the setting allows us to observe all key market participants—authentic producers and counterfeiters, foreign firms and domestic intermediaries—whose interactions jointly determine market outcomes. Because counterfeiting is illegal and typically covert, identifying counterfeit activity has posed a central challenge to the literature (Fink, Maskus, and Qian, 2016). In early-20th-century Shanghai, however, the likelihood of being an authentic producer versus a counterfeiter varied systematically by nationality: Western firms filed most of the trademark complaints, while Japanese firms were disproportionately represented among defendants. In complementary analysis, we further exploit archival records on trademark approvals, denials, and revocations to construct an alternative firm-level classification that directly identifies authentic producers and counterfeiters. The city also featured a large and well-documented intermediary sector, allowing us to trace how relationships between foreign firms and Chinese agents responded to the reform.

Finally, our analysis draws on an unusually rich set of newly digitized micro-level datasets spanning

Law in 1982 and major revisions in 1993, 2001, 2013, and 2019, coincided with economic reforms, WTO accession, and broad improvements in IP enforcement. These concurrent changes directly affect firm behavior, foreign investment, and trade.

both the pre- and post-reform periods. We construct an annual panel of all firms operating in Shanghai's concession areas from 1920 to 1930, including detailed information on product portfolios, employment, and critically for studying intermediation, comprehensive agent–client links from the *North-China Hong List*, a comprehensive annual firm directory. To measure firms' private deterrence efforts, we digitize the universe of anti-counterfeiting advertisements published in *Shen Bao*, China's leading daily newspaper, over the same period. To study consumer impacts, we digitize a monthly brand-level price panel from January 1923 to December 1926 drawn from the *Shanghai Market Prices Report*. While our primary focus is on Shanghai-based foreign firms, we complement the analysis with newly assembled product-by-origin import data for China from 1920 to 1926. These sources allow us to trace the effects of trademark protection across firms, intermediaries, and consumers with a level of granularity rarely available for either historical or contemporary emerging economies.

To examine how firms, intermediaries, and consumers responded to the reform, we implement an intent-to-treat difference-in-differences (DiD) design that compares outcomes for firms selling products with differing reliance on trademarks before and after the introduction of the trademark law in May 1923. Product-level trademark intensity is measured using the pre-1922 distribution of trademark registrations across product categories in foreign countries that had already established trademark regimes. At the firm level, we construct a firm-specific trademark intensity based on each firm's initial product composition and estimate differential DiD effects for Western firms, the primary victims of counterfeiting, relative to Japanese firms, which were most frequently accused of imitation. This structure allows us to trace how the law differentially affected authentic producers and counterfeiters and how these effects varied systematically with trademark intensity. To assess identification and rule out differential pre-trends, we complement the baseline estimates with event-study specifications.

Our results indicate that the 1923 Trademark Law substantially reduced information frictions about producer identity. Prior to the reform, authentic producers relied heavily on anti-imitation advertising to help consumers distinguish genuine products from counterfeits. Following the law's introduction, these costly private deterrence efforts declined sharply, providing direct evidence that the reform reduced authentic firms' exposure to imitation and strengthened the informational content of trademarks.

The law led to large and asymmetric adjustments across foreign firms on opposite sides of trademark disputes. Average employment at Western firms operating in products with mean trademark intensity increased by 4.6 percent, while employment at Japanese firms declined by 19.7 percent. An alternative classification based directly on trademark applications, approvals, denials, and dispute outcomes yields similar estimates. These effects are robust to alternative measures of trademark intensity, controls for domestic and foreign macroeconomic shocks, and specifications allowing for industry-specific trends. Western firms also became more likely to establish local production, shifting from distribution-focused activity toward manufacturing investment. Consistent with the distinctive role of trademarks relative to patents, stronger trademark pro-

tection did not reduce competition; instead, we observe an expansion in the number of authentic product varieties introduced by Western firms.

Trademark protection also reconfigured the organization of local distribution. Although Chinese intermediaries possessed valuable local knowledge, in the absence of trademark protection they heightened the risk of imitation and unauthorized brand use through collaborations with Japanese counterfeiters. After the reform, reliance on domestic intermediaries increased both within and outside firm boundaries: trademark-intensive Western firms hired and promoted more Chinese employees in sales roles and expanded arm's-length relationships with independent Chinese agents. These intermediaries subsequently grew, highlighting a novel channel through which trademark protection can contribute to host-country economic development.

Complementing the firm-level evidence, we show that the effects of the trademark law extended beyond Shanghai to broader patterns of Chinese imports. Consistent with market reallocation toward authentic producers, imports from Western countries rose significantly in trademark-intensive products after 1923, while imports from Japan declined. These trade patterns reinforce the interpretation that stronger trademark protection increased demand for authentic branded goods while curbing the presence of foreign counterfeiters.

Finally, we examine how these forces translated into consumer prices. While the equilibrium net effect is predicted to be ambiguous, the data allow us to disentangle the underlying channels. Prices increased in products where authenticity was highly valued and competitive entry was limited, but declined in categories characterized by intense competition or heavy pre-reform anti-imitation advertising, consistent with firms passing through savings from reduced private brand-protection costs. These patterns indicate that trademark protection improved market efficiency: it raised willingness to pay where authenticity matters most while lowering costs and therefore prices where information frictions had previously compressed firms' margins.

Our findings highlight the distinct economic role of trademark institutions in international markets. Whereas debates over intellectual property protection in trade and development often focus on the potential anti-competitive effects of patents or the redistribution of rents from poorer to richer economies (e.g., Fink and Javorcik 2002; Maskus 2000), trademark rights do not primarily operate through the creation of market power. Instead, they affect market access and competition by strengthening producer identification, raising expected product quality, and limiting deceptive counterfeiting. In our setting, these channels induced entry by authentic firms, displaced imitators, and reduced reliance on costly private deterrence. Crucially, in environments where foreign firms rely on local distributors and intermediaries, stronger trademark protection also lowers brand-dilution risk within supply chains, facilitating deeper foreign–domestic integration and more efficient distribution. More broadly, the results suggest that strengthening trademark institutions can provide a development-compatible means of improving market transparency, supporting competitive entry, and enhancing allocative efficiency in low- and middle-income economies, without the market-power trade-offs typically associated with other forms of IP protection.

Related Literature. A large body of work studies how innovation-oriented IP shapes market structure, firm behavior, and development. Much of this literature focuses on patents, examining the determinants and consequences of patent protection across countries (Ginarte and Park, 1997; Javorcik, 2004; Branstetter, Fisman, and Foley, 2006; Branstetter, Fisman, Foley, and Saggi, 2011) and assessing how patent systems affect innovation and technological progress (Moser, 2013). A parallel literature examines copyright protection and its effects on creative output, pricing, and diffusion (e.g., Oberholzer-Gee and Strumpf, 2007; Biasi and Moser, 2021; Giorcelli and Moser, 2020; Li, MacGarvie, and Moser, 2018). While these literatures highlight important trade-offs between incentives and market power, they largely study forms of IP designed to protect inventive or creative output rather than producer identity.

In contrast, the economics of trademarks, despite their central role in global commerce, has received comparatively limited empirical attention. Foundational theoretical work by Grossman and Shapiro (1988a,b) analyze how counterfeiting and enforcement affect consumer welfare, firm profits, and market structure in settings with asymmetric information. Empirically, Baroncelli, Fink, and Javorcik (2005) provide the first analysis documenting the global distribution of trademarks across countries, and Dinlersoz, Goldschlag, Myers, and Zolas (2021) study the distribution of trademark activity across U.S. firms. Other work examines specific institutional changes or contexts. Qian (2008) shows that weaker trademark enforcement in China led authentic shoe producers to pursue costly private differentiation strategies. Heath and Mace (2019) study profit effects of the U.S. Federal Trademark Dilution Act, which strengthened protection for selected trademarks. In related work on international trade, Kuroishi (2020) finds that export quality increased after African countries joined the Madrid Protocol. More recently, Bo, Chen, and Liu (2024) show that firms use trademarks strategically to convey product information.

Our analysis also relates to the economic history of treaty-port China. Prior studies examine how treaty ports shaped long-run regional development and market integration by facilitating trade, lowering transport costs, and connecting Chinese regions to global capital markets (Jia, 2014; Keller and Shiue, 2023), the interaction between legal origins and economic outcomes in Shanghai's concessions (Levine, Lin, Ma, and Xu, 2023), and the effect of alternative legal regimes on property values (Li, 2022).

This paper contributes to these literatures by providing new evidence on how trademark protection reshapes markets characterized by severe information frictions and widespread imitation. Exploiting the abrupt introduction of China's first trademark law, we study how firms, intermediaries, and consumers reorganize when producer identity becomes legally enforceable for the first time. The results complement existing empirical work on trademarks by directly observing the mechanisms emphasized in theory, including the reduction of deception, reallocation from counterfeiters to authentic producers, and expansion of competitive entry rather than the creation of market power. They further show that trademark protection reshapes international firm organization and domestic business linkages by reducing risks in intermediary-based distribution, highlighting how legal institutions discipline firm boundaries in markets with weak information.

The rest of the paper is organized as follows. Section 2 provides the historical background of China's first trademark law and documents how the 1923 reform created a unified and enforceable system of trademark protection. Section 3 describes the digitized micro-datasets we assemble, including the firm–employee and agent–client panels, the monthly brand-level price series, advertising data, country-product-level imports, and cross-country trademark registrations. Section 4 offers an initial test of effectiveness by examining how anti-imitation advertising responded to the reform. Section 5 analyzes how the law reshaped the growth of foreign authentic producers and counterfeiters. Section 6 turns to Chinese intermediaries and studies how stronger trademark protection reorganized foreign–domestic distribution networks. Section 7 examines the implications for consumer prices. Section 8 concludes.

2 Background: How the 1923 Trademark Law Established Trademark Protection

China has a long tradition of using distinctive marks to identify goods (Chang, 2014), but until the early twentieth century, these marks were not protected by a unified legal framework. Formal trademark protection emerged only after intensifying foreign commercial activity and escalating disputes over brand imitation in treaty-port China. By the 1910s, Western firms, particularly British and American producers, faced pervasive imitation by Japanese competitors operating in Chinese markets, especially in Shanghai. In the absence of a territorial trademark law, disputes over brand ownership were resolved inconsistently across jurisdictions, undermining the credibility of trademarks as indicators of producer identity.

The 1923 Trademark Law marked China's first comprehensive and enforceable attempt to regulate trademark ownership. Enacted amid growing commercial conflict between Western producers and Japanese imitators, the law introduced exclusive territorial rights to registered trademarks for the first time. This section situates the law within that institutional context, showing how foreign competition and legal fragmentation combined to make trademark reform both urgent and economically consequential.[5]

2.1 Japanese Imitation and Rising Trademark Conflicts

By the early 20th century, China had become one of the world's most attractive consumer markets. With roughly one-quarter of the global population, it promised "a market of four hundred million customers" (Alford, 1995, p. 35). Western firms entered primarily through the treaty ports established after the Opium Wars, which granted foreigners extraterritorial rights, low tariffs, and administrative control over concession territories.[6] Japan entered this market following its victory in the Sino–Japanese War (1894–95). Lacking the technological and branding advantages of Western competitors, Japanese producers frequently imitated Western trademarks to compete in China's rapidly expanding markets (Motono, 2011). Chinese intermediaries, who served as distributors for foreign firms, often facilitated the sale of such imitations, sometimes

[5]For detailed historical accounts of the evolution of China's trademark system and the political economy behind the 1923 law, see Motono (2011, 2013).

[6]The first treaty ports, established under the 1842 Treaty of Nanking, included Shanghai, Canton, Ningpo, Fuchow, and Amoy.

deliberately and sometimes unknowingly (Bryan, 1919).

Archival sources consistently identified Japanese firms as the primary source of trademark infringement. The *Patent and Trademark Review* reported in 1907 that "Japanese trade in China consists largely of Japanese imitations," while other observers described Japanese producers as "the worst trademark pirates in the Orient" (Bryan, 1919). 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)

These conflicts intensified pressure on the Chinese government to establish a formal legal framework for trademark protection.

2.2 Legal Fragmentation and Failed Negotiations

Before 1923, trademarks registered abroad had no legal standing in China. The country was neither a signatory to the 1883 Paris Convention nor party to bilateral trademark treaties (Baroncelli et al., 2005; Higgins, 2012). As a result, foreign brands were highly vulnerable to imitation.

Extraterritoriality further weakened protection. Foreign defendants were tried in their own consular courts under home-country law. In disputes involving Japanese counterfeiters, cases were adjudicated in Japan's Consular Court in Shanghai, where rulings typically favored defendants. In contrast, disputes involving Chinese firms were heard in the Mixed Court, which generally upheld trademarks registered with Chinese Customs.[7] This asymmetry produced a deeply fragmented legal environment: as many as 22 distinct legal systems operated simultaneously in Shanghai, generating inconsistent rulings and eroding the credibility of trademark protection.

Between 1902 and 1903, Great Britain, the United States, and Japan signed commercial treaties with China promising to relinquish extraterritorial rights once China established a modern legal system (Heuser, 1975; Alford, 1995). Trademark protection featured prominently in these negotiations. In response, the Qing government sought Japanese assistance in drafting a trademark law in 1905 (Motono, 2011, p. 11). Japan proposed a first-to-file regime that would have enabled Japanese firms to register Western trademarks preemptively. Western governments protested strongly, and the proposal was abandoned.

Subsequent attempts to introduce trademark regulations after the 1911 Revolution also failed to satisfy foreign powers. As the *North China Herald* lamented in 1919, reforms "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

After decades of stalled negotiations, the Chinese government enacted its first national trademark law on May 9, 1923, without prior consultation with foreign governments. The law represented a compromise

[7] As noted by Heuser (1975), Chinese courts often provided effective remedies against domestic infringers.

between competing legal traditions: trademarks were generally assigned to the first registrant, but prior commercial use could override registration in disputes.

The law's unilateral introduction provoked resistance from all treaty powers, which feared it would erode their extraterritorial privileges (Motono, 2011; Patent and Trade Mark Review, 1923). Many of these countries had previously pledged through the 1902-1903 bilateral commercial treaties to relinquish extraterritorial rights once China had modernized its legal system. The 1923 Trademark Law was thus viewed as China's move toward fulfilling that condition and reclaiming judicial sovereignty. Yet resistance quickly gave way to widespread compliance. Firms rushed to register trademarks to avoid losing control of valuable brands. Registration fees were low (40 silver dollars, roughly the cost of twenty cases of beer), making legal protection accessible even to small firms.[8]

The accessibility of the new trademark law was reflected in the surge of registrations: between 1923 and 1927, firms registered 13,736 trademarks with the Chinese Trademark Bureau. Registrations spanned both nationality and industry, as shown in Figure 1. British firms held the largest share, followed by Japanese, German, Chinese, and American companies, mirroring their prominence in Shanghai's commercial landscape. Industry-wise, trademarks clustered in textiles, chemicals, tobacco, and cosmetics, sectors most exposed to counterfeits based on documented dispute cases. The breadth and speed of registrations across nationalities and industries indicate that the 1923 law was rapidly implemented and widely accepted by foreign firms, making reversal practically impossible.[9]

The timing of the reform was unexpected. Its enactment was driven not by firm lobbying but by the Chinese government's effort to demonstrate legal modernization and reclaim judicial sovereignty under the unequal treaties. From this perspective, the 1923 Trademark Law constitutes a sharp institutional break and a plausibly exogenous shock to trademark protection.

2.4 Enforcement and Legal Change under the 1923 Trademark Law

The 1923 law marked a turning point in China's legal IP institutions and transformed trademarks from a loosely governed convention into a legally enforceable right. For the first time, disputes were adjudicated under a unified Chinese legal framework. The law introduced monetary fines and custodial penalties for infringement and empowered police authorities to seize counterfeit goods and detain violators. For the first time, authentic producers were granted the legal right to claim damages for reputational harm, and convicted counterfeiters faced fines of up to $500 and imprisonment.

[8] We later show that the effects of the law were similar across firm sizes, with only slightly smaller magnitudes among firms with fewer than four employees (Online Appendix Figure A.8).

[9] After the Chinese Civil War broke out in 1927, the Nationalist government retained the 1923 Trademark Law. As Motono (2013) notes, "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 opposing local warlords, they had to fight against the Chinese Communist Party." Our baseline analysis focuses on 1920–1926, before the Nationalist takeover, with robustness checks extending to 1930.

Importantly, enforcement capacity already existed. Shanghai possessed functioning courts and professional police forces; the primary obstacle before 1923 was jurisdictional fragmentation rather than administrative weakness.[10] The reform replaced nationality-based adjudication with territorial enforcement, a central feature of modern trademark systems (Fink and Javorcik, 2002).

Evidence from dispute records confirms effective enforcement. Our digitized trademark dispute data from China's *Trademark Gazette* between 1924 and 1927 shows that while some Japanese counterfeiters attempted to register trademarks belonging to other businesses, their trademark applications were swiftly disputed and ultimately unsuccessful. Specifically, Japanese firms accounted for 63.4 percent of disputed applications (Figure 2a) and Western firms were the dominant complainants (Figure 2b). Western firms prevailed in 72 percent of cases, a sharp contrast to pre-1923 outcomes.[11]

Court verdicts from the *North China Herald* further demonstrate the shift. As shown in Figure 3 and detailed in Section A.1 of the Online Appendix, before 1923, nearly 40 percent of defendants were acquitted and another 40 percent were merely ordered to "promise not to infringe again," while only one in five faced minor fines averaging about $85. After the reform, over 70 percent of defendants were fined at substantially higher levels, averaging $200, and nearly one-fifth received prison sentences averaging five weeks. The introduction of custodial penalties was particularly consequential: unlike fines, imprisonment could not be offset through reimbursements by manufacturers, fundamentally altering intermediaries' incentives.[12]

The above evidence indicates that the 1923 Trademark Law constituted a substantive institutional change. By replacing a fragmented, nationality-based regime with a unified territorial system backed by credible penalties and enforcement capacity, it established enforceable trademark protection and provides a clean setting to study how firms, intermediaries, and consumers respond to stronger producer identification.

2.5 Economic Mechanisms: How Trademark Protection Alters Incentives

The preceding subsections document how the 1923 Trademark Law transformed the institutional environment for brand protection in Republican China. This subsection outlines the economic mechanisms through which such a reform reshapes firm behavior, market integration, and consumer welfare. The model in Appendix B formally develops the mechanisms and welfare implications; here, we focus on intuition and how they map to the empirical analysis.

