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**Competing Globally:
Institutional Voids in Emerging Markets**

A dissertation presented

by

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to

Harvard Business School

in partial fulfillment of the requirements

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**Competing Globally:
Institutional Voids in Emerging Markets**

Abstract

This dissertation addresses institutional development in emerging economies, as well as its implications on firm strategy. Specifically, as emerging markets are characterized by “institutional voids”, that is, the absence of information or contracting intermediaries that effectively connect economic agents, I take imperfect information as a defining characteristic of emerging economies, and investigate how the ever-increasing societal demand for information disclosure and transparency affects firm behavior and competitiveness. The three chapters of my dissertation examine “institutional voids” at product markets, capital markets and labor markets, respectively. In examining these questions, I utilized various empirical methods including natural, field and online survey experiments, and large-sample dataset econometric analyses.

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Inefficiency of Information Disclosure: Evidence from Two Field Experiments in China’s Infant Milk Powder Industry*

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Abstract

Many countries regulate the safety and quality of health-related products. However, it is unclear whether markets could be relied upon to deliver high quality in the absence of regulation, where companies could potentially advertise based on quality. We provide evidence from two field experiments in China’s infant milk powder industry, which faces tremendous challenge in regaining consumer trust after several safety scandals. Our results suggest that advertising high quality may backfire and that voluntary information disclosure may lead to inefficient market outcomes. In both experiments, we find that providing certain quality-related information, especially on the existence of a product traceability system and international quality certification, has a significantly *negative* impact on consumers’ purchase decisions. A survey among individual consumers further indicates that voluntary information disclosure has a negative effect on consumers’ impression of the entire industry. One explanation is that consumers become suspicious when provided with quality information and start questioning the intention of the producer, especially in light of past safety scandals. We refer to this as a “reminder effect,” in which information triggers recall of and diverts attention to health and safety risks related to the products at issue.

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1 Introduction

The quality of health-related products is an important issue in many countries. One way to ensure high quality is for the government to establish regulations from firms' production process to the sale of their final products. However, what remains unclear is whether the market will produce similar incentives for firms to produce high-quality products in the absence of regulation, especially in underdeveloped institutions where the lack of trust is a major social problem. For instance, a possible alternative to government regulation is to allow firms to advertise based on the quality of their products. If quality information cannot be conveyed directly, firms can also choose to provide signals that consumers believe are correlated with their product quality, thus indirectly informing potential consumers of their "true type." However, as we will show in this paper, signaling might not provide the right incentives for firms to deliver high quality when consumers have already developed an extremely negative prior belief about a particular market before any information is provided. In this case, it becomes important for the government to intervene and to contemplate the most appropriate public policies to incentivize high quality. Our study is conducted in the context of the infant milk powder industry in mainland China, which is undergoing a collective reputation crisis due to previous scandals related to toxic chemicals added to the milk powder products. Specifically, the problem is twofold: first, no entrepreneurs or incumbents themselves have devised an effective system that credibly reveals their product quality; second, the Chinese government has not taken enough regulatory measures to combat milk safety issues.

In this study, we conduct two field experiments to evaluate possible ways in which producers of high-quality products in a certain industry can differentiate themselves from others when consumers hold a strong, negative belief about the collective reputation of the industry. There is a widely received idea that in markets with asymmetric information, consumer behavior often changes when quality information is revealed through

various channels such as consumer reports, online forums, quality certification programs, etc. (Nelson, 1970; Spence, 1973; Grossman, 1981). For the rest of this paper, we will focus on possible informational strategies for producers and examine the effectiveness of these strategies. We find that providing quality-related information may actually contribute negatively to the perceived quality because it may remind consumers of the negative images associated with a specific industry, which may affect every product that belongs to the industry. In fact, our results cast doubt on the hypothesis that providing information that signals higher product quality raises consumers' willingness to buy among similar goods. In other words, high-quality producers may be unable to differentiate themselves from low-quality producers by merely providing information about their costly, verifiable, and quality-improving efforts. If voluntary information revelation fails, government interventions such as mandatory information provision or forced shutdowns of some firms may become necessary in order to resolve the market failure.

There are two types of information strategies that we will examine in this paper. One type is information about firm-specific investments. In the case of the milk powder industry, an important investment is the traceability system, which allows consumers to track every step along the supply chain, from the dairy farmers who supply raw milk to the supermarkets where milk powder products are purchased. Having such a system increases the accountability of each party in the food supply chain and thus their incentive to maintain high quality standards. Given the high cost of the traceability system, it is conceivable that those who made this expensive investment might be in a better signaling position, but there is a possibility that consumers' prior belief is so negative that they choose not to trust such systems at all. Moreover, although the traceability system is expected to contribute to high quality on a macro level, it is less clear whether it actually adds value in terms of individual consumers' well-being. In other words, the traceability system does not necessarily guarantee that every product purchased by every consumer is absolutely safe and of high quality.

Another type is information about the quality certification program offered by a third

party, such as the government or an international agency. In this study, we focus on the ISO9001:2008 quality certification. ISO (International Organization for Standardization) is an independent, non-governmental membership organization and the world's largest developer of voluntary International Standards. It is designed to give world-class specifications for products, services, and systems, to ensure quality, safety, and efficiency. However, there are several issues with the certification program: some people are simply not familiar with it, while those who have the knowledge might not trust the program because producers may still be able to circumvent the standards by adopting inappropriate procedures that are not currently part of the test. Hence, despite its worldwide recognition, it is debatable whether the ISO9001 quality certification is actually effective in terms of conveying the idea of high quality to consumers and thus stimulating sales for producers.

For both field experiments, we partnered with Beingmate Baby & Child Food Co., Ltd. (hereafter "Beingmate"), the largest domestic infant formula manufacture headquartered in Hangzhou, Zhejiang Province. Its products were tested clean during the melamine scandal in 2008. Beingmate runs five infant formula manufacturers that supply products to supermarkets across China. It has a traceability system based on QR codes and it has obtained the ISO9001:2008 quality certification.

In the first experiment ("the online study"), we investigate the effect of voluntary disclosure of quality-related information on consumers' purchase decisions, measured by consumers' likelihood of purchase and quantity of purchase. Specifically, we use Beingmate's online store as a platform to randomize information provision based on the last digit of each visitor's IP address. In particular, we remind potential consumers of Beingmate's brand name, its traceability system, and its ISO quality certification, to observe whether providing such information changes consumers' purchasing decisions. Moreover, we conduct a survey at the end of each purchase to establish a direct, causal linkage between voluntary disclosure of quality information and consumers' reported impression of the infant milk powder industry in China.

Our main findings are summarized as follows: providing information about Beingmate’s product traceability system or its ISO9001 quality certification has a significantly *negative* impact on both the quantity of sales and consumers’ likelihood of purchase. Moreover, we find that consumers who are provided with quality-related information are more likely to report a more negative impression of the domestic infant milk powder industry. Hence, our results cast doubt on the hypothesis that providing information that signals higher quality has an unambiguously *positive* impact on consumers’ willingness to buy. In contrast, we find that even positive information on product quality can lead to a *negative* impact on consumers’ willingness to buy, which is consistent with some behavioral theories on memory and attention but cannot be explained by the hypothesis that assumes perfectly rational consumers.

In our second experiment (“the offline study”), we provide the same types of product information about Beingmate products in around 90 supermarkets in Hangzhou, each of which sells an average of 30 different Beingmate products. Using difference-in-difference regressions, we estimate the treatment effect of each treatment by comparing the quantity sales before, during, and after the experiment period. We also run separate regressions for stores located in high-income districts and those in low-income district to see if the treatment effects are the same. Overall, the results confirm our findings in the online study. In addition to the negative treatment effect of quality-related information, we find that the treatment effect on high-income districts is significantly more negative than that on low-income districts during the experiment period, possibly because consumers in high-income districts have better understanding of both the previous safety scandals and the limitations of the quality-related investments.

Our results suggest that in the context of a market failure, providing more information may actually be a worse decision than providing less information due to a “reminder effect,” in which information triggers consumers’ recall of and diverts their attention to health and safety risks, especially in light of the past safety scandals related to milk powder

products. Consumers can also become suspicious and start questioning the intention of the producer. As a result, high-quality producers are unable to differentiate themselves from low-quality producers by merely providing information about their costly, verifiable, and quality-improving efforts. This implies that at least in some markets with asymmetric information, the separating equilibrium in the classic signaling model may not be achieved. Our results also shed light on the broader notion that government regulation may be necessary when the market-based information channel alone fails. Moreover, it is worth noting that since advertising consumes real resources, even if there is a separating equilibrium, it may not be efficient in terms of the cost-effectiveness for high-quality producers.

The remainder of this paper is organized as follows. [Section 2](#) describes the background and some previous literature. [Section 3](#) sets up the theoretical framework to show why a separating equilibrium may fail to exist with the introduction of the “reminder effect.” [Section 4](#) describes the experiment design, lays out the empirical strategy, and presents the results of our online experiment. [Section 5](#) discusses the results of our offline study. The paper concludes with [Section 6](#).

2 Background and Previous Literature

2.1 The Melamine Scandal

Domestic companies are the key players of China’s dairy market. Sanlu, which used to be the fourth largest dairy company, went bankrupt after the “melamine scandal” in 2008 that claimed the lives of six infants and sickened 300,000 others. Investigations by national and local authorities found that a low-end infant milk powder made by Sanlu contained an elevated level of melamine, a toxic chemical that could cause kidney failure in infants. Banned in food processing, melamine is widely used in production of plastics, adhesives, countertops, and fertilizers. Adding melamine into diluted milk could artificially inflate the protein levels when subjected to standard tests for protein content. The reason is that

standard protein tests measured only the level of nitrogen. As melamine is extremely high in nitrogen, blending raw milk with melamine could make milk appear to have higher protein level. The chairwoman of Sanlu’s board of directors was sentenced to life imprisonment because of the melamine scandal. Dozens of milk brands including several industry giants were later found tainted by melamine. The court later found that Sanlu provided tacit support to such misconduct, and melamine addition had been a “known secret” of the dairy industry. The dispersed nature of milk supply chain made tracing the source of contamination and enforcement of quality regulation a daunting challenge.

After the melamine scandal, consumers became more cautious. Some started to make soybean milk at home instead of buying milk. Others opted to buy imported products only. The milk scandal boosted the market share of foreign milk brands from about 30% in 2008 to over 50% and as high as 70% in high-end infant formula segment in 2012¹. Some consumers went online or overseas to buy infant milk powder. Hong Kong implemented an “infant milk powder quota order,” a policy that banned people from taking more than two tins of infant milk powder outside Hong Kong. However, a later issue involving New Zealand’s dairy giant Fonterra in 2013 raised public concern over foreign brands as well. Fonterra-admitted clostridium botulinum, a kind of toxin, was found in its whey protein that other companies purchased to produce baby formula.

2.2 Key Investments for Milk Safety

2.2.1 Traceability System

A generic definition for traceability was given by the International Organization of Standards: “traceability is the ability to trace the history, application or location of an entity, by means of recorded identifications” (ISO, 1995). The Europe Union later narrowed down

¹“Restore Faith in Dairy,” *China Daily*, August 8, 2013, http://usa.chinadaily.com.cn/opinion/2013-08/08/content_16879410.htm, accessed January 26, 2015.

the definition to food industry, defining traceability as “the ability to trace and follow food or any ingredient intended to be incorporated into food through all stages of production, processing and distribution” (EU, 2002). Traceability systems have been gradually adopted by large food producers in China. This is regarded as an innovative way to secure food quality by sourcing products directly from qualified farmers and thus achieving better control of the supply chain. Although many producers claim that they have a traceability system of some sort or other similar systems, the quality of such systems varies. Moreover, it is not difficult for consumers to see the differences: most producers require their consumers to go through a lengthy and sometimes broken registration process in order to trace the products, while only a few producers are able to print a unique QR (Quick Response) code² on every product so that consumers can simply use their smartphones to trace the products. A good traceability system can be costly. In particular, Beingmate spent more than 20 million Chinese Yuan (approximately 3.17 million USD) in building its traceability system.

2.2.2 ISO9001 Quality Certification

ISO is made up of 163 member countries that are the national standards bodies around the world, with a Central Secretariat based in Geneva, Switzerland. By 2013, there are more than 1.13 million enterprises worldwide certified by the ISO9001 quality management system, and ISO is better known and much more widely adopted in Europe and East Asian than in North America³. Unlike the traceability system, ISO certifications are not specific to the food industry. In fact, ISO has published more than 19,500 International Standards covering almost every industry, from technology, to food safety, to agriculture and healthcare. Within China, the top five industries for ISO are metal, electronics, machinery, trade and repairs of motor vehicles, and rubber and plastic products⁴. Obtaining an ISO9001 certification

²QR code is a special type of machine-readable barcode. See https://en.wikipedia.org/wiki/QR_code for details.

³See Table A.1 for the number of firms with ISO9001 certification by region.

⁴See Figure A.1 for the number of firms with ISO9001 certification in China by industry.

requires creating and documenting a production process in accordance with the ISO9001 standards, training the entire organization for effective implementation of the standards, and getting an ISO-accredited certification body for initial assessment, multiple rounds of audits, and the final registration. The cost of obtaining an ISO9001 certification varies depending on the size and complexity of the organization and on whether the enterprise already has some elements of a quality management system in place. For an enterprise with 501 to 1000 employees and a basic quality system in place, it is estimated to cost \$42,750 (registration and consultancy fees) and 432 employee hours to obtain an ISO9001 certification⁵.

2.3 Empirical Setting

In implementing the field experiments, we partnered with Beingmate, the largest domestic infant milk powder producer in China. Beingmate, founded in 1992, is an infant and child foods company headquartered in Hangzhou, Zhejiang Province, China, which specializes in providing products and services to mothers and their children aged from 0 to 12. In 2010, Beingmate entered the Hong Kong market after gaining accreditation from the Hong Kong Standards and Testing Centre, and it has been listed on the Shenzhen Stock Exchange since 2011.

Beingmate operates six plants and logistics centers, 80,000 retail terminals, 30 regional subsidiaries, and more than 1,000 Beingmate-authorized stores across China. It employs 7,000 full-time staff and 20,000 maternal service consultants in authorized stores.

Beingmate's products were tested clean during and after the melamine infant milk powder scandal. The most rapid sales growth took place after the melamine scandal. From 2008 to 2009, Beingmate's revenue grew by more than 65%. In the infant formula segment, Beingmate is the largest domestic player and third largest player among all producers, ranked only after Wyeth and Mead Johnson and accounting for 8.5% of the total market share

⁵See <http://the9000store.com/ISO-9000-Tips-How-Much-Does-it-cost.aspx> ("How Much Does ISO 9001 Certification Cost?") for details.

in 2013⁶. Beingmate describes its competitive position as “International Quality, Chinese Formula.” The company’s research and development employs hundreds of professional R&D staff. Compared to international players such as Wyeth and Mead Johnson, Beingmate’s competitive advantage centers on formula that mimics Chinese mothers’ breast milk⁷.

2.4 Review of Relevant Theories

2.4.1 Rational Theory: Effect of Information on Market Behavior

There have been a series of papers that analyze the *incentives for firms* to reveal their private information, in which the idea of unraveling equilibria is developed in depth. Beginning with the pioneering study of [Akerlof \(1970\)](#), economists have theorized about the incentives for producers to voluntarily reveal their private information to consumers. If consumers believe that the high-quality non-disclosing sellers are no different from the low-quality non-disclosing sellers, there are incentives for the highest quality sellers to voluntarily reveal their quality. The next highest quality sellers then become the highest quality non-disclosing sellers, so these firms then have an incentive to disclose their quality as well. This unraveling process continues as long as the benefit of disclosure outweighs the cost. The notion of unraveling equilibria in settings with voluntary disclosure was initially put forward by [Grossman and Hart \(1980\)](#), [Grossman \(1981\)](#), and [Milgrom \(1981\)](#). Subsequent extensions to the theory include the effect of disclosure costs ([Jovanovic, 1982](#)), the effect of information acquisition costs ([Farrell, 1986](#)), the effect of some consumers being uninformed ([Fishman and Hagerty, 2003](#)), and the effect of competition ([Jin, 2005](#)).

The theoretical literature identifies several ways through which information may affect the efficiency of markets. The typical insight supports information disclosure, which has

⁶“China’s Dairies Facing Fierce Competition,” *Xinhua*, May 6, 2014, http://news.xinhuanet.com/english/china/2014-05/06/c_133314393.htm, accessed January 26, 2015.

⁷“Lessons from the Netherlands: Co-Op Model for Dairy Farming from Generation to Generation [in Chinese],” *China Business News*, March 26, 2014, <http://www.yicai.com/news/2014/03/3630748.html>, accessed January 26, 2015.

led economists to support policies that seek to increase the amount of information available to consumers. Meanwhile, existing empirical studies find small or negligible effects from increased information availability, casting doubt on the importance of such policies. For instance, health researchers have long debated the extent to which “report cards” — public disclosure of comparative information on the performance of doctors, hospitals, and insurers — affect the allocation of consumers to health care providers. It has been contended that the failure is on the part of the empirical research, and is mainly due to the difficulty of observing exogenous variation in the amount of information available to consumers (Jin and Leslie, 2003, 2009). Estimating the causal effect of information on market outcomes therefore remains an open empirical issue.

2.4.2 Behavioral Theory: Evidence of Limited Attention on Information Processing

In contrast to the models that have uniformly assumed full rationality, behavioral theories emphasize that the human brain has limited information processing capacity and that limited attention is ubiquitous in an information-rich economic environment, where the relevant information to be analyzed exceeds the information processing capacity of the human brain. At any given point in time, individuals have only a finite amount of attention. Scanlon et al. (2002), Pope (2009), and Luca and Smith (2011) document situations where consumers rely on very coarse information, while ignoring finer details, suggesting that consumers are subject to limited attention in these settings. Attention must be selective and is required to process information in conscious thought, whereby an individual’s focus is on a specific topic while excluding others. When attention is split, performance can suffer and individuals may have a difficult time evaluating both the pros and cons of alternatives. Psychological models indicate that limited attention can be an optimal strategy that allows effective and economical search for cryptic objects (Clark and Dukas, 2003).

How attention is directed depends on one’s ability to retrieve immediate examples from

memory. One simplifying strategy people use is to make judgments based on what comes to mind first (Tversky and Kahneman, 1973, 1974). It enables people to make judgments easily and quickly. However, this can lead to errors. When individuals make decisions based on what comes to mind immediately, they are likely to overestimate the likelihood that something will occur. An event comes to mind first because it is more important than alternatives that also come to mind at the time. It does not, however, necessarily mean that it is more likely to occur. According to Luca (2011), “there is a non-trivial cost of using information, but consumers act in a way that is consistent with Bayesian learning, conditional on easily accessible information.” Moreover, consumers do not use all available information; instead, they are more responsive to quality changes that are more visible and to ratings that contain more information. Recent work by Bordalo et al. (2015) presents a theoretical model that helps to explain how consumers under or overreact to information when their allocation of attention is distorted by salience.

Behavioral finance studies suggest that limited attention affects capital market outcomes: investors fail to make use of all available information (Lipe, 1998) and they tend to respond to salient, easy-to-process information while neglecting relevant aspects of the economic environment (Amir, 1993; Hirshleifer and Teoh, 2003). There is also evidence that firms present accounting information in a way that is consistent with exploiting perception of partially attentive investors (Kothari, 2001). Limited attention makes investors resort to cognitive shortcuts that simplify the information processing process, but it may also result in a failure to attend fully to the newly arrived information or taking into account differences in alternative information provided. In nearly every experimental study, investors demonstrate limited information processing power — even professional analysts resort to simplifying tools such as placement, categorization, and labeling, in evaluating accounting information and do not fully adjust for differences in accounting alternatives (Maines, 1995; Libby et al., 2002).

3 Theoretical Framework

3.1 Basic Setup

3.1.1 Assumptions

There are two types of products in the market, high-quality products with true value \bar{v} and low-quality products with true value \underline{v} , where $\bar{v} > \underline{v} \geq 0$.

There are $n \geq 2$ sellers of two types: good sellers and bad sellers. Let $j \in \{g, b\}$ denote the type of seller j . Good sellers (g) sell high-quality products with true probability p_g and low-quality products with probability $1 - p_g$, and bad sellers (b) sell high-quality products with probability p_b and low-quality products with probability $1 - p_b$. We assume that $p_g > p_b$ so that good sellers have a higher probability of selling high-quality products.

A seller can voluntarily make costly quality-improving investments and provide information to buyers about their investments. All information provided must be observable and verifiable, which means that a seller cannot provide information about an investment unless they have actually made the investment in the first place. Let $y \in [0, \infty)$ be an index that measures the value of the information provided by the seller, which is a continuous function that strictly increases with the amount of investment I . Specifically, we define $c(j, y)$, which is continuous and differentiable in y , as the cost of investment, which is incurred before any information about the investment can be provided.

We assume that

$$\frac{\partial c(j, y)}{\partial y} > 0$$

so that the value of information is positively associated with the cost of investment. By construction, for any given $j \in \{g, b\}$, the inverse function $y = c^{-1}(j, \cdot)$ exists.

We further assume that $c(j, 0) = 0$ and that for all $y > 0$,

$$0 < c(g, y) < c(b, y)$$

which means that it is more costly for bad sellers than for good sellers to provide any information that is valuable. In the milk powder industry, the intuition behind this assumption is that good sellers are often equipped with better infrastructure or resources that allow them to make the same level of investment in a less costly way.

Then, suppose there are $m \geq 1$ buyers whose utility functions are all given by

$$u(x, w) = x - w$$

where x is their expected value of the product and w is the amount they are willing to pay for the product.

There are two types of buyers in the market: the “rational” buyers and the “naïve” buyers. Let α be the fraction of rational buyers and $1 - \alpha$ be the fraction of naïve buyers. Rational buyers always have correct beliefs of the probability of high-quality products sold by each type of seller, regardless of whether any information is provided to them. Naïve buyers, on the contrary, are too “optimistic” in the absence of information provision and thus believe that such probabilities are higher than they actually are. In particular, let p'_g and p'_b be their perceived probabilities of good sellers selling high-quality products and bad sellers selling high-quality products, respectively, when no information is provided to them. However, once the naïve buyers are provided with any type of information related to the milk-powder industry, their perceived beliefs of such probabilities will revert to the correct ones, i.e., p_g for good sellers and p_b for bad sellers. We assume that

$$0 < p_b < p_g < p'_g < 1$$

$$0 < p_b < p'_b < p'_g < 1.$$

Let x_g and x_b be the “rational” expected value of a product produced by a good seller and that by a bad seller, respectively. Similarly, let x'_g and x'_b be the “naïve” expected value of a product produced by a good seller and that by a bad seller, respectively. By construction,

$$\begin{aligned}x_g &= p_g \bar{v} + (1 - p_g) \underline{v} \\x_b &= p_b \bar{v} + (1 - p_b) \underline{v} \\x'_g &= p'_g \bar{v} + (1 - p'_g) \underline{v} \\x'_b &= p'_b \bar{v} + (1 - p'_b) \underline{v}.\end{aligned}$$

Finally, we assume that the sellers have all the bargaining power and that all the sellers and buyers are risk neutral.

3.1.2 Timing

- (a) The sellers privately observe their type $j \in \{g, b\}$.
- (b) Each seller chooses the amount of information $y \in [0, \infty)$ they would like to provide explicitly to the buyers.
- (c) The buyers observe the sellers’ provision of information and make offers with price $w(y)$ to the seller.
- (d) Sellers decide whether to accept the offer. Once an offer is accepted, products are supplied and payoffs are realized.

3.2 Separating Equilibrium

3.2.1 Benchmark

We first assume that $\alpha = 1$, which means that all buyers in the market are rational. We claim that there exists an infinite number of separating equilibria where the good sellers will

choose to provide information and bad sellers will choose not to provide information. In return, buyers are willing to pay more for products produced by those who choose to provide information.

Proposition 1. *Suppose that buyers make the following decisions:*

$$w(y) = \begin{cases} x_g & \text{if } y \geq y^* \\ x_b & \text{if } y < y^* \end{cases}$$

where $y^* > 0$.

Then, a separating equilibrium exists if the signal threshold y^ satisfies the following:*

$$c^{-1}(b, x_g - x_b) \leq y^* \leq c^{-1}(g, x_g - x_b).$$

Proof. Given the buyers' belief, we know that a seller will choose either $y = y^*$ to get x_g or $y = 0$ to get x_b . We need to check whether it is optimal for all the good sellers to choose $y = y^*$ and all the bad sellers to choose $y = 0$.

For the good sellers, their incentive compatibility constraint is

$$x_g - c(g, y^*) \geq x_b \implies c(g, y^*) \leq x_g - x_b. \quad (1)$$

For the bad sellers, their incentive compatibility constraint is

$$x_b \geq x_g - c(b, y^*) \implies c(b, y^*) \geq x_g - x_b. \quad (2)$$

Equations (1) and (2) jointly imply

$$c(g, y^*) \leq x_g - x_b \leq c(b, y^*) \implies c^{-1}(b, x_g - x_b) \leq y^* \leq c^{-1}(g, x_g - x_b). \quad (3)$$

By our assumption, since $x_g - x_b > 0$

$$[c^{-1}(b, x_g - x_b), c^{-1}(g, x_g - x_b)] \neq \emptyset.$$

Therefore, for any y^* satisfying Equation (3), there is a separating equilibrium where good sellers provide information of value y^* to get x_g from the buyers and bad sellers do not provide any information so as to get x_b from the buyers. \square

As long as the separating equilibrium exists, the optimal amount of investment I by good sellers (denoted as I_g) and that by bad sellers (denoted as I_b) satisfy the following:

$$\begin{aligned} I_g^* &= y^{-1}(y^*) \\ I_b^* &= 0 \end{aligned}$$

which means that good sellers have the incentive to make the investment in while bad sellers do not.

3.2.2 Information Provision with a “Reminder Effect”

In the benchmark case, we only considered the case where all buyers are rational. However, it is conceivable that in real life, buyers do not readily recall all the information they have when choosing products. Their information retrieval might depend on what they see and what is being provided to them. For instance, when the reputation of a particular industry is at issue, disclosure of quality-related information by sellers in this industry may have two effects: the “direct effect” and the “reminder effect.” While the direct effect only allows the buyers to learn what is being disclosed to them, the reminder effect might trigger their recall of some negative aspects associated with the industry. In other words, even if a piece of information involves only a quality-improving investment, the mentioning of the investment might bring up a negative prior that buyers have about the industry, thus lowering their

willingness to pay.

In this case, we assume that $\alpha \in [0, 1)$, which means that there are at least some naïve buyers in the market. We claim that a separating equilibrium is no longer guaranteed in this case.

Proposition 2. *There does not exist any separating equilibrium if*

$$\frac{p'_b - p_b}{p_g - p_b} \geq \frac{1}{1 - \alpha}.$$

Proof. We use proof by contradiction in this case. There are two possible types of separating equilibrium we need to check:

- (1) Good sellers provide a positive amount of information while bad sellers do not provide any information;
- (2) Good sellers do not provide any information while bad sellers provide a positive amount of information.

For the first equilibrium candidate, suppose that there exists a separating equilibrium with some $y^* > 0$ in which the buyers classify whoever provides $y \geq y^*$ as a good seller and whoever provides $y < y^*$ as a bad seller.

Similar as the benchmark case, a seller will choose either $y = y^*$ to be perceived as a good seller or $y = 0$ to be perceived as a bad seller. Hence, the rational buyers make the following decision

$$w(y) = \begin{cases} x_g & \text{if } y = y^* \\ x_b & \text{if } y = 0 \end{cases}$$

and the naïve buyers make the following decision

$$w(y) = \begin{cases} x_g & \text{if } y = y^* \\ x'_b & \text{if } y = 0. \end{cases}$$

However, we will show that the good sellers have an incentive to deviate by not providing information at all.

For the good sellers, their incentive compatibility constraint is

$$x_g - c(g, y^*) \geq \alpha x_b + (1 - \alpha)x'_b \implies c(g, y^*) \leq x_g - (\alpha x_b + (1 - \alpha)x'_b). \quad (4)$$

For the bad sellers, their incentive compatibility constraint is

$$\alpha x_b + (1 - \alpha)x'_b \geq x_g - c(b, y^*) \implies c(b, y^*) \geq x_g - (\alpha x_b + (1 - \alpha)x'_b). \quad (5)$$

Note that

$$\begin{aligned} & x_g - (\alpha x_b + (1 - \alpha)x'_b) \\ = & p_g \bar{v} + (1 - p_g)\underline{v} - \alpha(p_b \bar{v} + (1 - p_b)\underline{v}) - (1 - \alpha)(p'_b \bar{v} + (1 - p'_b)\underline{v}) \\ = & \alpha(p_g - p_b)(\bar{v} - \underline{v}) + (1 - \alpha)(p_g - p'_b)(\bar{v} - \underline{v}) \\ = & (\bar{v} - \underline{v})(\alpha(p_g - p_b) + (1 - \alpha)(p_g - p_b + p_b - p'_b)) \\ = & (\bar{v} - \underline{v})(p_g - p_b - (1 - \alpha)(p'_b - p_b)). \end{aligned} \quad (6)$$

However, since

$$\begin{aligned} \frac{p'_b - p_b}{p_g - p_b} \geq \frac{1}{1 - \alpha} & \implies p_g - p_b - (1 - \alpha)(p'_b - p_b) \leq 0 \\ & \implies x_g - (\alpha x_b + (1 - \alpha)x'_b) \leq 0 \end{aligned}$$

from Equation (6). Then, Equation (4) implies that

$$c(g, y^*) \leq 0.$$

However, by definition, $c(g, y^*) > 0$ for any $y^* > 0$, which is a contradiction. This means that good sellers do not have the incentive to provide any information. Hence, there is no separating equilibrium in which good sellers provide information while bad sellers do not.

