Yi Qian’s
Professional Statement

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Appendix

List of My Articles That Are Included in Reading Lists for Courses Outside of Northwestern University
Research Statement

My research lies at the intersection of marketing and economic strategy. It is centered on the economics of brand management against counterfeiting, innovation, and intellectual property (IP). At a broad level, my interests in branding and IP motivate my analysis of the strategic roles of IP development and protection, the impact of counterfeiting and imitation, and brand management in emerging markets. The goal of my research is to understand a) the origins, impact, and remedies of counterfeiting and imitation, b) how IP policies shape incentives for innovation and marketing of innovation, and c) the relationship between intangible IP and economic performance. I explore these questions to better understand how marketers can more effectively respond to IP policies and devise IP strategies. In addition, my research offers insights into ways to improve consumer surplus and social welfare.

My primary research involves understanding the impact counterfeiters can exert on the market. It directly contributes to the branding literature as well as the IP literature. For companies, brands are valuable IP and strategic assets, a source of competitive advantage. For policy makers, branding investments affect social welfare and, in the long run, the rate of economic growth. My research sheds light on the ways in which brand infringement and protection interact with the broader economy and subsequently generate important implications for government and managers alike. I do so in two ways: a) by investigating the role of trademarks – the form of IP that protects the exclusivity of brands – and presenting evidence informing trademark policy choices and branded firms’ self-enforcement strategies, and b) by exploring how brand management activities against counterfeits affect market competition and innovation, thus relating branding to broader company strategies and industrial organization.

I identify heterogeneous sales impacts counterfeiting has on different quality tiers and brands. I evaluate how firms can better manage their IP and branding strategies in a market with counterfeits or imitations, including the extent, nature, and directions of innovations (product), pricing (price), investment in self-enforcement (promotion), and vertical integration of downstream retail channels (place). The set of strategies are complements rather than substitutes for each other. I further explore how income inequality and status signaling can drive the demand for counterfeits. My research also extends to brand management in the context of line extensions and store brand competitions. I explore the role of IP and branding in emerging markets like China in several of my studies. I show that IP policies could complement local infrastructures (educational attainment, development level, and economic freedom) to stimulate domestic innovations and marketing of innovations. My research has revealed profitability differences between foreign direct investments in China by investors that have ethnic ties and those that do not, with intangible branding and innovation as mediating factors. Research in this area also sheds light on how Chinese exporters with or without self-branding perform under various macroeconomic environments. I detail the contributions of the research in the following sections. In short, I analyze the relationship between national Intellectual Property Rights (IPR) laws and innovation, develop strategies to deal with counterfeit and imitative entries, and study consumer attitudes, behaviors, and demand for counterfeits using field and experimental data.

Constructing relevant datasets and conducting proper causal analyses are two crucial steps in studying these substantive issues: relevant datasets make it possible to empirically study these issues and proper analyses ensure valid causal inference. To overcome various encountered data limitation issues, I have made strides over the past years to work with government agencies, firms, and consumers to collect new field and experimental datasets and develop or employ cutting-edge database development methods and econometric approaches that can facilitate the development of pertinent datasets and overcome limitations of collected datasets. The second stream of my research is devoted to developing these
empirical methods that help address the aforementioned substantive issues and to expanding the field’s repertoire of tools. My methodological research, which overlaps with my teaching, examines and provides new perspectives on how to use available data to develop optimal databases for empirical testing and how to conduct valid causal inferences in the face of potential endogeneity threats, selection bias, and completely missing key variables. I propose new approaches to developing large-scale country-, firm- or consumer-level databases and to analyzing observational studies based on formulating and estimating econometric models using these databases. Given its methodological nature and the fact that some of this work is motivated by related concerns in broader context of data collection and analytics, this stream of work can contribute to a wider range of fields.

My research program reflects a synthesis of research styles, including theoretical models, empirical causal inference models, and randomized experiments. Theoretical models inform generalizable hypotheses. Empirical studies test theoretical predictions and develop new insights into firm and consumer behavior. Randomized experiments allow me to manipulate treatment conditions and draw causal inferences under well-controlled laboratory conditions. The combination of field data and lab experiments proves to be fruitful for causal inferences that are more likely to have both internal and greater external (ecological) validities.

As of November 2013, I have fourteen published or forthcoming peer-reviewed articles, nine of which are in top economics, marketing, and management journals and two in top statistics journals. In addition, I currently have three manuscripts in different review stages at top marketing and management journals and three in the final stages of preparation for submission. I also have one policy white paper at the World Intellectual Property Organization and three book chapters. Please refer to my curriculum vitae for a numbered reference list of my papers.

My body of research has already started to receive recognition. My *Quarterly Journal of Economics (QJE)* paper won the Emerald Citation of Excellence Award as one of the 50 best articles published in 2008 in management across the top 400 business and management journals worldwide. The award was presented at the American Management Association Conference of 2009. I organized and chaired a special session on the Economics of Counterfeits at the Marketing Science Conference in 2009 and a special session on IP and Brand Management at the Marketing Science Conference in 2012, each featuring five of my papers in the area. I was invited to co-author a literature review on “The Economic Effects of Counterfeiting and Piracy” [15] for the Advisory Committee on Enforcement for the World Intellectual Property Organization, which adopted and studied the paper in its annual committee meeting in December 2010. In recognition of my body of research on emerging markets, I was invited to the “Emerging Markets” session of the 9th Invitational Choice Symposium. Following the symposium, our session is working on a review article to summarize important insights from research works on emerging markets in marketing, economics, and sociology and to discuss avenues of future research.

The article “Does Ethnicity Pay?” received the best paper award at the Chinese Financial Association Conference in NYC. The manuscript “Made in China or Made by China” won the Best Paper Award at the *Journal of Marketing Science* Conference. Several of my papers have been incorporated in Ph.D. course syllabi at various universities, as listed in the appendix. In recognition of the impact of my research, I have been a faculty research fellow at the National Bureau of Economic Research since 2008 in two programs: the Productivity group and the China group. In recognition of my work in emerging markets and China, I have been invited to serve as a co-editor of the journal *Economics of Transition* since 2011. I have made special efforts to stay connected with colleagues in marketing, strategy, and economics, and to disseminate research to different audiences. For example, I have been invited to seminars at various departments of different schools, and I have close contacts with colleagues in Kellogg’s Internal Strategy and Economics Departments.
1. Brand Management, Innovation, and IP

In my work on intellectual property rights and brand management against counterfeiting, I consider how national IP policies affect incentives to innovate and other marketing norms. I study the demand for counterfeits, the impact of counterfeiting, and strategic responses by brand owners. I use the resulting insights, based on micro-level phenomena, to aid managerial decision making, as well as to aggregate facts about IP policy implications. This section discusses twelve papers that relate to this agenda. The relationship of this body of work to the existing literature is described below.