Unlike patents or copyrights, which grant temporary exclusion rights to encourage innovation or creative activity, trademarks address a different market failure: asymmetric information about producer identity. In many product categories of the period, such as medicines, cosmetics, and packaged foods, buyers could not verify quality, safety, or authenticity at the point of purchase. As emphasized in classic models of experi-

[10] See Kirby, 1995; Alford, 1995.

[11] Examples appear in Online Appendix Section A.1.

[12] As noted in the *North China Herald* (1919), "a few sentences of imprisonment would nullify all the guarantees that Japanese or any other manufacturer of goods under false trade marks might give."

ence goods (e.g., Akerlof, 1970; Nelson, 1970; Shapiro, 1982, 1983), consumers therefore rely on producer identity to infer unobservable attributes. Trademarks serve this function by linking current purchases to past experience, allowing consumers to form expectations about quality. As Besen and Raskind (1991) note, while novelty and originality underpin patent and copyright protection, the defining feature of trademarks is distinctiveness: the ability to identify the source of goods.

When enforcement is weak, however, this signaling mechanism breaks down. Deceptive counterfeiting, where imitation goods are intentionally designed to be indistinguishable from genuine products, can become especially pervasive in markets characterized by linguistic, informational, and contractual frictions, as in treaty-port China. In such settings, consumers face particular difficulty verifying authenticity at the point of purchase and brand signals lose credibility.[13] Counterfeiters thus free-ride on brand reputation, supply lower-quality goods, and price close to authentic products to avoid detection. As a result, consumers discount brand signals, willingness to pay falls, and authentic firms face weaker incentives to invest in reputation or expand production.

Intermediation amplifies these frictions. Foreign firms depend heavily on local agents and distributors to reach consumers. While intermediaries reduce distribution costs and expand market access, they also increase exposure to dilution, substitution, and relabeling. Greater reliance on intermediaries thus raises the probability of counterfeit infiltration and lowers effective authenticity. In response, authentic firms resort to costly private deterrence, such as anti-imitation advertising, packaging changes, and retailer monitoring, but these strategies are expensive and imperfect substitutes for legal protection.

The 1923 Trademark Law altered these incentives on both sides of the market. By establishing exclusive territorial rights and imposing meaningful penalties for infringement, the law raised authenticity by strengthening the link between brand identity and product origin. Expected counterfeit profits fell as the penalty rose. At the same time, stronger legal protection reduced intermediary moral hazard, lowering dilution risk and restoring the advantages of intermediated distribution. On the demand side, improved authenticity raised expected quality and expanded demand for branded goods, particularly in product categories with greater quality dispersion where producer identity was especially valuable.

These institutional changes generate a coherent set of equilibrium responses. First, as authenticity rises with enforcement, the marginal return to private deterrence declines. Authentic firms, therefore, scale back costly advertising and monitoring that previously substituted for weak legal protection. Second, higher enforcement reduces counterfeit entry and reallocates demand toward genuine producers. This reallocation, together with increased demand for branded goods and reduced imitation risk, encourages the expansion and entry of authentic varieties. Third, by reducing dilution risk in intermediated distribution, the reform makes

[13]The literature distinguishes between deceptive and non-deceptive counterfeiting (Fink et al., 2016). In deceptive counterfeiting, consumers unknowingly purchase imitations (Grossman and Shapiro, 1988a); in non-deceptive counterfeiting, consumers knowingly purchase lower-priced replicas (such as counterfeits of luxury goods) (Grossman and Shapiro, 1988b). Contemporary dispute records indicate that deceptive counterfeiting dominated in our setting.

reliance on domestic intermediaries more attractive, leading foreign firms to deepen their engagement with Chinese agents and distributors.

The implications for prices and welfare are correspondingly nuanced. Stronger trademark protection may raise prices where higher authenticity substantially increases willingness to pay, but it may also lower prices where reduced deterrence costs and increased competition dominate. As shown formally in Appendix B, the welfare effects of trademark enforcement therefore operate through three channels: authenticity gains from reduced information frictions, variety expansion through authentic entry and growth, and equilibrium price adjustments driven by changes in demand, costs, and competition.

Guided by these mechanisms, the empirical analysis examines how the 1923 Trademark Law reshaped market outcomes in Shanghai. We investigate how the reform reallocated activity between authentic producers and imitators, reorganized foreign–domestic intermediation, and translated into changes in product variety, prices, and consumer welfare.

3 Data: Firms, Brands, and Domestic Intermediation in Treaty-Port Shanghai

To examine how the 1923 Trademark Law reshaped international firm behavior, market integration, and consumer outcomes, we digitize and assemble a new collection of firm-, brand-, and intermediary-level microdata from Shanghai during the treaty-port era. The data link firms to workers, intermediaries, products, trademarks, prices, and advertising, allowing us to trace how changes in trademark protection affected firm organization, distribution networks, and consumer markets in a setting characterized by intense foreign competition and pervasive imitation.

Shanghai provides a uniquely informative environment for this analysis. By the 1920s, it was China's principal commercial and financial center and one of the world's largest trading cities, with a population exceeding three million and an unusually dense concentration of foreign firms and intermediaries (Osterhammel, 1989). Between 1900 and 1930, trade passing through Shanghai increased fourteen-fold and accounted for more than half of China's foreign trade, equivalent to over 2 percent of global trade flows (Lardy, 1994). By 1930, the city hosted roughly two-thirds of China's manufacturing FDI, at a time when China itself accounted for over 8 percent of global inward FDI (Hou, 1965). These features made Shanghai the central arena for trademark registrations, infringement disputes, and commercial intermediation.

Institutionally, Shanghai was divided into the International Settlement, the French Concession, and Chinese-administered areas. Foreign firms were heavily concentrated in the concessions, which operated under extraterritorial legal regimes and possessed relatively strong administrative and judicial capacity. This combination of high exposure to counterfeiting, dense intermediation, and functioning enforcement infrastructure makes Shanghai an unusually clean setting for observing how markets respond to the introduction of legal trademark institutions.

Our analysis draws on five newly digitized datasets: (i) a firm–employee panel covering all firms op-

erating in Shanghai's concession areas; (ii) an agent–client panel capturing intermediation links; (iii) a monthly brand-level price panel; (iv) a comprehensive archive of newspaper advertisements, including anti-counterfeiting ads; and (v) a product-level import panel for China. Together, these sources provide a rare micro-level view of how trademark protection shaped firm organization, brand competition, and the evolving relationships between foreign producers, domestic intermediaries, and consumers.

Our baseline regressions focus on the period 1920–1926 in order to isolate the institutional shock created by the 1923 reform and avoid exposure to subsequent political changes associated with the establishment of the Nationalist government. In the Online Appendix, we show that the effects persist beyond the initial years of enforcement through 1930, the year prior to the Japanese invasion of Manchuria, suggesting that the estimated effects are not confined to the immediate post-reform period.

3.1 Firm-Employee and Intermediation Data

We construct an annual firm–employee panel covering all firms operating in Shanghai's concession areas from 1920 to 1930, digitized from the North-China Hong List, an annual business directory published by the North-China Daily News. The Hong List is the most comprehensive contemporary source on foreign commercial activity in Republican-era Shanghai and provides systematic coverage of firms located in the International Settlement and French Concession.[14]

For each firm–year observation, the Hong List reports firm names (in English, Chinese, and Wade–Giles), addresses, lines of business, and detailed employee rosters with job titles. Figure A.1 in the Online Appendix shows a representative page from the 1927 edition. Firms' product portfolios are reported in dedicated appendices. We classify employees by nationality using names and contextual information and exploit the directory's indentation structure—where subordinates are listed under supervisors—to infer organizational hierarchy within firms.

Crucially for our analysis, the Hong List also includes a client directory for intermediary firms ("agents"), listing each agent's foreign clients, product categories, and addresses. We digitize these listings to construct a firm-level map of intermediation, allowing us to observe how foreign firms connected to Chinese distributors and how these relationships evolved around the 1923 reform. To our knowledge, these data provide one of the first systematic measures of foreign–domestic intermediation in the study of trademark protection.

Firm nationality is identified using multiple archival sources, including foreign business directories, importer–exporter registries, and Japanese Chamber of Commerce records. Remaining cases are assigned manually based on historical documentation and firm names. Firms are matched across years using English and Chinese names, product descriptions, and ownership histories. Detailed construction procedures are

[14] Coverage of purely domestic firms outside the concessions is incomplete. Because foreign firms were the primary parties to trademark disputes and almost entirely located within the concessions, our analysis focuses on this universe. Aggregate foreign employment in the Hong List accounts for roughly 80 percent of the foreign adult male population in the International Settlement, consistent with contemporary census records. See Section A.3.

described in Section A.2.[15]

3.2 Brand-Level Price Data

To examine consumer-side responses, we digitize monthly brand–product–level price data from the *Shanghai Market Prices Report*, published by the Bureau of Markets of the Chinese Ministry of Finance. This official publication reports wholesale prices for branded goods traded in Shanghai's markets and is among the earliest systematic records of branded prices in an emerging economy.

The reports provide monthly prices by brand and product, along with identifying information such as brand names, firm names, and packaging sizes, across a wide range of industries, including food products, textiles, chemicals, fuels, and manufactured goods. We digitize all available issues from January 1923 through December 1926 and match brands over time to construct a panel. To ensure comparability, we restrict the sample to brands observed for at least twelve months.

This unusually rich historical price report enables us to construct the most comprehensive and disaggregated price panel data at the time and conduct brand-level analysis of how the 1923 Trademark Law influenced price setting and competition across industries. In a robustness exercise, we manually match brands appearing in the price data to trademark registrations in China's Trademark Gazette, using textual and visual identifiers. This allows us to recover exact registration dates and to analyze price dynamics around trademark registration itself (Online Appendix Table A.15).[16]

3.3 Import Data

To assess whether the effects of trademark protection extended beyond Shanghai-based firms, we compile bilateral product-level import data for China from 1920 to 1926. The data come from Foreign Trade of China, published annually by the Statistical Department of the Inspectorate General of Customs, and report quantities, values, and unit prices by country–product pair.[17]

Because product classifications changed in 1925, we harmonize categories across years using an official concordance that retroactively applies the post-1925 classification to earlier data. The resulting panel covers 40 countries and 246 harmonized product groups. In value terms, 91 percent of 1924 trade flows can be matched either exactly or with minor deviations. Our baseline analysis uses exact matches; robustness checks include all harmonized categories.

[15] To compare trademark law with alternative institutions in Section A.13 of the Online Appendix, we digitized a longer version of the firm-employee panel covering 1872-1936. However, systematic firm–product listings are available only for 1920–1930, when the Hong List consistently reports detailed product portfolios; in other years, we classify firms into product categories only by textual industry descriptions to assign trademark intensity.

[16] Evidence outside Shanghai, especially beyond the treaty ports, is necessarily more limited, as foreign firms were legally restricted from operating inland and archival records are sparse. Nonetheless, national-level data on trademark disputes and court cases exhibit patterns consistent with those documented in Shanghai. We focus on Shanghai because it was the primary hub of foreign commercial activity and trademark conflict before 1923, and because its courts and police provided unusually strong enforcement capacity after the reform, making it a particularly clean setting to identify the effects of trademark protection.

[17] We thank Robert Bickers, Hans van den Ven, and collaborators for access to digitized source materials.

3.4 Newspaper Advertisements

To measure firms' private responses to information frictions, we digitize all business advertisements published between 1920 and 1930 in Shen Bao (申报), China's most widely read daily newspaper and a central source of commercial information in Republican-era Shanghai.

Using optical character recognition (OCR) combined with manual verification, we extract ad-level information on publication dates, brand names, product descriptions, and brand identifiers. A key component is the identification of anti-counterfeiting advertisements—ads that warn consumers about imitations or provide guidance on identifying genuine products. We classify these using Chinese and English keywords associated with imitation and infringement (e.g., "伪造," "冒牌," "仿冒," "假货" and their English equivalents "fake," "imitation," "counterfeit," "infringement"), followed by manual validation. Ads are classified as anti-counterfeiting if they (i) warn explicitly against imitation, (ii) describe distinguishing features of authentic goods, or (iii) reference legal or reputational disputes.

We further code advertisements that emphasize new products, inventions, or quality attributes, which serve as proxies for product entry and quality signaling. In particular, advertisements introducing "new products" (新品) or "inventions" (发明) provide a direct proxy for product entry, while those emphasizing "quality" (质), "efficacy" (功效), or "utility" (功用) capture firms' emphasis on product quality. Changes in advertising content provide direct evidence on how firms adjusted private deterrence, product introduction, and signaling strategies following the trademark reform and serve as an independent validation of our firm- and price-based findings.

3.5 Measuring Dependence on Trademarks

A central dimension of our empirical strategy is cross-product variation in the extent to which product markets relied on trademarks prior to the 1923 reform. To quantify this, we construct a measure of each product's pre-existing dependence on trademark protection, $TrademarkInt_p$, based on international trademark registration patterns before 1923.

Specifically, $TrademarkInt_p$ is defined as the share of trademarks registered between 1872 and 1922 in countries outside China, where trademark laws were already in force, within each product group p. The data are drawn from historical trademark records compiled by the World Intellectual Property Organization and are classified according to the international Nice Classification (NCL) scheme. Because trademark registration is voluntary and costly, these registrations provide a revealed-preference measure of the economic importance of brand identity: firms register trademarks primarily in product categories where producer identification is valuable to consumers, such as experience goods in the sense of Nelson (1970). By construction, $TrademarkInt_p$ is determined entirely by foreign registration behavior before 1923 and is therefore orthogonal to contemporaneous Chinese market conditions and the reform itself. Details on construction and robustness are provided in Online Appendix Section A.4.

Table 1 reports the distribution of $TrademarkInt_p$ across product groups. Trademark intensity is highest in pharmaceuticals, cosmetics, food and alcoholic beverages, chemicals, paper products, and tobacco, industries in which consumer trust and repeated purchase are central. Products such as firearms, musical instruments, leather goods, and tailoring supplies exhibit much lower dependence. While trademark intensity is generally higher among experience goods, the measure delivers substantial within-category variation. Consistent with its interpretation, $TrademarkInt_p$ is strongly correlated with the incidence of reported trademark disputes and counterfeiting cases, indicating that it captures industries where trademark protection was economically salient. In contrast, the measure is largely orthogonal to patent intensity, capital intensity, and pre-reform growth trends, suggesting that it does not proxy for innovation, scale, or generic demand growth.[18]

We merge $TrademarkInt_p$ to the brand-level price and advertisement data by product category. For firm-level analysis, we construct a firm-specific measure based on each firm's pre-reform product portfolio. Let P_i denote the set of products marketed by firm i between 1920 and 1922. We define:

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

This measure captures the extent to which a firm's pre-1923 activities depended on credible brand protection and allows us to compare firms with greater and lesser exposure to the reform within nationality and industry groups. Results are robust to alternative constructions, including averages and country-specific intensities (Online Appendix Section A.6).

4 A First Test of Effectiveness: Anti-Imitation Advertising

A first step in assessing the impact of the 1923 Trademark Law is to establish whether it materially reduced firms' exposure to imitation. While the trademark disputes and court verdicts discussed in Section 2.4 show that the law was actively enforced, such cases capture only infringements that escalated to formal litigation. To assess more broadly whether the reform weakened the counterfeiting environment faced by authentic producers, we examine firms' reliance on private defensive behavior: anti-imitation advertising.

Before 1923, authentic firms frequently placed advertisements warning consumers and distributors about counterfeit products and explaining how to identify genuine goods. Such advertising represents a costly substitute for weak legal protection and is a canonical response to consumer confusion in markets with deceptive counterfeiting (e.g., Grossman and Shapiro, 1988a). For example, in July 1920 the British firm Lea & Perrins placed an advertisement in the North China Herald instructing consumers to verify the authenticity of Worcestershire Sauce by checking for the firm's signature printed in white across a red label, accompanied by a photograph of the bottle. Similarly, British American Tobacco regularly published "Notice of Coun-

[18] See Online Appendix Section A.5.

terfeiting" advertisements in Shen Bao (申报), displaying side-by-side images of genuine and imitation cigarette packages.[19] If the trademark law meaningfully strengthened enforcement and reduced imitation, firms should have had less need to rely on these private deterrence strategies.

To quantify how reliance on such advertising changed after the law, we assemble the universe of anti-imitation advertisements published in Shen Bao and classify them by product category and month. We estimate the following difference-in-differences specification:

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

where p indexes product categories and t indexes months. $TrademarkInt_p$ measures pre-existing dependence on trademark protection, as defined in Section 3.5, and $PostMay1923_t$ is an indicator for months after the law's enactment. Product fixed effects control for time-invariant differences across categories, while time fixed effects absorb aggregate shocks to advertising or economic activity.

We consider three outcome measures $AntiImitationAds_{pt}$: (i) an indicator for whether at least one anti-imitation advertisement appears in a product-month; (ii) the share of anti-imitation advertisements in total advertising for that product-month; and (iii) the inverse hyperbolic sine of the count of anti-imitation advertisements, capturing both extensive and intensive margins.

The estimates reveal a sharp and economically meaningful decline in defensive advertising following the reform. Column (1) of Table 2 shows that, for a product with average trademark intensity, the probability of observing any anti-imitation advertising falls by roughly 40 percent relative to the pre-law mean. Columns (2) and (3) show corresponding declines in the share and volume of such advertisements. These patterns indicate that the law substantially reduced firms' need to signal authenticity through costly private means. To verify that these patterns are not driven by pre-existing trends, Figure 4 plots the event-study coefficients from an expanded version of equation (1). The coefficients are flat in the pre-1923 years; beginning in 1923, the incidence of anti-imitation advertising in trademark-intensive categories falls sharply and remains low thereafter.[20]

These findings provide a first, behavior-based validation that the 1923 Trademark Law materially strengthened trademark protection in practice. By raising the expected cost of imitation and constraining opportunistic registration, particularly by Japanese competitors, as documented in Section 2.4, the reform reduced authentic firms' exposure to counterfeiting and their reliance on private deterrence. We next examine how this institutional change translated into broader reallocations between authentic producers and imitators.

[19] See, for example, a series of advertisements titled "Notice of Counterfeiting" published in Shen Bao between May 19 and May 25, 1922.