For the second equilibrium candidate, suppose that there exists a separating equilibrium with some $y^* > 0$ in which buyers perceive whoever provides $y \geq y^*$ as a bad seller and whoever provides $y < y^*$ as a good seller. With a similar argument established for the first equilibrium candidate, the rational buyers make the following decision:

$$w(y) = \begin{cases} x_b & \text{if } y = y^* \\ x_g & \text{if } y = 0 \end{cases}$$

and the naïve buyers make the following decision

$$w(y) = \begin{cases} x_b & \text{if } y = y^* \\ x'_g & \text{if } y = 0. \end{cases}$$

For the bad sellers, their incentive compatibility constraint is

$$x_b - c(b, y^*) \geq \alpha x_g + (1 - \alpha)x'_g \implies c(b, y^*) \leq x_b - (\alpha x_g + (1 - \alpha)x'_g). \quad (7)$$

However, note that

$$x_b - (\alpha x_g + (1 - \alpha)x'_g) \leq x_g - (\alpha x_g + (1 - \alpha)x'_g) = (1 - \alpha)(x_g - x'_g) < 0$$

which obviously violates the assumption that $c(j, y) \geq 0$. Hence, there is no separating

equilibrium in which good sellers provide no information while bad sellers provide a positive amount of information.

Now that we have checked both candidates, we can conclude that there is no separating equilibrium in this case. \square

When the separating equilibrium does not exist, the optimal amount of investment by each type becomes the following:

$$I_g^* = I_b^* = 0$$

which is inefficient compared to the benchmark case without the reminder effect.

Intuitively, this result shows that good sellers are unable to distinguish themselves from bad sellers by merely providing quality-improving information on their products if any of the following is true:

- The industry has a sufficiently negative image such that once the naïve buyers are reminded of quality-related issues, they experience a significant reduction in their perceived probability of bad sellers selling high-quality products. This corresponds to a large $p'_b - p_b$.
- The probability of good sellers selling high-quality products is not too much higher than the probability of bad sellers selling high-quality products, which corresponds to a small $p_g - p_b$. This applies to the infant milk powder industry when many producers, including several previous industry giants, turned out to add toxic chemicals to their products, though to varying degrees.
- The proportion of rational buyers is small relative to the proportion of naïve buyers, which means that for most buyers, their information retrieval process is subject to a “reminder effect” as described before. This corresponds to a small α ; the closer it is to zero, the less likely a separating equilibrium exists.

4 Online Study

4.1 Experiment Design

One key implication of the theoretical model is that some consumers become less likely to purchase from a producer who provides positive quality-related information because the information reminds them of other negative aspects of the industry. To provide some empirical evidence, we conduct an online experiment with a survey to examine the effect of voluntary disclosure of quality-related information when consumers have a strong negative prior belief about the industry. The survey experiment is done at Beingmate’s online store “Motherbuy” (www.motherbuy.com) that offers the full range of the company’s products.

The online survey experiment is designed to have one control group and three treatment groups as follows. First, we instruct MotherBuy to randomly assign site visitors to different experiment groups based on the last digit of a visitor’s IP address⁸. The treatment assignment process is as follows:

- Control group: IP addresses with the last digit of 0, 5, 6 or 9
- Treatment 1 (Brand): IP addresses with the last digit of 1 or 4
- Treatment 2 (Traceability): IP addresses with the last digit of 2 or 7
- Treatment 3 (Certification): IP addresses with the last digit of 3 or 8

Then, quality-related information is shown in a pop-up window at the center of the computer/smartphone screen when a visitor enters the online store, and we allow visitors to close the pop-up window as they wish. All the information is provided in Chinese.

- Control Group: No information is provided.

⁸The IP address is related to the visitor’s physical location, but the last digit is randomly generated without any identifying information.

- Treatment 1 (Brand)

An information card is attached to the product rack for 14 days with the note “Beingmate is the go-to brand for your babies.” (This is a standard phrase used on many of Beingmate’s advertisements.) The card is shown in the first panel of [Figure A.2](#).

- Treatment 2 (Traceability)

An information card is attached to the product rack for 14 days with the note “Beingmate provides a product traceability system that achieves traceability from milk powder’s raw material, production, marketing to sales.” The card is shown in the second panel of [Figure A.2](#).

- Treatment 3 (Certification)

An information card is attached to the product rack for 14 days with the note “Beingmate has obtained the ISO9001 quality certification. ISO9001 is the world’s leading product quality certification system.” The card is shown in the third panel of [Figure A.2](#).

Then, for visitors who made a purchase, we conduct a survey to empirically test if quality information leads to a negative impression of the industry. At the end of the purchase, visitors are provided with an option to fill out a four-question survey. For each customer who answered the survey, we offer a 10 CNY (approximately 1.5 USD) coupon that can be redeemed towards future purchases. The survey questions are given in Chinese, and the translations are as follows:

Question 1. What is your impression of the domestic infant milk powder industry?

- 0: Highly untrustworthy
- 1: Untrustworthy
- 2: Somewhat trustworthy

- 3: Trustworthy
- 4: Highly trustworthy

Question 2. When choosing infant formulas, how often do you take into account traceability system as an important factor?

- 0: Never
- 1: Rarely
- 2: Sometimes
- 3: Often
- 4: Always

Question 3. When choosing infant formulas, how often do you take into account ISO9001 certification as an important factor?

- 0: Never
- 1: Rarely
- 2: Sometimes
- 3: Often
- 4: Always

Question 4. To ensure that you are not a robot, please choose the last option for this question. (This question is given in order to identify survey respondents who did not read the survey questions carefully.)

We conduct the online experiment from the week of April 13 to the week of June 1, 2015 (i.e., a total of eight weeks). For each online visit, we collected the following data:

- The visitor's IP address, and the province in which the IP address is located;
- The purchase decision of the visitor (binary);
- If the visitor made a purchase, we collect data on the following variables: date of

purchase, product(s) purchased and the unit price(s), number of units purchased, whether the visitor is part of Beingmate’s loyalty programs (binary);

- For visitors who chose to filled out the survey, we code their numerical responses to the survey questions.

4.2 Empirical Methodology

We examine two research questions with the data collected from the online survey experiment. First, for those who visited the online store, does the disclosure of quality information have a negative effect on purchase behavior? Second, for those who made a purchase and filled out the survey at the end of the purchase, does the disclosure of quality information lead to a negative impression of the industry?

For the first question, our baseline regression models are as follows:

$$\text{OLS : } \quad quantity_i = \beta_0 + \sum_{k=1}^3 \beta_{1k} \cdot treatment_{ik} + \beta_2 \cdot affiliated_i + \sum_{l \in L} D_{il} + \varepsilon_i \quad (8)$$

$$\text{Logit : } \quad purchase_i = \beta_0 + \sum_{k=1}^3 \beta_{1k} \cdot treatment_{ik} + \beta_2 \cdot affiliated_i + \sum_{l \in L} D_{il} + \varepsilon_i \quad (9)$$

where i indicates visitors to the online store. We define $quantity_i$ as the total number of units purchased by visitor i , which can be any positive integer greater than or equal to 0. We define a similar variable, $purchase_i$, as an indicator variable that takes the value of 1 if $quantity_i > 0$ and 0 otherwise. The variable $treatment_{ik}$ is an indicator variable that takes the value of 1 if a particular consumer i receives Treatment k . The variable $affiliated_i$ is an indicator variable that takes the value of 1 if visitor i is a member of at least one of the loyalty programs offered by Beingmate. Finally, the D_{il} ’s indicate location fixed effects at the province level.

For the second question, our baseline regression model is as follows:

$$\begin{aligned}
 impression_i = & \beta_0 + \sum_{k=1}^3 \beta_{1k} \cdot treatment_{ik} + \sum_{k=2}^3 \beta_{2k} \cdot Q_{ik} + \\
 & \sum_{k=2}^3 \beta_{3k} \cdot (treatment_{ik} \cdot Q_{ik}) + \sum_{l \in L} D_{il} + \varepsilon_i.
 \end{aligned}$$

In particular, $impression_i$ is defined as visitor i 's impression of the milk powder industry in China. This is the same as visitor i 's response to Question 1 of the survey, which is a numerical answer ranging from 0 to 4. The variables Q_{i2} and Q_{i3} are defined as visitor i 's response to Question 2 (on the importance of the traceability system) and Question 3 (on the importance of the ISO9001 quality certification) of the survey, respectively, both of which are numerical answers ranging from 0 to 4. All the other variables have exactly the same definition as before. Since the survey responses are all coded as ordinal variables, we use both the OLS regression and the ordered logit regression to estimate the coefficients on the interaction variables, which represent the treatment effect of the three types of information provided on consumers' impression of the milk powder industry in China.

4.3 Results and Discussions

Table 1 provides the summary statistics for all the relevant variables as described in Section 4.1, broken down by experiment group (one control group plus three treatment groups). There are a total of 569,272 potential consumers visiting the online store during the eight-week treatment period, of which 1,184 made a purchase. Among those who made a purchase, 737 consumers answered the survey. After eliminating the survey respondents who answered Question 4 incorrectly, we received a total of 493 valid survey responses.

Table 3 documents the effect of information disclosure on purchase decisions. Columns (1)–(4) present the results of the logit regression as detailed in Equation (8); and columns (5)–(8) present the results of the OLS regression as detailed in Equation (9). Overall, the results

are surprising from a rational perspective but confirm our hypothesis about the “reminder effect,” that is, disclosure of quality-related information, namely Treatment 2 (Traceability) or Treatment 3 (Certification), has a significantly negative effect on purchase behaviors. Translating to odds ratios, the coefficients of logit regressions indicate that Treatment 2 (Traceability) leads to a 16-21%, and Treatment 3 (Certification) leads to a 14-18% reduction in the likelihood of purchase.

One possible interpretation of these results is that seeing the information about the traceability system or the quality certification makes consumers suspicious because it reminds them of the negative images associated with milk powder products produced in China (the “reminder effect”), thus making them less likely to make the purchase. This also leads to the broader research question of why sometimes providing less information is actually better than providing more information.

Table 4 and Table 5 test the central hypothesis of this study: disclosure of quality information makes consumers nervous and start questioning, “why does the company need to assure me that their products are safe?” As detailed in Equation (10), the OLS regression results are reported in Table 4 and the ordered logit regression results are reported in Table 5. Overall, the results are consistent with the predictions of our model: disclosure of quality-related information leads to a more negative impression of the industry. In particular, this effect is significant for Treatment 3 (Certification) in all regression models: the coefficients of logit regressions indicate that Treatment 3 (Certification) leads to a 60-72% reduction in the likelihood of having a better impression of the milk powder industry. Moreover, in some regression models, we find that the negative effects of Treatment 2 (Traceability) and Treatment 3 (Certification) are mitigated by consumers who attach more importance to the traceability system or the ISO9001 quality certification. Specifically, the effect of Treatment 2 (Traceability) on the likelihood of having a better impression of the milk powder industry is 23-28 percentage points higher for people who attach one more degree of importance to product traceability systems. Similarly, the effect of Treatment 3 (Certification) is 41-45

percentage points higher for people who attach more importance to quality certifications. These findings are intuitive to understand: despite a negative “reminder effect” due to the bad collective reputation of the industry, consumers are less likely to be affected when they see a particular producer has made the exact type of quality-related investment that they value.

One potential concern with the survey responses is that they only come from visitors who made a purchase and that we have no information about visitors who decided not to make a purchase. However, it is reasonable to make the assumption that consumers who made a purchase should, on average, have a more positive impression of the milk powder industry than those who did not. In that case, our findings provide an upper bound for the magnitude of the negative “reminder effect.” In other words, if we were able to conduct the same survey among all consumers who visited the website, we would expect a even more negative “reminder effect” than what we find among our selected sample in this experiment.

5 Offline Study

5.1 Experiment Design

The offline experiment is conducted in supermarkets in Hangzhou, Zhejiang Province, where Beingmate is headquartered. These stores are not owned or operated by Beingmate; instead, they sell a variety of products by different producers. We randomly assign stores to the same control and treatment groups as detailed in the online experiment. In order to minimize the effect of information spillover, randomization is done at the postal zone level so that stores located in the same postal zone are assigned to the same experiment group. There are 59 major postal zones in Hangzhou. Due to budget constraint, only 10 postal zones are randomly selected for treatment and the other 49 zones are placed in the control group. Among the 10 selected postal zones, there are 3, 3, and 4 zones that receive Treatment 1 (Brand), Treatment 2 (Traceability), and Treatment 3 (Certification), respectively.

Then, we provide exactly the same information as in the online experiment to each corresponding treatment group. There is one “information card” (a physical A4-sized board printed according to [Figure A.2](#)) per store placed at a salient position. All the information is provided in Chinese.

We trace what happens to dollar and volume sales before, during, and after the experiment period. The following data are collected in order to estimate the treatment effects and to test whether the information provided has a significant impact on consumer behavior:

- For each store, daily data (for 14 days) on dollar and volume sales for each product, *before* the experiment period (“period 0”), *during* the experiment period (“period 1”), and *after* the experiment period (“period 2”).
- Store information: store ID, name, address, presence of sale representatives in the infant food section (binary), existence of store promotions relevant to milk powder products produced by Beingmate (binary), average income of the district in which the store is located.
- Product information: product name, whether a product belongs to the milk category⁹ (binary), and daily unit price.

[Figure 1](#), [Figure 2](#), and [Figure 3](#) illustrate the daily average quantity of sales for all Beingmate products, milk powder products, and all other products by Beingmate, respectively. As shown on the graphs, period 0 runs from July 28 to August 10, period 1 runs from August 11 to August 24, and period 2 runs from August 25 to September 7, 2014.

5.2 Empirical Methodology

We employ difference-in-difference regressions to estimate the effect of each treatment on the change of average daily sales. We compare two periods at a time (i.e., period 0 vs. period 1,

⁹Non-milk products include rice cereal, pork floss (protein supplement), biscuits and other products for toddlers.

period 1 vs. period 2, and period 0 vs. period 2) in order to capture different aspects of the effect of information that we are interested in. For any two periods, our baseline regression model is as follows:

$$\begin{aligned}
 quantity_{ijt} = & \beta_0 + \beta_1 \cdot period_t + \sum_{k=1}^3 \beta_{2k} \cdot treatment_{ik} + \sum_{k=1}^3 \beta_{3k} \cdot (period_t \cdot treatment_{ik}) + \\
 & \beta_4 \cdot price_{ijt} + \beta_5 \cdot salesperson_{it} + \beta_6 \cdot promotion_{it} + \gamma_i + \varepsilon_{ijt}
 \end{aligned} \tag{10}$$

where i , j , and t indicate store, product, and period, respectively. We define $quantity_{ijt}$ as the average daily sales of product j in store i over period t . The variable $period_t$ equals 1 if t is the latter period of the two that we are comparing and 0 otherwise. The variable $treatment_{ik}$ is an indicator variable that takes the value of 1 if a particular store i receives Treatment k . The variable $price_{ijt}$ is defined as the average price of product j in store i over period t . The variables $salesperson_{it}$ and $promotion_{it}$ are indicator variables that take the value of 1 if in period t , a particular store i has at least one salesperson in charge of milk powder products or has some form of store promotions on milk powder products, respectively. Finally, γ_i captures store-level fixed-effects.

Since our randomization is done at the postal zone level, we do not have a large number of randomization units as desired. Therefore, we use randomization inference to construct our standard errors. To do so, we generate 1,000 alternative randomization assignments. In each alternative assignment, we randomly reassign all the postal zones to different experiment groups, keeping all the outcome data the same as before. Then, we run the same regressions as specified for each comparison group and recalculate all the coefficients. The standard errors are calculated as the standard deviations of these new coefficients.

The p -values are generated from one-sided or two-sided hypothesis tests on the coefficients. In particular, we focus on the coefficient β_{3k} of the interaction term between $period$ and $treatment_k$ in Equation (10), where $k \in \{1, 2, 3\}$. We use β'_{3k} to denote the new coefficient calculated from alternative random assignments.

For the pre-experiment period versus the experiment period, since we are interested in the negative “reminder effect,” we conduct the following hypothesis test for each $k \in \{1, 2, 3\}$ in each regression model:

$$H_0 : \beta_{3k} = \beta'_{3k}$$

$$H_1 : \beta_{3k} < \beta'_{3k}.$$

For the experiment period versus the post-experiment period, since we are interested in the positive effect due to the removal the “reminder effect,” our hypothesis test is as follows for each $k \in \{1, 2, 3\}$ in each regression model:

$$H_0 : \beta_{3k} = \beta'_{3k}$$

$$H_1 : \beta_{3k} > \beta'_{3k}.$$

For the pre-experiment period versus the post-experiment period, since we are interested in the zero effect of “pure” information, we have the following hypothesis test for each $k \in \{1, 2, 3\}$ in each regression model:

$$H_0 : \beta_{3k} = \beta'_{3k}$$

$$H_1 : \beta_{3k} \neq \beta'_{3k}.$$

The p -values are calculated as the probability of rejecting the null hypothesis.

As a complement to our randomization inference method, we also run the same regressions using OLS to consolidate our results. Consistent with the level of randomization, we cluster the standard errors at the postal zone level in our OLS regressions. These regressions also allow us to estimate the effect of other variables than the treatments themselves. Besides the baseline regressions, we run separate regressions for stores located in high-income districts

(districts with average per-capita income above or equal to the median income in Hangzhou) and in low-income districts (districts with average per-capita income below or equal to the median income in Hangzhou) in order to examine whether the effect of information is the same across different income groups.

5.3 Results and Discussions

Table 6 through Table 8 provide summary statistics for all the relevant variables as described in Section 5.1 before, during, and after the experiment period, broken down by experiment group (one control group plus three treatment groups).¹⁰ We present our main regression results using randomization inference in Table 9, Table 10, and Table 11. The corresponding OLS regression results are reported in Table A.2, Table A.3, and Table A.4 in the appendix, respectively. The comparisons between high-income districts and low-income districts are conducted in Table A.5 through Table A.8.

5.3.1 Period 0 vs. Period 1

In Table 9, when examining *all products* produced by Beingmate in columns (1)–(3), we find that all the three treatments have a negative impact on the average daily sales, which is surprising compared to the existing literature. This effect is significant for Treatment 2 (Traceability) in all regression models and for Treatment 3 (Certification) when we do not control for store promotions or sales representatives. On average, compared to the control group, Treatment 2 (Traceability) reduces the average daily sales (in terms of quantity) by about 0.064 unit. Given the pre-experiment average daily sales of 0.26 in the Treatment 2 (Traceability) group, this reduction is equivalent to about 24.6% of the average average daily

¹⁰Note that observations vary from one period to another. This is because some stores reported sales data in one period but failed to do so in another period. The collection of products may also be different from one period to another. However, we are able to verify that none of the stores failed to submit sales data in the middle of a period. We further verify that for each period, the number of observations is a multiple of 14, which is the length of each period.

sales before the treatment. Similarly, Treatment 3 (Certification) reduces the average daily sales by about 0.061 unit, which is equivalent to about $0.061/0.445 \approx 13.7\%$ of its average average daily sales before the treatment.

When examining *only milk powder products* or *all other products than milk powder* by Beingmate in columns (4)–(6) and columns (7)–(9), respectively, we observe a similar, significantly negative effect for Treatment 2 (Traceability) in all regression models and Treatment 3 (Certification) when we do not control for store promotions or sales representatives. Although there is no obvious reason to believe that the traceability system that was established for milk powder products should have a direct impact on products other than milk powder, it seems that the negative “reminder effect” has spread to other products under the larger umbrella of infant food.

In [Table A.5](#), we compare districts with higher average income and those with lower average income in terms of the treatment effects on average daily sales. For either *all products* or *only milk powder products* produced by Beingmate, we find that all treatments have a negative impact on the average daily sales for both income groups, with the effect of Treatment 2 (Traceability) being significant at 1% or 5% in all regression models. The effect of Treatment 3 (Certification) is also significant for both types of districts when we do not control for store promotions. As for the difference between high-income and low-income districts, we find that for Treatment 2 (Traceability), the negative treatment effect is significantly stronger for high-income districts at 10% level when examine *only milk powder products* produced by Beingmate. However, we do not observe any differential impact of Treatment 1 (Brand) or Treatment 3 (Certification) in any regression models. All the corresponding p -values are reported in [Table A.8](#).

The difference between the two income groups is in line with our hypothesis. Districts with higher average income tend to be the urban areas where consumers are generally better educated and thus should understand the traceability system better than those consumers in districts with lower average income. Moreover, we expect consumers from districts with

higher average income to have better access to information about the traceability system, possibly through the Internet, TV, newspaper, or other promotional events by milk powder producers. However, it is interesting to see that as consumers become more aware of the traceability system, they react more negatively towards the products that are advertised to be “traceable.” One possible explanation is that the “reminder effect” is stronger among wealthier and better educated consumers who understand the limitations of the traceability system as well as its merits. Going back to our theoretical framework, we believe that the driving force of this reduction is that consumers from high-income districts have a larger $p'_b - p_b$ than consumers from low-income districts do. High-income “naïve” consumers are more likely to be reminded of the past scandals because they are more aware of the seriousness of the scandals, which gives rise to a larger belief correction. For the low-income “naïve” consumers, information has a small reminder effect, possibly due to their limited sources of information, which leads to a smaller belief correction for consumers in low-income districts.

Other than the treatment effects, we observe a very significant effect of store promotions, all at 1% significance level. On average, store promotions on milk powder products lead to an increase of about 2.2 units for all Beingmate products, about 2.9 for just milk powder products, and about 1.8 for products other than milk powder. As for product prices, the demand for milk powder products seems to be more inelastic than the demand for other products. On average, an increase in unit price does not have any significant effect on average daily sales of milk powder products, but it has a significantly negative impact on other products at 1% level.

5.3.2 Period 1 vs. Period 2

In [Table 10](#), when we examine *all products* by Beingmate in columns (1)–(3), we find that the removal of Treatment 2 (Traceability) has a positive impact on the average daily sales, which is significant in all regression models. The magnitude of this treatment effect is almost symmetric to what we observed when comparing period 0 to period 1. On average,

compared to the control group, the removal of Treatment 2 (Traceability) increases the average daily sales (in terms of quantity) by about 0.062, which is equivalent to about $0.062/0.227 \approx 27.3\%$ of its average average daily sales during the experiment period. When examining *only milk powder products* by Beingmate in columns (4)–(6), we observe a very similar pattern. These results suggest that by providing potential consumers with the information about the traceability system but not reminding them of such a fact, Beingmate is able to achieve a significantly higher quantity of sales compared to the experiment period. In other words, the “reminder effect” is temporary for Treatment 2 (Traceability). As for the effect on *all other products than milk powder* in columns (7)–(9), we do not find any significant impact of the removal of Treatment 2 (Traceability), which is in line with our expectation. However, as for Treatment 1 (Brand) or Treatment 3 (Certification) in all three categories, the removal has a significantly positive impact on sales when we only control for sales representatives or store promotions, respectively.

Then, we run separate regressions for high-income districts and low-income districts to see if the removal of each treatment has the same impact. In [Table A.6](#), whether we examine *all products* or *only milk powder products* produced by Beingmate, we find that the removal of Treatment 2 (Traceability) has a significant, positive impact on both high-income and low-income districts. The removal of Treatment 1 (Brand) and the removal of Treatment 3 (Certification) do not have any significant impact at 5% level.

As for the difference between high-income and low-income districts, we are able to reject the null hypothesis that the removal of Treatment 2 (Traceability) has the same impact on high-income districts and low-income districts at 10% for *all products* and 5% for *only milk powder products* produced by Beingmate. Since our earlier results indicate that the “reminder effect” induced by Treatment 2 (Traceability) disappears with the removal of the treatment, and since consumers in high-income districts experience a stronger negative “reminder effect” in the first place, we expect the reversal, positive effect that they experience with the removal of the treatment to be stronger as well. However, as for the removal of Treatment 1 (Brand)

or the removal of Treatment 3 (Certification), we cannot reject the null hypothesis that it has the same impact on high- and low-income districts at 5%. All the corresponding p -values are reported in [Table A.8](#).

5.3.3 Period 0 vs. Period 2

[Table 11](#) summarizes the results by comparing the pre-experiment period with the post-experiment period in order to estimate the “pure” effect of information provision. For these two periods, there is no “reminder effect” because no information is explicitly provided to consumers. The only difference is that consumers may not know about Beingmate’s traceability system and ISO9001 quality certification in the pre-experiment period, while they should all have received the information in the post-experiment period¹¹. Therefore, a comparison between the pre-experiment period and the post-experiment period should yield the “pure” value of information without any “reminder effect.”

For Treatment 1 (Brand) and Treatment 2 (Traceability), we do not observe any significant effect on the average daily sales in any of the regression models. This result suggests that providing information about product traceability system does not have any persistent impact once the “reminder effect” is removed. For Treatment 3 (Certification), however, we observe a significant, negative effect when we do not control for store promotions or sales representatives. These results suggest that the “pure” effect of information provision may be zero except for information about the ISO9001 quality certification, which seems to have a negative, lasting effect. In other words, the reminder effect seems to have “hysteresis,” or persistence, when combined with some institutional imprimatur like ISO signals. This result further suggests that not only can “wrong” types of information provision backfire, but combining information provision with credible institutions can worsen the reminder effect and thus backfire as well.

¹¹Based on the recommended serving size, most Beingmate products can be consumed within two weeks or less. Hence, we expect each supermarket to have similar groups of consumers from one period to another.

In [Table A.7](#), we examine the differential impact of information provision on high-income and low-income districts. In particular, when we examine *only milk powder products* by Beingmate, we do not find any significant differential impact for any of the three treatments on the average daily sales in high-income and low-income districts. However, the “pure” value of information contained in Treatment 1 (Brand) and Treatment 2 (Traceability) is significantly higher in high-income districts than in low-income districts when we examine *all products* by Beingmate, which seems to be driven by other non-milk products given our results for milk powder products (p -values shown in [Table A.8](#)).

6 Conclusion

In this study, we conduct two field experiments in order to evaluate the efficiency of voluntary information provision in the infant milk powder industry, which is undergoing a serious collective reputation problem. We partner with one of the largest domestic infant milk powder producers in China, Beingmate, to estimate what happens to sales when we provide different types of product information about Beingmate products, including its brand name, its traceability system, and its quality certification, to potential consumers in supermarkets. We identify a “reminder effect” of information provision, which is more evident in markets with a bad image among consumers and can lead to a negative response to positive quality-related information provided.

In order to establish a causal linkage between voluntary disclosure of quality information and the “reminder effect,” we conduct an online study at Beingmate’s online store that involves both random information provision and a survey at the end of each purchase. The survey involves questions directly on consumers’ impression of the infant milk powder industry in China and the importance they attach to various quality-related factors when choosing milk powder products. One of the interesting observations we have is that when we provide information about Beingmate’s product traceability system or its ISO9001 quality

certification, there is a statistically significant reduction on both the quantity of sales and consumers' likelihood of purchase. Moreover, we find that being exposed to quality-related information has a negative impact on consumers' impression of the infant milk powder industry in China, which is in line with our hypothesis about the reminder effect.

In the offline study, we conduct a similar experiment in supermarkets in Hangzhou, Zhejiang Province in China, where Beingmate's headquarters is located. We employ a difference-in-difference strategy to estimate the treatment effect of each treatment by comparing the quantity of Beingmate products sold before, during, and after the experiment period in supermarkets. Then, we compare districts with higher average income and districts with lower average income to see if each treatment has exactly the same impact. As in the online study, we find a negative treatment effect on the average daily sales of milk powder products when we provide information about Beingmate's product traceability system or its ISO9001 quality certification. Moreover, this negative treatment effect is significantly stronger for high-income districts than for low-income districts. After the removal of information about Beingmate's product traceability system, the average daily sales increases by almost the same magnitude as the previous reduction, which brings it back to its original level before the experiment. However, the removal of information about Beingmate's quality certification does not have an immediate positive impact; the negative impact on the average daily sales still persists even after the experiment period.

One explanation for this negative treatment effect is that seeing information about product quality may remind potential consumers of various negative images associated with the infant milk powder industry in China, thus resulting in a worse impression of the industry as a whole. Hence, even with positive quality information, this "reminder effect" can lead to a reduction in consumers' willingness to buy when it is sufficiently strong. Moreover, this negative effect is more evident in high-income districts because consumers in these districts tend to have better access to knowledge so that they have a better understanding of the limitations of the traceability system as well as its merits.

One limitation of our paper is that we cannot directly test the existence of the separating equilibrium because we have little information on what consumers opt for when they are deterred from buying Beingmate products as a result of the reminder effect. However, there are four possibilities of consumers' alternative choices: not buying milk powder at all, buying milk powder from another domestic producer similar to or slightly better than Beingmate, buying milk powder from another domestic producer worse than Beingmate, buying milk powder from a foreign brand. Due to the inelasticity of infant milk powder products, the first probability is highly unlikely in this specific market. Similarly, due to the restraints on purchasing foreign-branded milk powder products, we do not believe that most consumers are able to choose the last option. If the second possibility is at play, it should not have any impact on the existence or nonexistence of the separating equilibrium because it can be regarded as a shift within the "good" producers. Finally, if consumers opt for the third possibility, it should be detrimental to the existence of the separating equilibrium or lead to the nonexistence of the separating equilibrium because the "bad" producers now receive more purchases than before.