1.a Brand Management Under Counterfeiting Competition

Interbrand estimates that the brand value of Starbucks was $12.17 billion in 2008, accounting for 89% of the market cap of the entire company. This is one example of the IP value of brands. The values brands possess generate incentives for counterfeiting and imitations. Counterfeiting cuts across countries and industries. Notably, counterfeit footwear has topped the seizure list of the U.S. customs service for four years, accounting for nearly 40% of total seizures (The New York Times, Aug. 19, 2010). The origin, impact, and remedies of counterfeits and the protection of IP are pertinent questions to address.

i. General Marketing Impact of Counterfeiting

My paper “Impact of Entry by Counterfeiters” [2] presents the first econometric attempt to study the general marketing impact of the entry by counterfeiters under weak IP protection. I collected new panel data from Chinese shoe companies from 1993 to 2004. By exploiting the discontinuity of government enforcement efforts for the footwear sector in 1995 and the differences in authentic companies’ relationships with the government, I identify and measure the effects of counterfeit entry on authentic prices, qualities, and other market outcomes. My analysis shows that counterfeit entry stimulates the original producer to offer a higher-quality product at a higher price. In addition, company-level self-enforcement activities and downstream vertical integration of licensed company stores are effective ways to deter counterfeit entry or to reduce counterfeit sales. For companies conducting business in developing countries, it is worth noting that relationships with local governments play important roles in brand management.

As QJE coeditor Prof. Larry Katz commented, “[T]he referees, Glaeser [another QJE coeditor], and I think you are exploring fascinating issues.” The data, instrumental variable solutions, and results on firm behavior in the presence of counterfeiters are applauded by the editors and four referees as “extremely interesting.” A referee commented, “This is an ambitious and interesting paper. It addresses an important issue about which we know little: the impact of counterfeiting on sellers of authentic goods. It does so in a context – China, with its notoriously weak IPR – where these issues are particularly salient and where high quality research is particularly needed. The author responds to the paucity of data by demonstrating amazing creativity and resourcefulness in gathering her own data. And she responds to an endogeneity problem by exploiting detailed knowledge of the institutional and market context from which her data are taken to identify a natural experiment in government policy.”

The aforementioned strategies that branded firms adopt to combat counterfeits can be considered manifestations of endogenous sunk costs (ESC) that Sutton (1991) proposed as ways of sustaining market dominance. I provide a theoretical framework for understanding counterfeiting in “Brand Management and Strategies Against Counterfeits” [11]. I build upon a vertical differentiation model (Gabszewicz and Thisse, 1979) with endogenous quality and other ESC. I model two layers of asymmetric information that counterfeiters frequently generate: First, there is asymmetric information between a counterfeiter and buyers. Second, some buyers may show off the counterfeits to signal their fake status. I find evidence that legitimate firms react by establishing essentially a separating
equilibrium, through signaling their goods’ origin by investing in quality, developing retail stores, fostering self-enforcement, and raising prices. In contrast, the “conventional wisdom” in developing countries is that weak enforcement forces legitimate firms to accept lower prices and quality in what amounts to a pooling equilibrium. I find the former outcome in a common consumer good (footwear) in testing the theoretical predictions. It is noteworthy in the empirical setting that brands did not innovate prior to entry by their counterfeiters, even though there was sufficient competition among the horizontally-differentiated brands. My model conceptualizes and resolves this puzzle: due to the knockoff nature of counterfeits, they enter the vertical quality line of the infringed brand. Such competition exerts unique pressure for the brand to move up the quality ladder in a market where brand otherwise enjoys monopolistic power in its own niche. This research enriches a Teecean perspective: a substantial portion of the rents from innovation arise not from technological novelty but from embedding innovation in brands and distribution systems insulated from fringe competition.

The above two papers imply that public-private partnership in enforcement could be effective, leveraging both the private firms’ insider knowledge and the government’s sanction power. In a world with asymmetric information, the social planner’s optimization could often result in corner solutions. Discretizing the optimization problem by inviting collaboration with the brands that have vested interests and incentives to combat illegal activities such as counterfeits could lead to more efficiency.

ii. Nature and Direction of Innovation Responses to Counterfeiting

Qian (2008) [2] focuses on documenting the general impact of counterfeiting, whereas my coauthors and I provide a deeper theoretical examination of that impact by disentangling the attributes of quality in “Untangling Searchable and Experiential Quality Responses to Counterfeiting” [19]. The theoretical model in Qian (2012) [11] provides the microfoundations of consumer deception by a counterfeiter and an authentic firm’s tactics (distribution choices and self-enforcement) to mitigate it. Neither of those papers [2, 11] dissects the extent and nature of innovations. This paper [19], in contrast, is focused on the differential impact on two dimensions of quality. The fact that counterfeiters usually mimic an authentic product’s design but offer inferior functional quality has important implications for authentic producers’ incentives for innovation and the nature of innovations. This theoretical framework helps unravel these complexities with intuitive closed-form solutions. While Grossman and Shapiro (1989) primarily define a prestige effect as a function of the total sales of the brand (and its counterfeits) and one-dimensional quality, we decompose quality to a finer level. In addition, we endogenize quality choices and analyze the model under producers’ flexible cost structures. The findings provide practical guidance on brand-protection strategies under different market conditions where counterfeits may vary by production cost and pervasiveness.