[20] Table A.2 in the Online Appendix shows that this effect persists through 1930, after the establishment of the Nationalist government in 1927, who attempted to enact its own regulations but ended up retaining the 1923 law.

5 Foreign Firm Growth under Trademark Protection

In this section, we examine how the introduction of trademark protection altered the growth of foreign firms competing in China's markets. By strengthening producer identification and reducing consumer confusion, trademark protection affects firms through two closely related channels. First, exclusive trademark rights reallocate demand within brand segments away from imitators and toward authentic producers. Second, by improving confidence in authenticity, stronger protection raises consumers' willingness to pay for genuine goods, expanding effective demand for branded products. These forces reshape competition by shifting activity toward authentic firms while constraining firms that rely on imitation.

We test these implications using data on employment, entry, and exit among foreign firms operating in Shanghai. A distinctive feature of the setting is that firms' exposure to trademark protection varied systematically: Western firms held most registered trademarks and initiated the majority of infringement disputes, while Japanese firms were disproportionately represented among accused imitators. This institutional asymmetry allows us to trace how enforceable trademark rights differentially affected firms on opposite sides of trademark conflicts and how foreign firm activity reorganized following the establishment of trademark protection. In robustness exercises, we complement this nationality-based comparison with a direct firm-level classification constructed from trademark applications and dispute outcomes. We study firm responses along three margins: (i) within-firm employment growth, (ii) restructuring of internal activities, and (iii) entry and exit of product varieties.

5.1 Within-Firm Employment Growth

To estimate the impact of the 1923 Trademark Law on the employment growth of foreign firms, we extend the difference-in-differences framework from equation (1) to allow for heterogeneous effects across Western and Japanese firms in Shanghai:

$$\begin{aligned} y_{it} &= \beta \times Western_i \times TMInt_i \times Post1923_t + \gamma \times TMInt_i \times Post1923_t \\ &\quad + FE_i + FE_{c(i),t} + FE_{r(i),j(i),t} + \epsilon_{it} \end{aligned} \tag{2}$$

where y_{it} is either log employment or the employment share of firm i in year t. $TMInt_i$ measures the firm's pre-law dependence on trademarks based on its 1920–1922 product portfolio. $Western_i$ identifies firms headquartered in Western countries, and $Post1923_t$ equals one after the enactment of the trademark law. Firm fixed effects FE_i absorb time-invariant heterogeneity, country-year fixed effects $FE_{c(i),t}$ control for shocks originating in firms' home countries, and group-specific industry-year fixed effects $FE_{r(i),j(i),t}$ allow industry shocks in Shanghai to differ between Western and Japanese firms.[21]

[21] Standard errors are two-way clustered by product category and country–year. Clustering by product category accounts for correlation across firms producing similar goods and for within-firm persistence arising from pre-law construction of trademark intensity. Country–year clustering absorbs nationality-specific macroeconomic shocks. Results are robust to alternative clustering

The empirical design exploits differential exposure to trademark protection across firms that varied in trademark dependence prior to 1923. The design remains valid in the presence of other contemporaneous shocks so long as such shocks do not differentially affect firms along both nationality and pre-reform trademark intensity. We address nationality-specific disturbances—such as the 1923 Great Kantō Earthquake, diplomatic tensions, and country-specific consumer boycotts—by including country-year fixed effects, which absorb any shocks common to firms of a given nationality in a given year. To further guard against confounding factors, we allow these nationality-specific shocks to interact flexibly with trademark intensity; the estimated effects are stable across all specifications (see Section A.7 of the Online Appendix).

Our baseline sample includes firms observed at least once between 1920 and 1922 and focuses on 1920–1926 to isolate the immediate effects of the reform and avoid confounding events such as the 1927 civil conflict and the rise of the Nationalist government.[22] Results are robust to extending the window through 1930 and benchmarking the 1923 reform against earlier, non-binding institutional episodes (Appendix Section A.13).

We estimate the impact of the trademark law on firm growth using either the log of employment or the employment share of a firm in product group p as the dependent variable in specification (2). Column (1) of Table 3 shows a significant divergence in employment growth between Western and Japanese firms in trademark-intensive product categories after 1923. At the mean trademark intensity of 0.222 (see summary statistics in Table A.1), Western firms expanded employment by 4.6% on average, while Japanese firms contracted by 19.7%. Among the ten most trademark-intensive products in Table 1, average employment of Western firms rose by 7.5% and that of Japanese firms fell by 31.9%.[23]

Column (2) examines employment shares and confirms that this reallocation occurred primarily within product markets: Western firms with the mean level of trademark intensity increased their employment share by 0.8 percentage points, while Japanese firms lost 5.5 percentage points. For the most trademark-intensive products, the average gain in employment share for Western firms exceeded 1.3 percentage points. Columns (3)–(4) incorporate product-category-year fixed effects to absorb all product-specific shocks. The estimated differential effect between Western and Japanese firms remains robust. Figure 5 presents the corresponding event-study specification. The coefficients show no pre-trend prior to 1923 and a sharp, sustained reallocation of employment toward Western firms beginning in that year.[24]

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at the firm level.

[22] Summary statistics for this sample are reported in Table A.1 of the Online Appendix.

[23] As a placebo, we examine whether earlier institutional episodes, including changes in extraterritorial status, the 1902–1903 commercial treaties with Britain and the United States, and the unimplemented 1905 trademark code, generated similar responses among trademark-intensive firms. None of these episodes produced detectable effects. Using an extended firm panel covering 1872–1940, we find no reallocation toward trademark-intensive Western firms prior to 1923. These results, reported in Appendix A.13, reinforce the interpretation that the 1923 law constituted the first binding and enforceable shift in trademark protection.

[24] In Section A.5 of the Online Appendix, we confirm that our firm-level measure of trademark intensity is not capturing other firm or product attributes. The results are robust when we include interactions with alternative product characteristics (e.g., patent

The reallocation effect appears throughout the firm size distribution, with somewhat larger responses among medium and large firms (Figure A.8 in the Online Appendix). This pattern is consistent with our earlier evidence that low trademark registration costs made formal protection accessible to firms of all sizes, while allowing larger firms to scale more rapidly once protection became effective. Consistent with the informational role of trademarks, the effects are concentrated in final-goods industries, where consumers are most vulnerable to deception and rely more heavily on producer identity. As shown in Figure 6, reallocation from Japanese to Western firms is pronounced for final consumer goods but negligible for intermediate inputs, where repeated transactions and buyer expertise mitigate information frictions.

To further validate the findings, Section A.11 implements an alternative strategy that directly classifies firms based on their statuses in trademark registrations and disputes rather than by nationality. We construct a firm-level dataset from archival records of trademark applications, approvals, denials, and dispute outcomes to distinguish authentic producers—those granted trademarks or prevailing in trademark disputes—from counterfeiters—firms whose applications were rejected or registrations revoked. This approach estimates the effect of the trademark law without nationality-based assumptions and provides a direct link between roles in trademark conflicts and post-law performance. Consistent with the baseline results, firms with registered trademarks expanded significantly after 1923, while those identified as counterfeiters contracted.[25]

5.2 Within-Firm Restructuring

The differential growth effects documented above may conceal important adjustments occurring within firms as they adapted to the new institutional environment. To examine these internal responses, we analyze how firms restructured their workforce following the enactment of the 1923 Trademark Law. This analysis helps distinguish whether the observed expansion of Western firms primarily reflected increased legal staff or broader growth in productive and commercial activities.

To explore this question, we exploit detailed information on employees' job titles, which allows us to decompose firm-level employment into key functional categories. Columns (1)-(2) of Table 4 show that our main results remain robust within the sub-sample of firms for which job title data are available. We then examine changes in the hiring of lawyers, sales personnel, and manufacturing workers separately. Columns (3)-(5) indicate that, following the introduction of trademark protection, Western firms were significantly more likely than their Japanese counterparts to expand employment in sales and manufacturing, whereas the relative increase in legal hiring is positive but statistically insignificant.

intensity, market concentration, average firm size) and firm attributes (e.g., pre-law firm size). Section A.6 further demonstrates robustness to alternative constructions of trademark intensity. Additional robustness exercises by excluding services, individual products, specific nationalities, and distributors, controlling for the extraterritorial legal status of Western firms, and matching comparable Western and Japanese firms using propensity scores all yield consistent results (Online Appendix Sections A.8–A.10). Table A.3 in the Online Appendix shows that the estimates remain similar when the sample is extended through 1930.

[25] Because trademark dispute records are only available for firms that officially filed disputes, this sample is considerably smaller than the universe of firms captured in the main analysis. For this reason, we treat it as a robustness exercise rather than our baseline specification.

The composition of these adjustments is informative. The expansion of sales and production personnel suggests a reorientation of firm activity toward market expansion rather than a narrow response focused on legal enforcement. Rather than primarily investing in legal capacity, Western firms appear to have reallocated resources toward distribution, marketing, and local production. This pattern is consistent with a reduced reliance on costly private enforcement mechanisms and an expansion in market opportunities following the strengthening of trademark protection.

The increase in manufacturing employment, in particular, points to deeper structural change. Prior to 1923, many Western producers served the Chinese market primarily through imports. Following the introduction of trademark protection, improved assurance over brand integrity appears to have encouraged a shift toward local manufacturing, enabling firms to scale production closer to final consumers. This interpretation is supported by aggregate industry patterns shown in Figure A.5 in the Online Appendix, which document an increase in the manufacturing share of Western employment after 1923. These findings suggest that the 1923 Trademark Law did more than reallocate market shares across firms. By strengthening brand protection, the law induced foreign firms to internalize market expansion and invest in local production capacity, contributing to the emergence of the city as a regional manufacturing center.

5.3 Entry and Exit of Varieties

Beyond influencing the growth of incumbent firms, trademark protection may shape the extensive margin of competition by altering the entry and exit of product varieties. Strengthened trademark protection affects both the incentives and the feasibility of introducing new varieties. For authentic firms, the law raises the expected return to creating new brands and products by ensuring that reputations can be privately appropriated rather than dissipated through imitation, which in turn encourages new authentic producers to enter trademark-intensive markets (Grossman and Shapiro, 1988a).

For counterfeiters, the reform introduces a choice: firms previously reliant on imitation face a higher expected cost of infringement and thus may either exit entirely or adapt by rebranding and entering with their own legitimate trademarks. In both cases, consumers benefit from the reconfiguration: by expanding the range of genuine, differentiated products, trademark protection reduces information frictions and raises welfare through enhanced variety.

To quantify these effects, we estimate the impact of the trademark law on the number of firms offering a given product, separately for Western and Japanese producers:

$$\begin{aligned} NumVarieties_{prt} &= \beta \times Western_r \times TMInt_p \times Post1923_t \\ &\quad + \gamma \times TMInt_p \times Post1923_t + FE_{pr} + FE_t + \epsilon_{prt} \end{aligned} \tag{3}$$

where the data are aggregated to the product p-country region r (Western vs. Japanese)-year t level. We

construct two dependent variables: (1) the cumulative stock of firms offering a product, from which changes measure entries; and (2) the stock of surviving firms, from which changes capture exits. Product-region fixed effects (FE_{pr}) control for persistent region-specific differences across product categories, while year fixed effects (FE_t) account for common time shocks. The coefficient β thus captures the differential effect of the law on Western relative to Japanese product varieties within trademark-intensive products.

Table 5 presents the results. Column (1) shows that the trademark law led to a significant entry of Western varieties: at the mean trademark intensity, the trademark law led to roughly 2.9 additional Western varieties. In contrast, entries from Japanese firms were largely unaffected. Column (2) shows that exits moved in the opposite direction: Japanese firms in trademark-intensive products were more likely to exit after 1923, by approximately 0.13 firms on average, while Western firm exits did not change.[26]

We validate our entry results using an alternative proxy for product entry derived from firms' advertising behavior. Specifically, we identify newspaper advertisements that explicitly introduce new products as described in Section 3.4 and use these advertisements to proxy for the introduction of new consumer varieties. This approach allows us to observe entry behavior directly through firms' marketing decisions rather than inferring it from production outcomes. Estimating equation (1) with the frequency of "new product" advertisements as the dependent variable, column (1) of Table 6 shows a statistically significant increase in such advertisements in trademark-intensive product categories after 1923. This pattern is consistent with an expansion in the number of branded varieties following the strengthening of trademark protection.

These results highlight a distinct economic role for trademark protection. Unlike innovation-oriented forms of IP, which can attenuate competition by conferring market power, trademark protection can expand product variety by safeguarding the informational content of brands and their role in identifying producers. By reducing consumer information frictions while preserving competitive market structure, trademark protection generates welfare gains that are conceptually distinct from those associated with innovation-oriented IP, a distinction emphasized in Fink, Javorcik, and Baroncelli (2005) and Maskus (2000).

Trademark protection may also affect firms' quality choices, although theory offers ambiguous predictions regarding the direction of this effect. On the one hand, stronger protection raises the returns to maintaining a reputation for quality, thereby incentivizing firms to invest in higher-quality products (Landes and Posner, 1987, p. 269).[27] On the other hand, in the absence of effective legal protection, firms may rely on superior quality as a private strategy to deter imitation (Grossman and Shapiro, 1988a; Qian, 2012). Once legal enforcement reduces counterfeiting, the need for such costly quality signaling may diminish.

[26]Table A.12 in the Online Appendix shows that both the positive effect on Western firm entries and the negative effect on Japanese firm exits are larger when the time period is extended to 1930. Table A.13 in the Online Appendix confirms that these findings are robust to alternative measures of trademark intensity and controls for other product characteristics and consumer boycotts.

[27]Unlike patents or copyrights, trademarks do not restrict imitation of underlying technologies or designs, provided that imitators sell under distinct brand identities. As a result, their effect on innovation incentives through increased appropriability is likely weaker than that of other forms of intellectual property.

Although we do not observe product quality directly, we proxy for quality using advertisements that emphasize quality-related attributes, constructed as described in Section 3.4. Estimating equation (1) with the frequency of these "quality" advertisements as the dependent variable, column (2) of Table 6 shows a modest post-1923 increase in trademark-intensive product categories, though the estimate is not statistically significant. We interpret this evidence as suggesting that quality upgrading, while potentially present, was not the main channel through which trademark protection generated consumer welfare gains in this setting.

5.4 Export Growth to China

Thus far, our analysis has focused on the effects of the trademark law on foreign firms operating in Shanghai. However, many foreign producers also served the Chinese market through exports from home countries rather than local production. If trademark protection enhanced the security and profitability of brand ownership, its effects need not be confined to firms physically present in Shanghai. Instead, the reform may have altered the broader pattern of foreign exports to China by increasing the expected returns to supplying the market under proprietary brand identities.

To examine this, we digitize bilateral, product-level import data and estimate the following equation:

$$\begin{aligned} y_{pct} &= \beta \times Western_c \times TMInt_p * Post1923_t + \gamma \times TMInt_p \times Post1923_t \\ &\quad + FE_{pc} + FE_{ct} + FE_{jt} + \epsilon_{pct} \end{aligned} \tag{4}$$

where y_{pct} measures China's imports of product p from country c in year t, including import value (estimated by PPML), import share, or an import dummy. The coefficient of interest compares the evolution of trademark-intensive imports from Western countries to those from Japan after 1923.[28]

The results, summarized in Table 7, reveal patterns consistent with our firm-level findings. According to column (1), imports of trademark-intensive products from Western countries increased significantly relative to those from Japan after 1923. The magnitudes are meaningful: for the most trademark-intensive category in the sample (food products), imports rose by roughly 2.6 percent; for a product with average intensity (e.g., environmental apparatus), imports rose by about 0.98 percent. Column (2) shows a similar pattern using import shares. Column (3) indicates that the extensive margin expanded as well, as Western exporters entered new trademark-intensive categories. Corresponding event-study estimates in Figure 7 for Western countries reveal no discernible pre-trend. Coefficients before 1923 are close to zero and statistically insignificant, while post-1923 coefficients are larger and mostly positive. The effect attenuates gradually over time but remains economically meaningful through the late 1920s.

The patterns documented above show a broad reconfiguration of market activity after the enactment

[28] We weight regressions by the average import value of each country–product pair in 1920–22 and cluster standard errors by product category. Rice is excluded because unusually poor harvests in 1919–20 distorted early-1920s import patterns. This recovery appears as a pre-trend in our data and would mechanically inflate estimated treatment effects.

of the trademark law, spanning from between-firm reallocation to within-firm expansion and localization. Yet one of the most novel mechanisms of this transformation, as we show next, lies in the reorganization of relationships between authentic firms and domestic intermediaries. In the next section, we investigate a previously unexplored margin of adjustment: the rise of domestic intermediation as stronger trademark protection encouraged new linkages between foreign firms and Chinese agents and fostered the growth of the intermediary sector.

6 A Novel Adjustment Margin: Domestic Intermediation

We now examine a distinct and previously unexplored channel through which trademark protection reshaped market integration: the formation and expansion of linkages between foreign producers and domestic intermediaries. This margin is economically important in the Shanghai context, where intermediaries played a central role in distribution and market access, and conceptually important because it highlights how IP institutions can affect firm organization and market structure beyond direct producer–consumer interactions.

Most existing research on trademarks abstracts from intermediated exchange, implicitly assuming direct transactions between producers and consumers. In contrast, a large literature in international trade emphasizes the role of intermediaries in facilitating market access, particularly in settings where foreign firms face substantial frictions in reaching local buyers.[29] Despite this, the interaction between intermediary-based trade and intellectual property institutions, especially trademark protection, has received little attention.[30]

Intermediaries can both exacerbate and mitigate information frictions. On the one hand, introducing intermediaries increases the informational distance between producers and consumers, complicating the verification of producer identity. On the other hand, domestic intermediaries can substantially expand market reach by overcoming linguistic, cultural, and logistical barriers. In early twentieth-century Shanghai, Chinese intermediaries frequently acted as translators, distributors, and guarantors of local reputation, extending the reach of foreign firms into inland markets. Indeed, during our study period, intermediaries accounted for more than half of all registered firms (see Section 3.1).

In the absence of effective trademark protection, however, engagement with intermediaries entailed substantial risks. Historical accounts frequently report that intermediaries, sometimes unknowingly, mixed genuine and counterfeit goods or distributed imitations under established brand names, diluting brand reputation and undermining consumer trust (Bryan, 1919). As a result, authentic firms faced a tradeoff between market expansion and reputational risk.