Another limitation is that we do not have enough evidence to conclude on the external validity of our experiments. There are two key features of the infant milk powder industry in China: potentially high health-related risks from bad products and extremely poor collective reputation among consumers. While we expect to observe a similar effect in an industry that also possesses these two features, we are unable to determine whether these factors are necessary to observing the "reminder effect." In order to test the external validity, we need to conduct further experiments that randomize on both the information provision and those characteristics that are particularly pertinent to the infant milk powder industry.

In summary, our results suggest that at least in some markets, high-quality producers are unable to improve their sales by merely providing information about their quality-improving efforts. In other words, there does not exist any separating equilibrium where high-quality producers choose to provide a costly signal about their type while low-quality producers

choose to remain silent. In this case, some form of government intervention in the form of mandatory information disclosure might be necessary in order to improve the market efficiency¹².

¹²It is conceivable that mandatory information disclosure of quality-related investments will circumvent the issue created by the reminder effect. In other words, even if the information disclosure creates a negative reminder effect, it applies to every producer in the same industry, thus encouraging the “good” producers to put in these quality-related investments. This hypothesis has found some empirical support when researchers examine the effect of an increase in product quality information to consumers on firms’ choices of product quality. For instance, the Los Angeles County introduced hygiene quality grade cards to be displayed on restaurant windows in 1998. [Jin et al. \(2005\)](#) show that the grade cards lead restaurant health inspection scores to increase and the number of food-borne illness hospitalizations to decrease. Consumer demand also becomes more sensitive to changes in restaurants’ hygiene quality.

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A Figures

Figure 1: **Weekly Average Quantity of Sales**
For All Beingmate Products

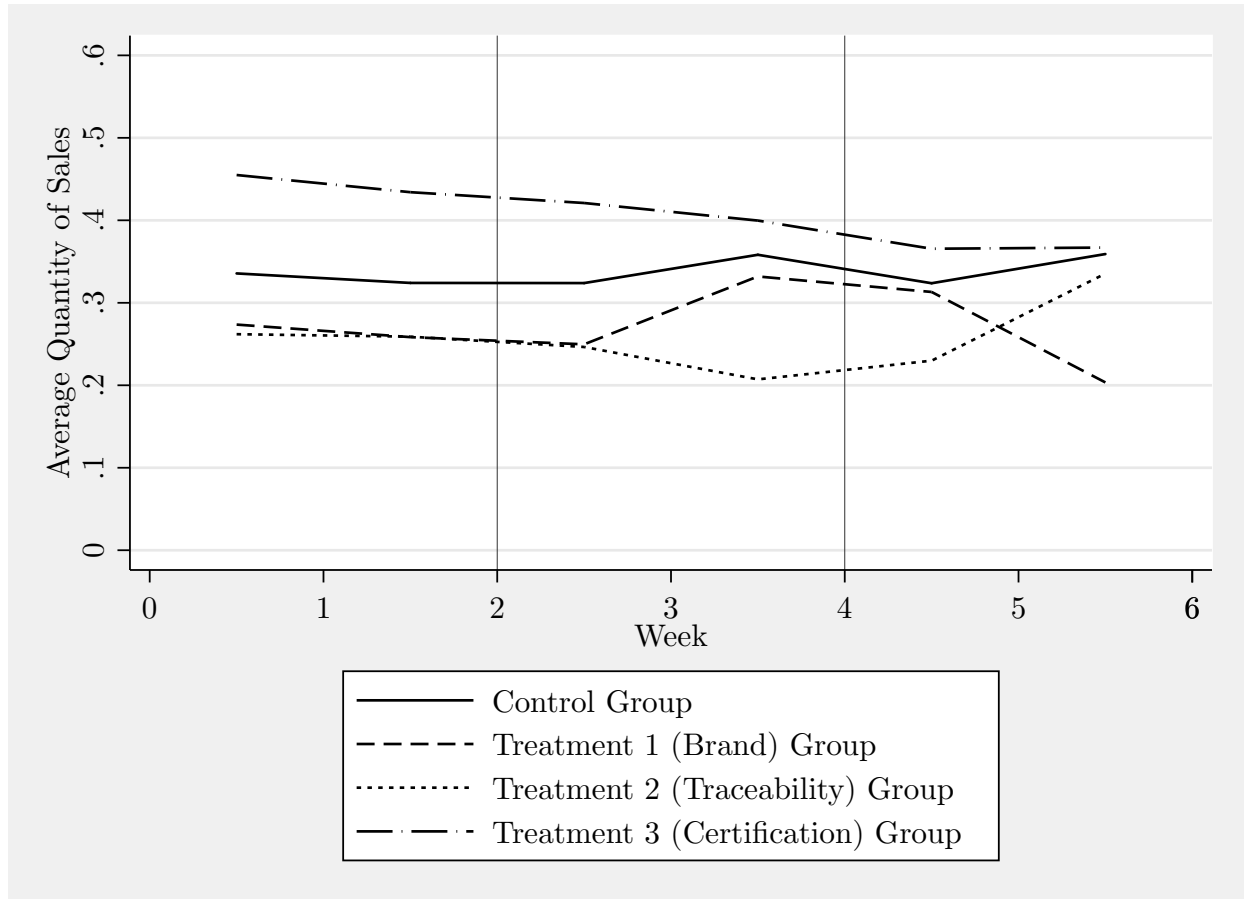


Figure 2: **Weekly Average Quantity of Sales**
For Only Milk Powder Products by Beingmate

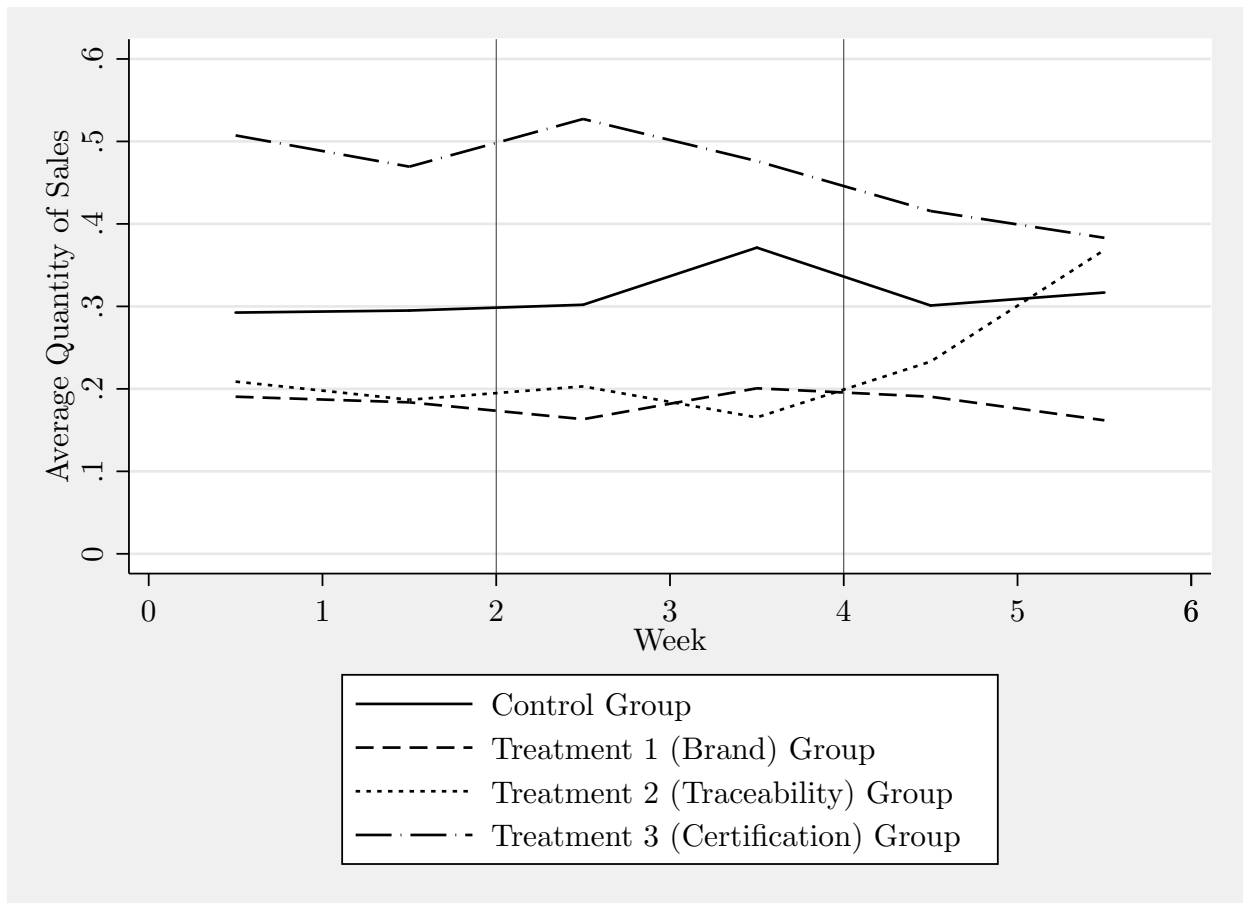
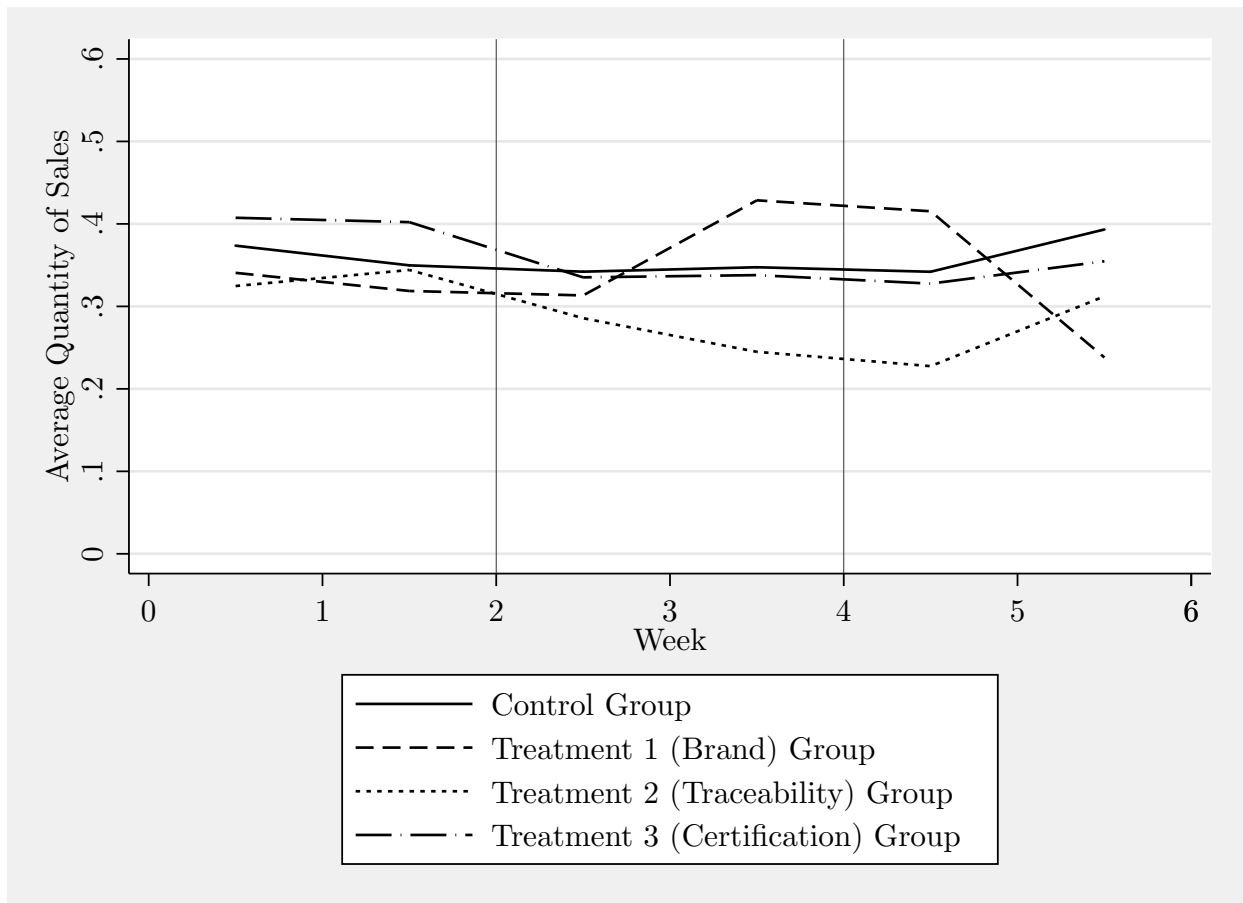


Figure 3: **Weekly Average Quantity of Sales**
For All Other Products by Beingmate



B Tables

B.1 Online Study

B.1.1 Summary Statistics

Table 1: **Summary Statistics for Online Study**
All Visitors

	<i>N</i>	Mean	SD	Min	Median	Max
<i>Control Group</i>						
Purchase Decision	229,095	.00226	.0475	0	0	1
Total Quantity	229,095	.00966	.273	0	0	28
Total Revenue	229,095	1.17	38.9	0	0	5,820
Affiliated	229,095	.125	.33	0	0	1
Impression of Industry	323	2.65	.873	0	3	4
Importance of Traceability	323	3.08	1.06	0	3	4
Importance of Certification	323	3.09	1.14	0	4	4
<i>Treatment 1 (Brand) Group</i>						
Purchase Decision	115,192	.00214	.0463	0	0	1
Total Quantity	115,192	.00911	.26	0	0	22
Total Revenue	115,192	1.11	32.4	0	0	1,885
Affiliated	115,192	.123	.328	0	0	1
Impression of Industry	151	2.58	.836	0	3	4
Importance of Traceability	151	3.22	.965	0	4	4
Importance of Certification	151	3.17	1.07	0	4	4
<i>Treatment 2 (Traceability) Group</i>						
Purchase Decision	113,526	.00183	.0428	0	0	1
Total Quantity	113,526	.00735	.231	0	0	24
Total Revenue	113,526	.973	31.9	0	0	2,910
Affiliated	113,526	.121	.326	0	0	1
Impression of Industry	129	2.7	.844	0	3	4
Importance of Traceability	129	3.11	1.01	0	3	4
Importance of Certification	129	3.26	1.04	0	4	4
<i>Treatment 3 (Certification) Group</i>						
Purchase Decision	111,459	.00188	.0434	0	0	1
Total Quantity	111,459	.00773	.25	0	0	25
Total Revenue	111,459	.949	29.9	0	0	2,328
Affiliated	111,459	.119	.324	0	0	1
Impression of Industry	134	2.51	.907	0	3	4
Importance of Traceability	134	3.16	1.03	0	4	4
Importance of Certification	134	3.08	1.26	0	4	4

Table 2: **Summary Statistics for Online Study**
Valid Survey Respondents Only

	<i>N</i>	Mean	SD	Min	Median	Max
<i>Control Group</i>						
Purchase Decision	211	.37	.484	0	0	1
Total Quantity	211	1.85	3.53	0	0	22
Total Revenue	211	236	561	0	0	3,856
Affiliated	211	1	0	1	1	1
Impression of Industry	211	2.73	.872	0	3	4
Importance of Traceability	211	3.27	.965	0	4	4
Importance of Certification	211	3.2	1.12	0	4	4
<i>Treatment 1 (Brand) Group</i>						
Purchase Decision	102	.402	.493	0	0	1
Total Quantity	102	1.83	3.76	0	0	22
Total Revenue	102	205	377	0	0	1,561
Affiliated	102	1	0	1	1	1
Impression of Industry	102	2.7	.793	0	3	4
Importance of Traceability	102	3.42	.849	0	4	4
Importance of Certification	102	3.35	.992	0	4	4
<i>Treatment 2 (Traceability) Group</i>						
Purchase Decision	89	.315	.467	0	0	1
Total Quantity	89	1.31	2.56	0	0	12
Total Revenue	89	167	364	0	0	1,508
Affiliated	89	1	0	1	1	1
Impression of Industry	89	2.73	.822	0	3	4
Importance of Traceability	89	3.34	.891	1	4	4
Importance of Certification	89	3.35	.931	0	4	4
<i>Treatment 3 (Certification) Group</i>						
Purchase Decision	91	.429	.498	0	0	1
Total Quantity	91	2.59	4.51	0	0	24
Total Revenue	91	247	396	0	0	1,463
Affiliated	91	1	0	1	1	1
Impression of Industry	91	2.46	.911	0	3	4
Importance of Traceability	91	3.27	.955	0	4	4
Importance of Certification	91	3.13	1.27	0	4	4

B.1.2 Regression Results

- [Table 3](#): Treatment Effect on Online Purchase Decisions
- [Table 4](#): Treatment Effect on Consumers' Reported Impression of the Milk Powder Industry (OLS)
- [Table 5](#): Treatment Effect on Consumers' Reported Impression of the Milk Powder Industry (Ordered Logit)

Table 3: **Treatment Effect on Online Purchase Decisions**

	OLS				Logit			
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Purchase	(6) Purchase	(7) Purchase	(8) Purchase
Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Brand	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.053 (0.077)	-0.040 (0.078)	-0.047 (0.077)	-0.055 (0.079)
Traceability	-0.002*** (0.001)	-0.002** (0.001)	-0.002** (0.001)	-0.002** (0.001)	-0.211** (0.082)	-0.186** (0.083)	-0.199** (0.082)	-0.161* (0.083)
Certification	-0.002** (0.001)	-0.002 (0.001)	-0.002* (0.001)	-0.001 (0.001)	-0.183** (0.082)	-0.139* (0.082)	-0.172** (0.082)	-0.106 (0.083)
Affiliated		0.071*** (0.003)		0.072*** (0.003)		9.059*** (1.000)		9.145*** (1.002)
Location Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Observations	569272	569272	569272	569272	569272	569272	569272	569272
R^2	0.000	0.008	0.001	0.009				
Pseudo R^2					0.001	0.293	0.033	0.311

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: **Treatment Effect on Consumers' Reported Impression of the Milk Powder Industry**

	Dependent Variable: Impression of Industry (OLS)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Brand	-0.034 (0.099)	-0.079 (0.093)	-0.976** (0.448)	-0.333 (0.412)	0.005 (0.105)	-0.046 (0.097)	-1.037** (0.464)	-0.482 (0.415)
Traceability	0.000 (0.106)	-0.035 (0.103)	-0.455* (0.247)	0.237 (0.288)	0.065 (0.113)	-0.004 (0.110)	-0.415 (0.254)	0.239 (0.292)
Certification	-0.268** (0.113)	-0.256** (0.109)	-0.268** (0.113)	-0.256** (0.109)	-0.267** (0.113)	-0.266** (0.109)	-0.267** (0.113)	-0.265** (0.110)
Importance of Traceability		0.110** (0.043)		0.097** (0.045)		0.104** (0.044)		0.083* (0.045)
Importance of Certification		0.186*** (0.040)		0.195*** (0.045)		0.194*** (0.042)		0.201*** (0.047)
Traceability × Importance of Traceability			0.275** (0.125)	0.074 (0.118)			0.304** (0.130)	0.129 (0.120)
Certification × Importance of Certification			0.136* (0.077)	-0.081 (0.089)			0.142* (0.080)	-0.071 (0.092)
Location Dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	493	493	493	493	493	493	493	493
R^2	0.014	0.101	0.033	0.103	0.089	0.169	0.110	0.173

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Treatment Effect on Consumers' Reported Impression of the Milk Powder Industry

	Dependent Variable: Impression of Industry (Ordered Logit)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Brand	-0.108 (0.212)	-0.236 (0.217)	-2.307** (0.951)	-0.929 (0.934)	-0.031 (0.231)	-0.157 (0.232)	-2.500** (1.044)	-1.192 (0.994)
Traceability	-0.100 (0.244)	-0.149 (0.248)	-1.245** (0.579)	0.208 (0.700)	0.058 (0.270)	-0.063 (0.275)	-1.209** (0.597)	0.272 (0.721)
Certification	-0.592** (0.244)	-0.633** (0.256)	-0.598** (0.247)	-0.632** (0.257)	-0.657** (0.262)	-0.723*** (0.277)	-0.668** (0.264)	-0.723*** (0.278)
Importance of Traceability		0.276*** (0.096)		0.244** (0.100)		0.272*** (0.103)		0.226** (0.106)
Importance of Certification		0.408*** (0.094)		0.420*** (0.105)		0.445*** (0.103)		0.453*** (0.115)
Traceability × Importance of Traceability			0.638** (0.267)	0.204 (0.269)			0.716** (0.295)	0.306 (0.288)
Certification × Importance of Certification			0.349* (0.183)	-0.109 (0.219)			0.381** (0.194)	-0.101 (0.231)
Location Dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	493	493	493	493	493	493	493	493
Pseudo R^2	0.005	0.041	0.014	0.042	0.042	0.076	0.051	0.078

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

B.2 Offline Study

B.2.1 Summary Statistics

Table 6: **Summary Statistics for for Continuous Variables**
During the Two-Week Pre-Experiment Period

	<i>N</i>	Mean	SD	Min	Median	Max
<i>Control Group</i>						
Daily Quantity	11,984	.33	.861	0	0	14
Daily Revenue	11,984	21.6	98.5	0	0	2,256
Unit Price	11,984	73.4	77.2	3.5	35.9	306
Local Income	11,564	32,045	9,253	12,875	37,511	40,000
Milk Powder Product	11,984	.468	.499	0	0	1
Store Promotion	11,984	0	0	0	0	0
Salesperson	11,984	.113	.316	0	0	1
<i>Treatment 1 (Brand) Group</i>						
Daily Quantity	1,316	.266	.683	0	0	6
Daily Revenue	1,316	14.1	66.6	0	0	1,329
Unit Price	1,316	62.2	71	4.61	25.6	270
Local Income	1,316	38,305	1,161	37,511	37,511	40,000
Milk Powder Product	1,316	.447	.497	0	0	1
Store Promotion	1,316	0	0	0	0	0
Salesperson	1,316	.0912	.288	0	0	1
<i>Treatment 2 (Traceability) Group</i>						
Daily Quantity	672	.26	.911	0	0	15
Daily Revenue	672	12.5	50.4	0	0	770
Unit Price	672	72.1	72.1	4.62	40.3	266
Local Income	672	37,511	0	37,511	37,511	37,511
Milk Powder Product	672	.542	.499	0	1	1
Store Promotion	672	0	0	0	0	0
Salesperson	672	0	0	0	0	0
<i>Treatment 3 (Certification) Group</i>						
Daily Quantity	1,442	.445	1.13	0	0	13
Daily Revenue	1,442	27.5	110	0	0	1,411
Unit Price	1,442	60.7	65	4.61	25.6	241
Local Income	1,442	34,240	9,404	13,956	37,511	40,000
Milk Powder Product	1,442	.476	.5	0	0	1
Store Promotion	1,442	.169	.374	0	0	1
Salesperson	1,442	.169	.374	0	0	1

Table 7: **Summary Statistics for for Continuous Variables**
During the Two-Week Experiment Period

	<i>N</i>	Mean	SD	Min	Median	Max
<i>Control Group</i>						
Daily Quantity	12,250	.341	1.03	0	0	33
Daily Revenue	12,250	24.3	163	0	0	9,867
Unit Price	12,250	70.9	76.5	3.5	35	299
Local Income	12,250	31,415	9,638	12,875	37,511	40,000
Milk Powder Product	12,250	.453	.498	0	0	1
Store Promotion	12,250	0	0	0	0	0
Salesperson	12,250	.117	.321	0	0	1
<i>Treatment 1 (Brand) Group</i>						
Daily Quantity	1,386	.291	1	0	0	27
Daily Revenue	1,386	14.7	64.7	0	0	1,201
Unit Price	1,386	70.6	81.6	4.61	25.6	299
Local Income	1,386	38,265	1,144	37,511	37,511	40,000
Milk Powder Product	1,386	.424	.494	0	0	1
Store Promotion	1,386	0	0	0	0	0
Salesperson	1,386	.105	.306	0	0	1
<i>Treatment 2 (Traceability) Group</i>						
Daily Quantity	560	.227	.607	0	0	6
Daily Revenue	560	10	46.3	0	0	770
Unit Price	560	57.4	61.3	4.62	25.6	230
Local Income	560	37,511	0	37,511	37,511	37,511
Milk Powder Product	560	.475	.5	0	0	1
Store Promotion	560	0	0	0	0	0
Salesperson	560	0	0	0	0	0
<i>Treatment 3 (Certification) Group</i>						
Daily Quantity	1,316	.41	1.02	0	0	11
Daily Revenue	1,316	32.2	148	0	0	1,887
Unit Price	1,316	63.5	69.5	4.61	25.6	282
Local Income	1,316	35,048	8,526	13,956	37,511	40,000
Milk Powder Product	1,316	.447	.497	0	0	1
Store Promotion	1,316	.151	.358	0	0	1
Salesperson	1,316	.163	.37	0	0	1

Table 8: **Summary Statistics for for Continuous Variables**
During the Two-Week Post-Experiment Period

	<i>N</i>	Mean	SD	Min	Median	Max
<i>Control Group</i>						
Daily Quantity	12,264	.341	.929	0	0	15
Daily Revenue	12,264	21	98.4	0	0	2,691
Unit Price	12,264	69.9	74.8	3.5	34.9	299
Local Income	12,264	30,990	9,614	12,875	37,511	40,000
Milk Powder Product	12,264	.446	.497	0	0	1
Store Promotion	12,264	0	0	0	0	0
Salesperson	12,264	.115	.319	0	0	1
<i>Treatment 1 (Brand) Group</i>						
Daily Quantity	1,386	.258	.889	0	0	20
Daily Revenue	1,386	12.5	64.9	0	0	1,555
Unit Price	1,386	66.3	72.2	4.61	34.8	288
Local Income	1,386	38,165	1,096	37,511	37,511	40,000
Milk Powder Product	1,386	.455	.498	0	0	1
Store Promotion	1,386	0	0	0	0	0
Salesperson	1,386	0	0	0	0	0
<i>Treatment 2 (Traceability) Group</i>						
Daily Quantity	644	.283	.91	0	0	12
Daily Revenue	644	14	65.3	0	0	898
Unit Price	644	59.6	68.7	4.61	18.1	222
Local Income	644	37,511	0	37,511	37,511	37,511
Milk Powder Product	644	.413	.493	0	0	1
Store Promotion	644	0	0	0	0	0
Salesperson	644	0	0	0	0	0
<i>Treatment 3 (Certification) Group</i>						
Daily Quantity	1,428	.366	.954	0	0	12
Daily Revenue	1,428	23.8	114	0	0	1,539
Unit Price	1,428	57.4	65.1	4.61	18.1	270
Local Income	1,428	34,317	9,174	13,956	37,511	40,000
Milk Powder Product	1,428	.431	.495	0	0	1
Store Promotion	1,428	0	0	0	0	0
Salesperson	1,428	.172	.378	0	0	1

B.2.2 Regression Results Using Randomization Inference

- [Table 9](#): Treatment Effect on Beingmate Products, *for Period 0 vs. Period 1*
- [Table 10](#): Treatment Effect on Beingmate Products, *for Period 1 vs. Period 2*
- [Table 11](#): Treatment Effect on Beingmate Products, *for Period 0 vs. Period 2*

Table 9: **Treatment Effect on Beingmate Products**
For Period 0 vs. Period 1

	All Products			Milk Products			Non-Milk Products		
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Quantity	(6) Quantity	(7) Quantity	(8) Quantity	(9) Quantity
Period 1 (vs. 0)	0.022 (0.006)	0.022 (0.005)	0.021 (0.013)	0.054 (0.009)	0.054 (0.009)	0.061 (0.016)	-0.006 (0.005)	-0.006 (0.005)	-0.012 (0.013)
Period 1 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 1 × Brand	-0.000 (0.056)	-0.001 (0.058)	-0.016 (0.121)	-0.056 (0.082)	-0.057 (0.080)	-0.056 (0.149)	0.057 (0.058)	0.056 (0.058)	0.037 (0.114)
Period 1 × Traceability	-0.064** (0.052)	-0.063** (0.050)	-0.054* (0.120)	-0.068* (0.083)	-0.066* (0.078)	-0.071* (0.152)	-0.070** (0.047)	-0.070** (0.044)	-0.062* (0.108)
Period 1 × Certification	-0.061** (0.054)	-0.006 (0.053)	-0.035 (0.115)	-0.075* (0.087)	0.002 (0.085)	-0.055 (0.153)	-0.053* (0.043)	-0.008 (0.041)	-0.021 (0.099)
Unit Price	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Store Promotion	No	Yes	No	No	Yes	No	No	Yes	No
Salesperson	No	No	Yes	No	No	Yes	No	No	Yes
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2209	2209	2209	1017	1017	1017	1192	1192	1192
R^2	0.164	0.215	0.513	0.166	0.249	0.479	0.247	0.283	0.609

Standard errors in parentheses (generated via randomization inference)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: **Treatment Effect on Beingmate Products**
For Period 1 vs. Period 2