This research contributes to the literature on counterfeits and product quality differentiation. A key novelty in our theoretical model is that we extend Nelson’s (1970) constructs on searchable and experiential goods to quality dimensions within a good. For many products, including authentic brands subjected to counterfeit imitation, some quality traits may be observable (e.g., stitching, appearance) and others unobservable (e.g., durability) at the time of purchase. Counterfeits, by definition, share some searchable (observable) quality traits with the authentic brand, whereas the deception revolves around the experiential (unobserved). To the best of our knowledge, our model is the first attempt in the theoretical literature to incorporate two dimensions of endogenous vertical quality as well as endogenous price under asymmetric information and to yield closed-form solutions as testable predictions on counterfeit competition. Untangling these two quality dimensions yields insight into the unique impact counterfeiting can have on branded products compared with a generic entry.
The topic is relevant to emerging markets and the results shed light on an interesting feature of these markets. Emerging markets are characterized by relatively low enforcement of anti-counterfeit regulation. The weakened regulation of counterfeit shoe manufacturers in China is the setting for the theory’s empirical test. Therefore, this research can provide insights into marketing in emerging markets. A key result is that, unless counterfeiting is too rampant, the brand tolerates some counterfeiting by allowing the counterfeiter to pool on the searchable dimension. However, if counterfeiting grows too much, the brand separates by making the quality on the observable dimension sufficiently high that the counterfeiter cannot reproduce the same high level of quality on this dimension. We formalize this notion as the “self-correcting property” of emerging markets—if there would be too much counterfeiting, the brand would pre-empt it. There are a number of other interesting results on the choice of quality levels for the experiential dimension, including the inferred conditions for a lemon’s problem in this market, where low-cost counterfeiting could drive out authentic products in a pooling equilibrium. Implications are also derived for welfare. Finally, supportive anecdotal and empirical evidence is provided. Based on detailed shoe characteristics data in Qian (2012) [11], we find that branded companies improved their searchable quality dimensions after infringement by counterfeits, whereas the experiential dimensions did not experience significant improvements.

While branded firms were shown to innovate in the face of counterfeiting, are such incentives sustainable? In order to effectively guide priorities for and directions of innovation and enforcement strategies, it is crucial to understand the sales impacts of counterfeits on authentic products of different types and quality tiers and on brands of different natures and life stages. However, the extant literature has left this topic largely unexplored, due in part to insufficient data. My study “Counterfeiters: Foes or Friends” [12] fills the void by investigating the specific sales impacts of counterfeits through field and experimental methods, including how product quality, product type, brand age, and brand reputation mediate these effects. Such sales-related findings go well beyond the general marketing impacts of counterfeiting [2], shedding much-needed light on potential incentives and directions for innovation and enforcement, including academic, managerial, and policy-related implications.

I collect new product-line level data and propose a new IV based on biographic matches between managers and government officials to explore whether counterfeits have heterogeneous effects on products of different quality tiers within the same brands. I focus on the set of product lines that had been operating prior to the entry by counterfeiters to avoid problems associated with endogenous innovations. Analyses using economic theory, empirical modeling, and randomized lab experiments arrive at convergent results. I identify some of the benefits (advertising) and costs (substitution) to legitimate brands from counterfeit imitation. The advertising effect outweighs the substitution effect for high-end products and the business-stealing effects dominate for low-end products where counterfeits are closer substitutes. I further identify moderators to the advertising effects of counterfeiting, and find that the advertising effects are larger for brands that are younger and less famous at the time of infringement and for products that are more fashionable and tailored to younger customers. Such heterogeneous sales impact could steer innovations along the respective dimensions. The consistency of results from the Chinese field panel data and U.S.-based lab experiments demonstrate that the panel-based findings have implications beyond China. I have identified similar positive spillover effects of an entrant (e.g. outlet store) in other contexts in marketing, such as line extensions (“Cross-channel Spillover From a Factory Store” [21]).

iii. Time-varying Effects of Counterfeiting

In addition to estimating the overall average treatment effects of entry by counterfeiters, I propose new methodologies to estimate the dynamic and heterogeneous impact and the factors
underlying any heterogeneity in brand management responses. In “Investigating the Dynamic Effects of Counterfeits with a Hierarchical Random Changepoint Simultaneous Equation Model” [20], we identify both a temporary negative short-term effect and a stable positive long-term effect of counterfeit sales on the authentic-product prices. The findings help unify two strands of Industrial Organization theories on the pricing effects of competition. The hierarchical structure of our model enables a study of the drivers of the heterogeneity in authentic firms' response behaviors (in both response time and response magnitude). Firms with more human capital or less diversification from infringed markets were faster in differentiating from counterfeits.

In “Counterfeiters: Foes or Friends” [12], I have charted out the long-term sales impact of counterfeiting for three quality tiers of brands. I show that the positive advertising effects on the high-end product sales and negative substitution effects on the low-end product sales lingered for years.

Understanding the heterogeneous effects of counterfeits on product and brand types will help to paint a more complete picture of counterfeits’ impact as well as provide more specific direction for guidance. This stream of research therefore contributes to the broader literature on how firm responses to their legal environment could have important moderating effects on the impact of IPR protection.

iv. Demand for Counterfeiting

In order to propose effective IP and brand-management strategies, it will also be helpful to understand what drives the demand of counterfeits and what affects consumer purchase behavior of counterfeits. I thus collect and analyze consumer-level data to study these questions. In “Income Inequality and Demand for Counterfeits” [22], my co-author and I gather field data and conduct lab experiments to establish the causal relationship between income inequality and demand for counterfeits. In the field and lab studies, we provide evidence that consumers have more-favorable attitudes toward counterfeits across a few typical product categories when they are subject to a higher level of income inequality. In particular, when we randomly primed subjects with a low-income condition in a more unequal neighborhood, they expressed higher purchase intent and attitudinal ratings for counterfeits. Furthermore, we found status-signaling to be a mediating mechanism. This finding has immediate policy implications: reducing income inequality could be an effective means of eliminating counterfeits, in addition to other benefits. On a light note, moderate counterfeiting could serve as a form of compensatory consumption.

The finding that counterfeits can have positive effects and the fact that enforcements are costly, prompted me to investigate the priority and optimality of enforcement against counterfeiting. In “Which Brand Purchasers Are Lost to Counterfeitors?” [14], my co-author and I employ new nonparametric data fusion methods to develop comprehensive databases that overcome data constraints when studying consumer counterfeit purchase behaviors. By examining the branded company’s internal records and consumer survey datasets simultaneously, we find data fusion provides a feasible approach to developing databases that enable studying the relationship between counterfeit purchases and various marketing elements, such as the consumers' purchase motivations, behaviors and attitudes toward the authentic product, and the brand's marketing channels, promotions, and advertisements.