Stronger trademark protection relaxes this constraint. By reducing the risks of imitation and brand dilution, trademark enforcement lowers the expected costs of delegating marketing and distribution activities

[29] See, for example, Ahn, Khandelwal, and Wei (2011); Akerman (2018); Antràs and Costinot (2011); Bernard, Grazzi, and Tomasi (2015); Startz (2016); Grant and Startz (2022); Ganapati (2025).

[30] A notable exception is Qian (2008), who shows that firms are more likely to vertically integrate downstream distribution when trademark protection is weak.

to local agents. Authentic producers can therefore expand distribution networks with greater confidence, deepen engagement with domestic intermediaries, and invest in local sales capacity. We test this mechanism by examining whether trademark protection increased integration between authentic firms and domestic intermediaries, both within firm boundaries (through local hiring) and across firm boundaries (through partnerships with Chinese intermediaries).

Domestic Integration within Firm Boundaries

A distinctive feature of our data is that it records the names, positions, and hierarchical ranks of individual employees within foreign firms, allowing us to observe how trademark protection influenced the internal organization of multinational enterprises in early twentieth-century China. This granularity enables us to move beyond aggregate firm outcomes and examine how firms reorganized their workforce in response to stronger intellectual property enforcement.

Table 8 shows that Western firms became significantly more likely to employ Chinese workers after the 1923 Trademark Law (column 1). The effect is driven by the extensive margin: firms that previously had no Chinese staff began hiring them. The intensive margin, i.e., the number of Chinese employees, also rose, though less precisely estimated.

Column (3) shows that this adjustment was concentrated in sales and comprador positions, indicating an expansion of Chinese workers' involvement in market-facing roles while non-sales employment show no significant response. Moreover, Chinese employees became more likely to occupy managerial positions (column 4) and advanced within firm hierarchies (column 5, where lower values indicate higher rank).

These results provide novel evidence that stronger trademark protection facilitated deeper organizational integration of local employees within foreign firms. By securing brand authenticity and reducing the risks associated with delegation, the law enabled Western producers to entrust marketing and distribution responsibilities to Chinese staff, integrating them into roles central to brand representation and market access.

Domestic Integration across Firm Boundaries

We next turn to domestic integration across firm boundaries, another critical margin through which trademark protection could affect foreign firms' domestic linkages. By enabling authentic firms to engage more safely with local distributors, stronger trademark protection may reshape the structure of foreign–domestic business networks.

To examine this mechanism, we digitize a novel dataset that links foreign producers to their Chinese agents and distributors using the Hong List's agent-client directory. This unique source provides a rare window into the structure of foreign–domestic business networks and allows us to analyze how trademark protection reconfigured the formation of intermediation. Using this data, we investigate whether Chinese intermediaries expanded their client networks after 1923 in trademark-intensive product categories.

Adapting equation (2) to the full sample of distributors, Table 9 shows that Chinese intermediary firms

operating in trademark-intensive product categories prior to the reform experienced a significant expansion in their foreign client base after 1923, relative to other distributors. This increase is driven entirely by Western clients (columns 3–4). We find no comparable effects for Western intermediaries.

Growth and Entry of Chinese Intermediaries

The integration between Western producers and Chinese intermediaries not only reshaped commercial relationships but also affected the growth and entry dynamics of domestic intermediary firms. To assess these broader effects, we link intermediary status to firm-level outcomes in the Hong List data.

In Table 10, we examine whether closer integration between Western firms and Chinese intermediaries translated into measurable growth among domestic agents. Column (1) shows that relative to other Chinese firms, Chinese intermediaries operating in trademark-intensive product categories experienced a larger and statistically significant increase in employment following 1923.

Columns (2) and (3) examine extensive-margin responses. Defining intermediary status at the time of entry, column (2) shows that trademark protection significantly increased the likelihood that entering Chinese firms operated as intermediaries in trademark-intensive products. Column (3) examines exit, defining intermediary status in the year prior to disappearance, and shows that these firms were somewhat less likely to exit after the reform, although the estimate is not statistically significant.[31]

These findings indicate that trademark protection, introduced primarily to regulate competition among foreign firms, had far-reaching domestic consequences. By reducing reputational and contractual frictions that previously constrained foreign-domestic business relationships, the 1923 Trademark Law indirectly stimulated the expansion of China's intermediary sector. This evidence highlights a novel mechanism through which trademark protection can foster domestic firm growth: by enabling new forms of commercial collaboration in markets historically characterized by distrust, imitation, and weak contract enforcement.

7 Consumer Effects of Trademark Protection: Brand Prices

The preceding sections examined how the Trademark Law reshaped the supplier side of Shanghai's economy: reallocating resources across firms, fostering new entry and local production, and deepening integration between foreign producers and domestic intermediaries. We now turn to the other side of the market: how these transformations affected consumers. Understanding the consumer response is critical, since the core economic rationale for trademark protection lies in its ability to reduce information asymmetry in product markets. By allowing consumers to better identify the source of goods, trademarks not only protect producer reputations but also improve the efficiency of exchange. This section investigates how the law influenced consumer surplus through its effects on prices, variety, and the perceived authenticity of goods.

As discussed in Section 2.5, the supply- and demand-side responses imply potentially offsetting effects

[31] Table A.14 in the Online Appendix shows that these effects persist through 1930.

on consumer prices. Reduced counterfeiting and expanded authentic entry lower information frictions and intensify competition, while improved confidence in brand authenticity can raise consumers' willingness to pay for genuine goods. The net price response is therefore ambiguous and varies across product categories depending on the relative importance of these forces.

To discipline this ambiguity, we examine whether prices of branded products changed differentially after May 1923 in trademark-intensive categories, and whether these responses vary systematically with product characteristics that proxy for the three mechanisms formalized in Appendix B: consumer valuation of authenticity, barriers to entry shaping competitive pressure, and firms' pre-reform reliance on costly private enforcement. Using monthly brand-level price data, we estimate the following specification:

$$\begin{aligned} \ln(price)_{bt} &= \beta \times TMInt_b \times PostMay1923_t \\ &\quad +\gamma \times TMInt_b \times PostMay1923_t \times Channel_p \\ &\quad +Controls_{pt} + FE_b + FE_t + FE_{jq} + \epsilon_{bt} \end{aligned} \tag{5}$$

where b denotes brands, t months, j broad industries, and q quarters.[32] We include brand fixed effects FE_b to absorb persistent brand-specific differences, month fixed effects FE_t for macro price movements, and industry-quarter fixed effects FE_{jq} to control for industry trends. Our data record market prices observed at the brand level and do not distinguish between authentic and counterfeit units. This limitation mirrors the information set faced by consumers, who typically cannot verify authenticity at the point of purchase. In settings with deceptive counterfeiting, counterfeiters have incentives to closely match the prices of authentic producers; otherwise, price differences would reveal imitation (Grossman and Shapiro, 1988a; Qian, 2008). As a result, the observed price reflects a common market price for each brand, shared by authentic and counterfeit goods.[33]

We measure the three channels, $Channel_p$, as follows. To proxy for heterogeneity in consumers' willingness to pay for authenticity, we use the "length of the quality ladder" measure developed by Khandelwal (2010), which captures quality dispersion within a product category. We compute this measure using the detailed bilateral Chinese import data from 1920–1922 described in Section 3.3 merged with tariff data.[34] As an alternative proxy, we use price dispersion across brands within product categories. To capture entry barriers, we use capital per factory and average factory size by product category, digitized from Lieu (1936)'s industrial surveys of early-1930s Shanghai. Finally, to measure potential cost savings from reduced private enforcement, we use the pre-1923 frequency of anti-imitation advertisements by product category

[32] We group brands into five broad industries based on their NCL product classification p: chemicals; food, beverages, and tobacco; metals, machinery, and vehicles; non-metallic materials; and textiles.

[33] This argument does not apply to non-deceptive counterfeiting; see Grossman and Shapiro (1988b).

[34] Following Khandelwal (2010), quality and quality dispersion are inferred from import unit values and quantities. Details of the estimation and instrumentation strategy are provided in Section A.12 of the Online Appendix.

(Section 4).

Table 11 presents the results. Column (1) shows that, on average, the trademark law slightly reduced prices, although the coefficient is statistically insignificant. The event-study estimates in Figure A.11 confirm the absence of pre-trends and reveal only a brief, transitory price dip in the months immediately following the law.[35] This pattern suggests that the reform did not lead to systematic price inflation, a sharp contrast to typical findings for other forms of intellectual property protection.

Columns (2)–(4) introduce heterogeneity by product-level consumer preferences. In categories with greater quality dispersion, where consumers are more likely to place higher value on identifying authentic producers, prices increased significantly.[36] In the last row of Table 11, we report the marginal effects for products with the highest levels of quality and price dispersion. The positive and statistically significant coefficients in columns (3) and (4) indicate that the trademark law led to price increases in these industries. This indicates that trademark protection enhanced willingness to pay in product categories characterized by greater quality dispersion, where the value of brand signals and authenticity is highest.

Columns (5)–(6) examine differences by entry barriers. Prices decreased significantly in industries with low capital requirements, where intensified competition from authentic entrants exerted downward pressure on prices. Conversely, in capital-intensive sectors, where entry barriers restricted competition, prices tended to rise modestly.

Finally, column (7) shows that products with greater pre-law reliance on anti-imitation advertising experienced significantly lower prices following the enactment of the trademark law. This pattern is consistent with the finding in Section 4 that firms in these categories reduced anti-imitation advertising after the introduction of formal trademark protection, some of which may have translated into lower market prices.

When all three channels are included jointly in column (10), the results remain consistent: prices rose in markets where consumers valued authenticity most and competition was limited, but fell where competition was high or anti-imitation advertising had been substantial.

These findings portray a nuanced pattern of price responses. The 1923 Trademark Law did not raise prices through increased market power. Instead, it altered pricing in a manner consistent with improved market efficiency: consumers paid higher prices in categories where authenticity and brand signaling mattered most, and lower prices where reduced information frictions and stronger competition compressed producer rents. Together with the supply-side evidence, these results underscore how trademark protection, unlike

[35] As a robustness check, we implement an alternative identification strategy that exploits the month in which each brand was registered at the trademark office, using a staggered difference-in-differences design following Callaway and Sant'Anna (2020). Because the timing of trademark registration may be endogenous to firm decisions, we treat this as a complementary test rather than our main specification. Reassuringly, the results are consistent: brand prices show no significant change following registration. To conduct this analysis, we manually matched brand-level price data to trademark registration records in China based on brand and product names. Detailed results are reported in Table A.15 of the Online Appendix.

[36] Note that column (3) controls 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.

patents or copyrights, can enhance consumer welfare without undermining competitive market outcomes.

To translate these reduced-form estimates into welfare terms, we combine the empirical results with a model structure in Appendix B.7. Consumer welfare gains arise through three channels directly identified in both the theory and the data: reduced information frictions, expansion in the set of authentic varieties, and equilibrium price responses. Calibrating the model using the observed increase in authenticity, the expansion of authentic varieties, and the small net price effects, we find economically meaningful gains. In a representative trademark-intensive consumer-goods category, the 1923 Trademark Law increased consumer surplus by approximately 9–10%, with the majority of gains driven by greater access to authentic varieties.

8 Conclusion

This paper studies how international firms and markets respond to the introduction of modern trademark institutions by exploiting a quasi-natural policy experiment: the enactment of China's first trademark law in 1923. Implemented in one of the world's most contested environments for brand protection, the reform established a legally enforceable regime governing the use of trademarks in Republican China. By assembling and digitizing new micro-level data on firms, brands, employees, intermediaries, and trade and by developing a framework that highlights the interaction of information frictions, deceptive counterfeiting, and intermediated distribution, we show that this institutional change fundamentally reshaped international firm behavior and market outcomes.

Our findings demonstrate that trademark protection operates through mechanisms distinct from those emphasized in the broader intellectual property literature. Whereas patents and copyrights primarily reward innovation by granting monopoly power, trademarks work by reducing asymmetric information about producer identity. Strengthened trademark protection increases the informational content of brands, reduces deceptive counterfeiting, and lowers firms' reliance on costly private enforcement strategies such as defensive advertising and distributor monitoring.

These improvements in authenticity trigger wide-ranging market adjustments. On the supply side, trademark protection reallocates activity away from counterfeiting firms toward authentic producers. Reduced imitation risk encourages entry and expansion by authentic firms and leads to an increase in the number of branded varieties. We also highlight a novel effect on the organization of international firms, where stronger trademark enforcement reshapes foreign–domestic linkages: authentic firms expand their use of domestic employees in sales and managerial roles and increase collaboration with domestic intermediaries; the latter benefit by experiencing growth in both their foreign client base and overall market participation.

Importantly, we find that trademark protection neither reduces market competition nor systematically raises prices. Instead, trademark protection expands authentic entry, increases product variety, and generates heterogeneous price responses consistent with improved market efficiency rather than enhanced market power. Consumer welfare gains arise primarily through greater access to genuine varieties.

While our setting is Shanghai's treaty-port economy, the mechanisms we identify—information frictions over producer identity, private deterrence, and organizational responses to brand dilution—are general to markets in which trademarks serve as the primary instrument of consumer protection. Our results therefore speak to the broader role of trademarks in facilitating entry and market integration, particularly in international contexts. China's first trademark law illustrates how trademark institutions can support market development in environments characterized by severe information frictions, a common feature of developing economies. By reducing asymmetric information about producer identity, trademark protection can sustain competition, foster domestic industrial expansion, and improve consumer outcomes. More broadly, our findings highlight that the economic effects of intellectual property institutions depend critically on their interaction with market frictions, firm organization, and distribution networks, an insight that is central to both historical and contemporary policy debates.

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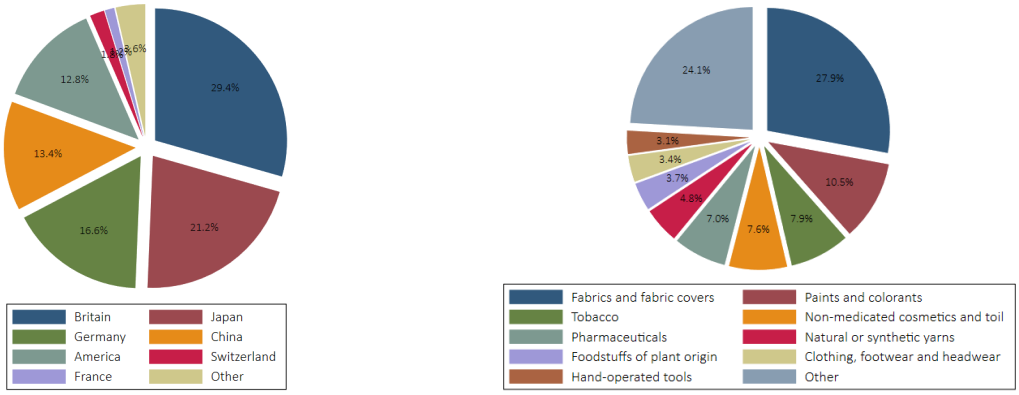

(a) By nationality of registering firm

(b) By product categories

Figure 1: Chinese Trademark Registrations

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

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

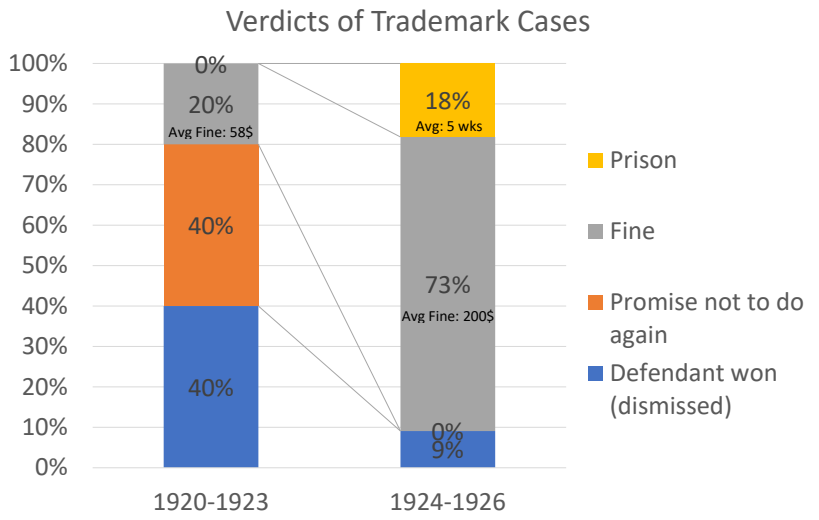

Figure 3: Verdicts of Trademark Cases, Before and After 1923

Notes: Own calculations based on available Mixed Court case reports, as published in the *North China Herald*, 1920-1927.

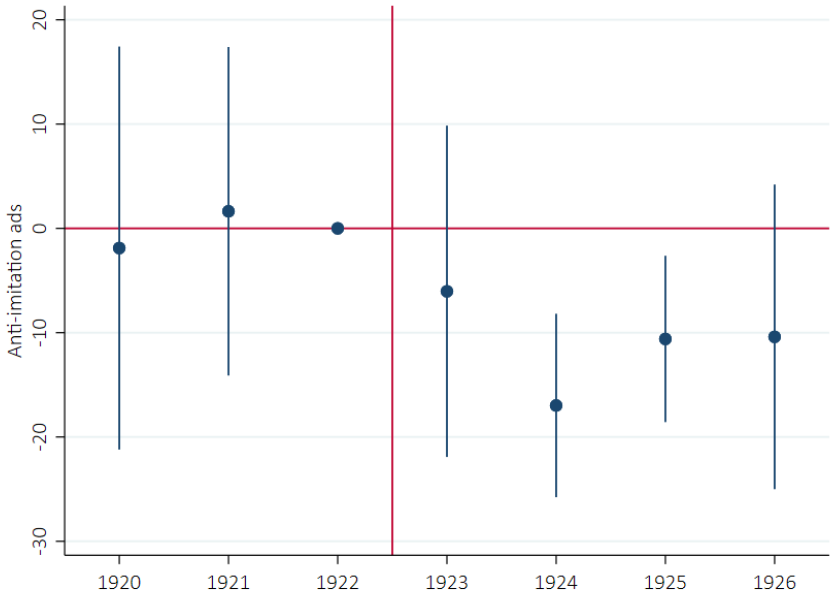

Figure 4: Effect of the Trademark Law on Anti-imitation Advertisements: Event Study

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.

