NBER WORKING PAPER SERIES

COUNTERFEITERS: FOES OR FRIENDS?

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Working Paper 16785
http://www.nber.org/papers/w16785

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2011

I warmly acknowledge support from the Kauffman Foundation Grants. I am grateful to Josh Lerner, Eric Anderson, Philippe Aghion, Meghan Busse, Shane Greenstein, Angela Lee, Jin Li, Keith Maskus, Ivan Png, Scott Stern, K. Sudhir, Catherine Tucker and Florian Zettlemeyer for helpful discussions; to seminar participants at the Kellogg School of Management, Yale School of Management, University of Colorado, and Quantitative Marketing and Economics conference for comments. Cooperation from the Chinese Quality and Technology Supervision Bureau (QTSB) and the companies we interviewed and surveyed are gratefully acknowledged. The results in this paper do not necessarily represent the views of QTSB or of the National Bureau of Economic Research.

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NBER Working Paper No. 16785
February 2011, Revised July 2011
JEL No. L25,L26,L6

ABSTRACT

This paper combines a natural policy experiment with randomized lab experiments to estimate the heterogeneous impacts of counterfeiting on the sales and consumer purchase intent of branded products of various quality levels. I collect new product-line-level panel data from Chinese shoe companies from 1993 to 2004. I identify heterogeneous effects of counterfeit entry on sales of authentic products of three quality tiers. In particular, counterfeits have both advertising effects for a brand and substitution effects for authentic products, and the effects linger for a few years. The advertising effect dominates substitution effect for high-end authentic product sales, and the substitution effect outweighs advertising effect for low-end product sales. The positive effect of counterfeits is most pronounced for high-fashion products (such as women's high-leg boots) and for high-end products of brands that were not yet well-known at the time of the entry by counterfeiters. Analogous heterogeneous effects of counterfeiting on consumer purchase intent for branded products of three quality tiers are also discovered in lab experiments. I propose a theoretical framework to explain and generalize the findings.

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"Imitation is the sincerest flattery."
~ C. C. Colton (1780 -1832), "The Lacon"

Counterfeits are illegal products that infringe upon others' brands that they do not own. They affect many industries and can have large influences on what a brand means to consumers. Marketing studies of whether consumers view a brand more positively or negatively in the presence of counterfeits have produced mixed results (Commuri 2009, Richardson 2009, Han et al. 2010). Given the growing popularity of counterfeits across many sectors and countries, it is not surprising that counterfeiting remains at the center of trade disputes. The year 2007 alone witnessed a G-8 summit recommending stronger enforcement of intellectual property rights (IPR), the initiation of a WTO dispute over China's IPR enforcement regime, and the launch of inter-governmental negotiations toward an Anti-Counterfeiting Trade Agreement (ACTA). In fiscal year 2009, the U.S. Customs and Border Protection seized more than $260 million worth of counterfeits, and counterfeit footwear accounted for 40% of the total seizures (Schmidle 2010). In fact, counterfeit footwear has topped the seizure list of the customs service for four years.

While curbing counterfeiting by tightening IPR has been a common practice worldwide to foster brand values, only a few researches have studied the impacts of counterfeits. Grossman and Shapiro (1988a,b) theorize about the implications of counterfeits for international trade. An investigation involving premium brands in Thailand and India reveals that consumers of genuine items adopt one of three strategies when faced with the prospect of their favorite brands being counterfeited: flight (abandoning the brand), reclamation (elaborating the patronage of a brand), and abranding (disguising all brand cues) (Commuri 2009). Qian (2008) offers the first econometric study of the impacts of entry by counterfeiters on authentic price, quality (as proxied by unit production cost), advertising, and self-enforcement expenditures. It shows that authentic firms innovate and engage in self-enforcement in the face of counterfeits. The sales responses remain a mystery partly due to lack of data.

This paper contributes to the literature in several important dimensions. First and foremost, I significantly extend the brand-level panel data in Qian (2008) to footwear product-line details within each brand and obtain product-line-level sales data for the first time. As a result, I am able to go beyond the general impacts of counterfeiting on authentic manufacturer marketing norms (Qian 2008) and study its sales impacts, a topic that marketing managers and scholars care about deeply.

Second, Qian (2008) provides the *average treatment effects* of counterfeits on marketing variables across all sampled brands. This paper, however, provides careful empirical identifications of the *heterogeneous effects* of counterfeits on sales of authentic products *at different quality tiers*. The dynamic heterogeneous effects over time are also charted here.

Third, I further probe into the heterogeneous sales impacts based on theories and data. The combination of field and lab data generates insights at both the aggregated market level and the individual sampled consumer level. The field data uncover the aggregated sales impacts, and the lab experiments unravel such impacts at the consumer level. The combination of a natural policy experiment and manipulated lab experiments produces conclusions that are more likely to have both internal and external validity.

In addition to the new research question, new data, and new approach of combining field studies with lab experiments, this study uncovers interesting findings that are surprising at first sight yet shed new light on linking different strands of theoretical literature on vertical differentiation, advertising, and consumer behavior. The theory framework proposed here helps provide theoretical foundations and generalize the findings.

Last but not least, the discovery and understanding of the heterogeneous impacts at theoretical and empirical levels have important implications for guiding priorities for IPR enforcement policy. As a recent World Intellectual Property Organization study comments, "Governments are invariably resource constrained and completely eradicating violations of IPR law – like violations of other types of law – is out of reach for even the best-resourced states"(Fink et al. 2010). Advocates of IPR believe in the stimulating effects it has had on innovation, which would fuel faster economic growth. Such stimulating effects are shown to be very limited in practice (Lerner 2009) with a generalizable conditional importance of patent effects only in countries of higher development and education levels (Qian 2007). The debate over IPR culminated in the TRIPs (Trade-Related Intellectual Property) negotiations, which were largely motivated by the desire to reduce trade in counterfeit goods. This study therefore contributes to the broader literature on how firm responses to the legal environment could have important moderating effects on the impact of IPR protection (Mortimer 2007, Qian 2008).

There is a dearth of empirical studies of counterfeits or underground economics in general: the illicit nature of counterfeiting implies it is "under the table" and difficult to measure. Since China

faces serious counterfeit problems, the Chinese footwear sector has a strong incentive to investigate the effects of counterfeiters. I gathered internal and external data on Chinese shoe brands to analyze the sales effects of counterfeiting. A key difficulty in empirically measuring entry effects on authentic sales is that entry is often endogenous to these outcomes. The higher the authentic producer's sales, the more likely counterfeiters will enter to copy the brand. The natural experiment and IV strategy allowed me to identify occasions in which counterfeiters are more likely to enter for exogenous reasons that are unrelated to the brand holder's sales prospects – "randomized" entry – to infer entry impacts.

The natural experiment was created by the Chinese government's emergent reallocation of IPR enforcement resources from monitoring footwear and fashion products to other sectors. This policy was implemented in response to a series of food poisoning and gas explosion accidents in the early nineties. Counterfeiters massively entered the Chinese footwear industry shortly after the policy shift, infringing on brands of both multinational corporations and Chinese enterprises. I was able to directly analyze short-term and long-term sales impacts of counterfeiting. I did so through a unique panel dataset with detailed financial information over a recent 12-year period for 31 branded shoe companies (including domestic brands and multinational brands operating in China) and their counterfeiters, if any, in China.[1] These financial data were supplemented by the Chinese Industrial Census database, eBay-in-China dataset, product catalog information, and interviews. The natural experiment and panel structure at the product-line level enabled systematic analyses of the heterogeneous sales impacts of counterfeiting.

In addition, I conducted controlled lab experiments to further test the effects of exposure to counterfeits on consumers' intent to purchase authentic products at the three representative quality tiers. These experiments complement the field studies by providing micro-foundations of the overall sales impacts based on individual purchase intent and motivations. The convergent results from the field policy experiment and randomized lab experiments assist with causal inferences that have both internal and external validity (Luo et al. 2010).

A number of insights emerge from this study. Counterfeit entry exhibits both negative substitution and positive spillover effects on authentic sales. The net effect is positive for high-end authentic

[1]Most brands in China are concentrated in the leather and sport shoes sector, as compared to other parts of the footwear industry, and accounts for approximately 6 billion USD annual sales. Some Chinese brands, such as Li-ning and Anta, occupy Chinese market shares close to that of Nike's.

products and negative for low-end authentic products, even within the same brand. This is consistent with the general asymmetric competition phenomenon in marketing (Blattberg and Wisniewski 1989). That is, higher-price and higher-quality brands draw market share from their own price tier competitors and from the tier below. However, lower-quality, lower-price ones rarely take unit sales from higher-priced, higher-quality brands in the tier above. Furthermore, the positive marginal effect of counterfeits on authentic sales is most pronounced for high-fashion products (such as women's high-leg boots) and for high-end shoes of brands that were not well-known at the time of the entry by counterfeiters. These findings, together with the stated purchase motivations in the lab experiments, reveal the potential advertising mechanism underlying the counterfeiting effects. That is, the positive effect on high-end authentic products comes mainly from increased brand awareness and affinity due to the presence of counterfeits. Brands with less government protection seek to differentiate their products by moving up the quality ladder. Over time, these brands shift toward higher-end product lines and shrink their low-end product lines. Such heterogeneous sales impacts are directly linked to the corresponding impact of being exposed to counterfeits on a consumer's purchase intent for products of the three quality tiers. The experiment responses also suggest the double-edged effects of counterfeits in increasing brand awareness and in substituting for the authentic product.

The rest of the paper is organized as follows: First, I discuss the relationship between this research and the existing literature. Second, I propose a theoretical framework that builds on and synthesizes the literature. Third, I describe the field data, followed by empirical analyses and results. Next, I document the lab experimental design and results. Finally, I draw out policy implications. Figures and tables are included in the end.

LITERATURE AND THEORY

Literature Review

To some extent, the marketing literature has explored the demand for counterfeits (Bloch et al. 1993, Cordell et al. 1996, Wee et al. 1995, Tom et al. 1998, Huang et al. 2004, Celso et al. 2007, Han et al. 2010), with price, social aspiration, and attitudes toward large branded companies cited

as main factors in driving counterfeit demand. Wilcox et al. (2009) conducted lab experiments and found that products with large logos are more likely to be valued for their social-adjustive function (helping consumers gain social approval and status), which, in turn, makes consumers more willing to buy counterfeits. Additionally, a consumer's willingness to buy a counterfeit is correlated with advertising campaigns that emphasize the social-adjustive function of the good. On the supply side, several studies have examined legal responsibilities (Olsen and Granzin 1993, Jain 1996, Cohen 1986, Gillespie 2002) and firms' internal organizations in complementing weak IPR enforcement (Zhao 2006).