The analysis reveals systematic differences in the characteristics of consumers with different counterfeit-purchase outcomes. In particular, consumers who did not purchase counterfeits in the past year have more positive attitudes toward the prices of authentic products and tend to use the products for work and in social interactions. Furthermore, they place more emphasis on the health, safety, and social-interaction benefits of branded apparel. Therefore, one potentially useful strategy would be to use advertisements to stress these authentic-product benefits compared with counterfeit products. This also indicates the importance of educating consumers about the potential hazards of purchasing counterfeits,
which some authentic firms have already been doing. The analyses also reveal the important role of the Internet in counterfeit purchases.

Besides the substantive contributions, we show methodologically how data fusion can combine complementary datasets to extract new information about counterfeit purchase behaviors and to suggest potential measures to fight counterfeits, which would not be available if these datasets were analyzed separately. This study also opens the door to more refined analysis of the impact of counterfeits on consumers [30].

My research on brand management also extends to more general contexts, where I study the consumption determinants of store brands ([9]) and propose new marketing models that lead to a more accurate assessment of the impact of marketing-mix strategies on brand competition ([7], [21]), as detailed in Section 2.

1.b Patent Protection for New Products and Marketing of IP

While brands are protected from counterfeits through trademark enforcement, new products and innovations are often protected from imitation through patent laws. My research on IPR policies explores a potentially central aspect of IP management: How do IP policies affect innovation and technology transfers? My research starts with the observation that national IP laws are not a panacea for innovation. A country has to have a sufficiently high level of development, educational attainment, and economic freedom for its domestic innovative potential to be boosted by national IP protection policies. Such interactive effects of IP protection on stimulating domestic innovation also take years to be felt.

In “Do National Patent Laws Stimulate Domestic Innovation in a Global Patenting Environment?” [1], I evaluate the effects of patent protection on pharmaceutical innovations in 26 countries that established pharmaceutical patent laws during 1978–2002. National patent protection alone does not stimulate domestic innovation, as indicated by changes in citation-weighted U.S. patent awards, domestic R&D, and pharmaceutical industry exports. However, domestic innovation accelerates in countries with higher levels of economic development, educational attainment, and economic freedom. This illustrates the importance of building infrastructure and harnessing innovative potential. IPR policy could play a complementary role once such first-order investments are in place. Additionally, my study is one of the first to provide empirical support for an “inverted-U” relationship between level of innovation and strength of national IPR laws. There appears to be an optimal level of IPR regulation above which further enhancement reduces innovative activities because it may block sequential innovations. This contributes to the broader Industrial Organization literature on the relationship between competition and innovation (Schumpeter 1942 vs. Arrow 1962; Scherer 1967, Gallini 1992, Aghion et al. 2005, and Goettler and Gordon 2011).

As Professor Richard Caves (Harvard Economics Department) published in the Hoops Prize nomination archives, “This paper employs an exceptionally sophisticated and resourceful procedure for dealing with the controlled-experiment problem, by matching each country that adopted the patent privilege in a given time period to an otherwise similar country that did not adopt, and an otherwise similar country that had long employed the policy. The matching is executed with great skill and resourcefulness, and the technique is state-of-the-art….The paper’s technical quality and originality are matched by its thoroughness in obtaining and evaluating data sources, understanding and working around their limitations.”

While innovations need significant buildups, one wonders whether favorable national IP laws attract more Foreign Direct Investments (FDI) and technology transfers. In a global patenting environment, national patent law implementations in developing countries could bring domestic welfare gains if the new laws stimulated more domestic innovation and attracted more-effective foreign direct investment (FDI), which could, in turn, bring advanced technology and technical know-how. I explore
this possibility in the invited book chapter “Are National Patent Laws the Blossoming Rains?” [16]. National patent protection in combination with economic freedom and higher education levels are positively related to increases in the establishment of U.S. and Japanese Multinational Corporations (MNC) subsidiaries and in British FDI.

These two pieces of research support the argument that “expectations that stronger IPRs alone will bring technical change and growths are likely to be frustrated” (Maskus 2000, p. 199). Countries with different degrees of development, general intellectual property strength, and economic freedom have varying innovative responses to changes in national patent laws. Most of these country characteristics indeed go hand in hand with each other. In short, for countries that have relatively low levels of development and market freedom, the net domestic welfare change due to patent protection is clear: rent transfers to foreigners immediately follow the national patent legislation, while any benefits from additional innovation ultimately depend on the country’s macroeconomic factors and require a substantial time discount.

IPRs attempt to balance long-run incentives for innovation and short-run access to innovation. The market power granted by IPRs allows innovators to charge higher prices, potentially reducing access to patented products. However, the existence of IPRs may make a market more attractive for innovators, leading to country-specific investments in marketing and distribution. Such investments may result in a quicker launch of new products, increased marketing of older products, and greater availability of treatments. In “Intellectual Property Rights and Access to Innovation: Evidence from TRIPS” [27], my coauthor and I examine the consequences of stronger pharmaceutical patent protection on the speed of drug launch, price, and quantity in 59 countries from 2000 to 2011. The World Trade Organization required its member countries to implement a minimum level of patent protection within a specified time period as part of the TRIPS Agreement, and we use these deadlines as a natural experiment for the strengthening of IPRs. Our results suggest that patents are generally associated with a faster launch, higher prices, and higher sales, and that the importance of patents varies across country income groups: patents have little effect in relatively poor countries. This work was well received at the NBER Summer Institute of 2013.

Another role of patents and other forms of IPR is that they can facilitate transactions of ideas. The market of ideas requires complex matching (Gans, Hsu and Stern, 2008). I study licensing agreements between upstream innovators and downstream commercializers in “Development and Commercialization Strategies for New Technologies” [28], and auctions of intellectual property in “Information Disclosure and Monetization of Intellectual Property Through Auctions” [23]. As theory predicted (Milgrom and Weber 1982; Tadelis and Zettelmeyer 2011), better information disclosure improved auction revenue.

1. c IP, Entrepreneurship, and Firm Performances

My work on IP and branding extends, in a different line, to investigate IP and firm performances. Understanding the values of these intangible assets (such as patents, trademarks, and royalties) and how they link to firm performances is crucial for devising appropriate marketing and management strategies.