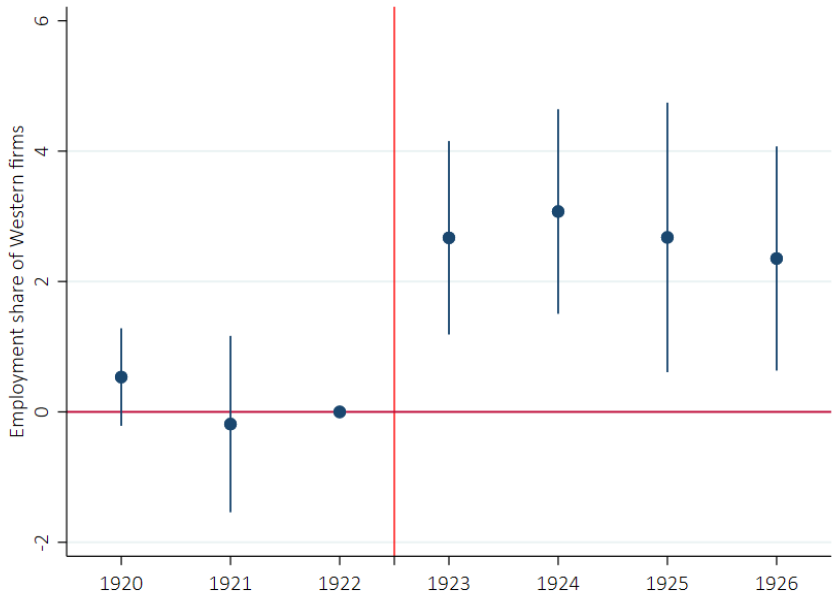

Figure 5: Effect of the Trademark Law on Reallocation from Japanese to Western Firms: Event Study

Notes: The figure estimates the event study version of column (4) in Table 3 by allowing the effect on the differential trademark intensity of Western firms to vary by year.

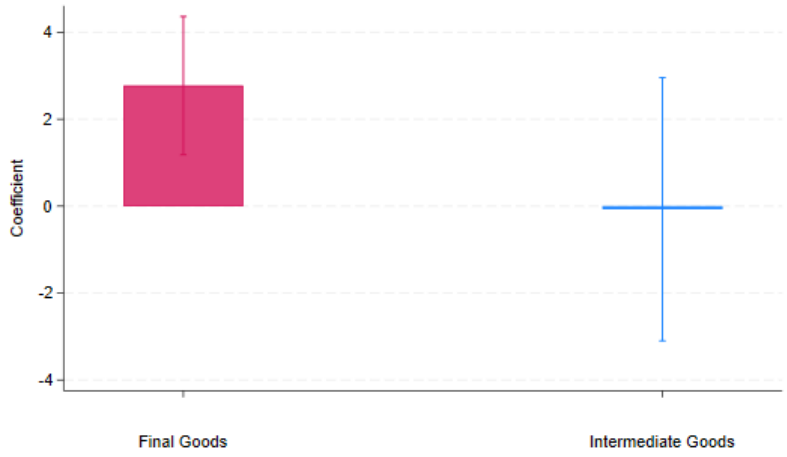

Figure 6: Effect of the Trademark Law on Intermediate and Final Goods

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 in column (4) in Table 3 with interaction terms for intermediate and final goods, depending on the NCL product classification of the most trademark intensive product that a given firm sells.

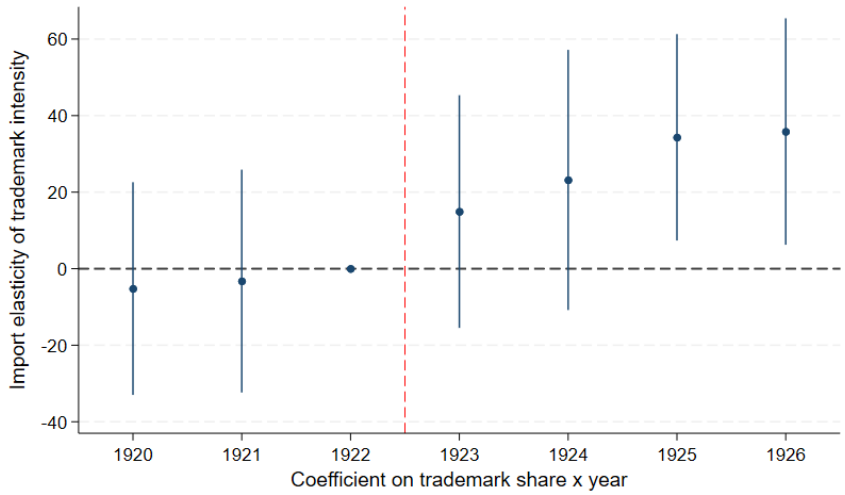

Figure 7: Effect of the Trademark Law on Chinese Imports from Western countries: Event Study

Notes: The figure estimates the event study version of column (1) in Table 7 on the sample of Western firms by allowing the effect on trademark intensity to vary by year.

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	-1.446**	-0.160**	-2.939**
	(0.548)	(0.072)	(1.115)
Observations	2,856	2,856	2,856
R-squared	0.038	0.035	0.038
Number of NCL	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. Standard errors are clustered by product group. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Effects of the Trademark Law on Foreign Firm Employment Growth

	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share
Post 1923 * trademark intensity * Western firms	10.929***	2.839***	10.405***	2.607***
	(3.138)	(0.824)	(3.659)	(0.916)
Post 1923 * trademark intensity	-8.853**	-2.475***		
	(3.433)	(0.828)		
Observations	2,131	2,131	2,088	2,088
R-squared	0.914	0.952	0.922	0.955
Firm FE	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes
NCL*year FE			Yes	Yes

Notes: This table reports the differential effect of the trademark law on employment and employment shares of Western firms relative to Japanese firms, 1920-1926. The sample includes Western and Japanese firms located in Shanghai's concessions between 1920–1923. The dependent variable is either the natural log of a firm's employment in a given year or the firm's share of employment in total employment within its 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. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Effect of the Trademark Law on Worker Composition in Foreign Firms

	(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
NCL*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, 1920-1926. 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 5: Entry and Exit of Foreign Varieties

	(1)	(2)
	Entry	Exit
Post 1923 * trademark intensity * Western firms	125.615***	-10.610
	(28.783)	(8.556)
Post 1923 * trademark intensity	0.037	5.776*
	(5.533)	(2.933)
Observations	4,186	4,186
R-squared	0.9482	0.9995
Prod-region FE	Yes	Yes
Year FE	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on the entry and exit of Western relative to Japanese firms, using data collapsed to product-years, 1920-1926. The dependent variable in column (1) is the stock of firms that entered the market before the end of the sample period (ignoring exits). The dependent variable in column (2) is the stock of firms that survived during the sample period, where the change equals exits. *Post 1923* indicates the period after the adoption of the trademark law. *Trademark intensity* is a product-specific measure of pre-1923 trademark dependence. Standard errors are two-way clustered by product category and region-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Effect of the Trademark Law on New Products and Quality based on Ads

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

Notes: This table reports the estimated effects of the trademark law on a dummy variable indicating whether the regular ad is about a new product, and a dummy variable indicating whether the regular ad highlights the quality or innovativeness of a 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. Standard errors are clustered by product group. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Effect of the Trademark Law on China's Imports

	(1) imports (PPML)	(2) Country's import share in product	(3) Import dummy
Trademark intensity * (Post $\geq$ 1923) * Western countries	36.040**	6.652***	0.965*
	(17.191)	(2.314)	(0.551)
Trademark intensity * (Post $\geq$ 1923)	-9.907	-3.628**	-0.830
	(18.874)	(1.674)	(0.558)
Observations	11,634	11,634	11,634
R-squared	0.987	0.887	0.567
Country-year FEs	Yes	Yes	Yes
Country-prod FEs	Yes	Yes	Yes
Broad industry-year FEs	Yes	Yes	Yes

Notes: This table reports the differential effects of the trademark law on China's imports from Western countries relative to Japan, 1920-1926. The sample consists of products that can be matched exactly across different product-classification schemes over time; it excludes rice. Column (1) shows a PPML regression using the import value as dependent variable. Columns (2) and (3) implement OLS regressions using a country's imports share in a product group, and a dummy for the existence of imports, respectively, as dependent variables. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* represents a product-level trademark intensity, calculated using each product's share of total pre-1923 trademarks. All regressions are weighted by the import value of the product by country averaged over 1920-1922. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Domestic Integration within the Boundary of Foreign Firms

	(1)	(2)	(3)	(4)	(5)
				Hierarchy	
	Chinese empl dummy	Num. Chinese employees	Num. Chinese sales staff	Dummy Chinese mgr	Avg layer of Chinese empl
Post 1923 * trademark intensity * Western firms	4.878*	4.319	5.469*	1.943**	-1.645**
	(2.591)	(9.395)	(3.054)	(0.835)	(0.631)
Observations	2,088	2,088	1,627	2,088	1,494
R-squared	0.781	0.671	0.716	0.633	0.643
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
NCL*year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the hierarchical structure of firms and their decisions to recruit and promote Chinese employees, 1920-1926. Column (4) uses the sample of firms for which we have job title information, and column (5) uses the sample of firms that have at least one Chinese employee. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Foreign-Client Growth at Chinese Intermediary Firms

	(1)	(2)	(3)	(4)
	Dummy having foreign clients	Number of foreign clients	Dummy having Western clients	Number of Western clients
Post 1923 * trademark intensity * Western firms	0.097	-26.271	0.097	-26.293
	(0.558)	(29.974)	(0.558)	(29.934)
Post 1923 * trademark intensity * Chinese firms	1.598***	7.880***	1.598***	7.880***
	(0.462)	(2.516)	(0.462)	(2.516)
Observations	3,006	3,006	3,006	3,006
R-squared	0.767	0.726	0.758	0.722
Firm FE	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes
Broad ind*Year FE	Yes	Yes	Yes	Yes
NCL*year FE	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the growth of firms' client rosters, for whom they act as intermediaries, 1920-1926. The dependent variables are a dummy for whether a business served as an agent for business clients, and the number of such clients for which it served as an agent. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. The sample consists of Western, Chinese, and Japanese firms (omitted category; absorbed by fixed effects). Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Growth, Entry and Exit of
Chinese Intermediary and Non-Intermediary Firms

	(1) ln(empl)	(2) Firm entry	(3) Firm exit
Post 1923 * trademark intensity	3.625*	-0.464	-0.504
	(1.723)	(0.388)	(0.398)
Post 1923 * trademark intensity * agent dummy	9.539**	1.545***	-0.610
	(2.654)	(0.254)	(2.179)
Post 1923 * agent dummy	-0.160	-0.123**	-0.039
	(0.146)	(0.047)	(0.090)
Observations	875	1,175	1,175
R-squared	0.881	0.327	0.757
Firm FE	Yes	Yes	Yes
Broad ind*Year FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the 1923 Trademark Law on employment, entry, and exit of Chinese firms, with a focus on intermediary firms (as indicated by interactions with the agent dummy). The agent dummy denotes firms that acted as intermediaries at any point between 1920-1926. The dependent variable in column (1) is log employment. Columns (2) and (3) examine entry and exit using a balanced panel of firms; and the agent dummy captures whether firms entered or exited as agents. *Post 1923* is a dummy indicating the period after the adoption of the trademark law. *Trademark intensity* is a firm-specific measure constructed from each firm's pre-1923 product mix and product-level trademark intensity. Standard errors are two-way clustered by product category and year. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Effect of the Trademark Law on Brand Prices

Channel	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		willingness to pay			**entry barriers**		**cost savings**	**all**
	ln(price)	ln(price)	ln(price)	ln(price)	ln(price)	ln(price)	ln(price)	ln(price)
Post May 1923 * TM int.	-0.745	-4.520***	-3.317	-1.030**	-2.819**	-4.502***	-1.209	-4.359***
	(0.455)	(1.307)	(3.567)	(0.458)	(1.058)	(1.029)	(0.911)	(1.473)
Post May 1923 * TM int. *								
– quality dispersion		0.155*	0.147**					0.081
		(0.078)	(0.069)					(0.047)
– no. of varieties			-0.116					
			(0.264)					
– price dispersion				0.690**				
				(0.320)				
– avg capital per firm					0.010**			0.026***
					(0.004)			(0.008)
– avg firm size						0.016***		
						(0.004)		
– anti-imitation ads							-0.088*	-0.125***
							(0.044)	(0.029)
Observations	33,245	16,955	16,955	15,618	32,344	32,344	33,245	16,344
R-squared	0.150	0.192	0.193	0.188	0.157	0.159	0.154	0.208
Number of panel_id	1,141	581	581	484	1,117	1,117	1,141	566
Brand FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Broad industry-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Marginal effect for		13.137	13.387**	10.702*	2.611**	1.523	-14.171**	
the 90th percentile		(7.812)	(6.038)	(5.568)	(1.221)	(0.990)	(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, broad industry times quarter fixed effects, and interactions of $PostMay1923$ and the respective channels $Channel_p$. Marginal effects at the bottom of the table are computed at the 90th percentile 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.

ONLINE APPENDIX

Trademark Protection and International Firms

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A Additional Background and Analysis

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

To assess whether the trademark law strengthened legal protection, we digitize all trademark disputes published in the *China Trademark Gazette* between 1924 and 1927. As discussed in Section 2.4 of the paper, the records indicate that while some Japanese firms attempted to register marks closely resembling those of other businesses, such registrations were frequently challenged and often revoked. In our sample, 63.4% of disputed trademarks were initially filed by Japanese firms, whereas complainants were predominantly from Western countries. Japanese firms lost 72% of disputes brought against them by Western counterparts.

The Gazette provides detailed documentation of the grounds on which registrations were invalidated. For example, *Tokyo Ink Co., Ltd.* applied to register a trademark depicting a winged lion resting its paws on a globe (Figure A.3a). The German dye producer *Farbenfabriken vorm. Friedr. Bayer & Co.* demonstrated prior use of a stylized lion design in China dating to 1912 (Figure A.3b). The Trademark Bureau required *Tokyo Ink* to withdraw its application, noting that "the drawings are identical except for an unimportant small part [. . .] the confusion is more than accidentally similar."

In other cases, Japanese firms initially secured registrations that were subsequently overturned. For instance, *Takisada Co., Ltd.* registered the trademark *"年年如意"* ("good luck every year") for cotton products (Figure A.3c). Seven months later, the British firm *Probst, Hanbury & Co., Ltd.* successfully challenged the registration based on its prior use since 1899 of a closely related mark, *"万年如意"* ("good luck for ten thousand years"), with an almost identical image (Figure A.3d). The Bureau revoked the Japanese registration, indicating "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 information on all 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 16 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.

- *Chinese employment.* We identified Chinese employees based on their names, and create a count as well as a dummy variable if a firm has any Chinese employees.
- *Chinese employees in sales positions.* We specified a Chinese employee as sales staff if the job title related to sales.
- *Chinese manager dummy.* Dummy indicator if a Chinese employee appears in the top organizational layer of employees according to indents.
- *Average organizational layer of Chinese employees.* We calculated the average organizational layer of Chinese employees (according to indents) relative to the average organizational layer of all employees.

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 data 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 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 3.5. 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 A.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 A.5). The array of nationalities represented by Shanghai businesses also varied significantly over time. As Figure A.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 A.7 (a)) in the Online Appendix). The Census reported the population of the international concession separately for male adults, female adults, and children. Figure A.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.

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,

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

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

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 Other Firm or Product Attributes

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 A.4, 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 (measured in 1920-1922). 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.

A.6 Robustness to Alternative Measures of Trademark Intensity

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

[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.

A.7 Controlling for Country-Specific Shocks including Consumer Boycotts

In column (1) of Table A.6, we allow for macro-economic shocks (measured by home country GDP) in foreign countries to differentially affect trademark-intensive firms from that country. This allows, for example, Japan's Great Kantō earthquake in 1923 to affect trademark-intensive Japanese-owned firms in Shanghai, and more generally, economic depressions or booms in home countries to affect their trademark-intensive firms in Shanghai.

Another example of country-specific shocks are consumer boycotts that the Chinese organized 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). For these boycotts, especially those targeting Japanese goods, to drive our empirical results, the boycotts would have to affect trademark-intensive products differentially, otherwise 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 infer the origin of a trademarked product (unless, of course, the trademarks themselves were counterfeited). In columns (2) to (4) of Table A.6, we therefore control for interactions between a country-year specific dummy variable indicating whether a foreign country experienced consumer boycotts in a specific year 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 (4) explains away the trademark law's effect; our estimated effects are also not sensitive to the specific boycotts we control for.

It is also possible that boycotts on specific countries, e.g., Japan, had spillover effects on the demand for Western products. To account for this, we allow all boycotts to differentially affect Western firms in columns (5) to (7), essentially only using the years without boycotts for identification.

Next, we refine our 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 (8) to (10), we interact the country-year-specific boycott indicator with the ratio of that country's trademarks over world trademarks (excluding the country)—this measure is larger than 1 if a country dominates the product category.

Finally, in columns (11) to (13), we refine the boycott dummy to capture the intensity of a boycott or more generally, any demand shock reflected in Chinese imports. This is based on the idea that without a boycott or other country-specific 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 (11), 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 (12), we expand this idea to all 21 countries in our data for which we have export data. Finally, in column (13), we allow the boycotts to affect the growth of Japanese vs. Western firms differentially.

A.8 Robustness to Different Subsamples

Here, we examine the robustness of our results for different subsamples. We start by dropping firms that sell only services during 1920-1922; results are reported in Table A.7. We find the estimated effect of the trademark law to increase in magnitude and continue to be statistically significant.

Next, we examine whether the estimated employment effects of the trademark law are attributable to a particular country or product. Figures A.9 and A.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 A.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 5.4). We find that results are robust to dropping distributors.

A.9 Testing for the Role of Extraterritoriality

In Table A.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 A.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 A.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 Measuring Consumer Preference for Quality

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).

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. 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.

A.13 Testing Alternative Pre-1923 Institutional Attempts

This section examines whether earlier institutional developments prior to the 1923 Trademark Law generated similar changes in the performance of trademark-intensive Western firms. These episodes represent substantive attempts to regulate trademarks but did not alter enforcement on the ground. Treating them as placebo reforms provides a robustness check for our main identification strategy.

Before 1923, several institutional arrangements were invoked, often by foreign powers, to address trademark disputes in China. These include: (i) the extraterritorial court system that applied defendants' home-country laws; (ii) bilateral commercial treaties signed in 1902–1903 in which China pledged to protect foreign trademarks; and (iii) China's 1905 draft trademark code, modeled on Japan's first-to-file regime but never implemented. Although historically important, none of these mechanisms created enforceable, territory-based trademark rights.