A stream of literature on online piracy has vigorously debated the effect of file-sharing on original music sales in recent years, and Liebowitz (2006) and Oberholzer-Gee and Strumpf (2009) provide excellent surveys. Several empirical studies point to a negative effect of piracy and file-sharing (Givon et al. 1995, Hui and Png 2003, Liebowitz 2006, Hong 2008), yet Oberholzer-Gee and Strumpf (2007) conclude the opposite, based on an uniquely matched dataset of music downloads and purchases. Along the same line, Mortimer et al. (2010) find that illegitimate redistribution of digital goods increases revenue from nondigital complementary products, notably live performances. At the consumer level, Rob and Waldfogel (2006) conducted surveys of undergrad students. Although they found that the average drop in album purchases due to downloading was \$0.2, consumer surplus increased due to the lower prices. King and Lampe (2003) propose that allowing piracy in the absence of price discrimination could be profitable only when the ability to pirate is inversely related to willingness to pay.

In short, the literature has not provided generalizable guidance on the sales effects of counterfeits or the underlying mechanisms. This study starts with theoretical foundations to guide empirical investigations. I collected detailed sales data at the product-line level for each of the 31 branded companies and their counterfeits in the original sample in Qian (2008). These new data enable rich analyses of the sales impacts of counterfeits at the product-line level. I then supplemented the field natural experiment with lab experiments in testing the heterogeneous effects and exploring mechanisms.

Theoretical Framework

Assimilating advertising effects into a vertical differentiation model, I link these two strands of the theoretical literature in a stylized model to conceptualize and guide the empirical tests. While I

relegate the model details to the Appendix, I summarize the key intuitions and insights of the model in this section.

I started with the vertical differentiation model pioneered by Mussa and Rosen (1978). Counterfeiters usually imitate authentic products by reverse-engineering to different degrees (Schmidle 2010). The quality is hence below or, at best, equivalent to that of the authentic product. The vertical differentiation model provides an appropriate and useful framework for conceptualizing the competition between the authentic and counterfeit producers. I extended the model in the traditional single-product setting to one in which the incumbent branded producer has multiple products, as in the real world, and studied a market with a multi-product brand facing the threat of counterfeit infringements.

The model yields insights on two opposing effects of entry: substitution effect and demand-enlarging effect. Like any entrant competitor, a counterfeiter steals demand from the authentic brand as some consumers trade down to purchase the counterfeits. This substitution effect is more negative when counterfeits are closer substitutes for the authentic product.[2] The vertical differentiation model also informs us of an opposite positive effect of the entry of a lower-quality product. Namely, it could help to capture a segment of consumers whose valuation of the product quality is so low that they are not willing to pay the higher price for the authentic product. With the introduction of counterfeits, these consumers now participate in the marketplace by enjoying lower quality (or lower authenticity) counterfeits at a lower price. I derived closed-form solutions for the negative substitution effect and the positive demand-enlarging effect.

Besides the demand-enlarging effect, illegal imitation can have other positive effects on authentic product sales. A commonly cited mechanism is network effects, where the consumer utility of a product is an increasing function in the size of the user base, and this argument is proposed particularly for software and book copyright cases (Takeyama 1991, Conner and Rumelt 1991, Khan 2004). Others suggests that imitation could serve as a signal for the original product's or idea's high quality (Castro et al. 2008, Biais and Perotti 2008). Sociology theory on omnivorism suggest that high-status consumers can traverse a broad taste hierarchy because they possess knowledge of a diverse array of objects. Richardson (2009) documented that having consumed counterfeits stimulated these consumers

[2]Here I focus on the case in which consumers knowingly purchase counterfeits. In the case of deceptive counterfeits, where consumers cannot discern counterfeits from authentic products, the business-stealing effect will be even stronger.

to purchase more branded purses, based on her ethnographic research. All these mechanisms speak to the advertising effect of counterfeits.

I therefore incorporated advertising into the vertical differentiation framework to explain an additional positive effect counterfeits could exert on authentic demand. That is, counterfeits could recruit new customers to purchase authentic products by increasing brand awareness. This relates to another strand of theory that debates the role of advertising. In particular, Becker and Murphy (1993) consider a model in which advertising is a complement to the good being advertised. Advertising has also been theorized to reduce consumer search costs and assist in better matches and coordinations between consumers and brands (Grossman and Shapiro 1984, Bagwell and Ramey 1994). In the current context, counterfeits could serve as advertisements for the brand and assist consumers' searches for best-fitting brands. Qian and Xie (2011) note survey results in which Chinese consumers learned about their favorite brands initially through counterfeits.

A recent study by Johnson and Myatt (2006) suggests a new taxonomy of advertising, distinguishing between hype, which shifts out demand, and real information, which rotates demand by altering the price elasticity for brands. Unlike the traditional advertising literature, the potential spillover effect of counterfeits may be considered an "externality" to the branded firm. Since the authentic branded companies do not internalize such advertising costs in their own optimizations, the advertising hype can lead to heterogeneous sales impacts for authentic products of different quality tiers. It can both shift and rotate demand functions for products of different quality levels. Notably, because counterfeits impose less competitive pressure on a high-end authentic product with a wider quality gap in between, the equilibrium sale quantity of the high-end authentic product primarily increases when counterfeits enter the market and boost the brand awareness. The equilibrium sales quantity of the low-end authentic product is influenced by the two opposing effects of counterfeits, and declines when the substitution effect outweighs the advertising effect.

In sum, the theoretical framework outlined here yields a set of testable hypotheses:

1. H1: Authentic high-end product sales increase after massive entry of counterfeiters of the brand;

2. H2: Authentic low-end product sales decrease after massive entry of counterfeiters of the brand;

3. H3: The positive spillover effects of counterfeits on authentic sales are larger for high-fashion

products, where trend drives consumption;

4. H4: The positive spillover effects of counterfeits on authentic sales are larger for less-well-known brands than already renowned brands.

I exploited a natural policy experiment and collected large-scale field data on shoes to study the heterogeneous sales impacts of counterfeits. I supplemented this with lab experiments to test the causal effects of counterfeit presence on consumers' purchase intent on the sample shoes of the three typical quality tiers as observed in the field data.

FIELD DATA

Data Design

The ideal experiment to test the sales impacts of counterfeits would randomly assign counterfeit entry for a set of brands in a large pool, while keeping other brands immune from counterfeiting. The exogeneity of counterfeit entry, however, may not hold in reality because entry is more likely to occur if the original producer has larger sales, easier-to-copy quality, or a looser trademark management team. These unobserved time-variant firm characteristics are not captured by the fixed effects in panel econometric models, resulting in a correlation between counterfeit entry and the error term. Simple OLS without accounting for this entry endogeneity would lead to biased effect estimates.

To account for these concerns, I located appropriate instruments that would identify the effects of the counterfeit entry variable. The IV strategy relies on a natural experiment in the Chinese IPR enforcement change and its differential impacts on different brands. The institutional context is explained in Qian (2008) and the Web Appendix, while the remainder of this section explains the necessary details for completeness.

The advantage of studying the Chinese shoe industry primarily comes from the natural experiment that stems from an enforcement change around the year 1995, due to external shocks exogenous to the shoe sector. Copyright and trademark laws were restored in China after 1976. In 1985, the Chinese government established the Quality and Technology Supervision Bureau (QTSB), with a branch in

each city and joint forces nationwide, to supervise product quality and outlaw counterfeit enterprises. Due to a series of accidents arising from low-quality or counterfeit agricultural products and gas tanks, the Chinese government issued notifications around 1995 to enhance quality supervision and combat counterfeits in the main sectors prone to hazardous materials. The majority of the Bureau workforce and funding went into these sectors, leaving loopholes for counterfeits to enter the footwear industry. For instance, in the early 1990s, approximately 10-12% of the Bureau's resources were devoted to the footwear sector, but this number fell to 2% after 1995 (QTSB yearbooks). As the data show, authentic companies experienced significant counterfeit entry after this loosening of governmental monitoring and enforcement, with the highest level of entry occurring in 1996.

Interviews revealed authentic shoe producers were surprised at the massive entry of counterfeits but soon reacted. The branded companies that had been infringed upon set up their own "brand-protection" offices to compensate for the lack of government monitoring. The company fixed-effects regression of the log of company enforcement investments on a legislation dummy is positive and significant at the 5% level (coefficient=3.2).

In light of the enforcement changes that permitted massive counterfeit entries, the ideal experiment would involve randomly loosening IPR enforcements for a group of brands in China at a certain time while leaving the IPR enforcements of the other brands unchanged. Although the government enforcement change mainly presents itself with time variations, I could bring in brand-level variations by measuring the relationship between each sampled authentic producer and the government. Pertinent details will be discussed below, but the bottom line is straightforward: After the enforcement-legislation change, the monitoring of counterfeits became decentralized, resulting in company-level supervision, carried out primarily through authentic manufacturers' own initiatives to protect their own brands. However, the authentic companies still had to rely on the government to outlaw the counterfeits discovered by their enforcement employees because only the government had such authority. Therefore, companies that had a poor relationship with the government received less attention and experienced more counterfeits. I thus exploited the interaction between the enforcement-legislation change and a proxy for the relationship between an authentic company and the government to identify entry impacts.

Before the enforcement change, the QTSB conducted regular inspections of shoe markets and factories, and confiscated and shut down counterfeit enterprises on the spot. The monitoring mech-

anism was, therefore, quite uniform across different brands. After the enforcement change, however, companies that had a good relationship with the government received faster responses when they reported counterfeit cases. All else being equal, this phenomenon reduced the incentives of counterfeiters to infringe upon these brands.[3] Brand-level variation in relationships with the government (the QTSB in particular) is therefore helpful for exploring the variation in counterfeit entries for different brands after the policy shift and, in turn, its effects on authentic sales. The challenge is to obtain a proxy for such a relationship. I seek a relationship proxy that is most relevant in explaining brand-level variation in counterfeiting and least influential with respect to authentic sales, except when it affected counterfeiting. Based on these criteria, the number of days it took a branded company to obtain ISO certificates nationwide is the most appropriate proxy.

Since the late 1980s, all registered companies in China have been *mandated* to meet the standards set by the International Standards Organization (ISO). This differs from the U.S., where companies adopt ISO standards voluntarily. A Chinese company has to reapply until certification is issued if the initial applications are not approved. This policy was motivated by the desire to harmonize with internatinoal rules. For the shoe industry, the ISO sets standards for the basic equipment a company uses and the basic treatments pertaining to the environment and labor. The QTSB is in charge of ISO certification. For some companies, one month was sufficient to obtain the ISO certificate, but for others, the application date and grant date were more than 300 days apart. Of the companies that spent a long time fulfilling the ISO requirements, some were small, and others medium or large.