In our paper “Does Ethnicity Pay” [10], we point to the importance of long-term investments in intangible assets such as IP and branding to a firm’s profitability, especially in the context of ethnic networks. Our paper takes advantage of a large dataset—over 50,000 firms over a period of eight years. In contrast to conventional wisdom, we find that ethnically Chinese firms in China do not outperform nonethnically Chinese firms by a set of conventional profitability measures. We also find that the performance of ethnically Chinese firms deteriorates over time. Our results present strong evidence that
the under-investment in intangibles may be the underlying mechanism (or at least an important factor) contributing to the acceleration of the Ethnically Chinese Enterprises (ECE) disadvantages.

The topic is of general interest and our data are novel. The review team views our results as “a healthy micro-data correction to a conversation about ethnicity-based FDI that has typically been either case-based or macroeconomic in nature”. The setting of China also has the nice side benefit of being a country of very high interest throughout the profession and one where FDI has been particularly powerful. A referee said, “I have no doubts that the paper will be cited a lot.” The paper studies a large sample of at least partially foreign-owned firms in China to evaluate whether firms owned by investors based in Hong Kong, Macao, and Taiwan show higher or lower productivity, ceteris paribus, than other firms. The question is interesting because there is a large body of literature discussing the effects of co-ethnic ties in business, building on the hypothesis that belonging to the same ethnic group facilitates the transmission of information, and hence trust and enforcement. Through several alternative channels, the common result is that co-ethnic ventures are likely to outperform non-co-ethnic ventures. The result should apply to joint ventures, to FDI, and to exports into a foreign market. The existing empirical literature looks at aggregate variables. Complementing those results with information obtained at the firm level is thus both important and timely.

While intangible IP and branding are important in firm performance and sustainability, policy makers often have to balance industrial policies to harness overall entrepreneurship, ranging from high-tech innovations to low-tech necessities and from prominent brands to normal generics and everything in between. In “Is Entrepreneurship Missing in Shanghai?” [4], we document a phenomenon of missing entrepreneurship in Shanghai and propose that Shanghai’s adoption of a particularly rigorous version of an industrial policy may have led to the atrophy of entrepreneurship.

This line of research provides empirical evidence of how intangible IP and branding link to firm performance. The findings can guide a company’s IP and branding strategies, depending on its short-term and long-term goals. At the macro level, policy makers need to balance value creation in the whole society. Industrial policies that heavily favor IP and brand owners at the expense of indigenous small entrepreneurs are likely to foster high entry barriers and suffocate further entrepreneurship and innovation.

Summary Overall, this stream of my research contributes valuable empirical evidence to the key debate around IP policies, which for over two decades has centered on whether IP laws could stimulate more innovation (Jaffe and Lerner 2004). This question was particularly pertinent during the Trade-Related Intellectual Property Rights (TRIPs) negotiations, when western pharmaceutical companies lobbied heavily for the harmonization of international IPR laws. The heart of the debate lies in whether IP could stimulate more innovations and access to innovations to offset the short-term monopoly friction. My research contributes to the literature by studying two sides of this key issue: 1. whether new IP laws stimulate innovations and their accesses, and 2. what happens to innovations and various marketing norms when counterfeits enter the market under weak IP enforcement.

Contrary to what IP proponents advocated, patent laws alone do not stimulate innovations. In addition, counterfeiting could in fact stimulate authentic brands’ innovation under certain regularity conditions. When there are few counterfeits under relatively stringent government IP laws, brands may choose to coexist with counterfeits while improving their functional quality to attract expert consumers. When counterfeiting becomes rampant under weak public IP enforcement, authentic firms innovate their searchable quality to differentiate from counterfeits. They further invest in self-enforcement and vertical integration of downstream retailers to garner better control over the distribution channels. The market therefore exhibits a self-correction mechanism against counterfeiting. This stream of research indicates
that IP laws serve as neither necessary nor sufficient conditions for innovations. However, IP protection could complement national infrastructures when there is innovative potential to start with. Public and private partnership in enforcement could also prove beneficial.

My work provides rigorous analyses and generates timely insights in a world with increasingly pervasive counterfeits and imitations. The World Customs Organization estimates that $512 billion of world merchandise trade in 2004 may have been counterfeits, and that the estimated annual apparel-industry loss due to counterfeiting amounts to over $12 billion. My research has been read and cited by officials at the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO). My research results have guided IP and brand management strategies by apparel companies in China. I have also been invited by international branded companies (such as Abbott, Kodak, and Microsoft) to share my research and offer advice on IP and brand management.

2. Methodologies in Database Development and Causal Inference

Answering new research questions often demands developing novel databases that may take years of efforts, as well as proper analyses of these databases. I started this line of work when pursuing the master’s degree in statistics under the supervision of Prof. Donald Rubin (Harvard Statistics Department). While compiling and analyzing a variety of large databases, I had to confront data limitations due to endogeneity, selection bias, and completely missing key variables. These issues are common in the context of intellectual property, counterfeiting and innovation, data-based brand management, and database marketing, as well as big-data analytics. This led me to apply and invent econometric and statistical methodologies to address these common and important data issues in database development and data analytics in order to draw valid causal inferences. A central theme of this work is to unify different kinds of problems under the framework of incomplete-data theory by viewing available data as incomplete forms of ideal data, and to develop robust, automated, or scalable methods that a) develop databases that approach ideal data and b) reduce or detect the dependence of empirical findings on model assumptions. This line of my work spans three intertwined areas: a) treatment effect evaluation methods (for handling endogeneity); b) missing-data methods for data-based brand management and marketing (for handling selection bias); and c) methods for handling completely missing key variables. Prof. Donald Rubin commented that my work “adhere[s] to very high standards for trying to draw causal inferences.” An expanded account of my methodological research is posted on http://www.nber.org/~yiqian/statement.pdf

2.a Treatment Effect Evaluation

In this line of work I strive to apply rigorous treatment effect evaluation methods to handle missing counterfactual outcomes, and to build on identification techniques such as propensity score methods, instrumental variables, and differences-in-differences (DID). When needed, I develop new modeling approaches that permit a more refined analysis of treatment effects that are heterogeneous in various dimensions [20].