To assess whether these earlier arrangements produced effects comparable to the 1923 Trademark Law, we construct three indicators corresponding to each institutional episode. 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.[8] 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 and the application of the defendant's home-country law could lead to unresolved disputes, jurisdiction evasion, and biased rulings, ultimately failing to provide effective trademark protection.

Second, we use dummy variables to denote China's commercial treaties with Great Britain (1902) and the United States (1903). However, these bilateral treaties, which required China to establish its own legal

[8]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).

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 a domestic trademark 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.

Using the extended Hong List panel covering 1872–1936, we interact each institutional indicator with firms' pre-1923 product-level trademark intensity (constructed using product descriptions prior to 1923).[9] We then estimate their effects on foreign firms' employment—our core measure of firm performance. Table A.16 reports the results.

Across all specifications, none of the pre-1923 institutional episodes exhibit positive or significant effects on trademark-intensive Western firms. Extraterritoriality status does not benefit firms whose products relied more heavily on trademark protection, consistent with its inability to extend trademark rights across borders. The 1902–1903 treaties also show no differential impact, reflecting the absence of operational enforcement provisions. Likewise, the unimplemented 1905 code is inert in all specifications. In contrast, the interaction term for the 1923 Trademark Law is strongly positive and precisely estimated even when all institutional indicators are included jointly.

These placebo exercises reinforce two conclusions. First, earlier attempts did not offer meaningful trademark protection, despite their prominence in diplomatic negotiations. Second, the 1923 Trademark Law was the first institutional shock that materially altered trademark enforcement. This supports our identification strategy and underscores that the post-1923 behavioral responses documented in the main text were not extensions of slow-moving pre-trends, but rather reactions to a sharp, legally binding reform.

[9]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.

Table A.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 3's column (4), the baseline regression.

Table A.2: Effect of the Trademark Law on Anti-Imitation Advertisements, 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	-1.286***	-0.204***	-2.664***
	(0.407)	(0.074)	(0.908)
Observations	4,411	4,411	4,411
R-squared	0.043	0.034	0.040
Number of NCL	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. Standard errors are clustered by product group. *** p<0.01, ** p<0.05, * p<0.1.

Table A.3: Effects of the Trademark Law on Foreign Firm Employment Growth, 1920–1930

	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share
Post 1923 * trademark intensity * Western firms	13.812***	3.262***	14.247***	3.187***
	(2.994)	(0.811)	(3.579)	(0.867)
Post 1923 * trademark intensity	-11.555***	-2.927***		
	(3.418)	(0.793)		
Observations	3,211	3,211	3,143	3,143
R-squared	0.895	0.950	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
NCL*year FE			Yes	Yes

Notes: This table reports the differential effect of the trademark law on employment and employment shares of Western firms relative to Japanese firms, 1920-1930. The sample includes Western and Japanese firms located in Shanghai's concessions between 1920–1923. The dependent variable is either the natural log of a firm's employment in a given year or the firm's share of employment in total employment within its 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. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table A.4: Controlling for Alternative Product Attributes

	(1) employment share	(2) employment share	(3) employment share	(4) employment share	(5) employment share	(6) employment share
Post 1923 * trademark intensity * Western firms	2.607***	2.513**	2.526**	2.499**	2.564***	2.572**
	(0.916)	(0.949)	(0.936)	(0.970)	(0.858)	(0.943)
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)
Observations	2,088	2,088	2,081	2,081	2,088	2,088
R-squared	0.955	0.955	0.954	0.954	0.955	0.955
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
NCL*year FE	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. 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 A.5: 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.6, following the same specification as in column (4) of Table 3. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table A.6: Controlling for Country-Specific Shocks, including Consumer Boycotts

	(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	(10) employment share	(11) employment share	(12) employment share	(13) employment share
Post 1923 * trademark intensity * Western firms	2.635***	2.512**	2.515**	2.603***	2.653***	2.967***	2.637***	2.529**	2.523**	2.606***	2.583***	2.802***	2.842***
	(0.897)	(0.906)	(0.938)	(0.910)	(0.824)	(0.886)	(0.907)	(0.913)	(0.908)	(0.920)	(0.877)	(0.986)	(0.997)
ln(real GDP) * TM intensity	-0.611												
	(1.263)												
Country-year specific boycott dummy (League of Nations, 1932) * TM intensity		-0.244			-0.320								
		(0.308)			(0.350)								
Country-year specific boycott dummy (Zumoto, 1932) * TM intensity			-0.152			-0.297							
			(0.336)			(0.341)							
Country-year specific boycott dummy (Orchard, 1930) * TM intensity				0.029			-0.021						
				(0.263)			(0.332)						
Country-year specific boycott dummy (League of Nations, 1932) * Western * TM intensity					-0.322								
					(0.233)								
Country-year specific boycott dummy (Zumoto, 1932) * Western * TM intensity						-0.726***							
						(0.246)							
Country-year specific boycott dummy (Orchard, 1930) * Western * TM intensity							-0.234						
							(0.346)						
Country-year specific boycott dummy (League of Nations, 1932) * product dominanc								-0.023					
								(0.020)					
Country-year specific boycott dummy (Zumoto, 1932) * product dominance									-0.017				
									(0.023)				
Country-year specific boycott dummy (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	2,088	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	0.955	0.955	0.955	0.955
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NCL*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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). Columns (2) and (5) control for a 1925 boycott against the UK and 1923 and 1925 boycotts against Japan, as in League of Nations (1932). Columns (3) and (6) add 1923 and 1926 boycotts to Japan, as in Zumoto (1932). Columns (4) and (7) add 1920 and 1921 boycotts to Japan, and extend the boycott against the UK to 1926, as in Orchard (1930). Columns (5) to (7) 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 (8) controls for Japanese exports to China divided by Japanese exports to the world, interacted with a Japan dummy. Column (9) 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 (10) interacts this measure with separate dummy variables for Japanese as well as Western firms. *** p<0.01, ** p<0.05, * p<0.1.

Table A.7: Effect of the Trademark Law on Employment at Western Firms: Drop Services

VARIABLES	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share
Post 1923 * trademark intensity * Western firms	21.267***	5.113***	22.707***	5.619***
	(4.727)	(0.938)	(4.815)	(0.878)
Post 1923*trademark intensity	-19.214***	-4.751***		
	(4.523)	(0.905)		
Observations	1,242	1,242	1,199	1,199
R-squared	0.913	0.947	0.928	0.951
Firm FE	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes
NCL*year FE	No	No	Yes	Yes

Notes: The sample drops all firms that only sell services in the years 1920-1922. The regressions implemented are the same as in Table 3, columns (1)-(4). Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table A.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
Post 1923 * trademark intensity * Western firms	8.723*	2.068***	9.015**	2.407**
	(4.548)	(0.653)	(4.248)	(0.987)
Post 1923 * trademark intensity	-5.093	-1.526***		
	(3.824)	(0.517)		
Observations	1,324	1,324	1,273	1,273
R-squared	0.923	0.944	0.930	0.949
Firm FE	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes
NCL*year FE	No	No	Yes	Yes

Notes: The sample drops all firms that are pure distributors, i.e., wholesellers or retailers. The regressions implemented are the same as in Table 3, columns (1)-(4). Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table A.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	10.911***	2.849***	10.361***	2.607**
	(3.151)	(0.825)	(3.650)	(0.981)
Post 1923 * trademark intensity * Western firms * non-ET	11.883**	2.330*	13.611***	2.671**
	(4.720)	(1.182)	(4.787)	(1.294)
Post 1923 * trademark intensity	-8.853**	-2.475***		
	(3.432)	(0.828)		
Observations	2,131	2,131	2,088	2,088
R-squared	0.914	0.953	0.922	0.955
Firm FE	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes
NCL*year FE	No	No	Yes	Yes

Notes: The regressions implemented are the same as in Table 3, 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 and country-year (except for column 4, where we were unable to estimate two-way clustered standard errors, and clustered by product category only). *** p<0.01, ** p<0.05, * p<0.1.

Table A.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
NCL*year FE			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 3, 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 A.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 A.12: Entry and Exit of Foreign Varieties, 1920–1930

	(1)	(2)
	Entry	Exit
Post 1923 * trademark intensity * Western firms	155.844***	-16.570
	(33.531)	(10.593)
Post 1923 * trademark intensity	-18.689	15.322***
	(11.438)	(4.534)
Observations	6,578	6,578
R-squared	0.8975	0.9987
Prod-region FE	Yes	Yes
Year FE	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on the entry and exit of Western relative to Japanese firms, using data collapsed to product-years. The dependent variable in column (1) is the stock of firms that entered the market before the end of the sample period (ignoring exits), such that the change equals entry. The dependent variable in column (2) is the stock of firms that survived during the sample period, where the change equals exits. *Post 1923* indicates the period after the adoption of the trademark law. *Trademark intensity* is a product-specific measure of pre-1923 trademark dependence. Standard errors are two-way clustered by product category and region-year. *** p<0.01, ** p<0.05, * p<0.1.

Table A.13: Entry and Exit of Foreign Varieties - Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A. Entry										
Post 1923 * trademark intensity * Western firms	125.6154***	144.2390***	169.2891***	117.8965***	85.8637***	85.4970***	97.1945***	128.8676***	133.8702***	137.3988***
	(28.7833)	(32.7992)	(38.6038)	(27.9035)	(27.9632)	(28.3312)	(28.0030)	(26.2167)	(20.9229)	(25.2960)
TM share * Post 1923	0.0371	-0.9703	-0.8372	3.9954	-0.7988	-1.8506	-12.9818	-7.4357	-10.9191	-57.2475
	(5.5332)	(6.1735)	(7.2133)	(4.9286)	(3.8915)	(4.0954)	(9.1465)	(9.9167)	(19.2732)	(36.2958)
Observations	4,186	4,186	4,186	4,186	4,186	4,186	1,876	4,186	4,186	4,186
R-squared	0.9482	0.9481	0.9483	0.9484	0.9534	0.9525	0.9471	0.9483	0.9482	0.9499
Panel B. Exit										
Post 1923 * trademark intensity * Western firms	-10.6098	-11.3642	-13.6112	-5.7469	10.6594	12.0760	-6.8099	-11.0767	-9.6466	-12.4181
	(8.5559)	(9.7491)	(11.3645)	(8.7016)	(7.2803)	(7.2779)	(9.6799)	(8.4826)	(10.5666)	(9.1910)
TM share * Post 1923	5.7760*	6.3781*	7.4105*	3.3503	4.3158**	4.9169**	10.8242**	6.8488**	4.4975	14.5671
	(2.9329)	(3.2396)	(3.7909)	(2.0657)	(1.6979)	(1.7210)	(4.6147)	(2.5429)	(3.5727)	(8.6548)
Observations	4,186	4,186	4,186	4,186	4,186	4,186	1,876	4,186	4,186	4,186
R-squared	0.9995	0.9995	0.9995	0.9995	0.9996	0.9996	0.9995	0.9995	0.9995	0.9995
TM measure	benchmark	excl. Japan	ctry-spec.							
Controls (incl. interactions)				patent intensity	ln(num firms)	ln(tot empl)	Herfindahl			
Region-year specific boycott dummies								League of Nations, 1932	Zumoto, 1932	Orchard, 1930
Prod-region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table performs robustness checks to Table 5. Panel A uses the stock of entered firms as dependent variable, while panel B uses the stock of exited firms as dependent variable. *** p<0.01, ** p<0.05, * p<0.1.

Table A.14: Growth, Entry and Exit of Chinese Intermediary and Non-Intermediary Firms, 1920–1930

	(1) ln(empl)	(2) Firm entry	(3) Firm exit
Post 1923 * trademark intensity	4.786***	-0.482	-1.625**
	(1.264)	(0.362)	(0.713)
Post 1923 * trademark intensity * agent dummy	10.540***	1.484***	-16.888***
	(3.118)	(0.329)	(3.464)
Post 1923 * agent dummy	-0.188	-0.123**	0.433**
	(0.165)	(0.044)	(0.137)
Observations	1,261	1,847	1,847
R-squared	0.841	0.259	0.751
Firm FE	Yes	Yes	Yes
Broad ind*Year FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the 1923 Trademark Law on employment, entry, and exit of Chinese firms, with a focus on intermediary firms (as indicated by interactions with the agent dummy), 1920-1930. The agent dummy denotes firms that acted as intermediaries at any point between 1920-1930. The dependent variable in column (1) is log employment. Columns (2) and (3) examine entry and exit using a balanced panel of firms; and the agent dummy captures whether firms entered or exited as agents. *Post 1923* is a dummy indicating the period after the adoption of the trademark law. *Trademark intensity* is a firm-specific measure constructed from each firm's pre-1923 product mix and product-level trademark intensity. Standard errors are two-way clustered by product category and year. *** p<0.01, ** p<0.05, * p<0.1.

Table A.15: Effect of Trademark Registrations on Prices

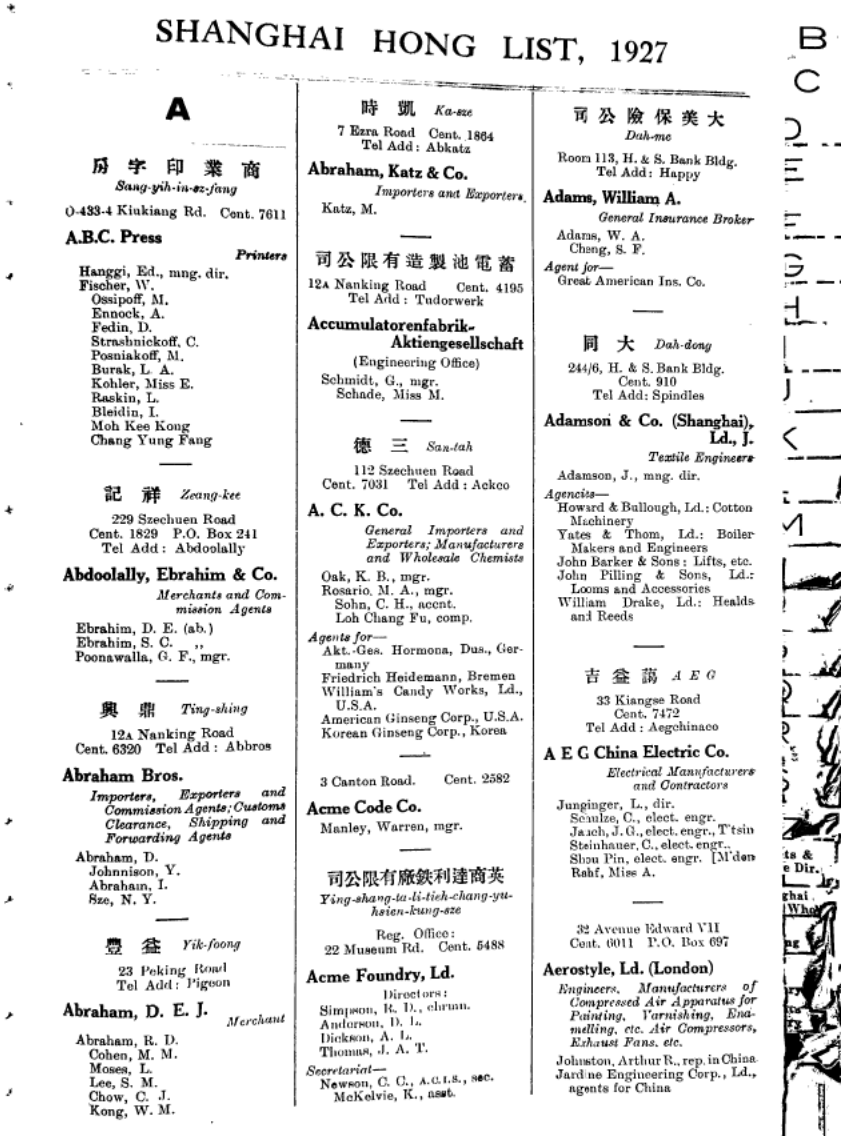
	(1) ln(price)	(2) ln(price)
Post trademark registration	-0.002	0.007
	(0.009)	(0.007)
Observations	14,263	35,862
# products in TG	594	594
# products in CG		1,101
Control group	not yet treated	never treated

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 A.16: 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
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year controls	Yes	Yes	Yes	Yes	Yes	
Ctry*Year FE						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.



SHANGHAI HONG LIST, 1927

A

商業印刷所 *Sang-yih-in-sz-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-sze*

7 Ezra Road Cent. 1864
Tel Add: Abkatz

Abraham, Katz & Co.

Importers and Exporters

Katz, M.

司公限有造製池電蓄

12A Nanking Road Cent. 4195
Tel Add: Tudorwerk

Accumulatorenfabrik-Aktiengesellschaft

(Engineering Office)

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

德三 *San-tah*

112 Szechuen Road
Cent. 7031 Tel Add: Ackco

A. C. K. Co.

General Importers and Exporters; Manufacturers and Wholesale Chemists

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

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

3 Canton Road. Cent. 2582

Acme Code Co.

Manley, Warren, mgr.

司公限有廠鉄利達商英

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

Reg. Office:
22 Museum Rd. Cent. 5488

Acme Foundry, Ld.

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

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

司公險保美大 *Dah-me*

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

Adams, William A.

General Insurance Broker

Adams, W. A.
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

吉益萬 *A E G*

33 Kiangse Road
Cent. 7472
Tel Add: Aegchinaco

A E G China Electric Co.

Electrical Manufacturers and Contractors

Junginger, L., dir.
Scaulze, C., elect. engr.
Jaach, J. G., elect. engr., T'tsin
Steinhauer, C., elect. engr.,
Shou Pin, elect. engr. [M'dem
Rahf, Miss A.

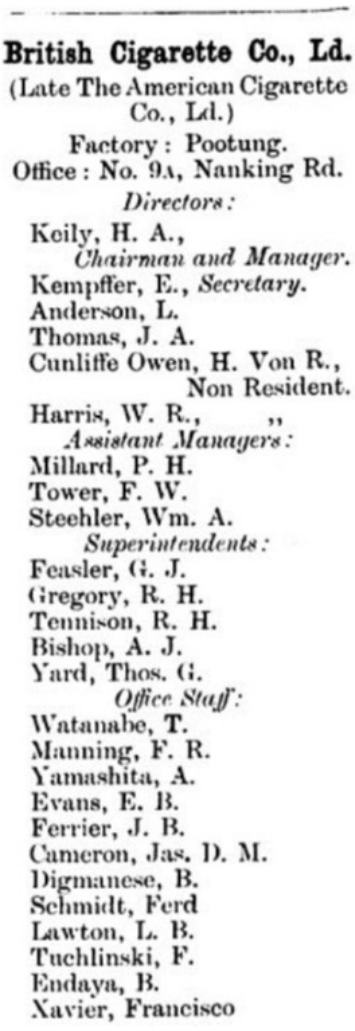
32 Avenue Edward VII
Cent. 6011 P.O. Box 697

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 A.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.