	All Products			Milk Products			Non-Milk Products		
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Quantity	(6) Quantity	(7) Quantity	(8) Quantity	(9) Quantity
Period 2 (vs. 1)	0.000 (0.007)	-0.000 (0.008)	-0.004 (0.008)	-0.026 (0.013)	-0.026 (0.014)	-0.038 (0.012)	0.024 (0.006)	0.024 (0.007)	0.026 (0.009)
Period 2 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 2 × Brand	-0.035 (0.069)	-0.035 (0.095)	0.186** (0.102)	0.019 (0.116)	0.019 (0.154)	0.188** (0.130)	-0.047 (0.064)	-0.047 (0.084)	0.198** (0.105)
Period 2 × Traceability	0.062* (0.059)	0.062* (0.074)	0.066** (0.078)	0.162** (0.092)	0.162** (0.114)	0.173** (0.103)	-0.027 (0.051)	-0.027 (0.064)	-0.028 (0.077)
Period 2 × Certification	-0.043 (0.072)	0.158** (0.079)	-0.054 (0.083)	-0.052 (0.120)	0.250** (0.132)	-0.024 (0.108)	-0.035 (0.054)	0.122** (0.064)	-0.070 (0.077)
Unit Price	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Store Promotion	No	Yes	No	No	Yes	No	No	Yes	No
Salesperson	No	No	Yes	No	No	Yes	No	No	Yes
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2231	2231	2231	998	998	998	1233	1233	1233
R^2	0.144	0.158	0.469	0.141	0.158	0.467	0.219	0.233	0.552

Standard errors in parentheses (generated via randomization inference)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: **Treatment Effect on Beingmate Products**
For Period 0 vs. Period 2

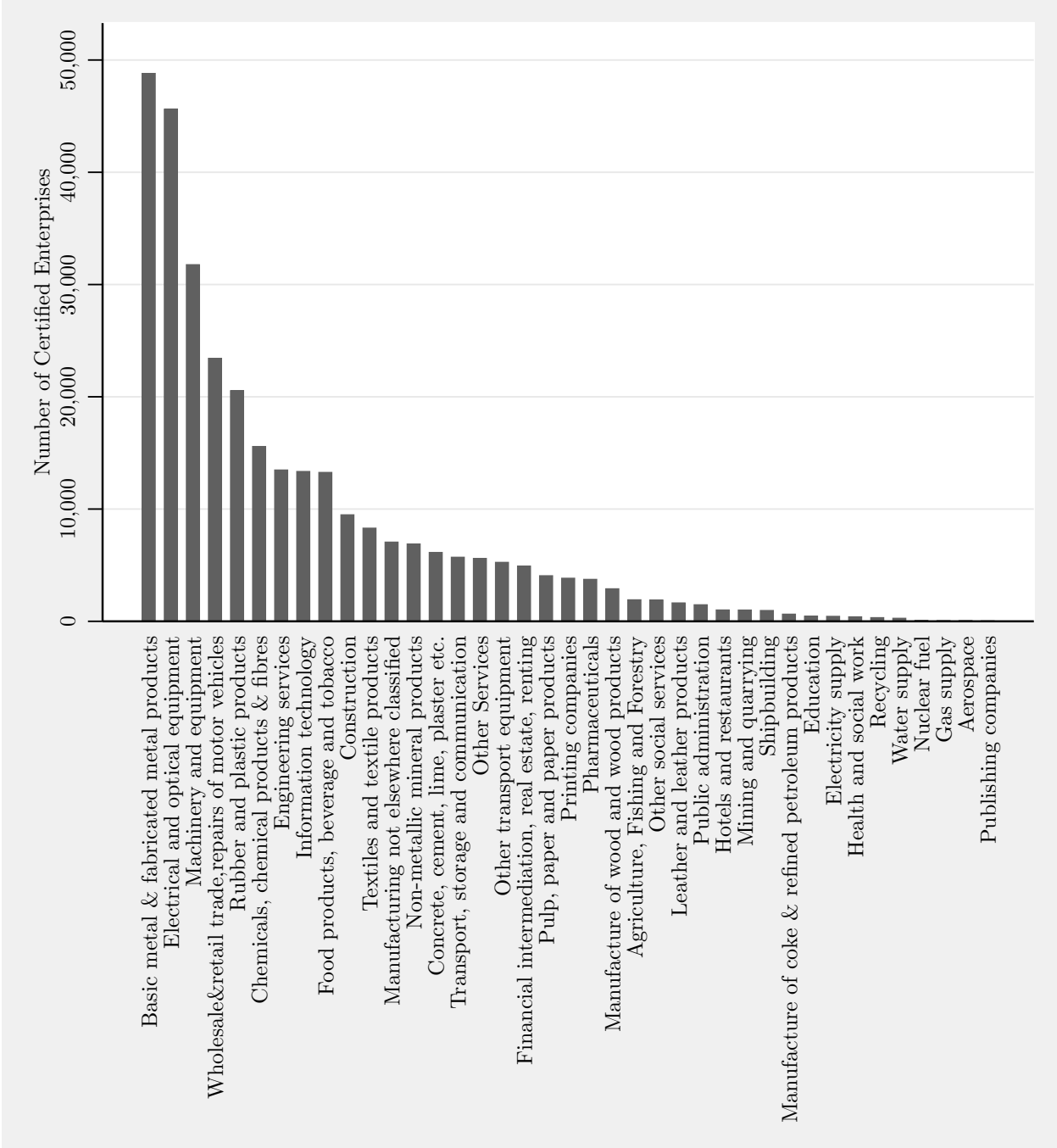
	All Products			Milk Products			Non-Milk Products		
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Quantity	(6) Quantity	(7) Quantity	(8) Quantity	(9) Quantity
Period 2 (vs. 0)	0.017** (0.005)	0.017 (0.007)	0.008 (0.013)	0.020 (0.009)	0.020 (0.012)	0.012 (0.014)	0.017** (0.007)	0.017 (0.007)	0.008 (0.016)
Period 2 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 2 × Brand	-0.027 (0.056)	-0.027 (0.094)	0.154 (0.135)	-0.035 (0.084)	-0.035 (0.141)	0.110 (0.144)	0.016 (0.071)	0.016 (0.089)	0.218 (0.150)
Period 2 × Traceability	-0.000 (0.060)	-0.000 (0.103)	0.015 (0.140)	0.095 (0.081)	0.095 (0.154)	0.102 (0.145)	-0.102 (0.076)	-0.102 (0.098)	-0.090 (0.152)
Period 2 × Certification	-0.098** (0.034)	0.149 (0.084)	-0.088 (0.106)	-0.115** (0.061)	0.261 (0.130)	-0.085 (0.111)	-0.093** (0.046)	0.069 (0.067)	-0.090 (0.121)
Unit Price	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Store Promotion	No	Yes	No	No	Yes	No	No	Yes	No
Salesperson	No	No	Yes	No	No	Yes	No	No	Yes
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2224	2224	2224	1017	1017	1017	1207	1207	1207
R^2	0.168	0.190	0.488	0.166	0.214	0.492	0.228	0.237	0.528

Standard errors in parentheses (generated via randomization inference)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix 1 Overview of ISO9001 Certification

Figure A.1: Number of Firms with ISO9001 Certification in China (by industry)



Source: ISO Survey 2013, by International Organization for Standards

Table A.1: **Number of Firms with ISO9001 Certification (by region)**

	1995	2000	2005	2010	2011	2012	2013
<i>Overview</i>							
Africa	1,563	4,769	6,763	7,667	8,164	9,674	9,856
Central and South America	1,220	10,805	22,498	49,260	51,685	51,459	52,478
North America	10,374	48,296	59,663	36,632	37,530	38,586	48,579
Europe	92,611	219,561	377,172	530,039	459,367	469,739	485,554
East Asia and Pacific	19,766	109,217	266,100	438,477	471,836	476,106	467,320
Central and South Asia	1,038	6,411	27,966	37,596	33,577	32,373	44,847
Middle East	776	9,003	13,681	18,839	17,069	19,050	20,812
Total	127,348	408,062	773,843	1,118,510	1,079,228	1,096,987	1,129,446
<i>Regional Share</i>							
Africa	1.2%	1.2%	0.9%	0.7%	0.8%	0.9%	0.9%
Central and South America	1.0%	2.6%	2.9%	4.4%	4.8%	4.7%	4.6%
North America	8.1%	11.8%	7.7%	3.3%	3.5%	3.5%	4.3%
Europe	72.7%	53.8%	48.7%	47.4%	42.6%	42.8%	43.0%
East Asia and Pacific	15.5%	26.8%	34.4%	39.2%	43.7%	43.4%	41.4%
Central and South Asia	0.8%	1.6%	3.6%	3.4%	3.1%	3.0%	4.0%
Middle East	0.6%	2.2%	1.8%	1.7%	1.6%	1.7%	1.8%
Total	100%	100%	100%	100%	100%	100%	100%

Source: ISO Survey 2013, by International Organization for Standards

Appendix 2 Card Designs

Figure A.2: Card Designs for the Treatment Groups

Treatment 1 (Brand):



Treatment 2 (Traceability):



Treatment 3 (Certification):



Appendix 3 Additional Regressions for Offline Study

Appendix 3.1 Alternative Regression Results using OLS

- [Table A.2](#): Treatment Effect on Beingmate Products, *for Period 0 vs. Period 1*
- [Table A.3](#): Treatment Effect on Beingmate Products, *for Period 1 vs. Period 2*
- [Table A.4](#): Treatment Effect on Beingmate Products, *for Period 0 vs. Period 2*

Table A.2: **Treatment Effect on Beingmate Products**
For Period 0 vs. Period 1

	All Products			Milk Products			Non-Milk Products		
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Quantity	(6) Quantity	(7) Quantity	(8) Quantity	(9) Quantity
Period 1 (vs. 0)	0.022 (0.015)	0.022 (0.015)	0.021 (0.040)	0.054** (0.024)	0.054** (0.024)	0.061 (0.048)	-0.006 (0.012)	-0.006 (0.012)	-0.012 (0.038)
Period 1 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 1 × Brand	-0.000 (0.020)	-0.001 (0.020)	-0.016 (0.040)	-0.056 (0.035)	-0.057 (0.035)	-0.056 (0.051)	0.057 (0.034)	0.056 (0.034)	0.037 (0.042)
Period 1 × Traceability	-0.064*** (0.015)	-0.063*** (0.015)	-0.054 (0.040)	-0.068*** (0.025)	-0.066** (0.025)	-0.071 (0.049)	-0.070*** (0.013)	-0.070*** (0.013)	-0.062 (0.040)
Period 1 × Certification	-0.061** (0.026)	-0.006 (0.030)	-0.035 (0.042)	-0.075** (0.036)	0.002 (0.028)	-0.055 (0.050)	-0.053* (0.029)	-0.008 (0.038)	-0.021 (0.047)
Unit Price	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.005*** (0.001)	-0.005*** (0.001)	-0.003*** (0.001)
Store Promotion		2.181*** (0.023)			2.856*** (0.027)			1.827*** (0.013)	
Salesperson			1.985*** (0.166)			2.373*** (0.326)			1.830*** (0.159)
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2209	2209	2209	1017	1017	1017	1192	1192	1192
R^2	0.164	0.215	0.513	0.166	0.249	0.479	0.247	0.283	0.609

Standard errors in parentheses (clustered at the postal zone level)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: **Treatment Effect on Beingmate Products**
For Period 1 vs. Period 2

	All Products			Milk Products			Non-Milk Products		
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Quantity	(6) Quantity	(7) Quantity	(8) Quantity	(9) Quantity
Period 2 (vs. 1)	0.000 (0.021)	-0.000 (0.021)	-0.004 (0.017)	-0.026 (0.038)	-0.026 (0.038)	-0.038 (0.032)	0.024 (0.018)	0.024 (0.018)	0.026* (0.015)
Period 2 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 2 × Brand	-0.035 (0.048)	-0.035 (0.048)	0.186 (0.118)	0.019 (0.050)	0.019 (0.050)	0.188 (0.113)	-0.047 (0.042)	-0.047 (0.042)	0.198 (0.142)
Period 2 × Traceability	0.062*** (0.021)	0.062*** (0.021)	0.066*** (0.018)	0.162*** (0.058)	0.162*** (0.058)	0.173*** (0.056)	-0.027 (0.053)	-0.027 (0.053)	-0.028 (0.048)
Period 2 × Certification	-0.043 (0.030)	0.158 (0.146)	-0.054 (0.060)	-0.052 (0.040)	0.250 (0.238)	-0.024 (0.071)	-0.035 (0.033)	0.122 (0.119)	-0.070 (0.068)
Unit Price	-0.000** (0.000)	-0.000** (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.004*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
Store Promotion		1.333*** (0.267)			1.735*** (0.522)			1.174*** (0.185)	
Salesperson			2.053*** (0.133)			2.749*** (0.271)			1.834*** (0.136)
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2231	2231	2231	998	998	998	1233	1233	1233
R^2	0.144	0.158	0.469	0.141	0.158	0.467	0.219	0.233	0.552

Standard errors in parentheses (clustered at the postal zone level)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: **Treatment Effect on Beingmate Products**
For Period 0 vs. Period 2

	All Products			Milk Products			Non-Milk Products		
	(1) Quantity	(2) Quantity	(3) Quantity	(4) Quantity	(5) Quantity	(6) Quantity	(7) Quantity	(8) Quantity	(9) Quantity
Period 2 (vs. 0)	0.017 (0.013)	0.017 (0.013)	0.008 (0.034)	0.020 (0.023)	0.020 (0.023)	0.012 (0.039)	0.017 (0.018)	0.017 (0.018)	0.008 (0.037)
Period 2 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 2 × Brand	-0.027 (0.032)	-0.027 (0.032)	0.154 (0.109)	-0.035 (0.048)	-0.035 (0.048)	0.110 (0.081)	0.016 (0.017)	0.016 (0.017)	0.218 (0.154)
Period 2 × Traceability	-0.000 (0.013)	-0.000 (0.013)	0.015 (0.036)	0.095 (0.061)	0.095 (0.062)	0.102 (0.072)	-0.102* (0.056)	-0.102* (0.056)	-0.090 (0.064)
Period 2 × Certification	-0.098** (0.044)	0.149 (0.179)	-0.088 (0.054)	-0.115*** (0.037)	0.261 (0.256)	-0.085 (0.061)	-0.093* (0.051)	0.069 (0.131)	-0.090 (0.060)
Unit Price	-0.001*** (0.000)	-0.001*** (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.006*** (0.001)	-0.006*** (0.001)	-0.004*** (0.001)
Store Promotion		1.423*** (0.315)			1.976*** (0.449)			0.997*** (0.230)	
Salesperson			1.847*** (0.124)			2.129*** (0.239)			1.721*** (0.106)
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2224	2224	2224	1017	1017	1017	1207	1207	1207
R^2	0.168	0.190	0.488	0.166	0.214	0.492	0.228	0.237	0.528

Standard errors in parentheses (clustered at the postal zone level)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix 3.2 Comparison between High-Income Districts and Low-Income Districts

- [Table A.5](#): Comparison between High-Income Districts and Low-Income Districts, *for Period 0 vs. Period 1*
- [Table A.6](#): Comparison between High-Income Districts and Low-Income Districts, *for Period 1 vs. Period 2*
- [Table A.7](#): Comparison between High-Income Districts and Low-Income Districts, *for Period 0 vs. Period 2*
- [Table A.8](#): Comparison between High-Income and Low-Income Districts, *p-Values Corresponding to Each Hypothesis Test on the Interaction Terms*

Table A.5: **Comparison between High-Income Districts and Low-Income Districts**
For Period 0 vs. Period 1

	All Products				Milk Products			
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
Period 1 (vs. 0)	0.026 (0.023)	0.028 (0.018)	0.026 (0.023)	0.028 (0.018)	0.077** (0.036)	0.053* (0.030)	0.076** (0.036)	0.053* (0.030)
Period 1 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 1 × Brand	-0.007 (0.027)	-0.004 (0.026)	-0.007 (0.027)	-0.005 (0.026)	-0.079 (0.047)	-0.081* (0.041)	-0.081* (0.047)	-0.083* (0.042)
Period 1 × Traceability	-0.065*** (0.021)	-0.072*** (0.017)	-0.064*** (0.021)	-0.071*** (0.017)	-0.090** (0.034)	-0.064** (0.030)	-0.088** (0.035)	-0.062** (0.030)
Period 1 × Certification	-0.084*** (0.026)	-0.065* (0.037)	-0.018 (0.037)	0.018 (0.019)	-0.106** (0.047)	-0.094** (0.038)	-0.018 (0.040)	0.010 (0.033)
Unit Price	-0.000 (0.000)	-0.001** (0.000)	-0.000 (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Store Promotion			2.199*** (0.030)	2.185*** (0.024)			2.861*** (0.038)	2.873*** (0.031)
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1452	1723	1452	1723	665	801	665	801
R^2	0.151	0.170	0.224	0.231	0.166	0.178	0.264	0.286

Standard errors in parentheses (clustered at the postal zone level)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: **Comparison between High-Income Districts and Low-Income Districts**
For Period 1 vs. Period 2

	All Products				Milk Products			
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
Period 2 (vs. 1)	-0.027 (0.033)	0.006 (0.024)	-0.027 (0.033)	0.006 (0.024)	-0.075 (0.063)	-0.019 (0.045)	-0.075 (0.063)	-0.019 (0.045)
Period 2 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 2 × Brand	-0.008 (0.055)	-0.051 (0.062)	-0.008 (0.055)	-0.051 (0.062)	0.065 (0.075)	0.015 (0.065)	0.066 (0.075)	0.015 (0.065)
Period 2 × Traceability	0.089*** (0.032)	0.056** (0.024)	0.089*** (0.032)	0.056** (0.023)	0.213*** (0.073)	0.153** (0.063)	0.212*** (0.074)	0.152** (0.063)
Period 2 × Certification	-0.024 (0.040)	-0.059* (0.035)	0.226 (0.187)	0.281 (0.173)	-0.010 (0.066)	-0.049 (0.048)	0.364 (0.290)	0.438* (0.245)
Unit Price	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Store Promotion			1.412*** (0.340)	1.572*** (0.317)			1.879*** (0.627)	2.171*** (0.533)
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1404	1821	1404	1821	621	819	621	819
R^2	0.142	0.143	0.164	0.162	0.145	0.142	0.169	0.170

Standard errors in parentheses (clustered at the postal zone level)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.7: **Comparison between High-Income Districts and Low-Income Districts**
For Period 0 vs. Period 2

	All Products				Milk Products			
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
Period 2 (vs. 0)	-0.001 (0.019)	0.030** (0.014)	-0.001 (0.019)	0.030** (0.014)	0.007 (0.037)	0.027 (0.028)	0.007 (0.037)	0.026 (0.028)
Period 2 × Control	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Period 2 × Brand	-0.010 (0.035)	-0.046 (0.042)	-0.010 (0.035)	-0.047 (0.042)	-0.022 (0.056)	-0.063 (0.067)	-0.022 (0.056)	-0.062 (0.068)
Period 2 × Traceability	0.019 (0.020)	-0.015 (0.014)	0.020 (0.020)	-0.015 (0.014)	0.108 (0.066)	0.088 (0.064)	0.108 (0.067)	0.088 (0.065)
Period 2 × Certification	-0.110*** (0.035)	-0.119* (0.061)	0.203 (0.244)	0.332 (0.211)	-0.123*** (0.040)	-0.126*** (0.045)	0.372 (0.324)	0.449 (0.283)
Unit Price	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)
Store Promotion			1.490*** (0.430)	1.768*** (0.373)			2.146*** (0.567)	2.320*** (0.495)
Store Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1432	1768	1432	1768	652	818	652	818
R^2	0.166	0.169	0.201	0.201	0.181	0.167	0.250	0.239

Standard errors in parentheses (clustered at the postal zone level)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.8: **Comparison between High-Income and Low-Income Districts**
p-Values Corresponding to Each Hypothesis Test on the Interaction Terms

	Period × Brand	Period × Traceability	Period × Certification
<i>Period 0 vs. Period 1</i>			
Table A.5, (1) & (2)	0.843	0.547	0.509
Table A.5, (3) & (4)	0.823	0.539	0.248
Table A.5, (5) & (6)	0.917	0.060	0.637
Table A.5, (7) & (8)	0.924	0.056	0.100
<i>Period 1 vs. Period 2</i>			
Table A.6, (1) & (2)	0.090	0.069	0.171
Table A.6, (3) & (4)	0.090	0.070	0.728
Table A.6, (5) & (6)	0.135	0.034	0.223
Table A.6, (7) & (8)	0.136	0.034	0.757
<i>Period 0 vs. Period 2</i>			
Table A.7, (1) & (2)	0.039	0.013	0.861
Table A.7, (3) & (4)	0.039	0.013	0.550
Table A.7, (5) & (6)	0.185	0.201	0.910
Table A.7, (7) & (8)	0.188	0.205	0.794

Source: In each interaction term, “Period” refers to the latter period within each comparison group.

Independent Directors' Dissent on Boards: Evidence from Listed Companies in China

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ABSTRACT

Although opinion conformity is believed to be commonly used by corporate elites to invoke reciprocity, it is hard to study in the context of corporate boards since boards are typically “black boxes”. Focusing on publicly traded companies in China where disclosure of dissent is mandated, we show that dissent is associated with a breakdown of the social exchange relationship within boards. Specifically, dissent is more likely to occur when the board chair who appointed the independent director has left the board, or when the board “game” is reaching its last round, defined as a 60-day window before departure of the board chair or the director herself. Our findings lend considerable support to conceptualization of boards as a social exchange device.

Key Words: Inner Workings of Boards, Social Exchange Theory, Corporate Governance, Independent Directors, China

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1. Introduction

By far, no solid empirical evidence exists to suggest that independent directors add value to shareholders (Adams, Hermalin and Weisbach, 2010; Tung, 2011). One possibility is that independent directors are not *socially* independent, and therefore compromised in the performance of their duties. As Warren Buffett once observed, “it was not easy to ask difficult questions in a boardroom populated by well-mannered people who got on well (FT.com, 2009).” Much research on social influences suggests that the social norm of reciprocity significantly compromises directors’ decisions (e.g. Wade, O’Reilly and Chandratat, 1990; Westphal and Zajaz, 1997; Westphal and Stern, 2007; Stern and Westphal, 2010; MacDonald and Westphal, 2011; Park, Westphal and Stern, 2011).

The extant literature, however, tends to view boards as black boxes (Adams et al., 2010). Researchers tend not to observe the inner dynamics of boards except when exceptional circumstances force them into the media spotlight or into court proceedings. This study attempts to address this void. The regulatory environment in China offers a rare window to observe some of the inner workings of boards. For publicly-traded companies, the China Securities Regulatory Commission (CSRC) mandates that public firms disclose independent directors’ dissent during board meetings. Utilizing China’s unique empirical setting, we document a concrete interpersonal influence mechanism through which the reciprocity norm at work may affect board independence, that is, directors subject to the norm of reciprocity are more inclined to conform to the firm’s top management (Stern and Westphal, 2010; Park, Westphal and Stern, 2011).

This study contributes to the stream of corporate governance literature drawing on social exchange theory. Under this stream, for example, researchers have found a positive correlation between CEO pay and the proportion of independent directors hired after the CEO took office

(Wade et al., 1990), as well as with a measure of whether the compensation committee chair was appointed after the CEO took office (Main et al., 1995). However, due to the empirical challenge in observing boards' voting pattern, the opinion conformity mechanism has not been fully established in the literature. Our work illuminates that there is value to conceiving board of directors, not as a monolithic entity that shares a common agenda on all matters (Hermalin and Weisbach, 2003), but as a social institution consisting of individuals with different social exchange relationships with the top management (Pfeffer, 1972; Herman, 1981; Useem, 1984).

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Corporate boards and social exchange

Corporate laws around the globe mandate that independent directors play a supervisory role. Yet, the incentives of independent directors are not entirely clear. Though economic theories highlight the importance of labor market reputation in motivating directors to become decision making experts (Fama, 1980; Fama and Jensen, 1983), “a reputation as a director who does not make trouble for CEOs is potentially valuable for directors as well (Hermalin and Weisbach, 2003: 4).” Organizational researchers traditionally view boards of directors as a cohesive inner circle of corporate elites that acts as a rubber stamp for management's initiative (Pfeffer, 1972; Herman, 1981; Lorsch and MacIver, 1989).

Social exchange literature suggests that favor reciprocation has both normative and instrumental bases. The norm of reciprocity refers to a universal code of moral conduct that programs human beings to reciprocating favors after they are offered (Ekeh, 1974; Molm, 2003), for receiving favors without repaying them leads to a mental state of indebtedness to which human beings are averse (Greenberg, 1980; Uahera, 1995). The instrumental basis for reciprocity, on the other hand, is the self-interest of individuals who seek to receive future favors and

benefits (Homans, 1958), which predicts that reciprocity would be more pervasive in repeated games of human interactions (Axelrod, 1984). Many social exchange theorists believe that social norms and individual self-interest combine to motivate reciprocity, which “dictates not only people look for opportunities to help those who have helped them, but also that they should be especially motivated to avoid taking actions that would actually harm their benefactors (Westphal and Clement, 2008: 876).”

Research on social influence tactics indicates that ingratiation is a common tool utilized by corporate elites in invoking reciprocity. Ingratiation by managers or board directors towards CEOs is shown to be associated with favorable career outcomes such as positive performance evaluations, higher compensation and increased references for outside board appointments (Kumar and Beyerlin, 1991; Gordon, 1996; Westphal and Stern, 2006; 2007; Stern and Westphal, 2010). Common ingratiation tactics include flattery and opinion conformity. Opinion conformity, expressing agreement with another person’s opinion, is traditionally regarded as an indirect form of flattery as it validates his or her judgment (Park, Westphal and Stern, 2011).

The effect of appointer-appointee tie

Social exchange theory suggests that boards would generally defer to top management as independent directors feel indebted for being offered a director position and in exchange, independent directors provide support. While generalized forms of social exchange relationships that involve multiple actors across organizational boundaries have also drawn the attention of corporate governance researchers (Westphal and Zajac, 1997), in this study in accordance with the recent governance literature that examined social dynamics within boards (e.g. Hwang and Kim, 2009; Jiang, Wan and Shao, 2012; Lin, Piotroski, Tan and Yang, 2012), we take a strictly dyadic and intraorganizational focus.

In the U.S. where ownership is widely dispersed, CEOs exert considerable influence over selection of board members (Bacon and Brown, 1975; Wade et al., 1990; Hwang and Kim, 2009; Coles, Daniel, and Naveen, 2010). In China ownership is concentrated, journalist interviews (e.g. Shi, 2001; Long, 2001) and legal scholarship (e.g. Lu, 2002; Shen and Jia, 2004) concur that independent directors are selected by listed companies' dominant shareholder. Our field visits further confirm that in China, board chair, who best represents firm's dominant shareholder and top management (Firth, Fung, and Rui, 2006; Liao, Chen, Jing, and Sun, 2009), handpicked nearly all of the independent directors from her own social network. Lastly, we note that in China, top management often overlaps with key board members. For state-owned enterprises (SOEs), the Communist Party selects key board members which significantly overlaps with top management, and for non-SOEs the controlling family or individual is usually also the top management.

To the extent that director dissent signals negative quality of the firm (Tang, Du and Hou, 2013), independent directors who feel indebted to the person for offering the directorship are motivated to conform to that person's initiatives. We thus propose that director dissent is positively associated with a breakdown of the social exchange relationship between the independent director and the board chair who appointed the director.

H1a. *Ceteris paribus*, dissent is less likely to occur in firm-years in which a higher proportion of independent directors are appointed by the board chair.

H1b. *Ceteris Paribus*, an independent director is more likely to voice dissent after her appointing chair left the board.

The "endgame" effect

Social exchange theory also predicts a higher likelihood of dissent when an independent director *foresees* a breakdown of the social exchange relationship in the near future. We identify

two instances in which an independent director may foresee a breakdown of the social exchange relationship and thus have a weaker instrumental motive for reciprocity. The first instance is before departure of the independent director herself. In such case, either the independent director is reaching her six-year term limit as mandated by China's regulations, the director is forced quit or she is no longer interested in serving the firm. The second instance is before departure of the current board chair, irrespective of whether the current chair appointed the director or not. In either case while obtaining other career advancement benefits (e.g. career advice, outside directorship recommendations) remains an instrumental motive, the motive for obtaining higher sitting fees or future appointments from the current firm/chair vanishes. Based on these arguments, we predict a higher likelihood of director dissent at the end of the board "game":

H2: *Ceteris paribus*, an independent director is more likely to voice dissent at the end of the board "game", that is, either when she herself is leaving the board or when the current chair is leaving the board.

3. Methods

Data collection

We hand-coded independent directors' voting patterns from a total of 24,212 "independent" opinion reports issued from August 2001 to June 2010. We retrieved these reports from the *China Stock Market and Accounting Research (CSMAR) Solution Database*, a leading data source for corporate governance research on Chinese firms. Independent directors of a firm issue a *joint* opinion report following a board meeting that has discussed a material matter. Each joint opinion report contains multiple director-opinion pairs, clearly stating which director(s) agreed and which director(s) dissented/abstained, along with independent directors' justification(s) for non-confirming (i.e. dissent or abstention) opinions. Independent directors' biographic information and career outcomes are hand-coded from information available at the *CSMAR*

Solution. Financial ratios and other control variables can be accessed from the *CSMAR Solution* in clean and useable format.