Through close readings of documents and multiple interviews with companies and the QTSB, I can confirm that the standards were rather basic and the differences in application times largely due to bureaucracy. Notably, the standard for companies to be registered as legal enterprises surpassed the basic quality standard specified by the ISO. The companies also had to meet internal requirements as outlined by the ISO before submitting their applications to the QTSB (QTSB 2000). I measured the actual number of workdays these applications sat on the desks of QTSB officials. Thus, the variation in application time was largely due to relationships and not product quality or other company factors. This is a more objective relationship proxy than managers' impressions recorded in the World Bank

[3]Chinese news agencies broadcast counterfeit-confiscation news, so counterfeiters are likely to know which brands are harder to infringe upon.

surveys (Batra et al. 2003).

The sampled shoe companies had to comply with two sets of ISO standards, one established in 1994 and the other in 2000. I obtained each company's application and grant dates for an ISO certificate corresponding to each set of standards and calculated the number of workdays between each pair of application and grant dates. I then constructed a variable that equaled the number of workdays between the application and grant dates for the 1994 certificate through the year 2000, and that equaled the number of workdays to obtain the 2000 certificate from the year 2001 on. The correlation between the number of days to obtain both sets of ISO certificates was very high, 0.96, suggesting that the relationship between a company and the government was rather steady in the period under examination.

There was also no significant correlation between this relationship proxy and the company's size, sales, product quality, or production costs in my data. The largest correlation amounted to only 0.08. The manager of a famous Chinese-branded company complained about its poor relationship with the QTSB and the consequent slow response in fighting its counterfeits: *"Our company bases success on our ability and product quality and [we] never cared to work on relationships (Guanxi). It is frustrating that we have to go through slow processes in some applications such as the ISO and wait months before the government outlaws the reported localities of our counterfeits."* In addition, Chinese consumers hardly notice these ISO certificates. Therefore, the ISO does not signal product quality and is not likely to influence prices in any way other than through affecting counterfeit entry and quantity.[4]

Figure A.1 in the Web Appendix shows a generally positive relationship between the average number of workdays a branded company took to obtain the ISO certificates and the mean quantity of counterfeit sales it experienced after 1995. This correlation remains significant in regressions of counterfeit entry or sales on ISO days, after taking out company- and year-fixed effects. A later section provides the first-stage IV estimation results to support IV validity.

In robustness checks, I adopted alternative relationship proxies and received qualitatively similar results. In the event that the political-connectedness element might play a role in the Chinese import-licensing system, I gathered data for the sampled companies. I also collected data on CEOs'

[4]Many sectors are privatized in China, the footwear industry included. None of the companies in my sample is state-owned. Shoe prices are freely set by supply and demand.

biographies and political connectedness for each company (see Web Appendix). However, I used them only in supplemental analyses because they did not reflect a company's relationship with the government agency of interest, i.e., the agency that was in charge of IPR enforcements and that influenced counterfeit entry and quantities.

Data Collection and Description

The design of my research required obtaining data on each brand's product sales, as well as information on counterfeit infringements. Due to the underground nature of counterfeits, I collected data through a combination of secondary data sources and primary research. The Chinese Bureau of Statistics Industrial Census database contains detailed financial information and basic company characteristics (such as size and age) for all registered companies in China. Several waves of data were available for the years 1995 and 1998-2005. While the database lists the main products of each company, it does not contain any data on prices or product-level details. Systematic information about counterfeiting was not found in existing Chinese or international data sources. It was therefore necessary to supplement data with my own research in China to acquire their financial statements and counterfeit confiscations.

Building on the database from Qian (2008), I gathered additional detailed information on sale quantities, transaction prices, and unit production costs at each quality tier for each general type of product, and on the corresponding counterfeits for each of the 31 branded companies sampled through stratified random sampling. The data were taken from the companies' annual financial statements and other relevant company records. I specifically requested companies' assistance in obtaining data from their databases.[5] The data provided by the company corroborate those recorded in the Industrial Census for the years available. The sales, sales costs, profits, and export aggregates of my sample mirror the trends in the census of shoe companies. In addition, the price data in my sample mirror the general price trends of the three quality levels in the eBay dataset collected by researchers at the University of Chicago.[6] While the eBay shoe price data provide useful validation, I used the original

[5]The company contacts were very responsible and they usually would not give casual estimates during interviews. Every time I had a follow-up question, they would email or fax me after checking with their sources.

[6]The researchers collected transaction-level data on eBay for several product categories. For each transaction, the data include the shoe brand and type, final transaction price, shipping cost, seller and buyer IDs, product

company price records in the main analyses. The Web Appendix details all the data diagnostics and sampling methods.

The detailed sales quantity, price, and cost data are now obtained for finer categorization of products than in Qian (2008). For instance, if a company produces six types of products, including high-leg, medium-leg, and regular leather shoes for both women and men, and there are three quality/cost levels within each type, then data on sales are disaggregated to each of the 18 quality-type combinations. The data approach a product-level panel. The input and production costs for the products within each quality-type combinations are very similar, although there are still variations in color and style (eg, decorative button on the side or front) that the current data cannot fully capture. The life-cycle of each style was one to two years; however, the product lines remained active over the sampled years. That is, the machinery and organization of each product-line did not change for any existing quality tier, manufacturing various colors of the same shoe model. New product lines added in later years were also clearly captured in the data and analyzed. Such fine-level aggregations are appropriate for the analyses at hand, as I am exactly interested in the differential sales impacts at the quality-tier level.

I collected data on the year counterfeits entered the market for each quality tier of each brand, whenever that existed, from the "brand-protection" offices of each authentic company. Because the branded companies and the government, QTSB in particular, worked together to track down counterfeits, the QTSB shared with each branded company its statistics of counterfeits of the corresponding brand it confiscated. The data represent the branded companies' records of discovered counterfeits, the QTSB's records of raided counterfeits from the marketplace and production locations, and the financial records of the counterfeiters. These bookkeeping records were kept internally as a tool for managing the day-to-day operations of the counterfeiting companies, and were confiscated with all the counterfeits when the government investigated and shut down these illegal entities.

Although the branded companies reported that they were able to track down most of their counterfeits and the remaining ones were minor and not as influential to them, it is prudent to view the counterfeits' sales as lower bounds of the true values. To ameliorate this potential bias, I generate a dummy variable for counterfeiting presence that takes on value 1 if a branded product experiences

condition, starting bid, and number of bids.

any amount of counterfeiting and zero otherwise. I primarily study the impacts of massive unexpected entry and the presence of counterfeiters on the authentic brands.

The data show that counterfeits for the authentic products of different quality levels within the same brand enter in the same years. The concern that annual data might be too broad was eased during interviews with branded companies. Interviews and internal records at the branded companies and the QTSB revealed that counterfeiters usually imitate all levels of authentic products, even though they use similar inferior materials to produce shoes that mimic different appearances of these products. I analyze different quality tiers separately, so the brand level and quality-tier level variations in a counterfeit entry are more relevant than minor variations at the product level within a brand.

To control for the overarching economic environment and consumer purchasing power, I obtained data on a common set of macro-indicators: the GDP per capita PPP, GDP growth, and Consumer Price Index (CPI) in the sampled years from the World Development Indicator (WDI) database, and the annual Gini coefficients in China from the UN Human Development Reports. Some descriptive statistics of the 31 companies over the 12-year panel are displayed in Table 1.

Insert Table 1 about here

Descriptive Evidence: Sales Shares Shift to High Tiers

Table 1 displays the descriptive statistics of the variables used in the analyses pre- and post-1995, the benchmark year for the government's allocation of resources away from the shoe industry to tightly monitor the safety sectors. The drop in the mean percentage of government resources devoted to monitoring the shoe sector from 11% to 2% is accompanied by a massive entry of counterfeiters. While the median of the counterfeit-sale quantity across brands was zero, with some 10,000 pairs for some brands, before 1995, counterfeits reached 857,100 pairs on average across the sampled brands in the years after. The product costs and prices of counterfeits are on average only fractions of those of the authentic products.

Table 2 tabulates the sales of shoes at the three broad quality tiers, which the companies classify, as percentages of total sales domestically. It is interesting to note that the quality lines moved upward after entry by counterfeiters. That is, the higher-end shoes occupied larger shares in total sales post-entry and the low-end shoes saw their shares decline dramatically. While I will present more rig-

orous analyses in the next sections, these summary statistics paint a general picture of the differential effects of counterfeit entry on authentic sales of different quality levels.

Insert Table 2 about here

The trends are consistent with the theoretical predictions. Entry by counterfeiters has two opposing effects on branded products: a business-stealing effect and a positive spillover effect. The first effect arises when consumers substitute counterfeits for authentic products of the infringed brand. This effect is largest when the quality of the counterfeits approaches that of the authentic products, as in the sample of the low-end products. The second effect arises when counterfeits increase brand awareness and help capture new customers for the brand. This positive effect is more pronounced when the new customers who learn the brand name value quality and authenticity. These consumers then choose to purchase the high-end authentic products instead of counterfeits, especially when the quality gap between the authentic and counterfeit products widens. In these cases, the new customers recruited by the counterfeits is gained by the authentic company, leading to increased sales for the high-end products. I present empirical tests for the hypothesis in the next section.

To tease out the mere advertising effect on sales by the entry of counterfeits from the increases due to introducing new products (Qian 2008, 2010), I separately compiled the sales shares for products of fixed quality pre- and post-entry by counterfeiters and those for the new products introduced after the infringements in Table 3. Among the fixed quality tiers, the percentage sales of high-end shoes increased post-entry, but those of the medium-end and low-end shoes declined. However, the decline in the medium-end shoes tended to be overcompensated by the new products in the same quality tier, whereas the new products in the low-end were not sufficient to make up for the category percentage drop. More formal regression analyses are carried out in the following section.

Insert Table 3 about here

EMPIRICAL IDENTIFICATIONS

An even richer database than that of Qian (2008) results in more identification power at the product-quality level. In particular, each brand has several quality levels, with different sales quantities

and values of products at each level. The loosening of the government enforcement for footwears, therefore, essentially created dozens of "mini-experiments" that I exploited to identify the entry effects of counterfeiters on authentic sales of these products.

Since there was little within-brand variation in the entry timing of counterfeits for products of different quality levels, I conducted IV regressions of the entry effects on sales for each quality level separately, resulting in three sets of analyses. For each sample consisting of one quality tier of all branded products, I executed the following two-stage least squares model.