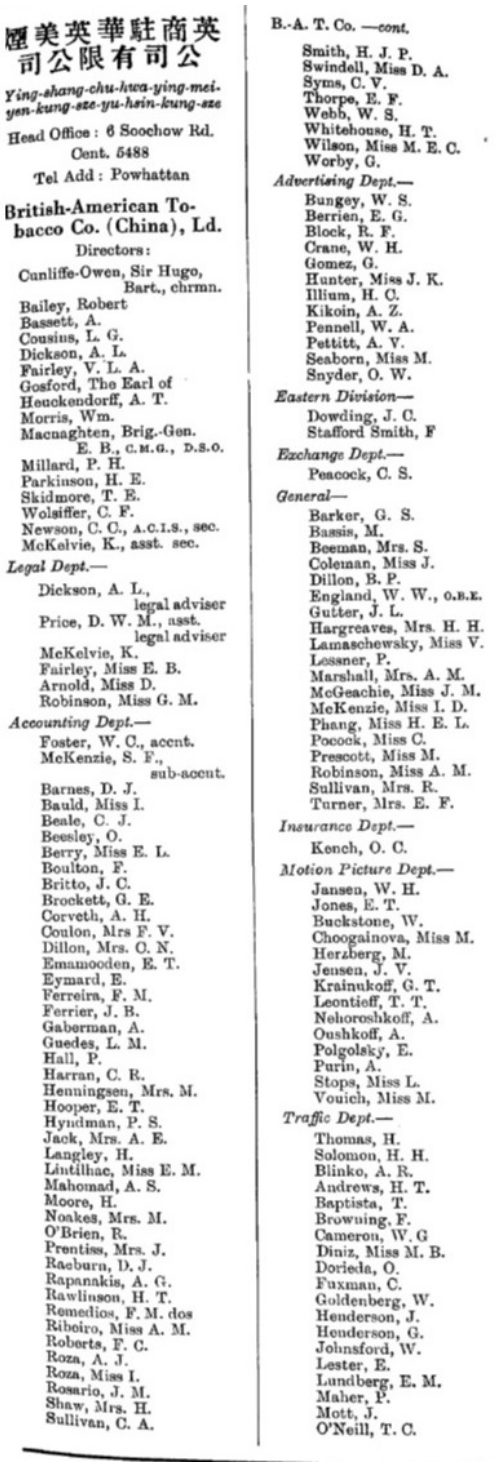
Superintendents:

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

(a) BAT's predecessor in 1906



英商駐華美英烟公司有限公司

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
Riboiro, Miss A. M.
Roberts, F. C.
Roza, A. J.
Roza, Miss I.
Rosario, J. M.
Shaw, Mrs. H.
Sullivan, C. A.

B.-A. T. Co. —*cont.*

Smith, H. J. P.
Swindell, Miss D. A.
Syms, C. V.
Thorpe, E. F.
Webb, W. S.
Whitehouse, H. T.
Wilson, Miss M. E. C.
Worby, G.

Advertising Dept.—

Bungey, W. S.
Berrien, E. G.
Block, R. F.
Crane, W. H.
Gomez, G.
Hunter, Miss J. K.
Illium, H. C.
Kikoin, A. Z.
Pennell, W. A.
Pettitt, A. V.
Seaborn, Miss M.
Snyder, O. W.

Eastern Division—

Dowding, J. C.
Stafford Smith, F

Exchange Dept.—

Peacock, C. S.

General—

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

Insurance Dept.—

Kench, O. C.

Motion Picture Dept.—

Jansen, W. H.
Jones, E. T.
Buckstone, W.
Chiogalnova, 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.

(b) BAT in 1926

Figure A.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

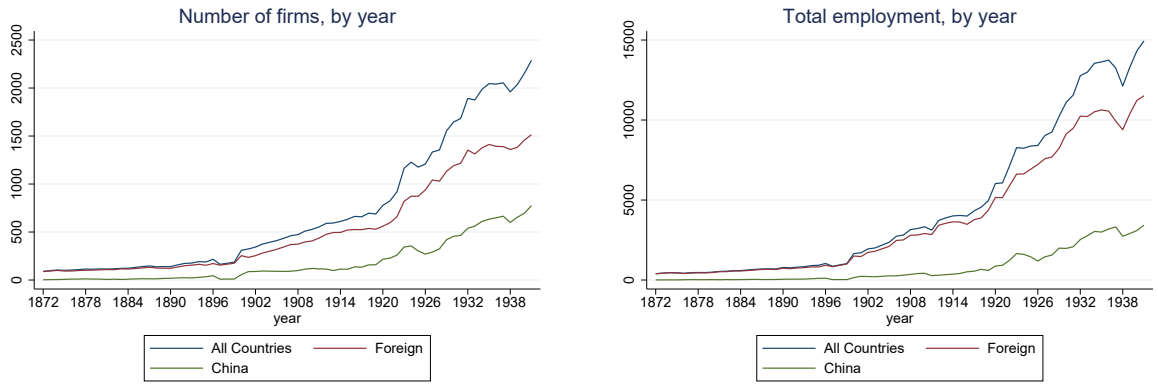
(b) Lion: German authentic producer

(c) Good luck: Japanese counterfeit

(d) Good luck: British authentic producer

Figure A.3: Examples of Authentic and Counterfeit Trademarks

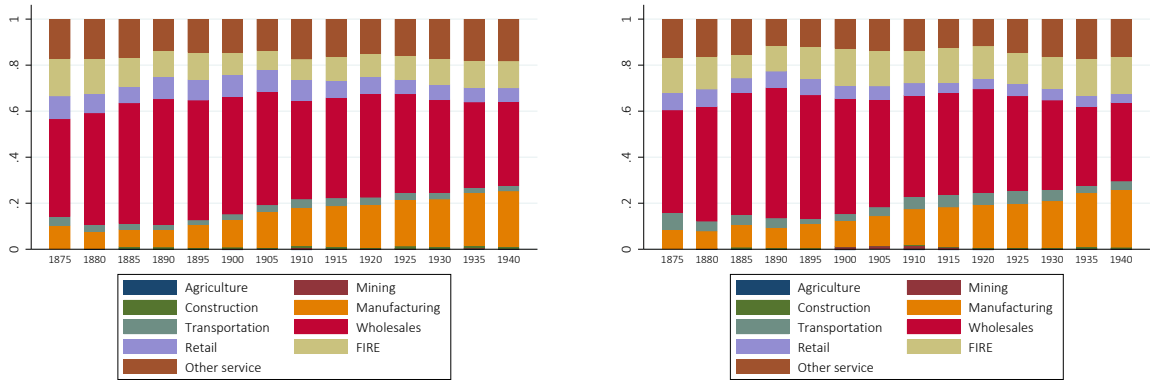
Sources: Images are taken from the Chinese Trademark Gazette *(Shangbiao Gongbao* (商标公报)) (volumes 9 and 29 of applications and volumes 15 and 29 of registrations).



(a) Number of firms

(b) Total employment

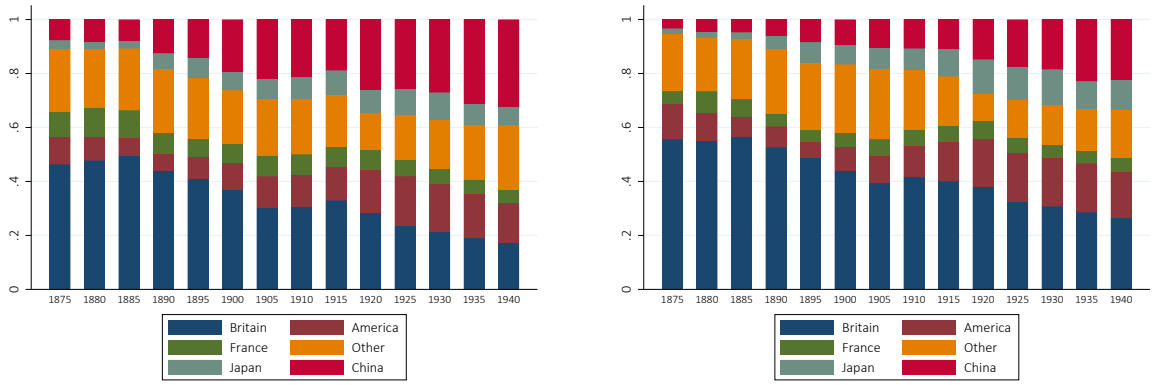
Figure A.4: Trends in Firms and Employment in the Shanghai Concessions, 1872-1938



(a) By number of firms

(b) By employment

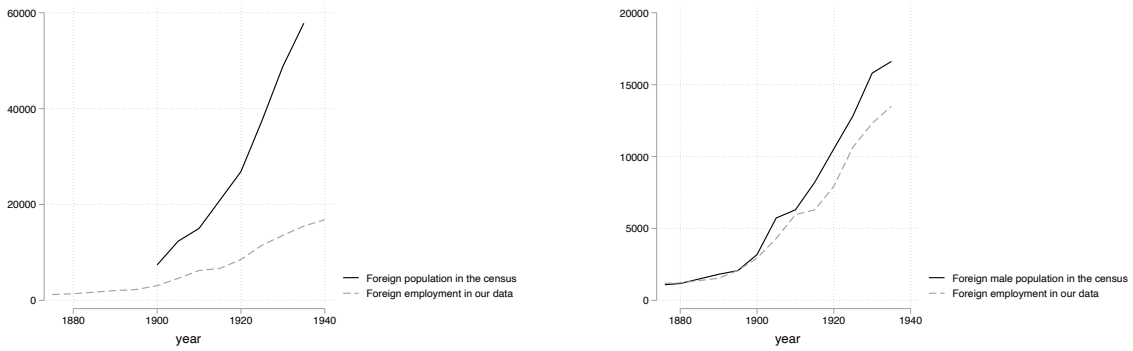
Figure A.5: Composition of Firms in Shanghai's Concessions by Industry, 1875-1941



(a) By number of firms

(b) By employment

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



(a) All concessions (b) International concession

Figure A.7: Data Validation

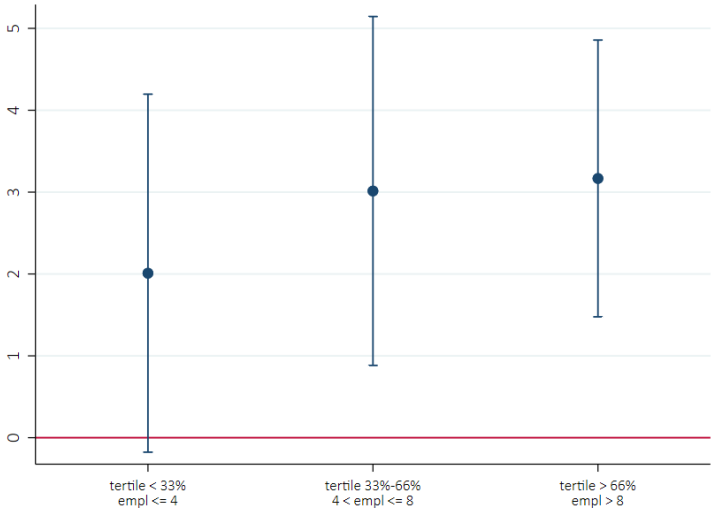


Figure A.8: Differential Effect of the Trademark Law on the Employment Share of Western Firms, by Size

Notes: For this graph we run the estimation used in column (4) of Table 3 and allow the effect to vary by initial employment size tertile of Western firms.

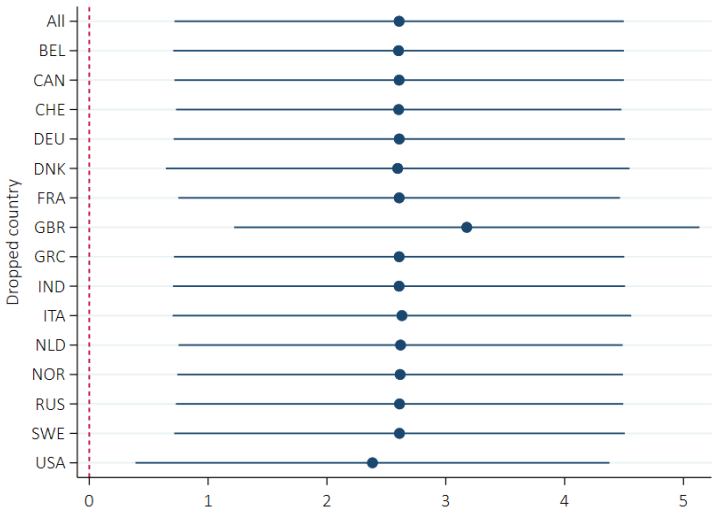


Figure A.9: Effect of the Trademark Law on Employment at Western Firms, dropping one home country at a time

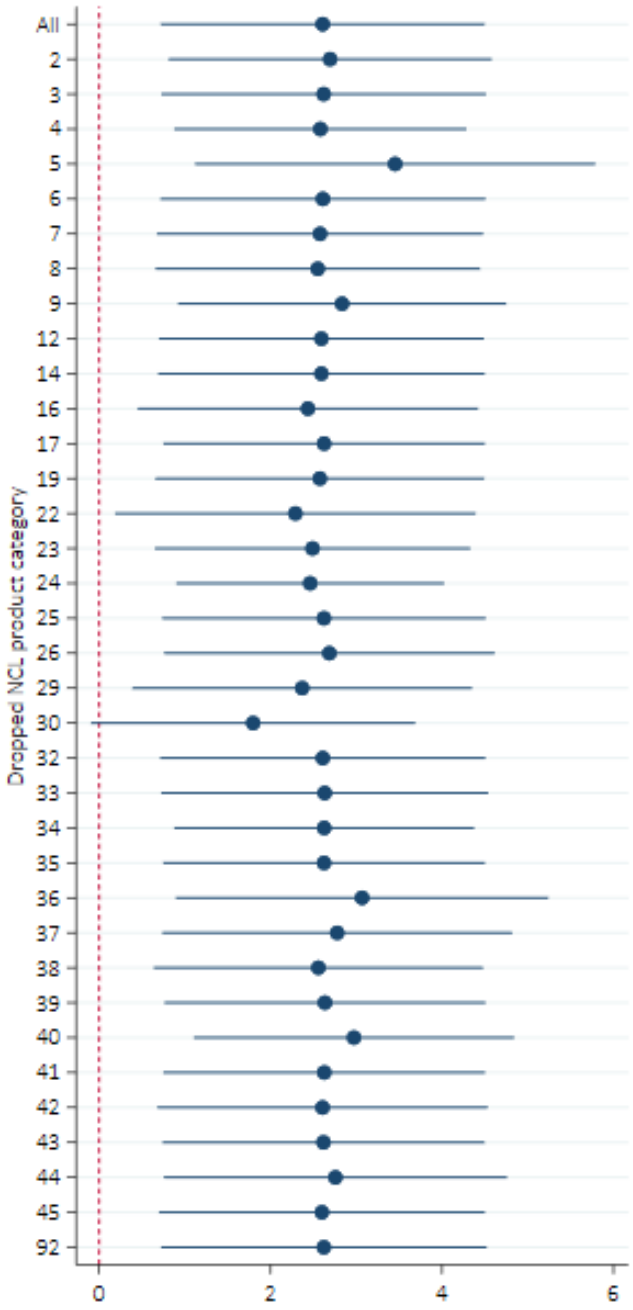


Figure A.10: Effect of the Trademark Law on Employment at Western Firms, dropping one NCL product category at a time

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.

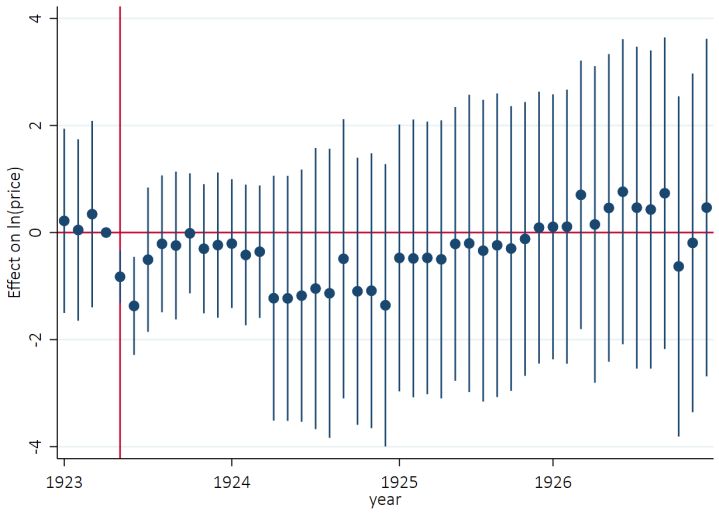


Figure A.11: Effect of the Trademark Law on Prices: Event Study

Notes: The figure estimates the event study version of column (1) in Table 11 by allowing the effect on trademark intensity to vary every month.

B Model: Trademark Protection, Counterfeiting, Intermediation, Entry, and Welfare

This appendix provides a stylized framework that isolates the mechanisms through which trademark protection affects the organization and behavior of firms in international markets with deceptive counterfeiting. The model is deliberately parsimonious. Its purpose is to (i) clarify how enforcement changes authenticity, firms' private deterrence, and reliance on intermediaries; (ii) generate comparative statics for entry and prices; and (iii) discipline the welfare decomposition used in Appendix B.7.

B.1 Environment

Consider a product category p with consumer mass M_p and N_p differentiated authentic brands, $\mathcal{B}_p = \{1, \ldots, N_p\}$. Each authentic brand delivers intrinsic quality $q_p > 0$. Counterfeits are deceptive at the point of sale (consumers cannot verify authenticity at purchase) and deliver lower realized quality $\underline{q}_p \in (0, q_p)$.