Samples

Cross-validated by two independent data coders, we identify 119 reports containing dissenting opinions from individual directors. Scarcity of dissent is a phenomenon that has been documented in the U.S. (e.g. Whisler (1984) and Mace (1986) in interview-based studies) and in Israel (e.g. Schwartz-Ziv and Weisbach (2012) in analyses of board meeting minutes).

Practically, one may expect that in equilibrium dissent rarely occurs, especially when dissent is deemed to be associated with negative outcomes for both the firm and the director herself. This reasoning is consistent with the cross-time distribution of dissent over the sample years. During the sample period from August 2001 to June 2010, dissent dropped drastically after 2006. We interpret this as reflecting the learning curve of both the firms and the independent directors. It appears that over time people figure out how to manage dissent. We thus see more dissent over the sample period than in the long run equilibrium even in China, and this offers us with a unique empirical window. We emphasize that our baseline results are robust to inclusion of year fixed effects.

In predicting when and where dissent occurs, we utilize two regression samples. Our first regression sample contains firm-year observations of all public firms listed on Shanghai and Shenzhen Stock Exchanges from 2001 to 2010. In testing the extent to which the norm of reciprocity affects board independence through opinion conformity, our dependent variable is a binary variable *Dissent* equal to one if a firm had at least one independent director who issued a dissenting opinion in a given year. We emphasize that all our results are robust to several alternative definitions of dissent. Specifically, our results are robust to defining dissent as a

combination of dissent and abstention, or excluding abstention opinion justified by conflict of interest, travelling and health issues.

The firm-year analyses allow us to test the extent to which firms that had directors who dissented are different from those where dissent never occurred. Under the assumption that corporate culture does not vary over the sample period, we allow firm fixed effects to address the endogeneity concern that omitted corporate culture is driving our results. Although we also report results without firm fixed effects for comparison, we emphasize results that are robust to inclusion of fixed effects.

The second sample contains director-vote observations. The outcome variable is a binary variable *Dissent* equal to one if a specific independent director dissented in an opinion report. Econometrically, allowing firm fixed effects in a binary dependent variable model implies restricting the estimation sample to 68 firms (i.e. 6% of the total number of listed firms in 2001, and 3% of total in 2010) where independent directors have dissented at least once over the sample period. Conceptually, this sample selection implies that we compare dissenting situations to non-dissenting situations restricted to the same firms that are less affected by firm-level unobserved heterogeneity.

When comparing observable firm characteristics across two groups of firms: firms that had at least one dissent and firms that never had dissent, F-tests show that for all observable firm characteristics other than the SOE dummy, within-firm, cross-year differences are shown to be at least as large as the cross-firm differences, offering little evidence that cross-firm variations constitute stronger determinants of independent directors' dissent than within-firm variations.

Variables of interest

Board chairs often nominate independent directors in the name of the entire board. It thus appears challenging to identify the exact nominator of an independent director based on publicly available information. In keeping with the recent U.S. literature (Huang and Kim, 2009; Coles et al., 2010), we define an independent director as appointed by a board chair if she joined the board after the chair assumed office.

In firm-year analyses, we conceive a firm's independent directors as an entirety and use two variables to measure its social exchange tie with the board chair: (1) *all hired by chairperson* is a binary variable equal to one if all independent directors sitting on the board in a particular year are appointed by the board chair; (2) *% hired by chairperson* is a continuous variable defined as percentage of independent directors appointed by the board chair. Dissent is associated with a breakdown of the appointer-appointee tie. The major endogeneity concern is that there are unobserved factors driving both departure of the board chair and director dissent. We therefore control for *chairperson transition*, a binary variable indicating whether a firm experienced departure of board chair in a given year. Ideally, one would like to compare the voting pattern of a firm's independent directors, as an entirety, before and after departure of its appointing chair. However, a board is not monolithic in regards to its social tie with the chairperson. Board composition is in constant flux whereby members come and go with their appointing leaders. We turn to dyadic ties in our director-vote analyses.

In director-vote analyses, we utilize multiple variables to quantify an independent director's social exchange relationship with the board chair at a specific point in time, that is, when the vote occurs. We include *chairperson departure*, a dummy variable equal to one if the appointing chair left the board during an independent director's tenure. *Post chairperson Departure* is a binary variable equal to one if an opinion was issued after the appointing chair

left the board. Inclusion of these two variables, *chairperson departure* and *post chairperson departure*, means that we estimate a difference-in-difference model in which the former captures the pre-treatment (unobserved) systematic difference between independent directors who experienced departure of the board chair and those who did not experience it, and the latter takes care of the difference in voting behavior before and after departure of the appointing chair.

Endgame is a binary variable equal to one if one of the following conditions is met: the opinion is issued in less than 60 days before (1) the director left the board before reaching the 6-year term limit (i.e. *director midterm departure*); (2) the current board chair left the board, irrespective of whether the chair appointed the director or not (i.e. *chairperson departure*); or (3) the director left the board as reaching the 6-year term limit (i.e. *director term limit*).

Before proceeding to the next subsection, we summarize how we have addressed several endogeneity issues that normally plague this literature. First, assuming firm culture does not change over the sample period, firm fixed effects are included in the model to control for the effect of unobserved firm culture. Second, we used a difference-in-difference framework to control for unobserved factors that might induce a correlation between director dissent and chairperson departure, and compared voting pattern before and after departure of the appointing chair. Lastly, even if we find that a director is more likely to dissent after the appointing chair leaves the board, this is consistent with not only social exchange theory, but also an information asymmetry explanation that directors dissent more because they have less confidence in a new chair's ability. So, to address the information explanation, we control for the number of days the director and the current board chair had been sitting together on the board (*days with current chair*). We also control for the number of days the director has been sitting on the board (*days on board*).

Control variables

Our model includes a set of control variables. First, we control for firm characteristics that are known to affect board effectiveness, including firm performance, leverage, firm size, equity concentration, board size, and board independence (see Adams et al. (2010) for a review). We use market-based *Tobin's Q* to measure firm performance since it captures firm's past performance as well as its growth potential. We use *debt-equity* ratio to measure leverage, log of book value of *asset* to measure firm size, Herfindahl index of top ten shareholders' percent shareholding to measure *equity concentration*, total number of board members to measure *board size*, and *% independent directors* and *chairperson-CEO duality* (i.e. a dummy variable indicating whether board chair also assumes the CEO position) to capture board independence. Second, we control for director characteristics, including a director's gender, *age*, *compensation* (i.e. log of annual sitting fee plus allowance), percent *shareholding*, *days on board*, as well as professional background, that is, whether the independent director is an *accounting* professional, *law* professional, *academic*, *bureaucrat*, or *engineer*. To account for China's unique institutional context, we also control for whether the firm is a *SOE*, and whether a director has *foreign experience* because exposure to developed socioeconomic institutions may affect one's willing to voice dissent. Lastly, in following the recent literature on inner workings of boards (Schwartz-ziv and Weisbach, 2012), in director-vote analyses we also include topic-subject fixed effects to capture variations that might be driven by particular issues under discussion, such as executive turnover, executive compensation, financial report, related party transaction, credit guarantee, investment and acquisition, auditing, equity issuance, financing, sale of assets, and reform in non-tradable shares.

4. Empirical Results

Table 12 presents results of the firm-year analyses. Panel A presents summary statistics and the univariate analysis, and Panel B presents multivariate regression results. In Panel B, Column (1)-(2) show results of the pooled, cross-sectional logit estimation, where the sample contains all possible firm-years from year 2001 to 2010. Column (3)-(4) show results of conditional (i.e. firm fixed effect) logit estimation, where regressions are restricted to the subsample of firms that had at least one dissent over the sample period. H1 is generally supported: though dissent is more likely to occur when the board is undertaking leadership transition, it is less likely to occur when board, as an entirety, has a stronger appointer-appointee tie with the board chair. In the pooled, cross-sectional regressions, dissent is *not* significantly correlated with Tobin's Q, but in the restricted sample firm fixed effect regressions dissent occurs more when performance suffers. These results suggest that dissent is to a large extent driven by within-firm cross-year variations, rather than cross-firm variations in firm performance.

Insert Table 12 Here

Table 13 presents results of director-vote analyses. The sample contains all director-opinions issued in firms that had at least one dissent. Panel A shows summary statistics and the univariate analysis. Panel B presents results of conditional (firm fixed-effect) logit estimation. Overall, the results are consistent with the hypotheses that dissent is associated with a breakdown of social exchange relationship with the board chair. First, independent directors who experienced departure of the appointing chair dissent more, as compared to those who never experienced departure of the appointing chair. This result is statistically significant, lending support to the potential endogeneity concern that unobserved firm-level financial and organizational problems causes both director dissent and chairperson departure. The difference-in-difference framework allows us to partially circumvent this endogeneity problem, by

comparing individual directors' voting patterns before and after departure of the appointing chair. Controlling for the fact that an independent director has experienced chairperson departure, voting after chairperson departure nearly triples her likelihood of dissent. Note that this result is consistent with not only H1, but also the information asymmetry explanation that directors dissent more as they know less about the new board chair's ability. To distinguish between the two explanations, we further show that likelihood of dissent does not significantly decrease with the number of days the director and the current board chair had been sitting together on the board (*days with current chair*), which provides little support for the information asymmetry explanation.

Column (2) further addresses the endogeneity concern that both chairperson departure and director dissent may be driven by unobserved firm-level turmoil. In Column (2), we break down *post chairperson departure* based on stated reasons for chairperson departure. First, we find that directors more likely to dissent after job transfer of the appointing board chairs. This can be interpreted as consistent with (1) the endogeneity concern that job transfer of board chair is less likely to be triggered by firms' internal turmoil, as compared to board chair resignation or dismissal, and (2) the social exchange hypothesis that independent directors are motivated to obtain future benefits from the appointing chairs who have been rotated to another position. Independent directors, however, dissent more after the appointing chairs completed a pre-specified term of office but did not end up transferring to another position. If board chair's term of office is strictly enforced, it can be considered as exogenous to unobserved firm-level abnormalities and thus provides strong support to H1. Compared to the "neutral" cases in which appointing chair leaves the company due to job transfer or end of term, independent directors are more likely to dissent when the chair departs for explicitly "bad" reasons (i.e. resignation,

dismissal, or lawsuit) or for “gray” reasons (i.e. health and personal issues), which may be capturing both dissolution of appointer-appointee ties and the target firm’s internal turmoil. To summarize, the results reported in Column (2) indicate that while endogeneity remains a concern, it does not refute our central point that independent directors’ increased dissent is associated with a breakdown of social exchange relationship (as shown in the “neutral” cases).

Lastly, consistent with H2, there is a strong “endgame” effect. All else constant, voting at board “endgames” increases the odds of dissenting by 86 percent. Column (3) breaks down *endgame* into three cases, namely, *director midterm departure*, *chairperson departure* and *director term limit*. Of the three types of departures, only *director term limit* is mandated by law and thus can be seen as strictly exogenous. *Director midterm departure* and *chairperson departure* are not mandated by law and may be related to firm’s internal financial or organizational problems. We found that the “endgame” effect is driven by endogenous movement of board members: dissent is positively correlated with *director midterm departure* and *chairperson departure*, however directors reaching the 6-year term limit are not more likely to dissent. These results suggest that although the endgame effect is consistent with H2, we cannot reject the idea that the unobserved factors lead to both departure of board members and director dissent right before those departure events.

An independent director is significantly more likely to dissent in firms with lower Tobin’s Q. The effect of firm performance, however, is moderate in magnitude, as compared to that of the social exchange variables. One unit improvement in Tobin’ Q decreases the odds of dissent by approximately 20 percent. We do not find that accounting and law professionals are more likely to dissent, casting doubt on the notion that professionalism facilitates active monitoring (Roe, 2004). Replacing Tobin’s Q with accounting performance such as return on

assets (ROA) or return on equity (ROE), including lagged performance, replacing book value of assets with number of employees, and using different measures of equity concentration (i.e. concentration of largest one, three, five or ten shareholders) generate qualitatively similar results.

Insert Table 13 Here

5. Discussion

Our results provide further empirical foundation for “a distinct alternative to under-socialized governance theories, such as agency theory (Westphal and Zajac, 2013: 607).” While our work, similar to other recent work on internal dynamics of boards (Jiang et al., 2012; Lin et al., 2012; Schwartz-Ziv and Weisbach, 2012) is from a particular institutional context, we believe that the mechanisms documented in this study are conceptually sound enough to warrant further scholarship. We highlight several further trajectories for research. First, idiosyncrasies of the Chinese institutional context make extrapolation to other contexts challenging. We conjecture that China provides a lower bound for independent directors’ dissent. Due to the legal necessity that dissent needs to be revealed, amidst the Chinese societal fabric that prioritizes relationships (Chen and Miller, 2011), Chinese firms can reasonably be expected to devote more efforts to resolve conflicts with independent directors. A fascinating research avenue is to examine independent directors’ voting patterns in a wide range of institutional settings. Second, we confine our analyses to the director-chair dyad, in keeping with the existing governance literature. To gain further insights on the strategic interactions within boards, future research may consider a higher-level social connection structure, for instance, a structure that takes into account generalized social exchange relationships within boards. Of course, this is harder to operationalize.

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Table 12. Firm-year analyses
Panel A. Summary statistics and univariate analyses

Variable	Summary statistics					Univariate analysis
	Obs	Mean	Std. dev.	10th percentile	90th percentile	Dependent variable: dissent
Dissent	14994	0.0054	0.0733	0	0	
Chairperson transition	14994	0.248	0.432	0	1	0.0272***
All hired by chairperson	14148	0.555	0.497	0	1	-0.0376***
% hired by chairperson	14148	0.637	0.439	0	1	-0.0388***
Tobin's Q	14787	3.958	155.693	0.958	2.728	0.0018
Debt/equity	14994	0.685	7.599	0.213	0.767	0.0156*
ln (assets)	14994	21.354	1.316	20.028	22.858	-0.0234***
Equity concentration (Top 10)	14994	0.200	0.138	0.053	0.399	-0.0261**
SOE	14994	0.689	0.463	0	1	-0.0290***
Board size	14831	9.430	2.160	7	12	0.0045
% independent directors	14829	0.322	0.102	0.2	0.429	0.0203**
Chairperson-CEO duality	14868	0.149	0.356	0	1	0.0272***

*denotes significance at 10% level, ** denotes significance at 5% level, and *** denotes significance at 1% level.

Panel B. Multivariate analyses

	Logit		Conditional logit	
	(1)	(2)	(3)	(4)
Chairperson transition	0.540** (2.43)	0.424* (1.84)	0.256 (0.86)	0.100 (0.31)
All hired by chairperson	-0.842*** (3.07)		-0.466 (1.26)	
% hired by chairperson		-0.930*** (3.34)		-0.713* (1.70)
Tobin's Q	-0.000 (1.09)	-0.000 (1.10)	-0.198** (2.39)	-0.206** (2.51)
Debt/equity	0.001 (0.50)	0.001 (0.46)	0.812** (2.38)	0.841** (2.49)
ln (assets)	-0.188* (1.74)	-0.192* (1.77)	-0.506 (1.50)	-0.514 (1.52)
Equity concentration	-2.003* (1.83)	-2.020* (1.86)	-3.364 (1.22)	-3.013 (1.08)
SOE	-0.550** (2.07)	-0.556** (2.11)	-0.954 (1.48)	-0.956 (1.50)
Board size	0.129** (2.10)	0.136** (2.19)	0.042 (0.41)	0.050 (0.48)
% Independent Directors	2.427 (1.23)	2.663 (1.39)	4.161 (1.59)	4.325* (1.65)
Chairperson-CEO duality	-0.133 (0.35)	-0.152 (0.40)	0.262 (0.52)	0.267 (0.53)
Constant	-2.346	-2.228		

	(1.07)	(1.01)		
Observations	13,657	13,657	549	549
Prob. > Chi ²	0.0000	0.0000	0.0000	0.0000

Standard errors are clustered at firm. *l*z statistics are reported in parentheses. *, ** and *** denote significance at 10% , 5% level, and 1% level.

Table 13: Director-vote Analyses
Panel A: Summary statistics and univariate analysis

Variable	Summary statistics					Univariate analysis
	Obs.	Mean	Std. dev.	10th percentile	90th percentile	Dependent variable: dissent
Dependent variable						
Dissent	3377	0.052	0.222	0.000	0.000	
Independent variables						
Social exchange relationship						
Chairperson departure	3377	0.640	0.480	0.000	1.000	0.0539***
Post chairperson departure	3377	0.364	0.481	0.000	1.000	0.0359**
Post chairperson departure × ln (days with ex-chair +1)	3377	-0.259	0.571	-1.247	0.238	0.005
ln (days with current chair +1)	3377	5.706	1.432	4.143	7.061	0.0098
Endgame	3377	0.184	0.387	0.000	1.000	0.0781***
Director characteristics						
Accounting	3364	0.255	0.436	0.000	1.000	-0.0112
Law	3364	0.145	0.352	0.000	1.000	-0.0063
Academic	3364	0.435	0.496	0.000	1.000	-0.0606***
Bureaucrat	3364	0.240	0.427	0.000	1.000	-0.0003
Foreign experience	3364	0.076	0.265	0.000	0.000	-0.0300**
Engineer	3364	0.084	0.277	0.000	0.000	-0.0223
Male	3364	0.924	0.266	1.000	1.000	0.0119
ln (age)	3364	3.884	0.184	3.664	4.220	-0.0107
ln (compensation+1)	3364	10.047	2.487	9.904	11.002	-0.0413
ln (days on board+1)	3377	6.271	1.208	4.913	7.356	0.0322**
Shareholding	3377	0.000	0.000	0.000	0.000	0.0007
Firm and board characteristics						
Tobin's Q	3366	6.226	55.383	0.933	3.906	0.0175
Debt/equity	3371	1.024	5.445	0.329	0.946	0.0902***
ln (assets)	3371	21.180	1.536	19.625	22.671	-0.0795***
Equity concentration	3377	0.148	0.107	0.044	0.289	-0.0209
SOE	3377	0.526	0.499	0.000	1.000	-0.0440**
Board size	3377	10.035	2.330	8.000	15.000	-0.0579***
% independent directors	3377	0.351	0.056	0.333	0.412	0.0318*
Chairperson-CEO duality	3377	0.107	0.309	0.000	1.000	0.0609***

*denotes significance at 10% level, ** denotes significance at 5% level, and *** denotes significance at 1% level.

Panel B. Multivariate Analyses

	(1)	(2)	(3)
Social exchange relationship			
Chairperson departure	0.869*** (2.58)	0.784** (2.28)	0.858** (2.50)
Post chairperson departure	1.062*** (2.92)		1.145*** (3.07)
Job transfer		1.347*** (2.65)	
End of term		1.297* (1.65)	
Resignation, dismissal, lawsuit		1.526*** (3.29)	
Health or personal issues		2.555*** (3.75)	
Change control		17.182 (0.00)	
Other		-2.008 (1.36)	
Post chairperson departure × ln (days with ex-chair +1)	0.130 (0.41)	0.297 (0.91)	0.128 (0.41)
ln (days with current chair+1)	0.097 (0.89)	0.128 (1.15)	0.117 (1.05)
Endgame	0.621** (2.32)	0.622** (2.26)	
Director midterm departure			0.495 (1.41)
Chairperson departure			0.474 (1.36)
Director term limit			-1.083 (1.57)
Firm characteristics			
Tobin's Q	-0.227*** (3.14)	-0.196** (2.51)	-0.232*** (3.21)
Debt/equity	0.884*** (3.09)	0.750** (2.43)	0.901*** (3.16)
ln (assets)	-1.181*** (3.26)	-1.263*** (3.35)	-1.237*** (3.38)
Equity concentration	12.500*** (3.22)	12.136*** (3.12)	13.065*** (3.31)
SOE	0.249 (0.34)	0.085 (0.11)	0.378 (0.51)
Board size	0.092 (1.01)	0.058 (0.62)	0.105 (1.12)
% independent directors	5.628* (1.86)	4.638 (1.48)	5.669* (1.87)

Chairperson-CEO duality	1.463*** (3.42)	1.468*** (3.28)	1.420*** (3.29)
Director characteristics			
Accounting	0.051 (0.20)	0.095 (0.36)	0.043 (0.16)
Law	0.130 (0.46)	0.129 (0.45)	0.147 (0.52)
Academic	-0.212 (0.79)	-0.147 (0.53)	-0.200 (0.73)
Bureaucrat	-0.012 (0.04)	-0.019 (0.07)	0.015 (0.05)
Foreign experience	-0.211 (0.44)	-0.220 (0.46)	-0.210 (0.44)
Engineer	-0.004 (0.01)	-0.013 (0.03)	-0.039 (0.09)
Male	0.156 (0.37)	0.255 (0.59)	0.102 (0.24)
ln (age)	0.084 (0.14)	-0.052 (0.08)	0.056 (0.09)
ln (compensation+1)	-0.021 (0.50)	-0.026 (0.59)	-0.032 (0.76)
ln (days on board+1)	-0.085 (0.56)	-0.141 (0.93)	-0.106 (0.69)
Shareholding	22,100 (0.86)	23,250 (0.90)	21,421 (0.83)
Observations	3,318	3,318	3,318
Prob. > Chi2	0.0000	0.0000	0.0000

Regressions contain unreported year and topic-subject fixed effects. Standard errors are clustered at firm. *l*z| statistics are reported in parentheses. *, ** and *** denote significance at 10% , 5% level, and 1% level (two-tailed test).

What do Connections Offer? Causal Evidence from IPO Approval in China

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ABSTRACT

While there is a growing recognition that connections with the government add value to firms, it remains unclear whether connections are simply used to help firms acquire inside information from public officials when policy direction is exercised, or in fact abused by those in power to enable *under-qualified* firms to acquire resources from the public. Using a unique hand-coded dataset, I analyze the likelihood of getting the China Securities Regulatory Commission (CSRC)'s approval for a sample of 1,076 firms that applied for initial public offerings (IPOs) from 2009 to 2012. I first show that IPO applicants connected to the Public Offerings Review Committee (PORC) via auditing/law services are *associated* with a higher likelihood of obtaining IPO approval. Using a specific regulatory change and a natural experiment, I further document the following findings: First, improved government transparency (i.e. having the government disclose why a specific IPO decision is made) significantly reduces the likelihood of obtaining IPO approval as well as IPO fraud for connected firms more than otherwise-similar firms. Second, assignment of a seven-member PORC to an IPO review, which is determined by a pre-specified *random* process, also affects the likelihood of obtaining approval and IPO fraud for connected firms. In particular, auditors sitting on the PORCs favor firms connected via auditing/law services, but CSRC officials act to suppress the connected. These findings suggest that connections do not simply facilitate information exchange; rather, they are abused by those sitting on the PORCs to enable fraudulent firms to pass the IPO review, and the government's internal power struggle plays a role in curbing connected firms from extracting rents.

Key Words: Non-market Strategy, Business-Government Relations, Political Connections, and Emerging Economies.

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1. Introduction

There is a growing recognition in the political economy and nonmarket strategy literature that connections with the government contribute to firm value, even in the developed world. A classic demonstration of this effect was put forth by Ray Fisman (2001), who mapped out connections of publicly-traded Indonesian firms to the then-president Suharto, and showed that the market value of connected firms dropped more than otherwise-comparable firms as rumors spread out about Suharto's health condition. However, one question that remains unclear is *how* connections actually add value to firms. For example, if Suharto directed government resources to firms that were the most compatible with his development strategy, it is only natural for these firms to drop more in value when his life was in danger, and it is not clear whether Suharto in fact had favored under-qualified firms that did not merit the preferential treatment. As Acemoglu, Johnson, Kermani, Kawk, and Mitton (2014) explained their study of Treasury Secretary Tim Geithner's influence on the value of Geithner-connected financial firms, "To be clear, our event study does *not* suggest that anything inappropriate or illegal took place...further study is needed to assess exactly which firms received what kind of advantage while Mr. Geithner was at Treasury."²

This study adds to the evolving literature on political connection by jointly addressing two research questions. First, are connections built and used for favoring *under-qualified* firms? In particular, are connections abused by those in power to help under-qualified firms gain undue advantage, or simply used to facilitate information exchange between public officials and private firms when policy discretion is exercised (Acemoglu et al. 2013)? Second, if connections *do* enable under-qualified firms to obtain undue

² "Political connections in turbulent times (Acemoglu et al., 2014)", retrieved on August 2, 2015, <http://www.voxeu.org/article/political-connections-turbulent-times>.

advantage, what can society do to curb connected firms from extracting rents? This study undertakes a systematic investigation of how the China Securities Regulatory Commission (CSRC) grants firms access to equity finance and IPO approval in particular. To do so, I obtained confidential archival data from the Chinese central government, and hand-coded a dataset for a sample of 1,076 Chinese firms that applied for IPO between 2009 and 2012.

Ubiquitous in emerging economies is the role of government as gatekeeper to a wide array of input and output markets. Bureaucrats sit in the driver's seat of various market-entry processes, which create opportunities for connected firms to extract economic rents from society. In China, the IPO process is unique with respect to the role played by the securities regulator. A seven-member public offering review committee (PORC) recruited by the China Securities Regulatory Commission (CSRC) wields a veto as to which companies are permitted to be listed. Justification for this so-called merit review system is that China's capital market is in its infancy. Investors, especially retail investors, are not equipped with relevant expertise to assess the quality of stock issuers. By the end of 2014 China had more than 72 million retail investors accounting for 75% of trade on domestic stock exchanges. Merit review is, therefore, justified as a device through which the government controls the amount of risk that is passed on to the public. In cases where firms are precluded from public offerings, the central government decides on behalf of the public that risk should not be passed along³.

The main findings of this study can be summarized as follows:

First, IPO applicants connected to the CSRC are *associated* with a higher likelihood of passing the merit review. In vetting IPOs, each year the CSRC recruits auditors and lawyers from prestigious auditing and law firms, along with academics, securities

³ Note that it is *not* the objective of this study to examine whether the government should approve IPOs. While my results may ultimately shed light on this broader question, the regulation issue is beyond the scope of the study. This study examines how slots on stock exchanges are granted to companies that have applied for an IPO. It does not analyze either the social cost of such a system in its operation or lost investment opportunities for firms.

examiners recruited internally from the CSRC, and bureaucrats from non-CSRC ministries to form a sixty-member review committee pool. From this pool of committee members, the CRSC then, through a pre-specified *random* process, assigns a seven-member PORC to a single IPO review. Documenting connections with a specific government decision-making body is traditionally regarded as an empirical challenge, as connections are often “a taboo topic of conversation (Fisman, 2001, p.1095)”. In this study, I focus on a firm’s connections with a specific government decision-making body instead of an aggregate tie (e.g. friendship or familial tie with a political leader). I define an IPO applicant as connected to the CSRC if that applicant hires an auditing or law firm that has an employee who is part of the review committee pool, and show that connected firms are associated with significantly higher IPO approval rates. Admittedly, this is not a causal statement, for firms with certain characteristics may come to develop connections while others fail to do so. Specifically, high-quality firms naturally enjoy a higher likelihood of obtaining IPO approval for their better fundamentals, while at the same time afford to use a prestigious auditing/law firm that is also recruited by the CSRC for reviewing IPO applications.

Second, to address the endogeneity issue, I identify a public policy event that is orthogonal to unobserved firm and industry characteristics. Starting from April 2010, PORCs have to justify to the public, via the CSRC’s official website, why a specific IPO decision was made. Using a difference-in-difference framework, I show that the positive effect of connections on IPO approval decreases significantly with improved government transparency. The likelihood for a connected firm of obtaining approval is estimated to be reduced by 14 percentage points, having the government disclose to the public why IPO decisions are made⁴.

⁴ I would like to add a caveat that China is undertaking a series of actions domestically to improve its economic, legal and political institutions. Though improved transparency has solid theoretical grounds, and it is a first-order effect directly applied to the IPO review process over the sample period, it is possible for transparency to pick up various indirect effects of improved institutional quality in general, leading to an *overestimation* of the effect of transparency. Nonetheless, additional tests show that transparency significantly reduces IPO underpricing and helps to correct information asymmetry regarding stock issuers’ quality, suggesting that transparency is

The finding that the effect of connections decreases with transparency suggests that connectedness is not merely an artifact of firm quality. In particular, it is consistent with two nonexclusive explanations: (1) having bureaucrats justify their decisions prevents the abusive use of policy discretion and thus keeps the government from exercising unchecked power (e.g. Brautigam, 1992; Dawes and Helbig, 2010); and (2) improved transparency helps private players understand how the government operates and thus reduces the comparative advantage of connected firms. To address these explanations, I present two sets of supplementary evidence that support the first explanation but are inconsistent with the second. First, among firms that successfully went public, connected firms are more likely to be sanctioned for IPO fraud at a later point in time, and this positive effect decreases significantly for connected firms reviewed after improved transparency. This is consistent with the hypothesis that connections prevent the government from keeping bad IPOs out and transparency acts to curb connected firms that have fraudulent accounting in place. Second, connectedness is associated with higher IPO underpricing and improved transparency (insignificantly) mitigates underpricing for connected firms. This result is consistent with the information asymmetry theory of IPO underpricing (Rock, 1986; Beatty and Ritter, 1986), suggesting that investors consider connected firms as associated with a higher level of uncertainty in terms of quality because connections have helped weak IPOs pass the merit review. Consequently, connected firms have to discount their offering prices more than unconnected firms to invite a sufficient number of investors to bid on their stocks.⁵

Lastly, taking advantage of the *random* assignment of a seven-member PORC to an IPO review, I examine whether variation in composition of the review committee, in

not just an artifact of general institutional development. However, I hold that other qualitative findings of this paper would not alter as a result of this concern, for other sorts of institutional development taking place at the same time are also orthogonal to firm and industry characteristics. Therefore, even if government transparency is interpreted as a proxy for general institutional development, it can be still considered as uncorrelated with omitted firm characteristics.

particular an increased presence of auditors or securities examiners, alters the effect of connections. Due to the merit review nature of the IPO system in China, IPO applicants may perceive that there is an opportunity to manipulate financial statement elements by overstating assets, sales and profits, or understating liabilities, expenses and losses. When IPO documents contain falsifications, they no longer represent a true picture of firm quality. Auditors and securities examiners represent two important professions whose members are trained to detect fraud and other types of violations (McMillan and White, 1993). Consistent with favor exchange among connected committee members, I find that an increased presence of auditors on the PORC leads to a higher likelihood of obtaining IPO approval and IPO fraud, and this positive effect is mediated by firms connected via audit/law services. However, an increased presence of securities examiners on the PORC, recruited internally from the CSRC, leads to a significantly lower likelihood of obtaining IPO approval and IPO fraud, and these CSRC officials act mainly to suppress connected firms. These findings seem to highlight the role of a government's internal governance structure, implying that self-serving actions of connected decision-makers can be limited by potential reactions from their colleagues.