First Stage IV Estimations

I instrumented for the entry of counterfeiters using the plausibly exogenous enforcement shift away from the footwear industry and its interactions with the relationship between each branded company and the government. I constructed an indicator variable, Loose, to benchmark the years with diverted government enforcement efforts for shoes (Loose=0 prior to 1995 and 1 starting from 1995). I used this enforcement change and its interaction with the relationship between a branded company and the government (proxied by the days it took the brand to pass ISO standards, averaged across its subsidiaries in various regions) as the main instrumental variables for counterfeit entry. Because the enforcement change was due to a series of accidents that took place in other industries, it is plausibly exogenous. The IV exclusion restrictions are also fulfilled because tightened government enforcement elsewhere is not expected to affect shoe prices or sales directly. Since authentic prices are set by market equilibrium and the ISO time proxies for the relationship of a company only with the QTSB, this ISO proxy does not affect sales directly.

The entry by counterfeiters is identified with the equation below:

$$\begin{aligned} \text{Counterfeit}_{at} &= \gamma_0 + \gamma_1 * (\text{Relation*Loose})_{at} + \gamma_2 * \text{Loose}_t + \gamma_3 * \text{Relation}_{at} \\ &\quad + \gamma_4^T * \text{Year Dummies}_t + \gamma_5^T * \text{Firm Dummies}_a + \psi_{at} \end{aligned} \tag{1}$$

where Counterfeit_{at} is an indicator variable for the existence of counterfeits of brand a's product in the market at time t, and it equals 1 if there are positive amounts of counterfeits for a in the year t. Relation_{at} is the ISO proxy for the relationship between authentic company a and the government, and $(\text{Relation*Loose})_{at}$ stands for the interaction variable between this relationship proxy and the

enforcement-change indicator.

In addition to the potential endogeneity of the entry variable, product price may be endogenous to sales. I adopted the traditional IV of product cost for that, modeled as follows:

$$lnP_{ajt} = \alpha_0 + \alpha_1 * lnC_{ajt} + \zeta_{ajt} \quad (2)$$

where lnP_{ajt} denotes the log price of brand a's product j at the year t, and lnC_{ajt} similarly denotes the corresponding product cost in logs.

Table 4 exhibits the estimations from several specifications of this first-stage IV regression. As shown in Columns (1) through (3), the legislation dummy and the interaction between Loose and relationships are highly correlated with counterfeit entry, statistically significant at the 1% level. The overall Wald Chi-square test or F-test for the instruments is highly significant as well. All these estimations tell a consistent and clear story that the policy shift and its interaction with the ISO relationship proxy are highly correlated with the treatment variable: counterfeit entry. Column (4) shows that log unit production cost is a good IV for log price as expected.

Insert Table 4 about here

IV Regressions for Sales of Fixed Quality Levels

The increases in sales share of high-end products in Table 2 could be in part due to the spillover effects of counterfeiting and in part a direct consequence of new product introductions after entry, as documented in Qian (2008). To tease out these two parts, I matched products of similar quality tiers before and after the entry by counterfeiters throughout the sample period, based on similar price and costs. I compiled this sample of existing product lines separately from the rest of the sample of new product lines introduced after entry as authentic companies aimed to differentiate from the counterfeits. I then investigated the entry effects on sales of these existing product lines broken down to three quality tiers: high, medium, and low. The part of the sales increase due to the potential advertising effect of counterfeits was expected to be captured by a positive coefficient on the entry dummy for the high-end shoes within the existing product lines.

To test the counterfeit entry effect on the authentic product sales of the three existing quality tiers (high-, medium-, and low-end), I estimated equations (1), (2) and the following equation (3) simultaneously within each quality tier of shoes separately. Standard errors are clustered at the company

level (Table 5).

$$log(Sales_{ajt}) = \beta_0 + \beta_1 * \text{Entry}_{ajt} + \beta_2 * lnP_{ajt} + \beta_3^T * X_{ajt} + \beta_4^T * \text{YearDum}_t + \beta_5^T * \text{ProdDum}_{aj} + \epsilon_{ajt} \quad (3)$$

where Entry_{ajt} is an indictor variable that takes on value 1 if there is a positive presence of counterfeits in the market for brand a's product j in year t. lnP_{ajt} is the log price of the product, and X_{ajt} is a vector of control characteristics such as company a's age and size and product j's shoe orientation (male or female) or usage (winter boots, slippery, etc.) at year t. The fixed effects for year (12 years) and product lines within the quality tier of the 31 branded companies control for year-specific confounding factors and time-invariant product attributes.

Using the log sales quantity and values as alternative dependent variables, I arrived at robust results. Table 5 presents the results and reveals interesting patterns. Counterfeit entry hurts low-end products but helps high-end ones, statistically significant at the 5% level. The sales of the high-end authentic products increased significantly after counterfeiters entered, controlling for year and product-line fixed effects and other time-varying company and shoe characteristics such as company age and size. This reflects the potential advertising effect of counterfeits on the brand. Counterfeits could serve as a form of mass advertising, increasing brand awareness especially for customers who would not have been captured by the brand otherwise. This relates to the "diseconomies of scope" theory proposed by Bresnahan et al. (2010) and to the finding in Godes and Mayzlin (2009) that the word of mouth that is most effective at driving sales is created by less-loyal customers.

Researchers have long been interested in how word of mouth affects sales and product diffusion (Arndt 1967, Coleman et al. 1966, Godes and Mayzlin 2004, Chevalier and Mayzlin 2006, Van den Bulte and Wuyts 2007, Iyengar et al. 2008, Villanueva et al. 2008). Conventional wisdom has it that negative word of mouth hurts product success and sales (e.g., Goldenberg et al. 2007, Blackshaw 2008). However, Berger et al. (2010) propose that negative publicity can increase purchase likelihood and sales by increasing product awareness. The findings here provide additional empirical support for these theories.

Benchmarking against the overall observed change in sales (Tables 1 and 3), the point estimate of the entry coefficient in the high-end sales sample implies that 29% of the increases in the sales

of high-quality-tier shoes can be attributed to the net positive spillover effects of counterfeits.[7] The medium-quality authentic products did not witness significant changes in sales due to counterfeiting, although the sign of the coefficient on the instrumented entry variable was negative. However, the sales of the low-end authentic products dipped significantly upon the entry of counterfeits, both in quantity and values. The coefficients on the instrumented entry dummy are -0.58 for low-end sales quantity and -0.75 for values, implying a 44% drop in sales quantity and 53% drop in sales values for the low-end shoes. A similar back-of-the-envelope calculation reveals that 86% of the decline in low-end sales after the entry by counterfeiters comes from the net negative substitution effect.[8] This demonstrates the moderate advertising and fierce competitive effects of counterfeits.

In robustness checks, I repeated the simultaneous equations model estimations by adding a control for the log average price of counterfeits of each quality tier, as instrumented by the log unit product cost of counterfeits. The estimation results do not change qualitatively. That is, the entry coefficients remain positive and significant for the high-end sales quantity and values, and negative and significant for the low-end sales quantity and values. Since the data for counterfeit prices are less systematic, I kept my main specifications as described earlier. I further conducted robustness analyses with controls for time-variant brand advertising expenditure and the number of company stores of the brand in alternative specifications. The results are qualitatively similar. Qian (2008) shows that authentic brands' advertising expenditure did not change significantly after entry by counterfeits, so this control is not collinear with the main treatment variable. However, because advertising and stores are endogenous to sales, I did not include them in the main regression specifications. To the extent that the IV teases out plausibly exogenous parts of the counterfeit entry, the sales responses are less susceptible to omitted variable biases, especially in the time period immediately following entry.

Insert Table 5 about here

[7] Drawing relevant summary statistics on the sale quantities, prices, and percentages of total sales pre- and post-entry by counterfeiters, the overall observed percentage change in sales equals to $\frac{558.28*32.24*17.0\%-309.38*26.21*13.9\%}{558.28*32.24*17.0\%} = 172\%$. The fraction of change due to the spillover effect of counterfeits is $\frac{50\%}{172\%} = 29\%$.

[8] The overall percentage drop in low-end sales $= \frac{558.28*32.24*32.1\%-309.38*26.21*5.6\%}{558.28*32.24*32.1\%} = -61\%$, of which the counterfeiting effect accounts for $\frac{-53\%}{-61\%} = 86\%$.

Dynamic Effects of Counterfeits on Product-level Sales

While the previous section tests the overall impacts of counterfeit entry, this section traces the dynamic entry effects on authentic sales over a longer time horizon. For the samples of shoes at each quality tier, I regressed the log sales quantity on the set of dummies indicating different years relative to entry by counterfeiters, controlling for the set of time-varying company characteristics, macro conditions, and company-fixed effects. That is, I simultaneously estimated the following equations:

$$lnP_{ajt} = \alpha_0 + \alpha_1 * lnC_{ajt} + \zeta_{ajt} \quad (4)$$

$$ln(Sales_{ajt}) = \beta_0 + \sum_{k=-5}^{5} \beta_{1k} * \text{YearToEntry}_{a,j,k} + \beta_2 * ln\hat{P}_{ajt} + \beta_3^T * X_{ajt} + \beta_4^T * \text{YearDum}_t + \beta_5^T * \text{ProdDum}_{aj} + \epsilon_{ajt} \quad (5)$$

where I regressed the log sales quantity of brand a product j at year t on the set of dummies indicating years (k) relative to entry from 5 years pre-entry to 5 years post-entry, controlling for the instrumented log product price and other characteristics. I plotted the regression coefficients on the year indicators against the corresponding years relative to entry for the sample of existing product lines and the sample of new product lines in Figures 1 and 2, respectively. Because the new products were introduced only after facing competition from counterfeiting, the coefficients for years prior to infringements were not plotted in Figure 2.

Figure 1 demonstrates the positive effects of counterfeits on the high-end shoes. Such an advertising effect was felt immediately upon the entry of counterfeits and lasted for a few years before it dwindled. It is possible that counterfeits first served to improve consumer awarenesses of the brand and later contributed negatively to brand equity because some consumers could misattribute the inferior counterfeit quality to the brand itself. The negative impacts on the other two quality tiers are quite large and long-lasting. Some of the dips in these sales are offset by the sales of new products in these two tiers, as indicated in Figure 2. The regression underlying Figure 1 uses the year of entry by counterfeits as the benchmark, so all the coefficients plotted indicate the relative change in log sales quantity of a particular quality tier in the respective year relative to entry. Because almost all the new products were introduced at least a year after counterfeits entered the market, Figure 2 uses the first year of observation, one year after entry, as the benchmark for comparison. These two figures are most suitable for demonstrating the dynamic changes in log sales quantity in the years relative to entry

within each quality tier.