I have worked on designing and applying suitable propensity score matched sampling procedures (combined with the panel DID methods) to establish comparable control samples for proper comparison to evaluate the effects of patent protection on pharmaceutical innovations in cross-country panel data analysis from 1978 to 2002 [1], and to evaluate the cross-channel spillover effects of opening a factory store using comprehensive panel consumer transactional data from 1994 to 2007 [21]. Matched sampling in combination with panel DID analyses can tease out the endogenous part of the treatment variable by appropriately controlling for the set of observable confounding covariates and unobserved
unit-specific heterogeneity, hence arriving at a reasonable causal inference (Rubin and Thomas 2000). I started the pursuit of causal inference methodology in my very first paper, “Do National Patent Laws Stimulate Domestic Innovation in a Global Patenting Environment?” [1], where I employ a two-stage Mahalanobis matching method to establish comparable country pairs in the face of missing data. I accomplish this by matching in two passes (Appendix III in the paper). Comparing the t-statistics of the covariates before and after matching clearly shows that the covariates are much more balanced after matching. When the countries in the treatment and control groups are comparable in all other characteristics except national patent laws, the differences in their innovation outcomes can be more comfortably attributed to the patent implementation treatment. Having the two control groups is a particularly useful check in that one would expect any remaining bias to go in opposite directions when the two control groups are used as comparators: up, when the control is the never-had-patents group; down, when it is the always-had-patents group. A referee commends it as “a very nice job of applying cutting-edge econometric methodology to a very interesting and important question.”

An alternative method to draw causal inference from observational study is to bring in exogenous shocks that give rise to treatment variation by finding appropriate instrumental variables. I provide a set of valid instruments for different aspects of the entry effects of counterfeiting in “Impacts of Entry by Counterfeiters” [2]. In particular, I exploit the plausibly exogenous loosening of government enforcement on footwear trademarks and the different relationship between each brand and the government to identify entry effects of counterfeits. This resembles a difference-in-difference idea in that brands that have a close relationship with the government were less adversely affected by the unexpected reallocation of government enforcement resources and hence faced fewer counterfeit threats after the policy change.

In the next study, “Investigating the Dynamic Effects of Counterfeits with a Hierarchical Random Changepoint Simultaneous Equation Model” [20], I develop a new modeling approach that allows the treatment effect to have discontinuous changes at firm-specific unknown change-points (structural breaks), to be heterogeneous across firms, and to have regime-switching moderating effects. Unlike the standard econometric techniques employed in [2], which addressed the research question of the average treatment effects of counterfeit entry, the new modeling approach permits dynamic and heterogeneous treatment effects that are crucial for identifying drivers of inter-firm differences in their response behaviors. The results enhance understanding of firms’ responses to counterfeit entry. Analysis demonstrates that the new model matches the underlying process better than the traditional hierarchical Bayesian (HB) models that do not model these random change-points. Compared with traditional HB models, the new model provides larger estimates for both short-term and long-term effects of counterfeit entry. It considerably improves the power to detect moderating effects, some of which cannot be detected in traditional HB models. The new hierarchical dynamic-effect analysis reveals new findings that (1) pre-entry product quality moderates the short-term price competition effects of counterfeit entry and helps alleviate the harmful impact of counterfeit entry; (2) brand popularity moderates the long-term price increase effect, and firms that were less popular pre-entry tend to have more price increases, consistent with the hypothesis that counterfeits can serve as free advertising for their authentic counterparts; and (3) firms with more innovation, less diversification from infringed markets, or more human capital were faster in responding to and differentiating from counterfeits.

2.b Missing Data in Data-based Brand Management and Marketing

Missing data are ubiquitous in databases and empirical studies. The missing-data issues have become even more salient with new kinds of data made available by innovations in digital technology, such as scanner panel data as well as electronic diary data collected through the Internet or from real-
time data-capture devices, such as handheld computers, smartphones, and other mobile devices, because of the way data are collected. These new settings raise novel issues as to the choices of general and flexible models and fast and computationally feasible methods, and provide opportunities for developing cutting-edge analytical techniques. Inspired by these interesting and important problems, I have been working on developing new generation of missing data procedures designed for the rich data environment in the new digital economy. As summarized below, I strive towards developing procedures that better match the underlying process obscured by missing data while still being tractable.

(1) Methods for handling missing data in covariates. In the paper “No Customer Left Behind” [7], I develop a distribution-free Bayesian method to correct for selection bias due to missing covariate values, such as missing price and coupon values in scanner panel data used for pricing management and missing consumer profiles used in consumer targeting. The new Bayesian estimation approach has several merits important for meeting the new challenges mentioned above. Unlike many other advanced missing-covariate methods aiming to correct for selection bias in complete-case analyses, the nonparametric Bayesian procedure developed in this paper [7] can automatically generate suitable distributions for missing covariates while simultaneously allowing for complex dependence among covariates. Thus, it overcomes the thorny problem of properly modeling a large number of incompletely observed and interrelated covariates in the big data context. Unlike parametric missing covariate methods, no evaluation of intractable high-dimensional integrations with respect to missing covariates is needed. Unlike Chen (2004), the new Bayesian estimation approach does not require evaluating the model likelihood and reduces the computational workload from an exponential rate to a linear rate. These merits make the new method feasible for many high-dimensional missing-data problems and/or complex models commonly encountered in business applications.

Applications demonstrate that the new method can lead to better control of selection bias, more accurate assessment of the impact of managerial policy and brand-management strategies, and improved ability to make optimal decisions on pricing and revenue management, consumer targeting, and individualized marketing. The method is general and can be applied to other datasets on consumers (e.g., in my study of counterfeit consumption behavior [14] to handle missing values in common linkage variables) and to datasets on firms or organizations (e.g., [12]). Beyond the specific applications illustrated in the paper, the proposed method contributes to the broad literature that develops appropriate analytical techniques for use with new kinds of data or new approaches to quantitative marketing and economics. The editor of Marketing Science notes, “There is a lot to like about this paper. It is clear that the paper is well-written, attacking an interesting and important marketing problem, and is very competently done.” The reviewer team comments, “This research is timely and highly relevant,” and adds, “The paper tackles a problem of immense importance, the Bayesian solution is competent, and the method is not difficult to apply in a wide range of empirical settings.”