This study contributes to the literature on political connection. A growing number of event studies report that political connection adds value to firms (e.g. Acemoglu et al. (2013); Akey (2013); Fisman (2001)), suggesting that connections with public officials bring a firm and its shareholders certain sorts of benefits. There is also growing evidence that connected firms enjoy a multitude of preferential treatments, including lower taxation, higher government subsidies, more government procurement contracts and better access to debt finance⁶, suggesting that connections may lead to a distorted allocation of capital and

⁶ See Amore and Bennedsen (2013), Bertrand, Kramarz, Schoar and Thesmar (2004), Claessens, Feijen and Laeven (2008), Faccio (2006), Faccio, Masulis and McConnell (2006), Goldman, Rocholl and So (2009), Johnson and Mitton (2003), and Khwaja and Mian (2005), among others. Several papers find that connected firms underperform on an accounting basis and exhibit a lower quality of accounting information disclosures (Faccio, 2010; Fan, Wong and Zhang, 2007; Chaney, Faccio and Parsley, 2007).

other valuable economic resources. My study adds directly to the small number of papers that examine if connections are abused to help under-qualified firms gain undue advantage, while at the same time providing *suggestive* evidence of corruption behind political rent-seeking of connected firms. Khwaja and Mian (2005) show that politically connected firms in Pakistan borrow more (mainly from state-owned banks) and have higher default rates, and the authors resort to a firm fixed effects framework to mitigate the risk that unobserved firm characteristics distort the results. Fisman and Wang (2015), with a focus on compliance to regulation instead of resource allocation, show that connected firms are associated with significantly higher worker death rates among a sample of Chinese firms, a pattern that holds for within-firm estimations. They also provide suggestive evidence that connections enable firms to avoid compliance with potentially costly workplace safety measures.

A few studies suggest that a higher quality of country-level institutions is associated with a smaller effect of connections (e.g. Faccio (2006), and Fisman, Fisman, Galef, Khurana and Wang (2012)), while recent work finds that connections have a positive effect even in low-corruption environments (e.g. Acemoglu et al. (2013)). In this study, I demonstrate that improved institutional quality, and government transparency in particular, has been an effective and powerful public policy tool in curbing the power of connected firms. This is consistent with the notion that connections pay off disproportionately more in weak institutions (e.g. Faccio and Parsley (2009)), and the large body of political economy literature documenting that transparency and the right to access government information are now internationally regarded as essential to prevention of corruption, trust in government, democratic participation and informed decision making (Brautigam, 1992; Cullier and Piotrowski, 2009; Mulgan, 2007; Quinn, 2003; Reyle, 2009; Shuler, Jaeger, and Bertot, 2010). Lastly, the government is not a monolithic decision-making entity that shares

a common agenda on all matters. By studying what happens within a specific decision-making body, my empirical approach addresses the divergent interests of public officials, highlighting the role of a government's internal checks and balances that may be as effective as improved transparency in curbing unchecked bureaucratic power.

This study also adds to the broad literature on business-government relations. The business-government relation is an especially prominent issue in state-led economies where the government acts as gatekeeper of various input and output markets. The literature, however, tends to leave government approval, a topic crucial to understanding business-government relations, in a "black box". This apparent deficiency in the literature is due mostly to the empirical obstacle that researchers face when observing the internal operations of emerging market governments. In this paper I show that when vetting IPOs, besides risk control, the government also takes into account socio-political factors, such as advancing China's industrial and regional development policies. Similar to other strong East Asian states, the Chinese government focuses on a firm's overall competitiveness and makes use of relative performance evaluation.

The rest of the paper is organized as follows: Section 2 documents institutional background; Section 3 describes data and variables; Section 4 presents baseline results; Section 5 reports supplementary tests; Section 6 discusses the results.

2. Institutional Background

Market Control in China

In the wake of the recent financial meltdown, the debate over the role of government in a modern economy has resurfaced. The Obama administration promotes a more active government in creating jobs domestically, while others have been wondering if the U.S. government needs to promote so-called "industrial policies" to help the country gain competitive advantage on the global stage, especially with China. In emerging

economies, the boundary between the state and the economy is more blurred. State intervention is a far less controversial issue in these markets, as a state-led economy is often regarded as more effective in implementing macroeconomic and infrastructure-related measures (Murphy, Shleifer and Vishny, 1989). In these economies, bureaucrats act to grant access to input and output markets to a limited number of handpicked, privileged firms. Government approval thus has become a crucial strategic factor that emerging market firms take into account when analyzing their competitive advantage⁷. According to the US-China Business Council's *China Business Environment Survey 2012*, while making progress on intellectual property rights and transparency, U.S. firms operating in China have seen virtually no improvement on competition with homegrown Chinese companies, restrictions on foreign investment, and market access for financial, telecom, legal and information sectors. Homegrown firms also report market control as a major barrier in doing business in China. According to a large-scale survey conducted by the China Listed Companies Association in 2013 (Table 14), firms report an average of 17.7 projects requiring government approval in a three-year time span. Of these, the most complicated project requires approvals from an average of 3.38 government agencies and the whole approval process takes an average of 106.1 days to complete. Surveyed firms believe that 13.46% of government approvals applied in the past three years are "unnecessary" from a regulatory standpoint⁸.

INSERT TABLE 14 HERE

Initial Public Offerings: U.S. versus China

⁷ Apple, for instance, faced a setback in launching its iPhone 6 in China, its largest market outside the U.S., because the iPhone 6 had not yet been signed off by the Ministry of Industry and Information Technology, which must approve technologies of high-tech devices like smartphones. Hong Kong, China's "special administrative region" not subject to the mainland's government approval system, launched the iPhone 6 weeks earlier than its mainland counterpart.

⁸ There is also significant variation across region, sector, firm size and ownership. Larger firms and firms in coastal regions applied for a greater number of approvals, due perhaps to the complexity of their business models. Governments of inland provinces are less efficient in granting approvals, consistent with the rhetoric that the inland provinces are more bureaucratically minded. Foreign-owned firms benefit from a streamlined approval process, but little difference exists between domestic state-owned enterprises (SOEs) and non-SOEs.

In the U.S., the Securities Act of 1933 (hereafter the 1933 Act) is the major federal law that regulates IPOs. The 1933 Act embraces a philosophy of full disclosure, meaning that the objective of the law and the respective government agency (i.e. Securities and Exchange Commission (SEC)) is to ensure that issuers fully and accurately disclose all material information in their S-1 filings, that is, registration statements provided to potential investors for assessing the quality of stock issuers. In most cases, the S-1 filings include a prospectus, audited financial statements, as well as descriptions of what the company is doing and why it is doing what it is doing. After reading the documents the SEC then goes back and forth with the issuer to modify them. The issuer, the underwriter, and other individuals and agencies signing the S-1 filings are strictly liable for fraud of any sort, while the SEC is not. Under the 1933 Act, it is not illegal to sell a bad company to the public, as long as registration statements are complete and accurate⁹.

The 1933 Act contrasts sharply with China's securities laws. Unique among the world's securities market regulators, the Chinese government reviews IPO candidates for their quality, no matter how fully and accurately a candidate discloses information in its S-1 filings.¹⁰ The CSRC not only controls new listings with thorough investigations of IPO applicants' financial conditions and business models, but also recruits auditors to sit on the review committees for detecting frauds. For instance, firms seeking to trade on Shanghai Stock Exchange's Main Board have to meet the following requirements in the three-year

⁹ The U.S. has a two-tier system for regulating securities offerings. At the federal level, there is the 1933 Act and the SEC. At the state level, every state has its own set of securities laws, commonly referred to as "Blue Sky Laws" that typically require companies making offerings to register their offerings before they can be sold in a particular state. A small number of states not only require meeting the SEC disclosure standards but also review candidate offerings for their quality. In addition to full disclosure, the offerings must also be "fair, just and equitable" to investors. These stricter states typically include California, Illinois, Iowa, Minnesota, Missouri and Wisconsin (Goodkind, 1976). Many states show a willingness to defer to federal securities standards and voluntarily relinquished their regulatory rights. To date, about 40 states use the Uniform Securities Act as the basis of their state "Blue Sky Laws". Even in many of the so-called "Blue Sky States", despite the fact that there are merit review standards on paper, in practice they are full disclosure states (Jennings, Childers and Kudla, 1986). Over the past decades, the state merit review has been increasingly criticized on theoretical and empirical grounds and state "Blue Sky Laws" have come to a demise under the Uniform Securities Act (see Jennings et al. (1986) for a review). A general welfare assessment for merit review is that it generates net costs for society: it imposes higher costs for firms to raise capital while failing to produce enough benefits for investors via reducing fraudulent conduct by firms (Mofsky and Tollison, 1977). There are few practitioners who hold faith in the merit review system. In practice, merit review does not seem to defer fraud: there is fraud in both full-disclosure and merit states.

¹⁰ While the central government sits in the driver's seat of the IPO process, deciding which companies are good and worthy of raising money, local governments have no merit review rights.

period before applying for an IPO: (1) cumulative net profits of CNY30 million or more; (2) cumulative operating cash inflows of CNY 50 million or more or cumulative revenue of CNY 300 million or more; and (3) intangible asset/net asset of 20% or less. It is not difficult to see that in a merit review system, hard requirements like these may create a bigger incentive for IPO candidates to overstate operating performance. The CSRC’s merit review process is regulated by Commission Order 32 (see Appendix 1 for the full translated text), which has also established many discretionary merit standards, including but not limited to, whether the applicant is able to continuously generate profits, whether it operates independently without the control of its parent firm and influence of other related parties, whether related party transactions are done at fair market terms, whether raised capital is to be invested in good potential projects, and whether the applicant has quality operating and internal control systems. On the law books, the very purpose of merit review is to reduce risk for stock purchasers. The central government takes the lead in screening “bad” firms from “good” firms, and thus works to provide an implicit credit guarantee to stocks issued to the public.

EXHIBIT 1. INITIAL PUBLIC OFFERINGS: CHINA VERSUS THE U.S.

Initial Public Offering	U.S. SEC Full Disclosure System	China CSRC Merit Review System
Phase 1	SEC ensures full disclosure of information in S-1 filings	CSRC ensures full disclosure of information in S-1 filings
Phase 2	<ul style="list-style-type: none"> • SEC does not decide which companies are good and worthy of raising money. • Underwriters, issuers and investors enjoy freedom in managing their own affairs. 	<ul style="list-style-type: none"> • CSRC as gatekeeper for the market in deciding which companies are good and worthy of raising money. • A fixed IPO date, approved by CSRC; Underwriters must file the pricing and planned share allocation for

IPOs.

Phase 3	SEC sanctions when firms violate securities rules.	CSRC sanctions when firms violate securities rules; Delist firms when they fail to meet performance standards.
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Note: China has been committed to a gradual transition to the U.S.-style full-disclosure IPO system. The 2014 IPO guidelines established new rules that give underwriters, issuers and investors more freedom than ever to manage their own affairs. The new rules, however, should not be interpreted as China is moving to the full-disclosure system immediately: the regulator will continue to wield a veto as to which companies are permitted to be listed.

The IPO Approval Process in China

In China, IPO approvals are granted by two public offering departments of the CSRC, with one department in charge of new listings on Shanghai Stock Exchange's Main Board and Shenzhen Stock Exchange's SME Board, and the other in charge of new listings on Shenzhen Stock Exchange's ChiNext Board. Once an IPO applicant's S-1 filings reach the corresponding public offering department (i.e. Main/SME or ChiNext), each case is assigned two preliminary review staffers and two directors, as well as a PORC made up of seven committee members. The IPO approval process begins with two department staff members giving the case a preliminary review, with one staffer focusing on legal issues and the other focusing on accounting issues. If the case is eligible for further review, the directors and staffers meet with the IPO applicant for a ten-minute presentation and a short follow-up discussion. Then a list of additional questions, explanations and requests is sent to the candidate, and answers must be received by the CSRC within 30 days. Up till this point, the CSRC acts much like the SEC, whose role is to ensure full disclosure of information in the submitted materials. Similar to the U.S., applicants that failed to meet full disclosure standards usually request to withdraw from securities offerings. For Chinese firms, administrative fees aside, the true cost of proceeding to a further review arises from the legal requirement of publishing IPO documents, which means that candidates have to describe and justify publicly what they are doing. That being said, proceeding to a further

review reflects a highly cautious decision by firms. Firms will not take the next step if they do not see a high likelihood of passing the review.¹¹

Once an IPO applicant's S-1 filings are completed, they are sent to the seven-member PORC, which ultimately decides whether or not the firm deserves a trading slot on the stock exchange. At this point, the IPO documents are made available on the CSRC website and public scrutiny is invited.

Each year, the CSRC recruits a total of sixty review committee members to review the IPO applications. Of these, 25 are hired for reviewing companies listed on the Main/SME Board, and 35 are hired for the ChiNext Board. The majority of reviewers are recruited from prestigious law and accounting firms, and the rest are CSRC officials, academics, and bureaucrats from non-CSRC ministries. Both the Main/SME and ChinaNext Boards recruit reviewers from the National Development and Reform Commission and the Ministry of Science and Technology, the two ministries in charge of China's development policies. Table 15 summarizes the composition of PORC members.

INSERT TABLE 15 HERE

Once the sixty review committee members are recruited, the CSRC assigns them into small groups of seven to form the so-called PORCs, subject to the condition that each PORC has a reasonable composition. For all the IPO applications examined in this study, each seven-member PORC is constructed such that it has at least one auditor. Conceptually, one may expect PORCs to be assembled with some pre-determined criteria that ensure a similar set of expertise and experience is built into different committees. The CSRC then *randomly* assigns these PORCs to single IPO reviews. Random assignment of PORCs is stipulated in Article 18 of Commission Order *Interim Measures on Public Offerings*

¹¹ To be clear, the focus of this study is on examining how IPO approvals are granted to firms proceeding to a merit review. I do not observe firms that choose not to apply for an IPO or lost investment opportunities due to such a system in operation. One sampling issue of this study is that characteristics of IPO applicants are different from those in the population. Generally speaking, this sampling bias would result in an underestimation of the treatment effect (e.g. the effect of transparency in reducing the likelihood of obtaining IPO approval for connected firms).

*Committees*¹². Field interviews on industry practitioners and policy commentators (e.g. *Legal Daily*, 2010) confirm that such a random assignment process is stringently implemented, and this is a public policy measure designed to preclude vested interests of PORC members in potential securities issuers. Additional statistical tests (reported in Section 6 “Supplementary Analyses”) have confirmed the randomness of the assignment of PORCs: composition of the PORC is *not* significantly correlated to whether an IPO applicant has developed connections.

Along the same line of precluding vested interests, a committee with an individual PORC member who has familial or financial ties with an IPO applicant is considered as subject to a direct conflict of interest and therefore will be banned from reviewing that particular applicant. Specifically, the law has made explicit that a PORC member recruited from an audit/law firm that works as the auditor/lawyer for an IPO applicant is subject to a conflict of interest. The CSRC usually releases the list of seven PORC members five days prior to the IPO review meeting. A firm wins approval if five or more committee members vote “yes” at the review meeting. One limitation of the data is that I do not observe the votes at each review meeting.

Despite having a lot of power fall into the hands of seven individuals, efforts are made to make the IPO approval process more transparent. In April 2010, the CSRC improved transparency and began justifying to the public why a specific IPO decision was made (Section 3.1. will provide a detailed description of this policy change). Though still a work in progress, the Chinese government has made strides to boost transparency and gradually developing systems of checks and balances to limit the reach of excessive government power. Transparency serves to keep public officials accountable for their actions even in the absence of ex-post enforcements or penalties, as disclosure of decision-

¹² Article 18 of China Securities Regulatory Commission Order *Interim Measures on Public Offerings Review Committees* states, “Each PORC shall have seven members. The CSRC randomly assign PORCs to single IPO reviews, subject to the condition that the PORC has a reasonable composition.”

making information in itself enables the public to check whether the government is doing what it is saying (Kierkegaard, 2009). Adherence to the State Council's *Regulations on the Disclosure of Government Information*, since 2010 central-government ministries (including the CSRC) have made significant progress to improve transparency. These efforts include disclosing decision-making processes and documents, publishing reports on information disclosure mechanisms, and soliciting public comments for draft regulations. In 2010, the Ministry of Health released the *Interim Measures on the Information Disclosure of Health Service Entities*, the State Council's Legislative Affairs Office began reporting its transparency efforts, and the Chinese Academy of Social Sciences started ranking ministries by their progress on transparency commitments. In October 2010, the State Council also released the *Opinions on Strengthening the Construction of a Law-Based Government* that encouraged local governments to disclose documents and publicize the conduct of state-owned enterprises.

3. Data

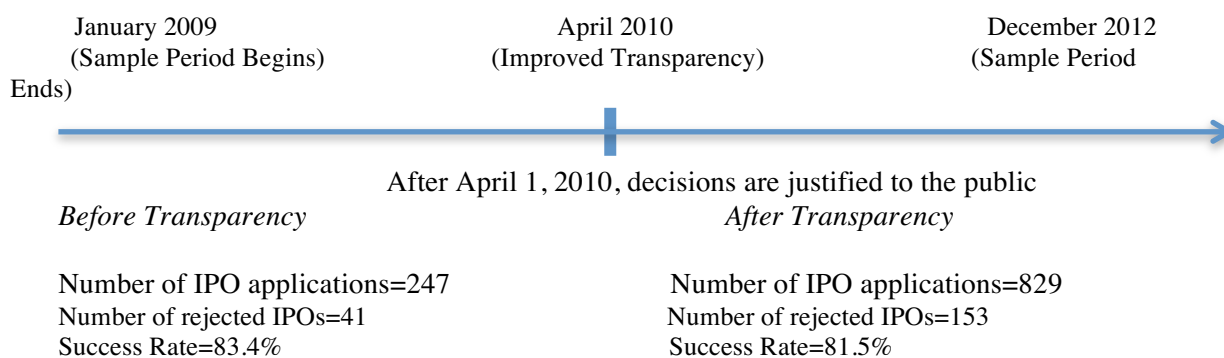
3.1. Data Sources

Archival Data Obtained from the CSRC

I obtained archival data from the China Securities Regulatory Commission (CSRC) on a total of 1,076 IPO applications from January 2009 to December 2012, of which 194 cases (i.e. 18%) were rejected by the CSRC. The archival data contain the CSRC's formal notices to individual IPO candidates stating the CSRC's final decision on a particular application. As described in Section 2, it was not until April 2010 that the CSRC began justifying to the public why a specific IPO decision was made. The sample here thus contains 247 applications ruled on before April 1, 2010 for which justifications are not visible to the public, and another 829 applications ruled on after April 1, 2010 for which decisions are justified publicly via CSRC's official website

(http://www.csrc.gov.cn/pub/csrc_en/). Exhibit 2 illustrates the improved transparency of the CSRC.

EXHIBIT 2. INCREASED TRANSPARENCY OF IPO APPROVAL



Panel A of Table 14 shows examples of the CSRC’s IPO decisions. Subject to the confidentiality agreement with the CSRC, I am unable to provide examples of rejected IPOs ruled on before April 1, 2010. The rejected IPO cited in Table 16 received a ruling on July 12, 2010, which was justified with violating Article 37 of Commission Order 32 (Appendix 1), “with a history of a significant portion of sales that comes from a single client, the company’s future profitability is vulnerable.”¹³ Panel B summarizes justifications for a total of 194 rejected applications in my sample, which indicates how many times each Commission Order 32 article was cited. If a firm is declined an IPO for more than one reason, it is included in each article that pertained to the rejection. All 194 rejected cases in my sample are classified. Note that the sum of the article codes exceeds 194, since many applications were rejected for multiple reasons. The article codes are ranked in descending order: uncertainty in future profitability (Article 37), organizational independency (Articles 14 and 20), prospects of project(s) as invested by raised capital (Article 41), influence of controlling shareholders (Article 18), and efficacy of the internal control system (Article 24)

¹³ There could be alternative ways of interpreting this message. The straightforward interpretation is that the reported revenue is truthful and the PORC is worried about drastic decline in operating profits as the firm loses the most important client. Alternatively, the message can be interpreted as IPO fraud: the PORC is questioning authenticity of the income statement, that is, the firm is overstating revenue by faking transactions with a single client. Most IPO frauds get discovered as firms announce lower-than-expected returns.

are ranked top considerations for declined IPOs¹⁴. These descriptive statistics appear consistent with the law-book conceptualization that risk control and protecting minority investors from being expropriated by controlling shareholders constitutes the “official” motivation for merit reviews. What is more, these murky discretionary merit standards leave room for connected firms to extract economic rents from the public. Critics believe that China's IPO approval process favors the politically connected, and this has, therefore, allowed many companies that are either not qualified or have fraudulent accounting in place to go public.

INSERT TABLE 16 HERE

Hand-Collected Data from S-1 Filings

The dependent variable in my baseline analysis is IPO success, a dummy variable equal to one if an IPO applicant received the CSRC's permission to be listed on the stock exchange. To conduct the empirical analysis, I hand-coded a list of independent variables from IPO applicants' S-1 filings, which are subject to public scrutiny via the CSRC's website over the entire sample period (i.e. 2009-2012). The S-1 documents are in Chinese and average more than 300 pages in length. I coded five categories of variables for a total of 1,076 applications in my sample: (1) basic information regarding an IPO applicant (e.g. location, auditor, lawyer, issue size), (2) financial statements data in the three-year period prior to the IPO application, i.e. year 3 to year 1, given that the year of application is treated as year 0, (3) industry characteristics, (4) a firm's competitive position, and (5) a set of dummy variables indicating whether the applicant highlights a specific type of business risk in its S-1's “Major Business Risks” section. Appendix 2 shows the list of variables coded from the S-1 filings as well as how these variables are defined. For each IPO review,

¹⁴ In fact, the idea of detecting IPO fraud is behind many of these merit review standards. For instance, “uncertainty in future profitability (Article 37)” can be in itself signaling fraud, as frauds are usually discovered when firms announce lower-than-expected returns. “Organizational independency (Article 14 and 20)” refers to transactions with a small number of clients, suppliers or related parties, which can be signaling overstated revenue or understated costs.

I also manually coded the list of seven PORC members attending a specific committee meeting, as well as each PORC member's employment information. Such information is subject to public scrutiny over the entire sample period, and can be retrieved from the CSRC's announcement directory (<http://www.csrc.gov.cn/pub/zjhpublic/>).

Data Retrieved from Commercial Database

For firms that successfully went public, supplementary data are retrieved from the *China Stock Market Accounting Research* (CSMAR) Solutions Database, a leading data source for research on publicly traded Chinese firms (Ma and Khanna, 2015). Variables retrieved from the CSMAR Solutions Database include the IPO offer price, the first day open price, the post-IPO performance, as well as legal sanctions for falsifying IPO documents.

3.2. Variables

Connection

I define an IPO applicant as connected with the CSRC if one of the following two conditions is met: (1) the corresponding Main&SME or ChiNext PORC pool has a member who is from the IPO applicant's auditing firm; and (2) the corresponding PORC pool has a member who is from the IPO applicant's law firm. Having addressed this issue in Section 2.2, once the IPO documents are complete, the CSRC *randomly* assigns PORCs to single IPO reviews. This shall constitute an ideal empirical setting to test the effect of political connections, given that connectedness is defined by an IPO applicant's relational tie with the PORC via auditing or law services. However, carrying out such an empirical test is not feasible, since Chinese law bans auditors or lawyers from reviewing their clients' applications. However, there are reasons to expect that firms whose auditors/lawyers sit on one of the PORCs enjoy higher IPO success rates, despite the fact that direct conflict of interest is taken out of the picture. First, firms seeking to issue new stocks usually employ

auditing and law firms three years before the formal application process starts, since applicants are required to disclose financial statements and descriptions of business operations for the three-year period prior to an IPO. If it is the case that high-quality firms employ prestigious auditing/law firms and employees of these prestigious firms are later recruited by the central government to review IPO applications, the observed correlation between connection and IPO success may simply be an artifact of unobserved firm quality. As a result, even if IPO applicants employ their auditing/law firms well before review committee members are finalized, it is difficult to argue that connectedness to PORCs is driven purely by luck. Second, due to the murky merit standards, auditing/law firms that have employees sitting on PORCs own private information regarding how PORCs interpret standards, and this private information can help their clients prepare S-1 filings that cater to the taste of the government. That being said, even if auditors/lawyers are banned from reviewing their own clients, their clients may still benefit enormously by developing a better understanding of PORCs' preferences. Third, although auditors/lawyers are precluded from reviewing their own clients, they may exchange favors by secretly helping clients of fellow auditors/lawyers gain preferential treatment, especially those that do not meet merit standards. While researchers do not observe secret favor exchanges or bribe payments, in this study I conduct empirical tests to investigate if PORCs exhibit undue favoritism to under-qualified or fraudulent IPO applicants that do not merit this preferential treatment.

Transparency

Since April 2010, the CSRC started to justify IPO decisions to the public. Improved transparency has at least two implications. First, due to the existence of discretionary merit categories and a murky application process, government officials own private information that was not readily available to IPO applicants. Having PORCs justify their decisions

helps clarify the discretionary merit standards (displayed in Table 3), which improves private firms' understanding of how IPO decisions are made. If the value of connections arises from acquiring private information when policy discretion is exercised, returns on connections are expected to diminish over time as information becomes publicly available. Second, improved transparency subjects PORC decisions to public scrutiny, which keeps bureaucrats from exercising unchecked power and giving undue advantage to connected firms that do not necessarily merit the treatment. *Transparency* is an indicator variable equal to one if an IPO decision was made on or after April 1, 2010, and the coefficient of the interaction term *Connection*Transparency* captures change in the effect of connectedness after improved transparency, a public policy event orthogonal to firm and industry characteristics.

Professional Skepticism

PORCs are made up of auditors, lawyers, academics and securities examiners recruited internally from the CSRC. As the CSRC randomly assigns PORCs to single IPO reviews, the composition of PORCs can be understood as orthogonal to firm fundamentals. However, as discussed in Section 2, one would naturally expect that PORCs are constructed with certain pre-determined criteria so that across-PORC variations in expertise, skills and experience are already mitigated before PORCs are randomly assigned to IPOs. Therefore, in this study I focus on two professions with a similar set of expertise, namely, auditors and securities examiners. Both professions deal with identifying and deterring fraud. Furthermore, auditors and securities examiners are both trained to show professional skepticism (McMillan and White, 1993). Conservative bias is an important concept in audit practice, evidenced by its prominence throughout auditing standards (Nelson, 2009; Hurtt, 2010). Along with the premise that the central government seeks to identify and control risk for retail investors, it is therefore natural to expect auditors to be

conservative voters at review meetings, especially when it comes to detecting fraudulent financial statements. Securities examiners are also trained to show professional skepticism. Today securities regulatory bodies across the world, including the SEC, continue to improve risk assessment techniques and institute measures to improve the ability of securities examiners to detect fraud and other types of violations. The variable *Auditors* is defined as the total number of auditors sitting on a seven-member PORC randomly assigned to a given IPO review, and *Securities Examiners* is defined as the total number of CSRC officials sitting on a PORC. As auditors and securities examiners differ in that the former are recruited as full time PORC members and the latter are recruited as part time PORC members, I control for *Full Time*, the number of full time members sitting on a PORC.