The trend that the positive effect on the high-end shoes was largest in the year immediately following massive entry of counterfeits again rules out the alternative explanation that authentic companies' own self-enforcement was the driving force. Authentic firms invested in self-enforcement with some lags and the number of company stores grew in later years of the sample period, opposite the trend of the high-end sales increases.

Insert Figures 1 and 2 about here

Mechanisms of the Spillover Effect of Counterfeits

While the negative effect of entry by counterfeiters on the sales of low-end shoes is consistent with traditional business-stealing intuitions, the positive effect on the sales of high-end shoes was at first surprising. Yet positive effects of IPR infringement have been termed the "piracy paradox" in a paper by Raustiala and Sprigman (2009), who study historical incidences of fashion innovation and find that imitation could turn a formerly innovative design into a nonexclusive feature and stimulate further product differentiations. The positive effect of counterfeiting on authentic product innovations is also identified in Qian (2008).

A strand of literature proposes that copyists create barriers to entry for competitors (Givon and Muller 1995) and help the originator establish its own technology as an industry standard, with switching costs further cementing the originator's competitive position (Katz and Shapiro 1994). Unlike software and other high-tech industries, there is very little standard-claiming behavior in the Chinese shoe sector. In addition, the shoe industry size has been stabilized since the late 1980s, and national statistics show that the number of employees in the footwear and garment industry was approximately 1,750,000 throughout the 1990s (Tables 12-2 and 13-2 in each Year Book, Chinese National Bureau of Statistics). According to the Basic Unit Census of China (the National Bureau of Statistics, 1996), most legal shoe companies were established in the late 1980s. The 1990s witnessed rather steady industry size. This evidence suggests that the positive spillover effect of counterfeits is not likely to work through the entry barriers argument in this context.

In this subsection, I present a set of analyses that demonstrate the potential advertising effect of counterfeiting, as predicted by my theoretical framework, even though the data at hand do not provide

a further test of the alternative forms of the advertising effect as discussed in the theory section.

The first piece of evidence in the data that point to the advertising effect is that the positive sales impacts of counterfeits is most pronounced in the high-fashion product lines, notably women's high-leg boots. This is expected because people buy them not just out of necessity but to keep up with the latest style. Shakespeare writes, "The fashion wears out more apparel than the man." Table 6 reports the IV regression results on the log sales quantities and values of the three quality tiers of these fashion boots, and the entry effects on the high-end fashion boots are estimated to be as high as 0.65 for log sales quantities and 0.66 for log sales values, statistically significant at the 1% level. The demand-enlarging effects for the nonfashion products are much more moderate (coefficients are estimated to be .46 in the sales quantity equation and .36 in the sales equation) (Table A.2).

Insert Table 6 about here

The second piece of evidence that speaks to the advertising effect is that the sales impacts of counterfeits are more positive for high-end shoes of brands that were less famous at the time of being infringed. The Chinese Trademark Office grants "well-known (famous) brands" to national and international brands according to the Chinese Trademark Law and the Paris Convention.[9] I repeated the IV regression estimations for three tiers of shoes among the set of brands that were not listed as "famous" at the time of infringement by the counterfeits. As shown in Table 7, the average effect of counterfeiting on the sales quantities of high-end shoes is 0.56 and on the sales values of high-end shoes 0.65, higher than the corresponding effect sizes in the complete sample, and statistically significant at the 5% level. For these non-famous brands, the entry effect on medium-tiered shoe sales was also positive. While the effect on low-tiered shoes was still negative and statistically significant, the point estimates were less negative than those in the full sample. The demand-enlarging effects for the famous brands were much smaller, with 12% of the increase in sales for the high-tiered shoes attributable to the spillover effects (Table A.3). The effect on the low-tiered shoes was again significantly negative.

In sum, these stratification analyses show that the positive marginal effects of entry by counterfeits on the sales of authentic shoes are largest among high-fashion boots and high-tier shoes of the less famous brands. These are exactly the products and brands that are expected to benefit most from mass

[9]The modern concept of the "famous" trademark is codified in Article 6bis of the International Convention for the Protection of Intellectual Property (the Paris Convention), which uses the French expression "notoirement connue," literally "notoriously known" or, in better English, "well known."

advertising. Counterfeits and imitations help to establish "trends", and trends are key drivers of sales (Raustiala and Sprigman 2010). The results, therefore, provide notable evidence of the advertising effects of counterfeits. The positive effect extends beyond the fashion industry. In an interview with the *New York Times*, the chief executive of LogMeIn (Michael Simon), a company whose software is used in smartphones and tablets, commented, "If people are going to steal something, we sure as hell want them to steal our stuff. When you have a saturated market like Microsoft and have no growth in these devices, then it might be different"(Schmidle 2010). The lab experiments further enrich evidence for the advertising mechanism based on respondents' stated preferences and purchase motivations.

Insert Table 7 about here

Discussions of Results from the Field Data

This section lends empirical support to the theoretical predictions, H1-H4, as outlined in the theory section. The findings presented so far further enhance those in Qian (2006), which indicate that the authentic producer upgrades quality in response to counterfeit infringements. In particular, among the set of branded companies whose products started at similar price and quality levels, only those that experienced counterfeit infringements strove to innovate after being counterfeited massively. The companies that had a good relationship with the government and did not experience massive counterfeiting threats did not witness internal quality upgrades. Such effects encounter interesting developments here: Not only did firms innovate to ameliorate competition from counterfeits, they also gradually shifted production lines to the high-end shoes over time. The findings in this study that counterfeits have positive effects on high-end products and a negative substitution effect on low-end products explain the incentives for the aforementioned business strategies. These strategies had positive effects for consumers, since the quantity demand increased, product variety increased, and the deflated price associated with basic characteristics kept stable.

LAB EXPERIMENTS

While the heterogeneous sales impacts of counterfeits are well identified in the field data, it is sometimes difficult to get a clear grasp of actual consumer purchase intents and motivations without

disaggregated consumer-level data. I therefore further manipulated the exposure to counterfeits experimentally in order to test the causal effect of counterfeits on purchase intent of authentic branded shoes and to gain initial understandings on the motivations underlying the purchase intent. I conducted lab experiments at Northwestern University and the University of Illinois at Chicago. The respondents consisted of Masters students in business administration, medicine, and statistics. Sixty-two responses were collected.

In the first wave of experiments, I randomly assigned these respondents to two groups, each taking a different survey. The survey for the treatment group exposed the subjects to actual photos of a counterfeit shoe, together with three quality tiers of authentic shoes of the brand name Muniao, and asked them to rate their purchase intent for each of the shoe stimuli. The respondents therefore rated their purchase intent based on full comparisons of all products, similar to the real-world condition where counterfeits coexist with authentic products in the market. The survey for the control group differed in the order of the questions and pictures. It first presented only the three quality tiers of authentic shoes for respondents to rate purchase intent. After they marked down purchase intent for the authentic shoes, they were exposed to picture of the counterfeit shoe and asked to rate their purchase intent on this. Respondents in the control group were asked to rate the counterfeit at the end so I could ascertain whether the two groups differed systematically in their preferences for counterfeits.

Respondents had to answer questions in sequence and could not look ahead. The ratings on the authentic products in the control condition therefore reflected purchase intent without the presence of counterfeits. This study enabled between-subject comparisons of purchase intent across treatment and control groups. The purchase intent was measured by semantic differential scales in the experimental surveys, following the well-established social psychology literature.

The average purchase intents for the counterfeit stimuli are similar across the treatment and control groups, and so are the ratings on general attitudes toward counterfeits. The demographic information also show that the two groups are rather comparable, thanks to the random assignments. The average purchase intents for the set of stimuli are tabulated in Figure 3. As compared to the control group, the treatment group (for whom the counterfeit was present in the consideration set when rating all products) exhibited higher average purchase intent for the high-end authentic shoes and lower average purchase intent for the low-end authentic shoes. Such differences account for at least half a point

on a 5-point Likert scale and are statistically significant at the 6% and 5% levels. The difference in the average purchase intent for the medium-tier shoes is not significant either managerially or statistically across the groups.

Insert Figure 3 about here

In the second wave of experiments, I conducted a follow-up survey four weeks after these respondents took the first survey. The follow-up survey was the same for all respondents. They saw actual photos of the three quality tiers of authentic Muniao shoes and the counterfeit. They then rated their purchase intent for each, and commented on their purchase motivations. The survey then asked a series of questions about their general attitudes toward counterfeits, using balanced Likert scales. Finally, each respondent copied down the serial number that was uniquely assigned on his or her first survey before exiting this follow-up survey. I used this number to match data for the two surveys by respondent while allowing respondents to remain anonymous. By observing the purchase intent of respondents in the control group before and after seeing the counterfeit image, I could detect within-subject changes in purchase intent due to the exposure to counterfeits.

The average purchase intent for the counterfeit stimuli are not statistically different across the two surveys for the treatment and control groups, and neither are the ratings on general attitudes toward counterfeits. This suggests the consistency of respondent attitudes in the two waves of questionnaires on items under identical conditions. Figure 4 tabulates the average purchase intent of the respondents in the control group (who rated authentic shoes prior to seeing counterfeits in the first questionnaire while rating after seeing counterfeits in the second wave). Their purchase intent for the high-end authentic product was 0.35 higher on a 5-point Likert scale, on average, in the second survey. Such an increase in purchase intent due to having the counterfeit in the consideration set together with the authentic shoes is statistically significant at the 3% level, based on pair-wise t-tests. Exposure to the counterfeit, however, reduced the average purchase intent within subject for the medium- and low-tier authentic shoes, statistically significant at the 1% and 2% levels.

Insert Figure 4 about here

I explicitly asked respondents about their motivations for purchasing in the survey. Almost all respondents qouted the price-quality ratio or value of products as an important determinant. A number of respondents said they would like to purchase a variety of products, including counterfeits. This

aligns with a strand of sociology theory on omnivorism, which predicts that high-status consumers can traverse a broad taste hierarchy because they possess knowledge of a diverse array of objects (Erikson 1996, Peterson and Kern 1996, Richardson 2008). A majority in the treatment group wrote that counterfeits indicate that the brand is famous, and they rated high on the high-end authentic shoe stimulus. One respondent said, "Brand is a guarantee for quality. I don't know this brand, but it should be good if it has counterfeit followers." Respondents who lowered their ratings on the low-end authentic shoe stimulus after seeing counterfeits largely agreed with the following sentiment: "As long as the product fits my needs, I don't care if it is brand name or counterfeit." Several other respondents said they buy shoes for comfort and value.