Trademark protection is summarized by $TP_t \in \{0, 1\}$ and interacts with category-specific trademark intensity $TMInt_p$. Higher $TMInt_p$ captures categories in which source identification is more valuable to consumers and, empirically, where trademark enforcement has larger effects.

Timing.

1. Policy (TP_t) and category primitives $(TMInt_p, M_p, q_p, \underline{q}_p)$ are given.
2. Entry: N_p symmetric authentic firms enter, each paying fixed cost $F_{ap} > 0$.
3. Each authentic firm chooses price P_p, reliance on domestic intermediaries $\mu_p \in [0, 1]$, and private deterrence (e.g., anti-imitation effort) $a_p \geq 0$.
4. Counterfeiting occurs. Counterfeiters sell under authentic brand identities at the posted brand price P_p.
5. Consumers observe (N_p, P_p, μ_p, a_p) but not authenticity, purchase, and learn authenticity only after purchase.

B.2 Demand and consumer surplus

Consumers j have multinomial logit preferences over brands and an outside option. Expected utility from brand i is

$$u_{jip} = \alpha_p \tilde{q}_p - \alpha_P P_p + \varepsilon_{jip}, \qquad \varepsilon_{jip} \sim \text{i.i.d. Type-I EV}, \tag{6}$$

with outside utility $u_{j0p} = \varepsilon_{j0p}$. Expected quality is

$$\tilde{q}_p \equiv s_p q_p + (1 - s_p)\underline{q}_p, \qquad s_p \in [0, 1], \tag{7}$$

where s_p is the equilibrium probability a purchased unit is authentic.

In a symmetric equilibrium, each brand's market share $\pi_{ip} = \pi_p$ is

$$\pi_p(P_p, s_p; N_p) = \frac{\exp(\delta_p)}{1 + N_p \exp(\delta_p)}, \qquad \delta_p = \alpha_p \tilde{q}_p - \alpha_P P_p, \tag{8}$$

so per-brand demand is

$$D_p(P_p, s_p; N_p) = M_p \, \pi_p(P_p, s_p; N_p). \tag{9}$$

Higher authenticity increases demand:

$$\frac{\partial D_p}{\partial s_p} = M_p \frac{\partial \pi_p}{\partial \delta_p} \cdot \alpha_p (q_p - \underline{q}_p) > 0. \tag{10}$$

B.3 Counterfeiting technology and authenticity

Counterfeiting is deceptive at the point of sale. We model counterfeiting as determining the *share* of transactions served by counterfeits for a given brand, θ_p. This formulation captures the core economic constraint (consumers cannot condition on authenticity at purchase) while keeping comparative statics transparent.

Enforcement and intermediary exposure. Trademark protection affects counterfeiting through two primitives. First, it increases the marginal cost of counterfeiters $\tilde{c}_{cp}$, and more so in high-$TMInt_p$ categories:

$$\tilde{c}_{cp} \equiv c_{cp} + \lambda_p(TP_t, TMInt_p), \qquad \frac{\partial \lambda_p}{\partial TP} > 0, \quad \frac{\partial^2 \lambda_p}{\partial TP \, \partial TMInt_p} > 0. \tag{11}$$

Second, it reduces counterfeit effectiveness through intermediary-based distribution ℓ_p, and more so in high-$TMInt_p$ categories:

$$\ell_p = \ell_p(TP_t, TMInt_p) \in (0, 1], \qquad \frac{\partial \ell_p}{\partial TP} < 0, \quad \frac{\partial^2 \ell_p}{\partial TP \, \partial TMInt_p} < 0. \tag{12}$$

Counterfeit penetration. Assume that the counterfeit penetration rate θ_p for a representative brand is given by

$$\theta_p(P_p, \mu_p, a_p; TP_t, TMInt_p) = \Theta\left(\underbrace{P_p - \tilde{c}_{cp}}_{\text{counterfeit margin}} + \underbrace{\eta_\mu \, \ell_p(TP_t, TMInt_p)\mu_p}_{\text{intermediary exposure}} - \underbrace{\eta_a a_p}_{\text{private deterrence}} \right), \tag{13}$$

where $\Theta : \mathbb{R} \to (0, 1)$ is increasing and continuously differentiable (e.g., logistic), and $\eta_\mu, \eta_a > 0$. The counterfeit penetration rate increases with the counterfeiters' margin and the use of intermediaries, and decreases with the level of private deterrence. Equation (13) can be microfounded by a continuum of potential counterfeiters with heterogeneous costs and free entry, in which the probability that a transaction is served by a counterfeit increases in the counterfeit margin and intermediary exposure, and decreases in deterrence.

Authenticity. Authenticity is then

$$s_p = 1 - \theta_p(P_p, \mu_p, a_p; TP_t, TMInt_p). \tag{14}$$

This formulation captures the key economic logic: enforcement raises authenticity by reducing counterfeit profitability and intermediary-based substitution, while firms' choices (P_p, μ_p, a_p) affect authenticity through counterfeit incentives and exposure.

B.4 Authentic firms: costs and profits

Producing an authentic unit has baseline marginal cost c_{ap}. Reliance on domestic intermediaries reduces distribution costs:

$$c_{ap}(\mu_p) = c_{ap} - \tau_p \mu_p, \qquad \tau_p > 0. \tag{15}$$

Private deterrence a_p has per-unit cost $\kappa_p \psi(a_p)$, with $\psi'(a) > 0$ and $\psi''(a) \geq 0$:

$$\text{unit deterrence cost} = \kappa_p \psi(a_p). \tag{16}$$

Given symmetry, the representative authentic firm's profit is

$$\Pi_{ap}(P_p, \mu_p, a_p; N_p, TP_t, TMInt_p) = (P_p - c_{ap}(\mu_p) - \kappa_p \psi(a_p))\ Q_{ap} - F_{ap}, \tag{17}$$

where authentic sales are total sales times authenticity:

$$Q_{ap} \equiv s_p\, D_p(P_p, s_p; N_p). \tag{18}$$

(Under posted-price deception, counterfeits divert transactions from authentic producers; authenticity therefore scales authentic sales.)

We assume an interior symmetric equilibrium exists for given N_p, with concavity in (P_p, μ_p, a_p). This is standard under logit demand and convex costs and is sufficient for the comparative statics below.

B.5 Comparative statics

The model delivers three core mechanisms emphasized in the paper: authenticity, firm organization (private deterrence and intermediation), and entry. Proofs are kept short by relying on monotonicity of (13)–(14) and standard envelope arguments.

Proposition 1 (Enforcement raises authenticity)**.** *For any (P_p, μ_p, a_p), authenticity s_p defined in* (14) *is increasing in TP_t. The increase is larger in high-$TMInt_p$ categories under* (11)–(12)*.*

Proof. By (11), TP_t increases $\tilde{c}_{cp}$, lowering the counterfeit margin $(P_p - \tilde{c}_{cp})$. By (12), TP_t reduces ℓ_p, lowering intermediary exposure. Since $\Theta(\cdot)$ is increasing, both changes reduce θ_p in (13), and thus increase $s_p = 1 - \theta_p$. Cross-partials in (11)–(12) imply larger effects when $TMInt_p$ is higher. ∎

Proposition 2 (Private deterrence falls with enforcement)**.** *In the interior symmetric equilibrium for fixed N_p, the optimal deterrence choice a_p^* is decreasing in TP_t. The decline is larger in high-$TMInt_p$ categories when enforcement has stronger effects on λ_p and ℓ_p.*

Proof. Deterrence affects profits through (i) its direct cost $\kappa_p \psi(a_p)$ and (ii) its effect on authenticity via (13)–(14), which raises Q_{ap} in (18). Stronger enforcement increases authenticity for any a_p (Proposition 1), reducing the marginal benefit of further deterrence. Under concavity, this implies the first-order condition for a_p shifts inward with TP_t, so a_p^* falls. Stronger enforcement effects in high-$TMInt_p$ categories further lower the marginal return to a_p, amplifying the decline. ∎

Proposition 3 (Intermediation rises with enforcement)**.** *In the interior symmetric equilibrium for fixed N_p, the optimal intermediary reliance μ_p^* is increasing in TP_t, with a larger increase in high-$TMInt_p$ categories when ℓ_p falls more with enforcement.*

Proof. Intermediation affects profits through (i) the cost reduction $\tau_p \mu_p$ in (15) and (ii) higher counterfeit penetration via the exposure term $\eta_\mu \ell_p \mu_p$ in (13), which lowers authenticity and thus Q_{ap}. Since enforcement reduces ℓ_p, it weakens the counterfeit penalty associated with μ_p, raising the marginal benefit of intermediation. Under concavity, the first-order condition shifts outward, implying μ_p^* rises. The cross-partial restriction in (12) implies stronger effects in high-$TMInt_p$ categories. ∎

Entry. Let $\Pi^*_{ap}(N_p, TP_t, TMInt_p)$ denote equilibrium profit after solving firms' within-N_p choices.

Assumption 1 (Competition reduces per-brand profits)**.** *For fixed* $(TP_t, TMInt_p)$, $\Pi^*_{ap}(N_p, TP_t, TMInt_p)$ *is strictly decreasing in* N_p *whenever* $N_p > 0$.

This holds under standard logit competition: more varieties reduce each brand's share, and re-optimized prices do not overturn this effect under regularity.

Proposition 4 (Enforcement increases authentic entry)**.** *Free entry pins down* N_p^* *by* $\Pi^*_{ap}(N_p^*, TP_t, TMInt_p) = 0$ *when* $N_p^* > 0$. *If* $\Pi^*_{ap}(N_p, TP_t, TMInt_p)$ *is (weakly) higher under* $TP_t = 1$ *for any fixed* N_p*, then* N_p^* *is (weakly) higher under* $TP_t = 1$*, with larger increases in high-*$TMInt_p$ *categories.*

Proof. If enforcement raises profits at the pre-reform entry level, profits become positive. Since profits fall in N_p (Assumption 1), restoring the zero-profit condition requires additional entry. Larger profit effects in high-$TMInt_p$ categories imply larger entry responses. ■

Corollary 1 (Ambiguous price effects)**.** *Trademark protection has an a priori ambiguous effect on equilibrium prices.*

Proof. Enforcement raises authenticity (increasing willingness to pay), but also reduces private deterrence costs and facilitates cost-saving intermediation, and it induces entry that intensifies competition. The net effect depends on the relative strength of these forces. ■

B.6 Mapping to the empirical analysis

The model yields a direct mapping from trademark protection to the empirical outcomes studied in the paper. Empirically, enforcement changes over time through TP_t and its effects vary across product categories through $TMInt_p$. In the model, the interaction restrictions

$$\frac{\partial^2 \lambda_p}{\partial TP\, \partial TMInt_p} > 0, \qquad \frac{\partial^2 \ell_p}{\partial TP\, \partial TMInt_p} < 0,$$

imply larger equilibrium responses in categories where source identification is more important, motivating difference-in-differences designs that compare high-$TMInt_p$ to low-$TMInt_p$ categories before and after the reform.

Anti-imitation advertising. Private deterrence a_p corresponds to anti-imitation advertising and related activities (labeling, packaging innovation, monitoring, and consumer education). Proposition 2 predicts that stronger enforcement reduces private deterrence, with larger declines in high-$TMInt_p$ categories.

Authentic firm activity (employment and production). Authentic sales $Q_{ap} = s_p D_p(\cdot)$ increase with enforcement as authenticity rises (Proposition 1) and counterfeit diversion falls. Under standard technologies, employment and production scale with authentic sales, predicting higher employment among authentic firms, especially in high-$TMInt_p$ categories.

Entry and exit of authentic firms. The equilibrium number of brands N_p^* maps to authentic firm entry and exit. Proposition 4 predicts increased entry (and reduced exit) of authentic firms in high-$TMInt_p$ categories.

Counterfeiter activity. Counterfeit penetration θ_p is decreasing in enforcement through both higher counterfeit costs and lower intermediary-based substitution (Proposition 1). Empirically this maps to contraction of imitation-prone firms and reduced indicators of counterfeiting.

Domestic intermediaries and firm organization. Intermediation μ_p maps to reliance on domestic intermediaries and the depth of foreign–domestic linkages. Proposition 3 predicts that enforcement increases reliance on intermediaries by lowering brand dilution risk, with larger effects in high-$TMInt_p$ categories.

Brand prices. Corollary 1 implies ambiguous average price effects and motivates heterogeneity tests: prices rise where authenticity is highly valued and competition is limited, and fall where reduced defensive costs and lower entry barriers intensify competition.

B.7 Welfare

We evaluate welfare at the product-category level and focus on consumer surplus. Under multinomial logit preferences, consumer surplus in category p is

$$CS_p = \frac{M_p}{\alpha_P} \ln(1 + N_p \exp(\delta_p)), \qquad \delta_p = \alpha_p\big(s_p q_p + (1 - s_p)\underline{q}_p\big) - \alpha_P P_p. \tag{19}$$

Let $IV_p \equiv \ln(1 + N_p e^{\delta_p})$ denote the inclusive value. Since $CS_p = (M_p/\alpha_P)\, IV_p$, percentage changes in consumer surplus are given by percentage changes in the inclusive value:

$$\Delta \ln CS_p = \Delta \ln IV_p.$$

B.7.1 Welfare decomposition

A first-order approximation around the pre-reform equilibrium yields a transparent decomposition:

$$\Delta \ln CS_p \approx \underbrace{\varepsilon_{s,p}\, \Delta \ln s_p}_{\text{Authenticity}} + \underbrace{\varepsilon_{N,p}\, \Delta \ln N_p}_{\text{Variety}} + \underbrace{\varepsilon_{P,p}\, \Delta \ln P_p}_{\text{Prices}}, \tag{20}$$

where elasticities are evaluated at the pre-reform equilibrium and equal

$$\varepsilon_{s,p} = \frac{\partial \ln CS_p}{\partial \ln s_p} = \frac{\alpha_p(q_p - \underline{q}_p)s_p}{IV_p}\, N_p \pi_p, \tag{21}$$

$$\varepsilon_{N,p} = \frac{\partial \ln CS_p}{\partial \ln N_p} = \frac{N_p \pi_p}{IV_p}, \tag{22}$$

$$\varepsilon_{P,p} = \frac{\partial \ln CS_p}{\partial \ln P_p} = -\frac{\alpha_P P_p}{IV_p}\, N_p \pi_p, \tag{23}$$

with $\pi_p = \exp(\delta_p)/(1 + N_p \exp(\delta_p))$.

Equation (20) expresses welfare changes as the sum of three empirically identifiable components: improved authenticity (reduced information frictions), expanded authentic variety (entry), and equilibrium price adjustments.

B.7.2 Quantifying welfare at mean trademark intensity

We quantify and decompose the welfare implications of trademark protection using the empirical estimates in the paper, evaluated at mean trademark intensity. The decomposition is an accounting exercise that maps

estimated changes in authenticity, variety, and prices into welfare components.

Empirical inputs. The empirical analysis delivers the three changes required by (20):

Variety. At the mean trademark intensity, trademark protection increases authentic varieties by about 2.9 per product. With baseline $N_p^0 = 4.54$,

$$\Delta \ln N_p = \ln\left(\frac{7.44}{4.54}\right) \approx 0.489. \tag{24}$$

Prices. The price regressions imply a mean effect of

$$\Delta \ln P_p \approx -0.026. \tag{25}$$

Authenticity. We discipline changes in authenticity using the reallocation of employment share away from imitation-prone firms and toward authentic firms. A benchmark estimate at the mean trademark intensity is

$$\Delta \ln s_p \approx 0.176. \tag{26}$$

Baseline elasticities. We evaluate elasticities at the pre-reform equilibrium. Since our data are conditional on product category purchases, the outside option is effectively absent. We therefore set the outside-option share to 0.1% as a numerical approximation. With $N_p^0 = 4.54$, this implies $\delta_p^0 = 5.6$ and $IV_p^0 \approx 7.11$.

We normalize the quality scale by setting $\alpha_p(q_p - \underline{q}_p) = 1$. Because α_p and quality enter utility only through their product, this assumption entails no loss of generality and simply fixes the units of quality. We set the baseline price disutility to $\alpha_P P_p^0 = 3.2$ to match a standard benchmark for within-category own-price elasticities under logit demand. In a symmetric equilibrium, the own-price elasticity of a representative brand is $\epsilon_{ii} = -\alpha_P P_p(1 - \pi_{ip})$. With an effectively negligible outside option and $N_p^0 = 4.54$, this choice implies $|\epsilon_{ii}| \approx 3.2 \times 0.78 \approx 2.5$, consistent with typical estimates for differentiated products. Given that this parameter scales the price component of the welfare decomposition and the estimated price response is modest, the quantitative contribution of prices is limited and not sensitive to reasonable alternative values.

Specifically, we obtain the following baseline elasticities:

$$\varepsilon_{s,p} \approx 0.107, \qquad \varepsilon_{N,p} \approx 0.140, \qquad \varepsilon_{P,p} \approx -0.449, \tag{27}$$

where $\varepsilon_{s,p}$ corresponds to baseline authenticity $s_p^0 \approx 0.75$ observed in the data.

Decomposition. Combining (24)–(26) with (27) and substituting them into (20) implies:

$$\Delta \ln CS_p \;\approx\; \underbrace{0.019}_{\text{Authenticity}} + \underbrace{0.069}_{\text{Variety}} + \underbrace{0.012}_{\text{Prices}} = 0.099, \tag{28}$$

implying an increase in consumer surplus of approximately **9.9%** in a representative product category at the mean level of trademark intensity. When excluding the price component whose estimate is insignificant in the empirical analysis, the implied welfare gain remains substantial at 8.8%. This decomposition provides a first-order accounting of how the estimated changes in authenticity, product variety, and prices translate into welfare under the logit demand structure.

To assess sensitivity to the price scale parameter, we vary $\alpha_P P_p^0$ over the range $[2, 5]$. Over this interval, the price component ranges from 0.007 to 0.019, while the total welfare effect varies only from 0.095 to 0.106. Thus, although the magnitude of the price term scales proportionally with $\alpha_P P_p^0$, the overall welfare

gain is stable, and the qualitative ranking with variety as the dominant channel, followed by authenticity remains unchanged across plausible calibrations.

Discussion. The decomposition highlights that the welfare gains are driven primarily by the expansion of authentic variety, with meaningful additional gains from improved authenticity and a comparatively small role for average price changes. This pattern matches the empirical evidence that trademark protection mainly improves market functioning by reducing imitation and encouraging authentic entry, rather than by conferring monopoly power.