Control Variables

Risk Control The very purpose of merit review is to control the amount of risk that is allowed to be passed along to the public. A major critique of merit review is that it inherently favors large, established firms and discriminates against small, capital-deficient ventures, which creates a barrier to entrepreneurship and a free enterprise system (Mofsky and Tollison, 1977). China has developed a multi-tier capital market to accommodate businesses of different risk profiles and at different stages of growth: large and established firms are listed on the Main Board, small/medium firms with stable earnings are listed on the SME Board, and start-up ventures are listed on the ChiNext Board. I include a natural log of firm *Revenue* for the last reporting year (i.e. year 1) to capture firm size, growth in revenue (*Revenue Growth*) over the pre-IPO three-year span to capture firm growth, and operating profits to sales (*ROS*) of year 1 to capture profitability. To capture the risk of expropriation by controlling shareholders via intragroup transactions (Shleifer and Vishny, 1997; Bertrand, Mehta and Mullainathan, 2002), I include two additional variables: (1)

Intragroup Sales, defined as dollar sales to group members over total sales at year 1, and (2) *Intragroup Purchases*, defined as dollar purchases from group members over total expenses at year 1. Since underwriters are also held accountable for authenticity of the S-1 filings, I control for underwriter reputation, that is, the total number of firms successfully listed by an applicant's underwriter by a specific IPO review meeting. I also control for size of issuance (log of *Shares Issued*) and debt-to-asset ratio (*D/A*), and include a dummy variable indicating that an applicant is a state-owned enterprise (*SOE*). As shown in Table 14, uncertainty in future profitability (Article 37) is the top merit standard, accounting for nearly one third of rejected applications. Measuring perceived risk is not an easy task. To address this, I coded a set of dummy variables indicating major business risks. These major risk factors are highlighted in the "Major Business Risks" section of an IPO applicant's S-1 filings, including increasing input price, falling output price, inventory risk, account receivable risk, undiversified business lines, concentrated customers, concentrated suppliers, and intellectual property risk.

Industrial Policies Five-Year Plans (FYPs) for Economic and Social Development are one of the most useful government documents to understand China's development strategies (Fan, 2006). The 11th FYP (2005-2010) and 12th FYP (2011-2015) focus on restructuring the economy to rely more on high-tech and high value-added industries, and less on fixed investment and labor-intensive exports. The government is committed to adopting financial, human resources and tax measures to encourage so-called indigenous innovation, particularly in high-tech industries, including, but not limited to, information technologies, biotechnologies, high-end machineries and electronic products, new energy (including nuclear and renewable energy) and energy conservation, and new materials.

Patent is a dummy variable equal to one if a firm owns at least one patent, and *Number of Patents* is a continuous variable equal to the log of total number of patents that a firm

owns¹⁵. Empirically, it is not difficult to identify firms supported by China's industrial policies. These firms are given tax benefits and classified as high-tech firms for corporate income tax purposes, with the effective income tax rate reduced from 25% to 15%. The dummy variable *High-Tech* indicates if an applicant is classified as a high-tech firm by local tax agencies and thus enjoys a discounted corporate income tax rate. In addition, the share of low value-added and polluting industries is expected to continue to decline. The 11th and 12th FYPs identified nine "restricted" industries: textiles, equipment manufacturing, shipbuilding, automobiles, iron and steel, nonferrous metals, building materials, petrochemicals, and light industry. These industries are identified as needing to be trimmed or upgraded with new technology. Preferential treatments, such as expedited government approval, subsidies, reduced land fees and tax incentives are not expected to be given to these industries. The dummy variable *Restricted Industry* indicates whether the firm operates in one of the restricted industries identified in 11th and 12th FYPs.

Regional Development Policy Since the 9th FYP (1996-2000), China's regional development policies have focused solely on promoting economic growth in underdeveloped provinces in central and western China. The 11th FYP under the Hu Jintao Administration seeks to build a *harmonious socialist society* that enables underdeveloped regions to benefit from two decades of double-digit economic growth, and the 12th FYP continues to seek to promote balanced growth. During this process, provinces that get rich first are expected to "yield" to those that are catching up. I expect China's regional development policy to be reflected in the increased representation of underdeveloped provinces on stock exchanges, as well as a gradually reduced disparity among different provinces. *Underdeveloped* is a dummy variable indicating if an IPO applicant was incorporated in central and west China, and *No. of Firms* is a continuous variable equal to

¹⁵ Since there are firms that own zero patent, *No. of Patents* is defined by $\ln(\text{no. of patents} + 1)$.

the log of the number of publicly traded firms incorporated in the province where the IPO applicant was incorporated.

Performance Evaluation The political economy literature discovers increasingly that strong East Asian economies should not be understood merely as an authoritarian regime imposing its will on the market (Schneider, 1998). It is not just state power or good public choices, but also a web of business-government ties that simultaneously allow close business-government ties and effective public governance (Evans, 1995; Silva, 1996). In granting access to the capital market, the central government sets certain performance standards for firms. If the objective of industrial policies is some sort of easy-to-measure growth in output or work force, performance standards may not be problematic. However, if policies seek to advance technologies or improve efficiency, performance is then harder to measure, and it is difficult and costly for governments to get reliable information on performance that is not easy to measure. In strong East Asian economies, particularly South Korea, it has been argued that performance standards have appeared to be general and relative. They are general in that they focus on overall competitiveness rather than accounting indicators; and they are relative in that good performance was determined in comparison to other firms in the same industry (Amsden, 1989; Schneider, 1998). The key relative performance indicator for competitiveness is market share. Using market share as a performance indicator provides IPO candidates with an incentive to perform well while not holding them responsible for risks and factors beyond the control of an individual firm, such as shifts in demand and changes in industrial policies. However, there is no generally accepted best method for calculating market share, due to different definitions of market scope as well as various measurement issues (e.g. units versus dollar sales, and shipments from manufacturers versus consumer purchases). In my analysis, a firm is defined as *Industry Top 1* if it reports itself as the industry's top performer in the S-1 filings,

regardless of the definition of market share adopted by individual reporters. As PORCs are made up of bureaucrats, lawyers and accountants who lack relevant firm-specific and industry-specific knowledge to accurately assess a firm's competitive position, they rely mostly on information provided by IPO applicants. If a firm is, in fact, the most competitive firm, but fails to report so in the S-1 filings, it is highly likely that the PORC will not consider it as the industry's top performer.

4. EMPIRICAL RESULTS

4.1. Summary Statistics

Panel A of Table 17 documents the mean differences in IPO success rates for two subsamples of IPO applicants with different characteristics. Overall the t-test statistics lend support to arguments developed in Section 3, with regard to factors that explain IPO success. The government favors large, established firms, reflected in the fact that firms applying for new listings on the Main Board enjoy significantly higher IPO success rates than those applying for the SME or ChiNext Boards. There is also evidence that the CSRC acts to support high-tech and innovative firms, but suppress applicants operating in restricted industries. Firms connected to the CSRC via auditing/law services are shown to have an average of 5.1 percentage points' higher IPO success rates, and the mean difference is significant at 5% level. In Panel B, I further document the difference-in-difference comparison, that is, percentage of connected and unconnected firms obtaining IPO approval before and after improved transparency. The summary statistics clearly show that although connected firms are associated with a higher likelihood of obtaining approval, the correlation is driven by the subsample of firms applying for an IPO before transparency. Connected firms enjoy an average of 14.5 percentage points' higher IPO success rates (significant at 1% level) before transparency, but the competitive advantage of connected firms in obtaining approval completely vanishes after having the government disclose why

a specific IPO decision is made. After transparency, the mean difference in IPO success rates becomes negligible (i.e. 0.818 for the connected and 0.814 for the unconnected) and the difference is also statistically insignificant.

Panel C presents summary statistics. Of a total of 1,076 IPO applications examined in this study, 882 (82%) obtained approval from the CSRC. 40% of IPO applicants hire an auditing/ law firm that has an employee sitting on one of the PORCs, 32% claim to be the industry's top performers, 82% own patents, and 39% are identified as high-tech firms for corporate income tax purposes. IPO applicants also appear to have high pre-IPO growth, with an average of 60% growth in revenue over a three-year time span prior to their IPO application. To demonstrate reduced corporate governance risk, most applicants "cleaned up" intragroup transactions prior to their IPO application¹⁶.

INSERT TABLE 17 HERE

4.2. IPO Success

Table 18 documents results of the pooled cross-sectional logit regression, where the dependent variable is a dummy variable indicating *Success* of a given IPO application. The regressions include unreported year and industry fixed effects, and robust standard errors are reported in parentheses. The analysis shows that connected firms enjoy significantly higher success rates. However, this is, not a causal statement. As explained previously, high-quality firms may come to develop connections, while at the same time enjoying a higher likelihood of winning IPO approval. Improved transparency, however, is a public policy event initiated by the central government, which can be understood as orthogonal to unobserved firm and industry characteristics. Columns (2) and (3) show that although connected firms enjoy a higher likelihood of obtaining IPO approval, the effect of connectedness declines significantly with improved government transparency. In Column

¹⁶ Summary statistics on pre-IPO reduction of intragroup purchases and sales are excluded from this paper but are available upon request.

(3), the coefficient of the interaction term is -1.138, translating to a marginal effect of 14%¹⁷. For the subsample of connected firms, IPO proceeds average 36% of total post-IPO equity if firms successfully go public. That being said, improved transparency leads to a 5.04 percentage points loss of equity financing for the connected. In Column (4), I replace the dummy variable *Transparency* with a continuous variable *Elapse*, which refers to the total number of days since improved transparency takes effect. The model assumes that the advantage of connected firms decreases linearly with time elapsed, and finds that it takes an average of 442 (=1.326/0.003) days for the positive effect of connection to completely disappear.

There are two identification issues that I would like to address here. First, China is undertaking a series of actions domestically to improve its economic, legal and political institutions. Though improved transparency has solid theoretical grounds, and it is a first-order effect directly applied to the IPO review process over the sample period, it is possible for transparency to pick up various indirect effects of improved institutional quality in general, leading to an *overestimation* of the treatment effect.¹⁸ However, I hold that the qualitative findings in the remaining sections of this paper would not alter as a result of this concern, for other institutional development taking place at the same time are also orthogonal to firm and industry characteristics. Therefore, even if government transparency is interpreted as a proxy for general institutional development, it can be still considered as uncorrelated with omitted firm characteristics. Second, given that transparency is shown to be an effective and powerful public policy tool, attrition effects may lead to an *underestimation* of the treatment effect. In the context of randomized control trials, attrition refers to a self-selection bias by which participants lost to follow up especially when an

¹⁷ Computing the interaction effects in logit model requires additional statistical adjustment, as the full interaction effect is the cross-partial derivative of the expected value of y , which depends on the value of the covariates. The marginal effect for *Connection*Transparency*, estimating at the means of covariates, is -0.1371**(|z|=-2.08 and p-value=-.037).

¹⁸ Nonetheless, additional tests (Table 6) show that transparency significantly reduces IPO underpricing and helps to correct information asymmetry regarding stock issuers' quality, suggesting that transparency is not just an artifact of general institutional development.

unpleasant treatment is given, resulting in a significant difference in characteristics of participants between randomized groups. In my quasi-natural experiment setting, anticipating a significantly lower likelihood of passing the merit review after government transparency, under-qualified IPO applicants may withdraw their application or even choose not to apply for an IPO at the first place. This can result in a sampling bias if connected firms are more likely to withdraw applications after improved transparency takes effect.¹⁹ Therefore, the estimated effect of transparency in reducing the likelihood of connected firms obtaining IPO approval would be stronger if attrition effects were not present.

Columns (5)-(7) examine whether an increased presence of auditors and securities examiners on the PORC affects IPO success. This is a particularly clean test, as Chinese law demands random assignment of PORCs to single IPO reviews. This institutional setup yields an ideal empirical laboratory to test behavioral differences across professions, of which I focus on the conservative bias highlighted in the audit and securities investigation practices. Contrary to conventional wisdom that auditors are in general more conservative voters, Column (5) shows that a higher presence of auditors on the PORC leads to significantly higher IPO success rates. To explain this counterintuitive result, in Column (6) I allow an interaction between *Auditors* and *Connection* to test whether auditors act to favor IPO applicants connected via audit/law services. The coefficient of *Connection* becomes insignificant once auditor presence on the PORC is controlled for and the interaction term is included in the model. Further investigations of the data reveal that the positive effect of *Auditors* is driven by connected IPO applicants reviewed by a PORC that

¹⁹ Section 4.3. documents that government transparency significantly reduces fraudulent IPOs among connected firms, lending support to the belief that there may be an attrition effect. However, for both connected and unconnected firms, I do not find a statistically significant difference in operating performance (measured by ROS) before and after transparency. Firms applied for an IPO after transparency tend to be larger in size, but this holds true for both connected and unconnected firms. Lastly, I do not find that percentage of connected firms in my sample decreases after transparency. This is consistent with multiple explanations: first, firms usually hire auditors/lawyers three years prior to IPO the application, and my sample period (i.e. four years) is not sufficiently long to allow me observe that firms stop working on developing connections; second, for firms returns on connections outweigh costs of building/maintaining connections even after transparency; and third, connection is an artifact of firm quality, meaning that good firms develop connections without regard to returns.

contains five or more auditors. This result becomes especially interesting when one reminds him/herself that the voting rule requires five or more votes to pass a case.

Increased presence of CSRC examiners on the PORC leads to significantly lower IPO success rates, and Column (7) further shows that securities examiners act mainly to suppress firms connected via audit/law services.

Large firms and firms with higher pre-IPO revenue growth are significantly more likely to win approval. After controlling for firm size, there is no significant difference between firms applying for the Main Board and those applying for the SME or ChiNext Board. Applicants reporting forthcoming market and inventory risks are associated with significantly lower IPO success rates. Underwriter reputation also helps predict IPO success, but its coefficient becomes insignificant once the set of business risk variables is controlled for. Applicants with a higher level of intragroup transactions, (i.e. a measure of tunneling risk), are less likely to obtain approval, but the coefficient is statistically insignificant.

I also find that the CSRC acts to advance China's industrial policies. All else being equal, high-tech firms and firms with patented innovation are significantly more likely to pass the review, while firms operating in restricted industries as identified by the 11th and 12th FYPs are significantly more likely to be rejected. There is some evidence in Column (3) that the CSRC acts to promote regional development policy, as reflected in the reduced variation in the number of listed firms owned by each province. The analysis also supports the argument that the CSRC values a firm's overall competitiveness and compares firms against their competitors. An industry's best performer is significantly more likely to win approval. This result is robust with respect to alternative model specifications, and qualitatively similar results are obtained when dummy variables indicating an industry's top 3 or 5 are used instead.

INSERT TABLE 18 HERE

4.3. Underpricing and Fraudulent IPOs

The finding that the effect of connections reduces significantly with improved government transparency suggests that connectedness is not merely an artifact of firm quality. In particular, the finding is consistent with two nonexclusive explanations. First, having bureaucrats justify their decisions prevents abusive use of policy discretion and thus keeps the government from exercising unchecked power. Second, improves transparency helps private players understand how the government operates and thus reduces the comparative advantage of the connected firms. In this subsection I present two sets of evidence that support the first explanation but is inconsistent with the second.

IPO Underpricing

IPO underpricing is a worldwide phenomenon and one of the great mysteries of modern corporate finance. Over the last 50 years, IPOs in the U.S. have been underpriced, on average, by 16.8 percent. This translates to more than \$125 billion that companies have left on the table in the past two decades (NY Times, 2011).²⁰ The most prominent explanation for IPO underpricing, put forth by Kevin Rock (1986), is the one that gained the most empirical support. Rock's theory states that IPO underpricing is a product of information asymmetry with regard to a firm's true quality. Informed investors bid only on stocks that will gain superior returns. Uninformed investors bid without regard for the true quality of offerings. With bad IPOs only uninformed investors will bid and lose money, and this eventually makes them leave the IPO market. Underwriters, however, need uninformed investors to bid since informed investors do not exist in sufficient numbers. To solve this problem, the underwriter discounts the IPO in order to draw in uninformed investors and ensure that they bid. The consequence is underpricing. IPO underpricing is

²⁰ In the case of underpricing, the IPO issuer does not raise an amount of capital that the public is willing to invest, and the lost capital goes to investors participating in secondary sales.

found to be lower when more information about an IPO issuer's quality is available so that uninformed investors are at a lesser disadvantage. In short, the information asymmetry theory predicts a monotone relation between IPO underpricing and the uncertainty of investors regarding firm value (Beatty and Ritter, 1986).

The rationale underlying China's merit regulation is to reduce the risk for uninformed retail investors to an acceptably low level, by letting so-called informed professionals screen bad IPOs from good IPOs. According to the information asymmetry theory of IPO underpricing, an effective merit review system should mitigate IPO underpricing by providing the public with credible information regarding a firm's true quality. By contrast, if any element of the review process disguises an IPO applicant's true type, more compensation will be needed to draw in uninformed investors, and this further worsens IPO underpricing. In particular, if connections *do* help under-qualified or fraudulent firms win approval, investors, provided that they understand how connections work, would consider connected firms to be of greater uncertainty regarding quality, and underwriters of these connected firms would have to further discount offer prices to draw in uninformed investors. In a similar vein, if improved transparency in fact curbs the government from giving undue advantage to connected firms, it can be expected that transparency reduces uncertainty of investors regarding firm value, and this should help correct IPO underpricing.²¹

Panel A of Table 19 tests these predictions. Since China's merit regulation occurs at the federal level, it is not feasible to compare the performance of firms that successfully went public and those that declined an IPO²². I thus explore variation within the subsample

²¹ With a sample of 423 Chinese firms that successfully went public from 1994-1999, Francis, Hansan and Sun (2009) find that, politically connected firms are associated with higher pricing of the newly offered stocks and lower fixed costs of going public.

²² A number of U.S. studies in the 1970s and 1980s examined the efficacy of state merit reviews by comparing post-IPO performance of securities withdrawn from certain merit states with those which were approved (e.g. Goodkind, 1976; Walker and Hadaway, 1982). Such an empirical design is feasible in the U.S., since in the U.S. offerings withdrawn from one state were subsequently sold in other states. Such a design is however not feasible in China since merit regulation takes place at the federal level. I, therefore, explore variation among firms that eventually went public.

of firms that passed the merit review, and examine which element(s) of the review process explain IPO underpricing for these firms. The analysis in Panel A excluded 194 rejected applications, which results in a smaller sample size of 882. Regressions in Table 6 include year and industry fixed effects, and robust standard errors are reported in parentheses. In Columns (1) and (2), the dependent variable *Underpricing* is the percentage difference between the first day open price and the offer price. An immediate and significant rise in stock price is an indication of underpricing. The higher the price difference, the more severe the IPO underpricing. For the subsample of firms that successfully went public, the first day open price is averaged to be 32% higher than the offer price, and this echoes practitioners' observations that IPO underpricing in emerging economies has been more severe than in developed capital markets (NY Times, 2011). Connected firms are associated with a higher level of IPO underpricing, and the coefficient is statistically significant at the one-tailed test. Albeit statistically insignificant, improved government transparency reduces the open-offer price difference for connected firms. These results are consistent with the hypothesis that the stock market considers connected firms to be of greater uncertainty in terms of quality, as connections may have helped under-qualified or fraudulent firms win IPO approval. As a result, underwriters have to further discount the offer price of connected firms in order to draw in a sufficient number of retail investors to bid on new listings. Improved government transparency significantly reduces IPO underpricing for all stock issuers *without* regard to connections to the government. This suggests that having the government justify its IPO decisions significantly reduces information asymmetry regarding a firm's true quality.

In addition, an increased presence of securities examiners on PORCs significantly reduces IPO underpricing, which reflects the previous result that securities examiners

constitute conservative voters by acting to suppress connected firms. An increased auditor presence on PORCs leads to higher IPO underpricing, albeit statistically insignificant. Large, established and profitable firms discount the offer price significantly less, which is consistent with established findings that these firms set a higher offer price to reflect a lower level of business risk. Results in Columns (1) and (2) are robust with respect to the inclusion of the first day market return, as well as an alternative definition of IPO underpricing, namely, the percentage difference between the first day close price and the offer price.

Fraudulent IPOs

Perhaps the most serious criticism of merit review is that it does not help to deter fraud (Jennings et al. 1986). It has been argued that there is fraud in both merit and non-merit countries/states. Stricter enforcement and harsher penalties are believed to be more effective in deterring fraud than merit regulation. Consistent with prevailing criticism, merit regulation does not seem to deter fraud: 12% of the firms that successfully went public were sanctioned for falsifying IPO documents for the merit review at a later point in time, i.e. after going public. If connections have helped fraudulent IPO applicants pass the merit review, we should expect a higher likelihood of IPO fraud among connected firms. Similarly, if securities examiners have done a better job at detecting fraud in the review process, we should expect that firms approved by a PORC with a higher presence of securities examiners have a lower likelihood of IPO fraud. In Panel B, Columns (3) and (4) predict whether legal sanctions are imposed on a given firm for falsifying IPO documents during the merit review process. Column (3) shows that connected firms are associated with a higher likelihood of being sanctioned for falsifying IPO documents after going public (albeit marginally significant), and improved transparency significantly reduces the likelihood of IPO fraud for connected firms. These results, again, support the hypothesis

that connections are abused to help under-qualified firms to pass the review, but are inconsistent with the hypothesis that connected and unconnected firms are of the same quality and connections are simply used to help IPO applicants to understand the discretionary merit standards. Column (4) finds that an increased auditor presence on the PORC leads to a higher likelihood of IPO fraud, while an increased presence of CSRC examiners significantly reduces the likelihood of fraud.

INSERT TABLE 19 HERE

5. SUPPLEMENTARY ANALYSES

Post-IPO Performance

Merit regulation is motivated by the idea of keeping bad businesses out. Yet it appears to be a challenge to identify factors that will predict future business success. For example, it is not clear ex ante whether auditors or securities examiners do a better job than other professionals in predicting an IPO applicant's future success. Similarly, it is unclear ex ante whether connected firms will demonstrate higher post-IPO growth, as business environments are always subject to a high level of uncertainty. If connectedness is merely an artifact of firm quality, we should not expect any significant correlation between connection and post-IPO growth, especially after controlling for pre-IPO performance. If connections have, in fact, helped weak IPOs pass the review, we may see a negative correlation between connection and post-IPO performance. In unreported regressions, I check post-IPO growth in operating profitability, measured by operating profits/sales, among the subsample of firms that successfully went public. Connected firms are associated with slower long-term growth, but the result is statistically insignificant. There is, however, evidence statistically significant at 5% that an increased presence of auditors on the PORC is correlated with lower post-IPO growth, while an increased presence of CSRC examiners is correlated with higher growth.

Test of Randomness

Although random assignment of PORCs is stipulated by law, one concern is that in countries with rampant corruption, IPO applicants may “game” the system by having the CSRC assign them PORCs with certain favorable characteristics. In particular, results established earlier in this study would be biased if connected firms pay bribes to CSRC officials in order to be assigned a lenient review committee (e.g. one with a smaller (larger) number of securities examiners (auditors)). I therefore conduct additional tests to examine whether the assignment of PORCs is correlated with connection. Panel A of Table 20 reports results of the randomness tests. The pooled cross-sectional logit regressions predict *Connection* with a series of independent variables capturing composition of the PORC (i.e. the number of auditors, lawyers, securities examiners, non-CSRC officials and academics sitting on the seven-member PORC) assigned to a given IPO applicant. The results show that composition of PORCs is *not* significantly correlated with connectedness. Hence, we cannot reject the null hypothesis that assignment of PORCs is random.

Reapplications

I conduct an additional Internet search for what happened to IPO applicants after being rejected by the CSRC. At the end of the sample period (i.e. end of 2012), 40 of the 194 rejected IPO applicants reapplied and finally went public. As of June 2015, another 23 rejected applicants obtained approval from the CSRC. Therefore, after an average of one additional round of review, one-third of the rejected firms in my sample eventually became listed. Other rejected applicants sought alternative means of equity finance: eight of them were later acquired by publicly traded firms (which can be understood as eventually becoming listed), and three made attempts at a reverse merger, but none of these was successful. It is worth noting that results established previously in this paper are robust with

respect to the inclusion and exclusion of reapplied IPOs, as well as to including in the model a dummy variable indicating that a given case is a reapplication.

Borderline Cases

Successful IPO applicants may differ from failed ones with regard to characteristics unobservable to researchers, and there are reasons to believe that one of these unobservable characteristics (e.g. the entrepreneur's business acumen) is correlated with both IPO success and a firm's ability in developing connections with the government. In light of this, I pool two sorts of IPO applications from my sample, namely, applications that are marginally accepted and those that are marginally declined, and then re-estimate the treatment effects on this selected subsample of borderline cases. I consider marginally declined applications as those which were declined in a given review, but which later reapplied and succeeded (number of observations=63), and marginally accepted applications as those which were accepted in a given review, but declined in an earlier application (number of observations=40). This is essentially a regression discontinuity design (RDD) that allows better estimates of the treatment effect. I re-estimate the logit regressions in Table 5 for this subsample of borderline firms, and Panel B of Table 19 reports coefficients of the key variables. A result established previously is that connections have helped weak IPOs succeed. If this is true, one would expect connections to have a larger effect on firms that are just above or below the merit standard, as these firms are more vulnerable to the use of policy discretion. Consistent with this, the RDD regressions show that connections have a much larger positive effect on these borderline cases and the effect of connections reduces significantly and by a bigger amount after improved transparency for these firms. An increased presence of auditors on the review committee leads to a higher likelihood of IPO success (statistically significant at the one-tailed test)

for this subsample of marginally accepted/declined firms, while an increased presence of CSRC examiners leads to insignificantly lower IPO success rates.

INSERT TABLE 20 HERE

6. CONCLUSION

This paper documents a particular mechanism through which connections with the government are associated with preferential treatments for firms. For a sample of 1,076 Chinese enterprises that applied for an IPO from 2009 to 2012, I show that connections with a specific government decision-making entity, namely, PORCs recruited by China's securities commission, are *associated* with a higher likelihood of obtaining approval for equity finance and IPO success in particular. Using a specific regulatory change and natural experiment, I further document that connections do not simply render benefits legitimately, that is, via providing IPO applicants with private information with regard to how decisions are made when policy discretion is exercised; rather, connections have helped weak or fraudulent IPOs succeed in the approval process, likely via some form of favor exchange among review committee members or even secret illicit bribe payments. Moreover, I present evidence that improved government transparency and the government's internal governance structure can be an effective and powerful public policy measure that curbs connected firms from extracting rents from the public. The results established in this study are robust with respect to alternative model specifications, different definitions of control variables, and an RDD design that pools together firms that are marginally declined or accepted in the review process.

Findings of this study are generally consistent with the set of well-established arguments with regard to merit regulations, including those that merit reviews create opportunities for rent-seeking behaviors, administrators do not effectively screen bad businesses from good businesses, and merit reviews do not keep all fraudulent IPOs out.

However, it appears challenging to make welfare assessments in the Chinese context. First, we do not observe lost investment opportunities due to such a system in its operation. For firms, administrative fees aside, the true cost of an IPO application is to describe to the public what they are doing and why they are doing what they are doing. The IPO is therefore a very cautious decision. Since there is a probability that an IPO will not be approved, firms weigh expected returns from IPO proceeds against costs associated with revealing their business models to the public. This study does not observe firms in need of equity finance that chose not to apply for an IPO. Second, in developed capital markets options like class action lawsuits are available for minority shareholders, and the density of securities analysts ensures that retail investors have sufficient advice and information while making their investment decisions. In China, measures that protect investors *ex post* are still a work in progress. Naïve retail investors may end up losing more if a review system screening businesses *ex ante* is not present.

This study also adds to the broad literature on business-government relations. Examining how decisions are actually made by the government, I consolidate various anecdotal claims put forth by previous work regarding how strong Asian states operate and why this has rendered more favorable macroeconomic outcomes (Amsden, 1992; Evans, 1995). The role of industrial policies and tax incentives is emphasized sufficiently in the literature, but the role of effective governance, such as the use of relative performance, has not been subject to the same scrutiny.

This paper has several limitations that highlight directions for future research. First, tracing through all possible sorts of connections is an empirical challenge, especially those unobservable to researchers. Furthermore, there are pros and cons associated with the narrower definition of connection adopted in this paper. Though using aggregate ties obscures the mechanisms through which connections add value to firms, it may enable

researchers to capture a larger amount of information (Fisman, 2001). Similarly, tracing through all possible ultimate beneficiaries of connections is also difficult. Connected PORC members may benefit from increased audit/law revenue, or even take bribes illicitly, but researchers are not able to observe these. Second, the effect of connections decreases significantly with improved government transparency that took effect on April 1, 2010, and various supplementary analyses have presented evidence further supporting this claim. I would like to add a caveat that China is undertaking a series of actions domestically to improve its economic, legal and political institutions. Though improved transparency has solid theoretical grounds, and it is a first-order effect directly applied to the IPO review process over the sample period, it is possible that transparency may also pick up various indirect effects of improved institutional quality in general. Third, one data constraint is that I observe only the final decision of a review committee meeting. The votes are not observed. There is evidence suggesting that one group of committee members acts to curb the self-serving actions of its colleagues. Yet the exact group decision-making dynamics are unclear. An IPO application is approved if five out of seven committee members vote “yes”. It is a fascinating question as to how one or two auditors/securities examiners can have a significant effect on the final outcome. It may have something to do with a committee’s power distribution, as well as the consensus building process before the final voting takes place. My results also seem to suggest that favor exchanges take place among “in-group” members, in that auditors exchange favors only with auditors but not with securities examiners. These are fascinating research questions on group decision-making dynamics, which can be better answered by utilizing data on individuals’ votes (e.g. Ma and Khanna (2015)).

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TABLE 14: GOVERNMENT APPROVAL IN CHINA, 2009-2012

This table documents government approval and market control in China, by region, sector, size and ownership, during the 2009-2012 period. Data are collected from a survey of 1,539 firms operating in Mainland China, conducted by *China Listed Companies Association* in 2013. Respondents report that market control is a major barrier of doing businesses.