I performed regression tests on the purchase intent for each type of authentic shoes and the counterfeit shoe against the treatment assignment and a series of general attitudinal ratings on counterfeits, controlling for a set of demographic variables. Table 8 reports the results. The regression coefficients on the treatment indicator tell a story consistent with the t-test comparisons reported previously. The exposure to counterfeits significantly increased respondents' average purchase intent for the high-end authentic shoe but decreased it for the low-end shoe. The control and treatment groups were comparable in their average purchase intent for the counterfeit stimuli. In addition, subjects who thought that counterfeits could add to variety to the market and believed they could distinguish counterfeits from authentic products had higher purchase intent for counterfeits as well.

Insert Table 8 about here

CONCLUSION

Sales impacts of counterfeits are urgent concerns for business managers and policy makers. New York's senior senator, Charles E. Schumer, introduced legislation at the beginning of August 2010 that would rewrite copyright law to cover fashion designs (Raustiala and Sprigman, 2010), but he may not have had the positive effect of imitations in mind. This paper collects product-line-level panel data on Chinese shoe companies to investigate the sales impacts of counterfeiting. I identified an exogenous change in government enforcement efforts in monitoring footwear trademarks since 1995, and its dif-

ferential impacts on counterfeit entry for branded companies with varying degrees of closeness with the government. Using the interaction between legislation change and relationship proxy as an IV for entry by counterfeits, I obtained empirical results robust across various specifications and consistent with theory predictions. In addition, the causal relationship between counterfeiting and purchase intent for authentic products was established in experiments where exposure to counterfeit shoe stimuli was randomly assigned in a sample of respondents.

The study uncovers heterogeneous effects of counterfeit entry on the sales of authentic products of three quality tiers among existing product lines. In particular, counterfeits have both advertising effects for the brand and substitution effects for authentic products. The advertising effect dominates the substitution effect for high-end authentic product sales, and the substitution effect outweighs the advertising effect for low-end product sales. The effects last for a few years before leveling off. Such differential effects reinforce incentives for authentic producers to innovate and move upward in the quality portfolio. The market shares for the higher-quality products increased post-entry and those of lower-end products declined. There is also evidence for product-line proliferation after the entry. Similar heterogeneous effects on the purchase intent of high-, medium-, and low-tier branded products were replicated in experimental settings. Responses in the experiments suggest that counterfeits signal brand popularity to at least some consumers and a large number of consumers prefer to enjoy a variety of quality levels. Counterfeits therefore steal demand from the low-end authentic products while having positive spillover effects for high-end authentic products. These findings substantiate and enrich the discovery in prior research (Qian 2008) that authentic firms' average prices and quality increase after entry by counterfeits. Combining these studies gives a deeper understanding of how counterfeit entry under weak intellectual property protection affects innovation incentives of firms and markets.

In sum, this paper identifies the heterogeneous effects of counterfeits on authentic product sales through a combination of field data, theory, and lab experiments. The findings have important policy implications. Since counterfeits hurt primarily low-end authentic products and have positive net effects on high-end ones, the focus of enforcement against counterfeits should be directed toward low-quality counterfeits or counterfeits that imitate lower-end authentic products. It seems not only socially beneficial to weed out low-quality counterfeits and to keep certain levels of higher-quality competition, but also privately efficient to the branded companies. In addition, the findings that the positive sales

impact of counterfeiting is more pronounced for brands that were not yet well known at the time of infringment could imply that trademarks and IPR may be optimally enforced at different stages of brand or product adoption cycles. This is exactly what Microsoft did in China. It fiercely enforced measures against piracy only after the majority of the Chinese users had adopted its products (in either authentic form or pirated copies). The positive spillover effect of a low-quality entrant on the original brand is also identified in Anderson et al. (2011), using the comprehensive scanner database by an American apparel company. Kuksov and Xie (2011) also theorize the positive competition effect in the status goods market. The findings here, therefore, have applications beyond counterfeiting. Together, this body of research suggests that there is an optimal level of IPR protection, and the optimum varies from country to country (Qian 2007 and 2009), sector to sector (Qian 2008), brand to brand, and even product to product. The optimum could also have a time dimension in light of the dynamic effects discussed in this study. After all, counterfeiters can be both foes and friends.

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Table 1: Summary Statistics Before and After the Policy Change

Variable:	**Pre-1995**	**Post-1995**
Percentage of Government Resources in	.11	.02
Monitoring Footwear Trademarks	(.004)	(.001)
Workdays Authentic Company Took to Pass ISO	142	149
(Relationship Proxy)	(116.5)	(112.6)
Incorporation Year of Authentic Brands	1985	1985
	(11)	(11)
Number of Company Stores	0	684
	(0)	(533.5)
Authentic Brand-Protection Office Personnel	.17	4.0
(Head count)	(.46)	(2.23)
Quantity (in 10,000 pairs)		
Fake Sale Quantity	Median 0	85.71
		(75.85)
Authentic Sale Quantity	309.38	558.28
	(725.76)	(995.82)
Prices, Costs, and other Numerairs (Deflated, in USD)		
Fake Shoe Price	Median 0	7.32
	(8.33 to 10.4)	(4.2)
Fake Shoe Costs	Median 0	2.66
	(2.2 to 3.56)	(1.56)
Average Authentic Price of Existing Product Lines	26.21	32.24
	(13.64)	(20.45)
Average Authentic Costs of Existing Product Lines	22.61	25.18
	(12.90)	(18.43)
Average Authentic Price of New Product Lines		45.37
		(26.06)
Average Authentic Costs of New Product Lines		35.47
		(24.37)
Self-enforcement Costs of Authentic Brands	520	81380
	(1550)	(83140)
Advertising Expenditure	1496700	2381500
	(2724200)	(3329300)
Real GDP per capita PPP	310.25	488.13
	(5.57)	(2.83)
No. of Obs.	62	310

This table presents the summary statistics of the brand-level dataset, slicing it into two parts: data prior to the year 1995, when the Chinese government reallocated enforcement resources away from the footwear sector to fill in the needs of the safety sectors, and data after 1995. Each row reports the means and standard deviations (in parentheses) of a variable in the two time lines. The percentage of government resources devoted to monitoring the shoe sector is obtained from the Quality and Technology Supervision Bureau. Real GDP per capita PPP is obtained from the World Bank *World Development Indicators (WDI)*. Prices and costs are deflated using the Consumer Price Index published in the WDI (Year 1995 was set as the base year in the database).

Table 2: Summary Statistics on Average Percentage of Sales Across Quality Tiers

Quality Tier:	**Pre-entry**	**Post-entry**
1. High-tier	13.9%	23.0%
2. Medium-tier	54.0%	61.5%
3. Low-tier	32.1%	15.5%

This table presents the summary statistics of the product-line level dataset, slicing it into two parts: data prior to the year that the corresponding brand was infringed by its counterfeits and the data after that year. The three quality tiers are categorized by the authentic branded companies. In later analyses, brand-fixed effects will be controlled for.

Table 3: Summary Statistics on Average Percentage of Sales of the Existing and New Quality Tiers

Quality Tier:	**Pre-entry**	**Post-entry**
1. Existing High-end	13.9%	17.0%
2. Existing Medium-end	54.0%	35.8%
3. Existing Low-end	32.1%	5.6%
1. New High-end	0%	6.0%
2. New Medium-end	0%	25.7%
3. New Low-end	0%	9.9%

This table presents the summary statistics of the product-line level dataset, slicing it into two parts: data prior to the year that the corresponding brand was infringed by its counterfeits and the data after that year. The three quality tiers are categorized by the authentic branded companies. Existing product lines refer to those that existed throughout the sample period, while new product lines refer to those that were added one to three years after the brands were infringed by counterfeits. In later analyses, brand-fixed effects will be controlled for.

Table 4: First-stage IV Regression

Dependent Variable:	Fake Entry			log price
	(1)	(2)	(3)	(4)
Loose	.72***	.27***		
	(.04)	(.05)		
Relation		.001	.001	
		(.001)	(.001)	
Loose*relation		.014***	.002***	
		(.002)	(.000)	
Year trend	-.000	.04**		
	(.000)	(.01)		
Log Cost				.704***
				(.009)
Year Fixed Effects	No	No	Yes	Yes
No. of Obs.	372	372	372	10392
p-values	.00	.00	.00	.00

This table reports the first stage of IV estimations. All models use brand fixed effects. The counterfeit entry dummy (equals one if counterfeits are discovered for a brand) and log of deflated authentic product prices are regressed on the set of I.V., with the year trend and company fixed effects, in four separate regressions. Each column reports one regression specification. Heteroskedasticity-consistent standard errors that correct for clustering at the company level appear in parentheses. Statistical significance levels: *-10%; **-5%; ***-1%. Columns 1 to 3 present alternative first-stage IV specifications to show robust significant relationship between the set of IVs and the entry of counterfeits. The variables are: Loose – a dummy indicating enforcement legislation change, which equals 1 in 1995 onwards; Relation – relationship between the brand and the QTSB, as proxied by the number of work days between the application and grant dates of ISO certificate for an authentic company; Loose*relation – interaction between legislation change and a company's relationship with the government. Column 4 shows the close relationship between authentic product price and its unit production cost, illustrating costs as a relevant IV for prices.

Table 5. IV Regression Results for Log Sale Quantity and Values of Three Fixed Quality Tiers

Notes: Each column reports one regression specification that is executed in the sample of quality tier as specified in the column header. Point estimates are reported in the first row aligning with the corresponding independent variable. Standard Errors are clustered at the product-line level, and are reported in the second row for each corresponding independent variable.

	log sale quantity			log sales		
Variable	**High-end**	**Medium-end**	**Low-end**	**High-end**	**Medium-end**	**Low-end**
	(1)	(2)	(3)	(4)	(5)	(6)
Log deflated price	-0.21	-0.34	-0.36	-0.18	-0.18	-0.84
	0.29	0.37	0.29	0.39	0.43	0.37
Fake entry	**0.51**	-0.28	**-0.58**	**0.41**	-0.08	**-0.75**
	0.21	0.17	0.24	0.20	0.24	0.38
Age	0.00	0.00	0.00	0.01	0.01	0.00
	0.01	0.01	0.00	0.01	0.01	0.01
Employment	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
Log GDP per capita	0.61	-6.93	-17.18	1.87	-4.90	-18.49
	2.23	2.59	2.64	3.05	3.36	3.30
Log consumption (deflated)	-0.69	2.54	6.09	-1.22	1.58	6.88
	0.87	1.00	0.98	1.15	1.26	1.22
Economic growth	0.07	-0.03	-0.17	0.07	0.00	-0.23
	0.04	0.04	0.04	0.04	0.05	0.05
Consumption/GDP	0.00	-0.09	-0.20	0.02	-0.06	-0.22
	0.03	0.03	0.03	0.04	0.04	0.04
Gini Coefficient	0.07	0.29	0.57	0.04	0.24	0.61
	0.08	0.09	0.11	0.11	0.12	0.12
Male Shoes	0.08	0.54	0.41	0.15	0.63	0.51
	0.06	0.06	0.06	0.08	0.06	0.05
Tall-leg boots	-1.56	-1.58	-1.59	-1.59	-1.52	-1.76
	0.10	0.12	0.12	0.14	0.14	0.16
Medium-leg boots	-1.01	-1.06	-1.10	-1.06	-1.10	-1.31
	0.03	0.05	0.07	0.04	0.06	0.08
Slippery	-1.52	-1.49	-1.58	-1.54	-1.54	-1.57
	0.08	0.07	0.07	0.11	0.09	0.07
Sport Shoes	0.90	1.47	1.52	1.32	1.89	1.92
	0.23	0.21	0.22	0.28	0.25	0.24
Constant	14.35	-6.47	-14.71	21.66	5.38	-19.43
	7.38	7.46	6.91	7.97	7.91	8.44
Year FE	Y	Y	Y	Y	Y	Y
Firm and Product-line FE	Y	Y	Y	Y	Y	Y
N	1944	1945	1944	1859	1861	1860