(2) Methods for handling missing data in outcomes. Missing data in regression outcomes are equally ubiquitous. Examples include missing consumer satisfaction ratings outcomes, life-style outcomes (e.g., smoking behaviors), and consumption behavior outcomes. In “Measuring the Impact of Nonignorability in Panel Data with Non-monotone Nonresponse” [8], my co-author and I develop a fast index method to quantify the potential selection bias caused by nonignorable nonmonotone nonresponse. The method removes obstacles encountered by alternative approaches to assess the validity of empirical findings in the presence of nonresponse. It reduces computational time from several hours to only a few seconds for problems of moderate size. The proposed method can handle larger applications increasingly available in the era of big data without difficulty while alternative approaches can become computationally prohibitive. The methodology is applied to a longitudinal cohort study of 10-year smoking trends for U.S. young adults. Results have both public policy and managerial implications.
because a) the National Institutes of Health sets goals to reduce the adolescent smoking rate, and b) these smoking-rate changes can be informative for firms and organizations to estimate the dynamics of their future consumer bases for targeting purposes. This research also tackles two high-priority research areas recommended by the Division of Behavioral and Social Sciences and Education of the National Research Council, “(1) methods for sensitivity analysis and principled decision making based on the results from sensitivity analyses” and “(2) analysis of data where the missingness pattern is non-monotone.”

2.c Methods for Handling Completely Missing Key Variables

In a wide variety of databases and empirical studies including some of my own [14, 20, 30], researchers often find available datasets completely missing key variables. To tackle the problem and exploit the full potential of available datasets, I develop the following three kinds of methods.

(1) In situations where key variables are collected in different samples, I develop effective and theoretically sound nonparametric data fusion methods to link key data elements collected from these different samples by using a set of linkage variables common to these independent datasets. The idea is to match nonoverlapping data items from similar units when matching these data from the same units is impossible. By combing complementary datasets, data fusion aims to exploit full potential of available datasets. The conventional industry-standard nonparametric hot-deck fusion procedure suffers from several important drawbacks. In “Which Brand Purchasers Are Lost to Counterfeiters? An Application of New Data Fusion Approaches” [14], my co-author and I develop effective and highly efficient nonparametric data fusion methods. These new methods retain the main merits of the hot-deck fusion procedures, and at the same time overcome their major drawbacks. These novel features of the proposed methods can substantially improve the identification of consumer behavior patterns, individual prediction, and targeting. I am currently working on developing more powerful data integration methods that can examine beyond simple associations and relax the commonly used conditional independence assumptions [30].

(2) In some situations a comprehensive dataset does exist, but data on some key variables are confidential and thus become completely unavailable (missing) to researchers. To solve the problem, in “Drive More Effective Data-Based Innovations: Enhancing the Utility of Secure Databases” [13], my co-author and I propose a new methodology to provide analytically valid data that also protect data privacy. The current state-of-the-art perturbation methods for providing secure datasets are based on nonparametric Copula models. We demonstrate a range of important limitations of these nonparametric Copula-based methods, which can affect the ability of the users of secure databases to make optimal managerial and policy decisions. The new set of nonparametric perturbation methods simultaneously address all these limitations and can substantially improve the effectiveness of data-based innovations for managerial and policy decisions.

(3) In some other situations, the completely missing key variables can be inferred from data using proper statistical models. In [20], we develop a third kind of method to infer unobserved firm-specific changepoints (structural breaks) in response to counterfeit entry. Our analysis demonstrates that the new model matches the underlying process better than the traditional hierarchical Bayesian (HB) models, and yields improved estimates of the dynamic and moderating effects of counterfeit entry.

Summary Overall, with the availability of big data, robust, automated, and scalable methods are in high demand to harness these data for understanding economic phenomena and guiding managerial and policy decisions. I develop a stream of research that formulates various research issues as incomplete data problems, and develop methods that can reduce or detect model independence so that
empirical findings are not artifacts driven by unnecessarily imposed assumptions. These automated methods can match more closely with the true underlying processes, make better use of available datasets, and have important modeling and computational merits for scalable data-driven decisions in a big-data environment. These methods are applied in a wide range of applications for better treatment-effect evaluation in studies of innovation, counterfeits, and intellectual property rights and for improved data-driven decisions in brand management, pricing and revenue management, targeted marketing and customer relationship management, and data integration and database development.

3. Ongoing and Future Projects

My primary research focuses on substantive issues in the area of IP and brand management, especially drawing data and applications from emerging markets. My ongoing work builds on these ideas and applies them in new directions. Given that counterfeiting can have positive spillover effects on branded products as well as negative business-stealing effects, questions naturally arise whether there is an optimal level of brand enforcement, and if so, what it is and what it depends on. I seek to develop more theories and conduct empirical tests on this topic.

Efforts to extend my studies on counterfeits to other industries are underway. For example, I recently obtained data on counterfeit cigarette in China, which enable studying a series of research questions in a new setting. In drawing out the importance of IP in the marketing context, I engage in collaborative projects that study the dyadic patent citation patterns and the marketing of ideas. I also have a collaborative working paper testing the impact of trademark infringements on stock performances of the plaintiffs and defendants, respectively.

I am also broadening my research on counterfeiting to the economics of fraud in general. I have applied for an NSF grant with other researchers for a series of projects on fraudulent mortality statistics and on food safety issues in China.

In all the studies, I adhere to high standards for causal inference. In light of the severe data limitations, I develop new econometric tools to enable my research endeavors and aid substantive understandings. I am currently working on developing a novel statistical matching procedure that matches data from independent consumer samples to study the impact of counterfeits on consumer brand awareness [30]. The procedure allows for estimating a consumer-level model of brand awareness as a function of the extent of counterfeit presence and a rich set of consumer demographic and purchasing behavior variables, even if the two key variables (brand awareness and the extent of counterfeit presence) are only observed in two independent samples. The procedure relaxes the strong conditional independence assumption commonly employed in the existing data fusion methods, and allows for examining more general relationships among key variables as compared with existing data fusion methods. Preliminary results from the new statistical matching analysis show that increased counterfeit exposure raises brand awareness for products that are less known to consumers.