Table 6. IV Regression Results for Log Sale Quantity and Values of Three Fixed Quality Tiers for the Women Fashion Boots

Notes: Each column reports one regression specification that is executed in the sample of quality tier as specified in the column header. Point estimates are reported in the first row aligning with the corresponding independent variable. Standard Errors are clustered at the product-line level, and are reported in the second row for each corresponding independent variable.

	log sale quantity			log sales		
Variable	**High-end**	**Medium-end**	**Low-end**	**High-end**	**Medium-end**	**Low-end**
	(1)	(2)	(3)	(4)	(5)	(6)
Log deflated price	-0.29	-0.20	-0.35	-0.02	-0.39	-0.90
	0.45	0.54	0.39	0.59	0.59	0.33
Fake entry	**0.65**	0.10	-0.28	**0.66**	0.19	-0.32
	0.19	0.28	0.33	0.18	0.34	0.47
Age	0.01	0.00	0.00	0.01	0.00	0.00
	0.01	0.01	0.00	0.01	0.01	0.00
Employment	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
Log GDP per capita	-0.01	-12.52	-21.72	1.13	-10.91	-21.69
	2.86	2.61	3.41	3.31	2.66	3.94
Log consumption (deflated)	-0.64	5.52	8.52	-1.65	4.18	8.10
	1.37	1.17	1.06	1.78	1.21	1.27
Economic growth	0.06	-0.19	-0.30	0.14	-0.10	-0.26
	0.07	0.06	0.03	0.10	0.07	0.03
Consumption/GDP	-0.01	-0.18	-0.27	0.03	-0.13	-0.25
	0.04	0.04	0.03	0.05	0.04	0.04
Gini Coefficient	0.10	0.42	0.66	0.07	0.38	0.65
	0.11	0.10	0.16	0.12	0.11	0.18
Constant	15.26	-33.56	-36.50	28.44	-16.61	-28.22
	15.46	12.80	6.42	20.78	14.57	6.94
Year FE	Y	Y	Y	Y	Y	Y
Firm and ShoeType FE	Y	Y	Y	Y	Y	Y
N	209	209	209	209	209	209

Table 7. IV Regression Results for Three Fixed Quality Tiers of the Non-Renowned Brands

Notes: Each column reports one regression specification that is executed in the sample of quality tier as specified in the column header. Point estimates are reported in the first row aligning with the corresponding independent variable. Standard Errors are clustered at the product-line level, and are reported in the second row for each corresponding independent variable.

	log sale quantity			log sales		
Variable	**High-end**	**Medium-end**	**Low-end**	**High-end**	**Medium-end**	**Low-end**
	(1)	(2)	(3)	(4)	(5)	(6)
Log deflated price	-0.33	-0.95	-0.66	-0.58	-0.73	-0.59
	0.33	0.41	0.28	0.46	0.52	0.34
Fake entry	**0.56**	0.34	-0.37	**0.65**	**0.52**	**-0.52**
	0.27	0.21	0.20	0.35	0.26	0.21
Age	0.01	0.00	0.00	0.01	0.00	0.00
	0.01	0.01	0.01	0.01	0.01	0.01
Employment	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
Log GDP per capita	-4.11	-11.36	-20.63	-2.69	-9.84	-19.54
	2.52	2.88	3.50	3.12	3.61	4.16
Log consumption (deflated)	1.59	4.91	8.02	0.44	3.75	7.23
	1.05	1.14	1.23	1.48	1.56	1.57
Economic growth	-0.03	-0.14	-0.27	0.08	-0.03	-0.20
	0.05	0.05	0.04	0.08	0.07	0.05
Consumption/GDP	-0.07	-0.17	-0.26	-0.03	-0.12	-0.23
	0.03	0.04	0.04	0.04	0.05	0.04
Gini Coefficient	0.20	0.39	0.63	0.18	0.36	0.60
	0.10	0.11	0.15	0.12	0.14	0.18
Male Shoes	0.01	0.50	0.37	-0.03	0.47	0.35
	0.06	0.06	0.06	0.08	0.07	0.07
Tall-leg boots	-1.71	-1.74	-1.85	-1.77	-1.83	-2.06
	0.11	0.14	0.13	0.14	0.18	0.15
Medium-leg boots	-1.01	-1.13	-1.22	-1.01	-1.16	-1.31
	0.03	0.07	0.08	0.04	0.09	0.09
Slippery	-1.37	-1.38	-1.50	-1.31	-1.34	-1.45
	0.10	0.08	0.08	0.13	0.10	0.09
Sport Shoes	1.34	1.89	2.05	1.64	2.18	2.37
	0.31	0.27	0.21	0.41	0.34	0.27
Constant	-4.02	-26.31	-30.81	9.29	-13.11	-21.61
	10.58	9.51	8.58	15.67	13.62	10.82
Year FE	Y	Y	Y	Y	Y	Y
Firm and ShoeType FE	Y	Y	Y	Y	Y	Y
N	1353	1353	1353	1353	1353	1353

Table 8. Regression Results for Purchase Intent of Three Quality Tiers in the Lab

Notes: Each column reports one Seemingly Unrelated Regression equation.
Point estimates are reported in the first row aligning with the corresponding product-line independent variable. Standard Errors are clustered at the level, and are reported in the second row for each corresponding independent variable.

	Purchase Intent			
Variable	**High-end**	**Medium-end**	**Low-end**	**Counterfeit**
Treatment	**0.83**	0.07	**-0.67**	-0.04
	0.35	0.36	0.33	0.36
Counterfeit adds to Variety	0.01	0.03	-0.04	**0.37**
	0.13	0.13	0.13	0.13
Disallow fakes	-0.05	-0.02	-0.03	-0.27
	0.14	0.14	0.15	0.14
Switcher	-0.15	0.21	0.11	0.06
	0.12	0.12	0.13	0.12
Expert	-0.16	0.25	-0.15	**0.49**
	0.14	0.14	0.14	0.14
Negative Association	0.20	0.00	-0.05	0.30
	0.17	0.17	0.17	0.17
Household size	0.10	-0.07	0.06	-0.09
	0.08	0.08	0.08	0.08
Age	-0.19	0.09	-0.02	0.01
	0.18	0.19	0.19	0.19
Gender	-0.27	0.38	0.09	-0.09
	0.31	0.31	0.32	0.32
Income	0.11	0.17	0.04	0.05
	0.13	0.13	0.14	0.14
Race				
Asian	0.10	-0.14	0.24	-0.37
	0.39	0.40	0.41	0.40
Hispanic	0.76	-1.31	1.07	**-3.32**
	1.22	1.24	1.28	1.25
White	0.11	-0.62	0.49	-0.31
	0.47	0.47	0.49	0.48
Others	-1.14	-0.79	0.94	**-1.47**
	0.64	0.65	0.68	0.66
Single	0.48	0.48	-0.14	0.19
	0.33	0.34	0.35	0.34
Constant	2.69	1.09	2.75	0.63
	1.10	1.12	1.16	1.14
N	62	62	62	61

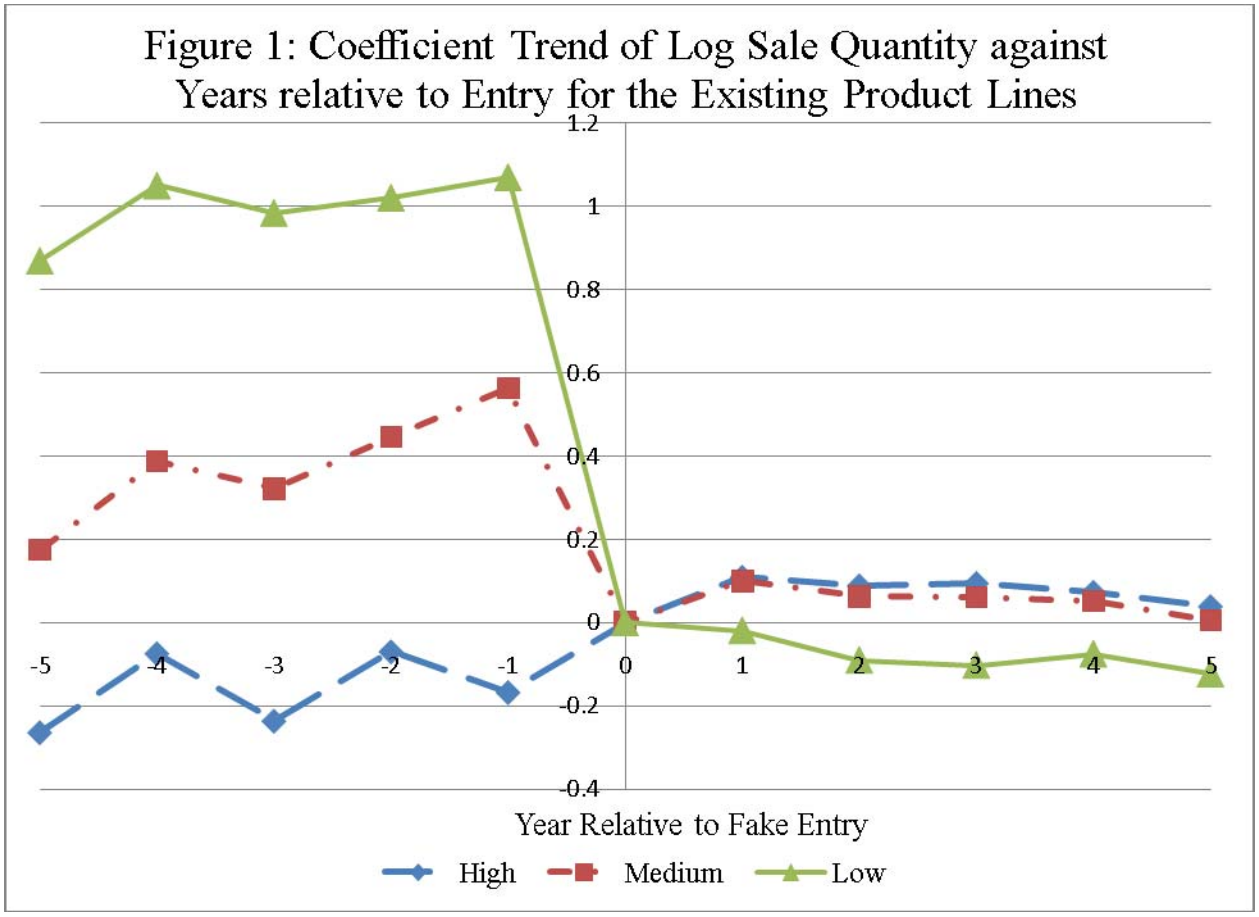


Figure 1: Coefficient Trend of Log Sale Quantity against Years relative to Entry for the Existing Product Lines
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-5
-4
-3
-2
-1
0
1
2
3
4
5
Year Relative to Fake Entry
High
Medium
Low

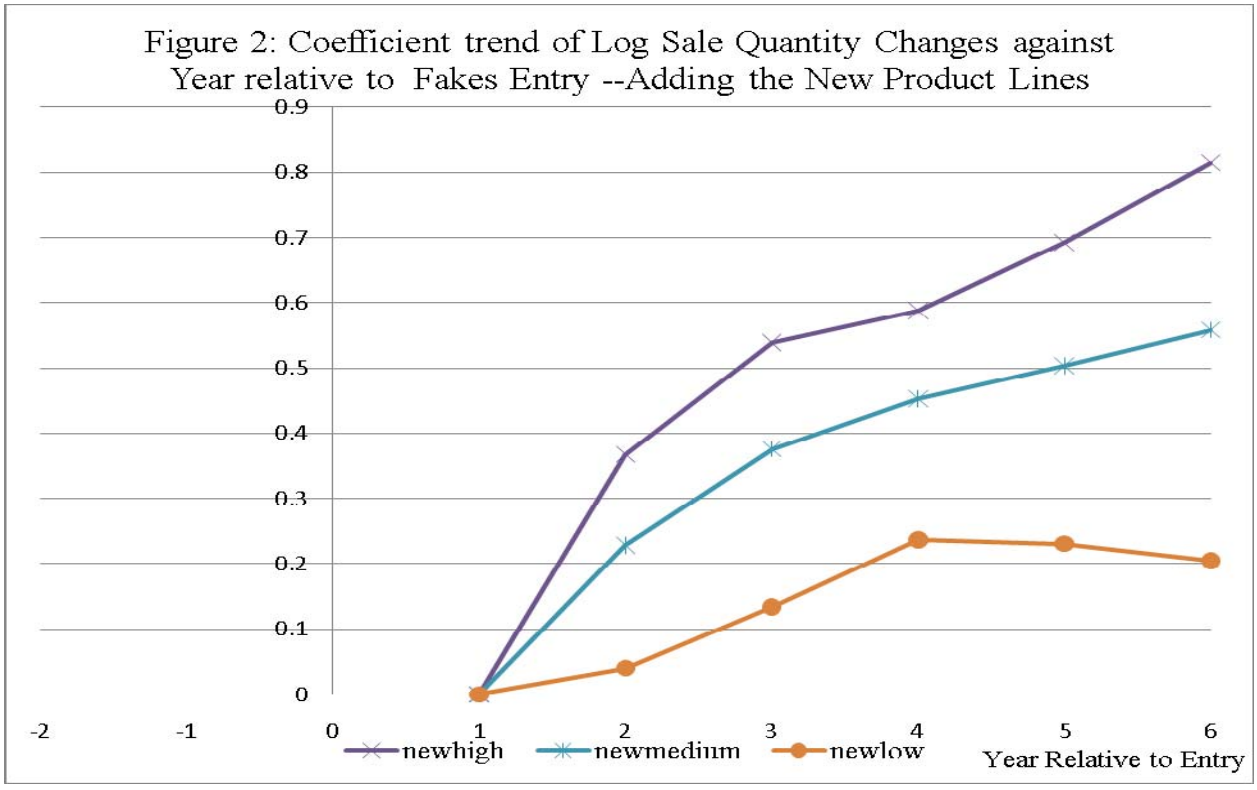
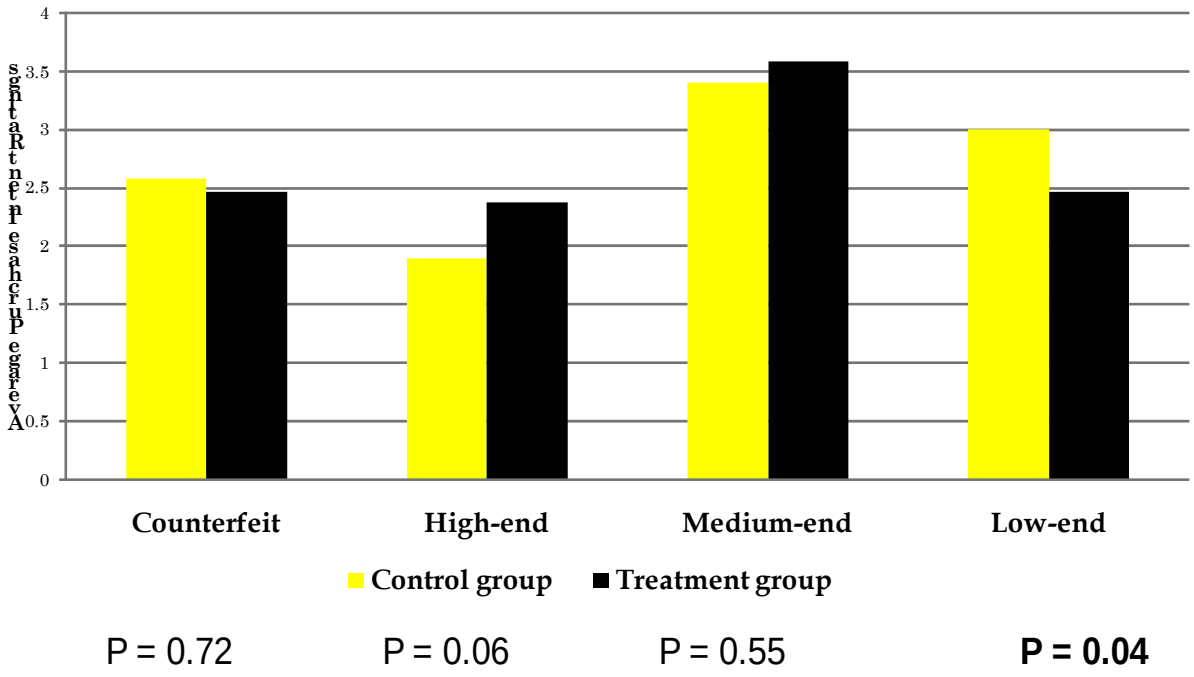


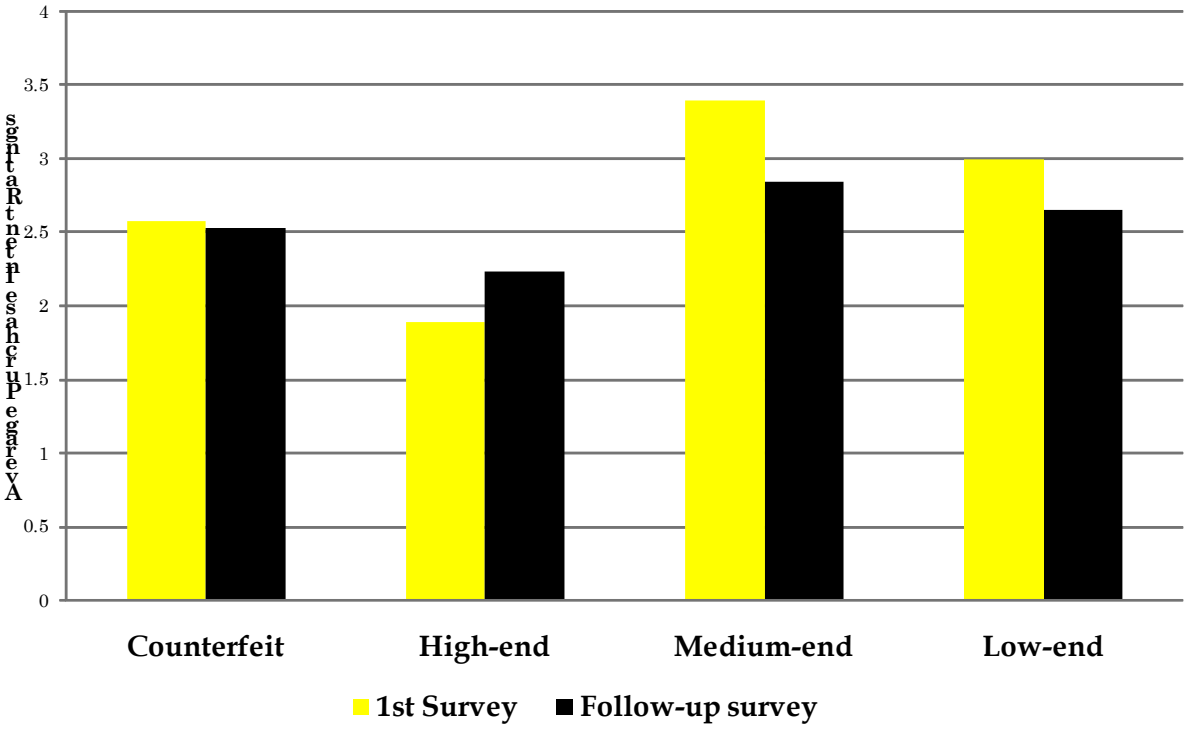
Figure 2: Coefficient trend of Log Sale Quantity Changes against Year relative to Fakes Entry --Adding the New Product Lines
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-2
-1
0
1
2
3
4
5
6
newhigh
newmedium
newlow
Year Relative to Entry

Figure 3. Purchase Intent Across Treatment and Control Groups



P = 0.72 P = 0.06 P = 0.55 **P = 0.04**

Figure 4. Purchase Intent Within the Control Group



P = 0.16 **P = 0.03** **P = 0.01** **P = 0.02**