I have also been working on analyzing the Hertz consumer databases to develop appropriate models to estimate the effects of customer and employee satisfaction ratings on customer retail purchase behaviors, while accounting for self-selection biases associated with informative satisfaction survey nonresponses. There are research opportunities to develop more general and efficient approaches to achieve optimal tradeoffs between data-driven innovations and data privacy concerns. Because some methods that I have developed require relatively sophisticated programming, there is a need to develop user-friendly software for others to use. Such work could be supported through external funding (e.g., NSF) and make these methods more useful.
Teaching Statement

**MKTG-450:** I teach the accelerated marketing research course for MBA students, Research Methods in Marketing. I have taught twelve sections of MKTG-450: Research Methods in Marketing. My last two sections (in spring 2013), with 60 full-time MBA students in each section, received overall instructor ratings of 8.9/10 and 9.2/10, and the modes were 10/10. I was awarded the Kellogg Faculty Impact Award by student votes. I have also been nominated for the Lawrence G. Lavengood Professor of the Year award several times. This marketing course is aimed at the manager who is the ultimate user of the research and the one responsible for determining the scope and direction of research activities. I provide students with a fundamental understanding of marketing research methods as employed by well-managed firms and proposed by leading researchers in academia. My goal is for students to develop an appreciation for the potential contributions and limitations of marketing research. I use a diverse combination of teaching methods that includes lectures, case analysis, assignments, and computerized exercises. In a group project, students obtain hands-on experience in identifying and solving real-world marketing research problems. Lectures are used to introduce both the basic concepts and techniques and demonstrate their role in an integrated marketing research process. I have developed a series of lecture notes and teaching materials that present the theory and practice of marketing research in a consistent and comprehensible manner. To support Kellogg’s transition to standardizing teaching with Stata software, I have written Stata programs that automatically conduct conjoint analysis and estimate validity statistics. To keep it current, I update the course with new ideas and events, while maintaining the theoretical content needed for later courses and the applications that convey practical relevance. I have introduced real-world market research examples from both the U.S. and foreign countries.

**Case Development:** I have written a new Kellogg Case on Segmentation, Targeting, and Positioning, based on success stories of a famous Chinese electronics company, Joyoung (enclosed in my packet). I have included the case in my course, and students have commented that the case and supplemental notes and data were very helpful. They “learned crosstabs and other STP tools in a fun and practical way,” and they “loved the real-world case to gain an international perspective of conducting research and business” (quotes from course evaluations). The case has been adopted at the University of Vanderbilt and a few other schools.

**MKTG-467:** I have taught the Kellogg-wide Ph.D. course on Introduction to Applied Econometrics (every fall quarter since 2008). The target audience is Kellogg graduate students interested in quantitative research. The main focus of the course is to provide students with the necessary quantitative skills to (a) read and criticize published research articles, (b) conduct independent quantitative research for papers and dissertations, and (c) progress to more advanced quantitative courses. I have developed materials for this course in the form of detailed lecture notes, data, and computer codes (R and Stata) to demonstrate econometrics in practice. I have continued to add new material each year. This course is attended by most first-year PhD students across the different departments of Kellogg, as well as a few students/auditors from the Engineering School and the Department of Political Science.
Service Statement

**Ph.D. Advising:** During my time at Kellogg, I have served on the dissertation committee for seven marketing Ph.D. students--Sandeep Conoor (2009), Junzhao Ma (2011), Qingyi Huang (2011), Yantao Wang (2012), Manuel Hermosilla (2013), Tae Jung Yoon (2014), and Chayoun Kim (2015). I have also served on the committee for Ph.D. students in the Management and Strategy Department (Mian Dai, 2008, and Andrew Butters, proposed in 2013). Having benefited from helpful guidance and advice from my own professors and senior colleagues, I intend to pass on the kindness.

**Marketing Department Service:** I have been actively involved in faculty recruiting, including interviewing at the AMA meetings in 2006, 2008, 2009, and 2012. I served as the Recruiting Coordinator for 2008. Our collective efforts resulted in the recruitment of two junior faculty and three senior faculty that year. I have co-organized our annual Marketing Camp for the past three years. I have also been actively involved in the Ph.D. recruiting process. This includes screening numerous applications, interviewing prospective Ph.D. students, and recruiting admitted students.

**Kellogg School Service:** I served on the personnel committee as an untenured observer in academic year 2008-2009. I have attended a variety of student events (e.g., Marketing major meetings, CIM-week events, Kellogg China conferences (invited at students' request)). I also moderated a panel on intellectual property rights protection for the Kellogg Manufacturing Conference in May 2009 per students’ invitation. Additionally, I contributed a chapter to a book on biotechnology edited by the Kellogg Biotechnology Center Director, Alicia Loffler (Commercializing Life Science Innovations: Rethinking the Business Model, Northwestern University). I have been actively maintaining and facilitating academic links among the Kellogg Marketing Department, Kellogg Management and Strategy Department, and Northwestern Economics Department. I am a member of the Center for the Study of Industrial Organization (CSIO) in the Economics Department.

**Professional Service:** I have been serving as a co-editor of the journal Economics of Transition, especially handling submissions on China studies, since 2011. I have refereed articles for the following journals and grant organizations: American Economic Review, International Journal of Industrial Organization, Review of Economics and Statistics, Marketing Science, Management Science, Journal of Marketing Research, Journal of Economics and Management Strategy, Economic Journal, Operations Research, Research Policy, Journal of Comparative Economics, and NSF Grant Proposals. A complete list of the journals for which I have served as a reviewer can be found on my vita. In 2008 I was appointed a faculty research fellow of the National Bureau of Economic Research (NBER). I am in two groups at the NBER: the Productivity Group and the China Group. Further affiliations at Northwestern include the Center for International Economics and Development, the Institute of Policy Research, and the Searle Center of Law and Economics. I have given regular seminars and conference presentations sponsored by these organizations.
References


Appendix: List of My Articles That Are Included in Reading Lists for Courses (Outside of Northwestern University)

   - Economics 318: Economics of Technology (Wesleyan University, Department of Economics)
     By Prof. Christiaan Hogendorn
   - Innovation and Technical Change: Ec 225 (Stanford University, Department of Economics)
     By Prof. Petra Moser

2. Impacts of Entry by Counterfeiters
   - Econ 700: Graduate International Trade (Yale University, Department of Economics)
     By Prof. Pinelopi Goldberg (editor-in-chief of the *American Economic Review*)
   - Innovation and Technical Change: Ec 225 (Stanford University, Department of Economics)
     By Prof. Petra Moser
   - Harvard Business School, Technology Management Unit
     By Prof. Feng Zhu
   - Pricing Strategy: 15.818 (MIT Sloan, Department of Marketing)
     By Prof. Catherine Tucker

3. Counterfeiters: Foes or Friends
   - Marketing Modeling (Ohio State University, Department of Marketing)
     By Prof. Gregory Allenby