	<i>Number of projects requiring government approval</i>	<i>Maximum processing time</i>	<i>% Government approval regarded “unnecessary” by survey participants</i>
<i>By region</i>			
East	21.17	105.81	13.84
Middle	12.63	98.20	12.62
West	11.21	117.14	13.75
<i>By sector</i>			
Manufacturing	14.88	104.79	14.22
Industrial Services	16.17	101.34	9.53
Non-industrial Services	14.81	71.19	13.5
<i>By size</i>			
Small	12.43	99.78	14.19
Medium	19.02	111.82	13.73
Large	31.12	137.78	17.68
<i>By ownership</i>			
SOEs	17.44	107.28	12.28
Foreign-owned	8.81	107.02	13.31
Homegrown non-SOEs	18.56	105.85	14.34
Mean	17.70	106.10	13.46

TABLE 15. PUBLIC OFFERINGS REVIEW COMMITTEES (PORCs)

This table documents sources of PORC members recruited by the China Securities Regulatory Commission (CSRC) over the sample period. Each year, a total of 25 members are recruited for reviewing IPO applicants seeking to list on the *Main* or *Small and Median Enterprises* (SME) Board, and another 35 members are recruited for the *ChiNext* Board.

		<i>Main/SME Board</i>	<i>ChiNext Board</i>
<i>Full Time</i>	Auditing Firm	9	14
	Law Firm	5	6
	Other	3	3
	Subtotal	16	23
<i>Part Time</i>	China Securities Regulatory Commission National Development and Reform Commission	3	3
	Ministry of Science and Technology	1	1
	Academics	1	1
	Other	2	5
	Other	2	2
	Subtotal	9	12
TOTAL		25	35

TABLE 16. DECISIONS ON IPO APPLICATIONS

This table documents the China Securities Regulatory Commission (CSRC)'s decisions on IPO applications. Panel A displays examples of the CSRC's written notices to IPO candidates regarding a specific application. Panel B summarizes justifications for rejected IPOs (i.e. *Commission Order* 32 articles being violated) over the 2009-2012 period, with justifications sorted in descending order. Justifications for a total of 104 rejected IPOs in my sample are coded from confidential documents obtained from the CSRC.

Panel A. The CSRC's Written Notices to IPO Applicants

<i>Chinese</i>	<i>English</i>
<i>Declined IPO Application</i>	
关于不予核准厦门蒙发利科技（集团）股份有限公司首次公开发行股票申请的決定 证监许可〔2010〕994号	Desion to Decline the Application for Initial Public Offering of Xiamen Mengfali Technology (Group) Co., Ltd. Securites Commission License [2010] No. 994
厦门蒙发利科技（集团）股份有限公司： 中国证券监督管理委员会（以下简称中国证监会）依法受理了你公司提交的首次公开发行股票申请文件。	Xiamen Mengfali Technology (Group) Co., Ltd. :
中国证监会发行审核委员会（以下简称发审委）于2010年7月12日举行2010年第103次发审委会议，依法对你公司的首次公开发行股票申请进行了审核。	The China Securities Regulatory Commission (hereinafter referred to as the CSRS) accepted the IPO application documents submitted by your company.
发审委在审核中关注到，你公司存在以下情形：	The Public Offerings Review Committee (hereinafter referred to as the PORC), on July 12, 2010, held the 103rd committee meeting of year 2010, which reviewed your company's application for initial public offering.
报告期内，发行人产品销售存在单一客户比	The PORC is concerned with the following

例较大的情形，构成发行人未来盈利能力的重大不确定性。

发审委认为，上述情形与《首次公开发行股票并上市管理办法》（证监会令第 32 号）第三十七条的规定不符。

发审委会议以投票方式对你公司的首次公开发行股票申请进行了表决，同意票数未达到 5 票，申请未获通过。根据《证券法》、《中国证券监督管理委员会发行审核委员会办法》（证监会令第 62 号）及《首次公开发行股票并上市管理办法》（证监会令第 32 号）等有关规定，现依法对你公司的首次公开发行股票申请作出不予核准的决定。

你公司如再次申请发行证券，可在本决定作出之日起 6 个月后，向中国证监会提交申请文件。

你公司如不服本决定，可在收到本决定之日起 60 日内，向中国证监会申请行政复议，也可在收到本决定之日起 3 个月内，向有管辖权的人民法院提起行政诉讼。

二〇一〇年七月二十三日

scenario:

During the reporting period, a significant portion of your sales is with a single client, which constitute significant uncertainty in your future profitability.

The PORC believes that the above scenario violates the provisions of Article 37 of the "Administrative Measures for the Initial Public Offering and Listing of Stocks" (Commission Order No. 32) (See Appendix 1).

The PORC convened to vote on the IPO application of your company, and consent votes did not reach five, the application is therefore not approved. According to the "Securities Act", "Guidelines of the Public Offerings Review Committee of the China Securities Regulatory Commission" (Commission Order No. 62) and "Administrative Measures for the Initial Public Offering and Listing of Stocks" (Commission Order No. 32), and other relevant regulations, we now decided to decline your company's IPO application.

Shall your company consider re-apply for initial public offering, you can submit the application documents to the CSRC within six months from the date of this decision.

Shall your company disagree with this decision, you can submit a petition to the CSRC within 60 days from the date of this decision, or pursue legal action against this decision within three months of this decision.

July 23, 2010

Approved IPO Application

关于核准上海大智慧股份有限公司首次公开发行股票批复
证监许可〔2010〕1900 号

上海大智慧股份有限公司：

你公司报送的《上海大智慧股份有限公司关于首次公开发行股票的申请报告》（大智慧股函字〔2010〕6 号）及相关文件收悉。根据《公司法》、《证券法》和《首次公开发行股票并上市管理办法》（证监会令第 32 号）等有关规定，经审核，现批复如下：

一、核准你公司公开发行不超过 11,000 万股新股。

Decision to Approve the Application for Initial Public Offering of Shanghai Great Wisdom Co., Ltd.
Securities Commission license[2010] No. 1900

Shanghai Great Wisdom Co., Ltd:

Your company submitted "Report on Application of Initial Public Offering of Shanghai Great Wisdom Co." (Great Wisdom Shares Letter [2010] No. 6) and related documents, and we have received these documents. According to the relevant provisions of the "Company Law", "Securities Law" and "Administrative Measures for the Initial Public Offering and Listing of Stocks" (Commission

二、你公司本次发行新股应严格按照报送我
会的招股说明书及发行公告实施。

三、本批复自核准发行之日起 6 个月内有效
。

四、本批复自核准发行之日起至本次股票发
行结束前，你公司如发生重大事项或者财务
报表超过有效期，应及时报告我会并按有关
规定处理。

二〇一〇年十二月二十三日

Order No. 32), the decision has been made as
follows:

1. Approve initial public offering of your
company not exceeding 11,000 shares.
2. Issuance of new shares of your company
should be proceeded strictly in accordance with
the IPO prospectus and and the issuing
announcement.
3. This approval remains valid for six months
from the date of the decision.
4. From the date of this decision to completion
of the share issuance, shall there be occurrence
of significant events or expiation of financial
statements of your company, your company are
required to promptly notify the CSRC in
accordance with relevant regulations.

December 23, 2010

Panel B: Justifications for rejected IPO applications (2009-2012), sorted in descending order

<i>Article Violated*</i>	<i>Total</i>	<i>Percent</i>
37	58	29.65%
14	43	22.09%
20	23	11.63%
41	18	9.30%
18	15	7.56%
24	14	6.98%
15	9	4.65%
19	9	4.65%
21	8	4.07%
30	6	2.91%
39	6	2.91%
12	5	2.33%
32	5	2.33%
25	3	1.74%
4	2	1.16%
13	2	1.16%
34	2	1.16%
6	1	0.58%
11	1	0.58%
17	1	0.58%
27	1	0.58%
28	1	0.58%
33	1	0.58%
35	1	0.58%
40	1	0.58%

*See Appendix 1 for the translated text of *China Securities Regulatory Commission Order 32: Administrative Measures for the Initial Public Offering and Listing of Stocks*.

TABLE 17. SUMMARY STATISTICS

This table documents summary statistics for the set of variables used in the baseline estimations (i.e. Table 5 and 6). The sample contains a total of 1,076 firms that applied for IPO from 2009 to 2012. Data are manually coded from S-1 filings and other public announcements available at the CSRC's official website (http://www.csrc.gov.cn/pub/csrc_en/). Definition of variables is reported in Appendix 2. Panel A reports results of the t-tests that compare the average success rate for two subsamples of firms. Panel B shows the difference-in-difference comparison, that is, percentage of connected/unconnected firms obtaining IPO approval before and after improved government transparency. Panel C reports summary statistics of the regression variables. *, **,*** denotes significance at 10%, 5% and 1% level respectively.

Panel A. Mean Differences in IPO Success Rates

<i>Subsample A</i>	<i>Subsample B</i>	<i>Mean(A)</i>	<i>Mean(B)</i>	<i>Diff(A-B)</i>	<i>One-tailed p-value</i>
Main Board	SME Board	0.876	0.805	0.072**	0.037
Main Board	ChiNext Board	0.876	0.824	0.052*	0.091
SME Board	ChiNext Board	0.805	0.824	-0.019	0.224
High Tech=1	High Tech=0	0.842	0.805	0.037*	0.060
Patent=1	Patent=0	0.834	0.758	0.076***	0.006
				-	
Restricted Industry=1	Restricted Industry=0	0.737	0.843	0.106***	0.0001
Underdeveloped=1	Underdeveloped=0	0.785	0.824	-0.038	0.837
Connection=1	Connection=0	0.861	0.810	0.051**	0.044

Panel B. IPO Success Rates: Before and After Transparency

	<i>% Firms Obtaining IPO Approval</i>		
	<i>Connected</i>	<i>Unconnected</i>	<i>Difference</i>
Before Transparency	0.929	0.784	0.145***
After Transparency	0.818	0.814	0.004
Difference	0.111***	-0.030	0.141***

Panel C. Summary Statistics

<i>Variable</i>	<i>Obs.</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>I Percentile</i>	<i>99 Percentile</i>
Success	1076	0.820	0.385	0.000	1.000
Underpricing	882	0.324	0.339	0.141	1.533
IPO Fraud	882	0.116	0.320	0.000	1.000
Connection	1076	0.401	0.490	0.000	1.000
Transparency	1076	0.770	0.421	0.000	1.000
Connection*Transparency	1076	0.322	0.467	0.000	1.000
Auditors	1076	3.401	0.684	2.000	5.000
Securities Examiners	1076	0.517	0.548	0.000	2.000
Auditors* Connection	1076	1.389	1.757	0.000	5.000
Securities Examiners*Connection	1076	0.195	0.422	0.000	2.000
Revenue	1076	19.867	1.197	17.777	24.284
Revenue Growth	1076	0.607	1.046	0.620	6.425
ROS	1076	0.185	0.108	0.024	0.553
Intragroup Purchase	1076	0.014	0.036	0.000	0.203

Intragroup Sales	1076	0.013	0.039	0.000	0.244
Main	1076	0.105	0.307	0.000	1.000
SME	1076	0.494	0.500	0.000	1.000
Underwriter Reputation	1076	2.532	0.877	0.693	3.892
D/A	1076	0.463	0.168	0.078	0.893
Issue Size	1076	4.760	0.890	1.099	5.768
SOE	1076	0.118	0.323	0.000	1.000
Falling Product Price	1076	0.058	0.233	0.000	1.000
Rising Input Price	1076	0.347	0.476	0.000	1.000
Inventory Risk	1076	0.070	0.255	0.000	1.000
Account Receivable Risk	1076	0.203	0.402	0.000	1.000
Customer Concentration	1076	0.262	0.440	0.000	1.000
Intellectual Property Risk	1076	0.123	0.328	0.000	1.000
Patent	1076	0.816	0.388	0.000	1.000
NO. of Patents	1076	2.279	1.512	0.000	6.252
High Tech	1076	0.389	0.488	0.000	1.000
Restricted Industry	1076	0.219	0.414	0.000	1.000
Underdeveloped	1076	0.099	0.299	0.000	1.000
Firms by Province	1076	4.696	0.774	3.045	5.802
Industry Top 1	1076	0.318	0.466	0.000	1.000
Full Time	1076	6.055	0.586	5.000	7.000

TABLE 18. IPO SUCCESS

This table shows results of the pooled cross-sectional logit regressions that predict likelihood of obtaining the China Securities Regulatory Commission's approval for a sample of 1,076 firms that applied for initial public offerings over 2009-2012. Regressions include unreported industry and year fixed effects. Robust *lzl* statistics are reported in the parentheses. *, **,*** denotes significance at 10%, 5% and 1% level respectively.

	<i>IPO Success</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Connection	0.383** (2.08)	1.320** (2.50)	1.281** (2.36)	1.326*** (3.75)	0.371** (2.00)	-0.368 (0.42)	0.851*** (3.13)
Transparency		0.811** (2.11)	0.749* (1.87)	0.616 (1.56)			
Connection*Transparency		-1.138** (2.03)	-1.060* (1.85)				
Connection*Elapse				- 0.003*** (3.83)			
Auditors					0.290*	0.215	

Securities Examiners					(1.81)	(1.13)	-0.280
					-		
					0.558***		
					(2.66)		(1.16)
Auditors*Connection						0.222	
						(0.89)	
Securities Examiners *Connection							-0.795**
							(2.43)
Revenue	0.436***	0.426***	0.435***	0.416***	0.456***	0.446***	0.437***
	(3.34)	(3.29)	(3.37)	(3.30)	(3.36)	(3.40)	(3.31)
Revenue Growth	0.510***	0.499***	0.508***	0.544***	0.551***	0.526***	0.534***
	(3.07)	(3.04)	(3.10)	(3.20)	(3.21)	(3.13)	(3.16)
ROS	1.884	1.763	1.264	1.246	1.876	1.839	2.011*
	(1.61)	(1.52)	(1.10)	(1.07)	(1.59)	(1.57)	(1.71)
Intragroup Purchase	-1.955	-1.713	-1.760	-1.657	-1.925	-2.065	-1.757
	(0.75)	(0.63)	(0.66)	(0.62)	(0.74)	(0.78)	(0.69)
Intragroup Sales	-2.370	-2.364	-2.316	-2.130	-2.368	-2.315	-2.664
	(1.18)	(1.17)	(1.11)	(1.00)	(1.24)	(1.17)	(1.35)
Main	0.075	0.027	0.118	-0.013	0.425	0.255	0.293
	(0.15)	(0.05)	(0.23)	(0.03)	(0.78)	(0.47)	(0.55)
SME	0.028	0.023	0.024	0.001	0.370	0.222	0.259
	(0.11)	(0.09)	(0.09)	(0.01)	(1.32)	(0.81)	(0.99)
Underwriter Reputation	0.171*	0.182*	0.156	0.176*	0.172*	0.157	0.183*
	(1.73)	(1.81)	(1.52)	(1.72)	(1.72)	(1.55)	(1.83)
D/A	0.371	0.369	0.512	0.768	0.362	0.322	0.510
	(0.56)	(0.56)	(0.75)	(1.11)	(0.55)	(0.48)	(0.77)
Issue Size	-0.027	-0.043	-0.022	-0.034	-0.032	-0.015	-0.022
	(0.25)	(0.39)	(0.19)	(0.30)	(0.30)	(0.14)	(0.20)
SOE	0.137	0.192	0.116	0.160	0.123	0.142	0.116
	(0.44)	(0.61)	(0.37)	(0.49)	(0.38)	(0.45)	(0.37)
Falling Product Price			-0.590*	-0.597*			
			(1.79)	(1.82)			
Rising Input Price			-0.281	-0.320			
			(1.44)	(1.63)			
Inventory Risk			-0.755**	-0.738**			
			(2.35)	(2.28)			
Accountable Receivable Risk			-0.146	-0.190			
			(0.71)	(0.93)			
Customer Concentration			-0.028	-0.011			
			(0.14)	(0.06)			
Intellectual Property Risk			0.402	0.450			
			(1.27)	(1.41)			
Patent	0.707**	0.670**	0.769**	0.781**	0.759**	0.720**	0.770**
	(2.23)	(2.10)	(2.36)	(2.34)	(2.37)	(2.27)	(2.41)
No. of Patents	-0.028	-0.020	-0.036	-0.038	-0.038	-0.032	-0.048
	(0.36)	(0.25)	(0.44)	(0.45)	(0.47)	(0.39)	(0.60)
High Tech	0.350**	0.365**	0.338*	0.355*	0.371**	0.352**	0.409**
	(1.97)	(2.04)	(1.87)	(1.94)	(2.07)	(1.98)	(2.26)
Restricted Industry	-	-0.750***	-	-	-	-	-0.726***
	0.751***		0.787***	0.818***	0.718***	0.754***	
	(3.90)	(3.90)	(4.01)	(4.07)	(3.69)	(3.89)	(3.72)
Underdeveloped	-0.369	-0.410	-0.424	-0.372	-0.366	-0.375	-0.337

	(1.20)	(1.34)	(1.35)	(1.18)	(1.18)	(1.21)	(1.09)
Firms by Province	-0.201	-0.215	-0.255*	-0.269*	-0.202	-0.203	-0.191
	(1.49)	(1.60)	(1.85)	(1.92)	(1.50)	(1.49)	(1.43)
Industry Top 1	0.677***	0.687***	0.691***	0.679***	0.664***	0.677***	0.658***
	(3.38)	(3.43)	(3.42)	(3.36)	(3.32)	(3.40)	(3.26)
Full Time					-0.301	-0.044	-0.170
					(1.39)	(0.24)	(0.86)
Constant	-	-7.274***	-	-	-6.992**	-	-6.735**
	7.371***		7.136***	6.875***		8.135***	
	(2.85)	(2.81)	(2.80)	(2.75)	(2.50)	(2.94)	(2.42)
N	1,076	1,076	1,076	1076	1,076	1,076	1,076

TABLE 19. UNDERPRICING AND IPO FRAUD

This table shows the pooled cross-sectional OLS regressions of *Underpricing* and the logit regressions of *IPO fraud* for the subsample of firms that successfully went public (number of observation=882). Regressions include unreported industry and year fixed effects. Panel B runs a randomness test for assignment of PORCs, with a logit regression of connection on composition of PORCs. Robust *lzl/ltl* statistics are reported in the parentheses. *, **,*** denotes significance at 10%, 5% and 1% level respectively.

	<i>Underpricing</i>		<i>IPO Fraud</i>	
	(1)	(2)	(3)	(4)
Connection	0.074 (1.50)	0.021 (0.93)	0.642 (1.54)	-0.002 (0.01)
Transparency	-0.272*** (5.18)		0.454 (0.87)	
Connection*Transparency	-0.067 (1.21)		-1.072** (2.03)	
Auditors		0.009 (0.49)		0.335 (1.45)
Securities Examiners		-0.057** (2.21)		-0.527** (2.13)
Revenue	-0.061*** (4.68)	-0.068*** (5.08)	0.059 (0.42)	0.061 (0.44)
Revenue Growth	0.008 (0.90)	0.008 (0.97)	0.308*** (2.94)	0.319*** (3.11)
ROS	-0.421*** (3.73)	-0.455*** (4.04)	-3.432*** (2.66)	-3.524*** (2.79)
Intragroup Purchase	0.382 (1.21)	0.385 (1.25)	1.110 (0.38)	0.260 (0.09)
Intragroup Sales	-0.034 (0.12)	0.016 (0.05)	1.610 (0.61)	1.257 (0.45)
Main	0.048 (0.92)	0.092 (1.65)	-0.173 (0.28)	0.043 (0.07)
SME	0.038 (1.42)	0.068** (2.19)	1.235*** (3.67)	1.469*** (3.92)
Underwriter Reputation	0.000 (0.02)	-0.004 (0.31)	0.084 (0.61)	0.063 (0.45)
D/A	-0.233*** (2.67)	-0.216** (2.44)	-1.125 (1.17)	-1.195 (1.25)
Issue Size	-0.008 (0.61)	-0.011 (0.80)	-0.013 (0.09)	0.003 (0.02)
SOE	0.176*** (4.03)	0.173*** (3.87)	0.026 (0.07)	0.021 (0.06)
Patent	-0.022 (0.52)	-0.020 (0.47)	-0.242 (0.60)	-0.234 (0.57)
NO. of Patents	-0.005 (0.45)	-0.007 (0.72)	0.030 (0.30)	0.022 (0.21)
High Tech	-0.016 (0.75)	-0.016 (0.73)	-0.065 (0.27)	-0.079 (0.33)
Restricted industry	-0.019	-0.012	0.023	0.064

	(0.76)	(0.48)	(0.08)	(0.22)
Underdeveloped	0.129***	0.126***	-0.434	-0.453
	(3.05)	(3.00)	(0.99)	(1.04)
Firms by Province	-0.002	-0.002	-0.456***	-0.470***
	(0.13)	(0.13)	(2.75)	(2.84)
Industry Top 1	-0.033	-0.036	-0.232	-0.193
	(1.48)	(1.57)	(0.93)	(0.77)
Full Time		-0.021		0.364
		(0.84)		(1.40)
Constant	1.866***	2.138***	-0.696	-3.961
	(7.27)	(6.93)	(0.26)	(1.34)
R2	0.21	0.18		
N	882	882	882	882

TABLE 20. SUPPLEMENTARY ANALYSES

This table presents supplementary analyses. Panel A runs a randomness test for assignment of PORCs, with a logit regression of connection on composition of PORCs. Panel B shows the results of a regression discontinuity design (RDD) that pools together marginally accepted/declined applications (number of observation=103). Regressions include unreported industry and year fixed effects. This table reports only coefficients of the key variables. Robust $|z|/|t|$ statistics are reported in the parentheses. *, **, *** denotes significance at 10%, 5% and 1% level respectively.

Panel A. Test of Randomness: Assignment of Public Offerings Review Committees (PORCs)

A1. Summary Statistics: Composition of PORCS

	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Auditors	3.4	0.7	1	6
Lawyers	1.7	0.6	0	3
Securities Examiners (CSRC)	0.5	0.6	0	3
Academics	0.2	0.4	0	2
Non-CSRC Ministries	0.1	0.3	0	1
Other	1.1	0.7	0	4

A2. Test of Randomness

	<i>Connection</i>	
	(1)	(2)
Auditors	0.098	-0.063
	(0.92)	(0.53)
Lawyers	-0.129	-0.170
	(1.09)	(1.37)
Securities Examines	-0.170	-0.008
	(1.13)	(0.05)
Non-CSRC Ministries	0.269	0.232
	(1.12)	(0.95)
Academics	0.187	0.194
	(0.98)	(0.99)
Control variables	No	Yes

<i>N</i>	1,076	1,076
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Panel B. Borderline Applications (RDD)

	<i>IPO Success</i>	
	<i>(1)</i>	<i>(2)</i>
Connection	16.317*** (8.52)	16.178*** (8.51)
Transparency	18.586*** (21.48)	19.263*** (15.03)
Connection*Transpare ncy	-16.686*** (8.80)	-16.737*** (8.53)
Auditors		0.942 (1.58)
Securities Examiners		-0.539 (0.57)
<i>N</i>	103	103

Appendix 1. China Securities Regulatory Commission Order 32: Administrative Measures for the Initial Public Offering and Listing of Stocks

Chapter I General Provisions

Article 1 In order to regulate the initial public offering (hereinafter referred to as the IPO) and listing of stocks and protect the legitimate rights and interest of investors as well as the social and public interests, the present Measures are formulated in accordance with the Securities Law and the Company Law.

Article 2 A stock IPO and listing within the territory of the People's Republic of China shall be governed by the present Measures. If a domestic company purchases or trades stocks in foreign currency, it shall not be under the control of the present Measures.

Article 3 A stock IPO and listing shall meet the requirements for issuance as prescribed by the Securities Law, the Company Law as well as the present Measures.

Article 4 The information as disclosed by an issuer in accordance with law shall be authentic, accurate and integrate, and shall not carry any false record, misleading statement or major omission.

Article 5 In accordance with the principles of due diligence and accountability as well as honesty and good faith, a recommender as well as the representative of recommendation thereof shall earnestly perform its obligation of scrutinized examination and tutorship, and shall be responsible for the authenticity, accuracy and integrity of the Recommendation Letters of Issuance it has provided.

Article 6 In accordance with the widely-accepted business standards as well as the moral criterion within the sector, the securities trading service institutions and personnel that produce the relevant documents for securities issuance shall strictly perform their statutory functions and duties and shall be responsible for the authenticity, accuracy and integrity of the documents they have provided.

Article 7 The CSRC shall implement verification on the stock IPO as made by an issuer and shall not make any material judgment or guaranty on the value of stock investment or on the proceeds as generated by investors. After a stock is issued in accordance with law, an investment risk as incurred from any change of the issuer's business or proceeds shall be borne by the relevant investors themselves.

Chapter II Requirements for Issuance

Section I Qualification for Issuers

Article 8 An issuer shall be a joint stock limited company, which has been established according to the law and lawfully exists.

When a limited company is altered into a joint stock limited company in accordance with law, upon the approval of the State Council, stock issuance may be adopted for the establishment by way of public offering.

Article 9 Since a joint stock limited company is established, its business operations shall last for 3 years or more, unless it is so approved by the State Council.

If a limited company is altered into a joint stock limited company by converting the entirety of its original net book value of assets, the term for its business operations may be calculated as of the day when the limited company is established.

Article 10 If an issuer's registered capital has been fully paid in and the formalities for transferring the property right of the assets that the issuer or its shareholders apply as contributions have been concluded, the issuer's major assets does not have the heavy dispute on title.

Article 11 The business operation of an issuer shall conform to the relevant provisions of the laws, administrative regulations as well as company constitution, and meet the relevant industrial policies of the state.

Article 12 Within the latest 3 years, there is no major change regarding an issuer's main business, directors and senior managers, and there is no alteration of the actual controller thereof.

Article 13 Where an issuer's equity is well-defined, it does not have the heavy dispute on title of the issuer's shares as held by its controlling shareholders, or by the shareholders under the control of its controlling shareholders or the actual controller.

Section II Independence

Article 14 An issuer shall have a complete set of operation system and can independently manage market-based business operations directly.

Article 15 An issuer's assets shall be integrated. A production enterprise shall be equipped with the relevant production system, auxiliary production system as well as supporting facilities corresponding to its business operations, have the right to own or use the land, workshop and machines and facilities relating to its business operations as well as the ownership or use right to its trademarks, patent technologies and know-how, and have an independent purchase system of raw materials and sales system of products. A non-production enterprise shall be equipped with a set of operation system as well as the relevant assets relating to its business operations.

Article 16 An issuer shall have personnel independence. Senior managers such as the general manager, deputy-manager, financial principal and secretary of the board of directors shall not hold any post other than director or supervisor in, or take any salary from the enterprise of its controlling shareholders, actual controllers or any other enterprise under its control. The financial staff of an issuer shall not hold any part-time post in the enterprise of its controlling shareholder, actual controller or any other enterprise under its control.

Article 17 An issuer shall enjoy financial independence. An independent financial verification system shall be established, independent decisions shall be made on financial and a standardized financial accounting system shall be formulated as well as financial management on its branches and subsidiary companies. An issuer shall not share a bank account with its controlling shareholder, actual controller or any other enterprise under its control.

Article 18 An issuer shall enjoy organizational independence. An internal operating and management system shall be established and improved, its power of business operation and management shall be used independently, and shall not have any organization mixed up with its controlling shareholder, actual controller or any other enterprise under its control.

Article 19 An issuer shall enjoy business independence. Its business operations shall be implemented independently from its controlling shareholder, actual controller or any other enterprises under its control, and no intra-trade competition or obviously unfair associated transactions shall occur with its controlling shareholder, actual controller or any other enterprise under its control.

Article 20 An issuer shall not have any other severe defect in its independency.

Section III Standardized Operation

Article 21 The systems of shareholders' assembly, board of directors, board of supervisors, independent directors, and a secretary system for the board of directors shall be established and improved according to law. The relevant organizations and personnel shall be capable of performing their functions and duties in accordance with law.

Article 22 The directors, supervisors and senior managers of an issuer shall have good knowledge of the relevant laws and regulations on the stock IPO and listing as well as the statutory obligations and duties of a listed company and the directors, supervisors and senior managers thereof.

Article 23 The directors, supervisors and senior managers of an issuer shall meet the qualification requirements for holding their positions prescribed by laws, administrative regulations and rules, and shall not be under any of the circumstances as follows:

- (1) They have been banned from entering into the market by the CSRC and the ban is still valid;
- (2) They have been given an administrative punishment by the CSRC within the latest 36 months or have been given a public reprimand by a stock exchange within the latest 12 months; and
- (3) They are subject to a case investigation of the judicial organ for its involvement in a suspected crime or suspected violation of any law or regulation, and yet there is no clear conclusion;

Article 24 Internal control systems of the issuer shall be perfect and be implemented effectively, and shall ensure the reliability of its financial statements, legality of its business operations, and efficiency and efficacy of its business performances in reason.

Article 25 An issuer shall not be under any of the circumstances as follows:

- (1) Having publicly offered any securities unlawfully or in disguise without obtaining an approval from the statutory organ within the latest 36 months; or having any law-breaking act that started 36 months ago but lasts till now;
- (2) An administrative punishment has been given for its violation of any provision on industry and commerce, taxation, land, environmental protection or customs, or any other law or administrative regulation, with serious circumstances;
- (3) Within the latest 36 months, having submitted an application to the CSRC but the submitted application materials having false record, misleading statement or major omission; or failing to comply with the requirements for issuance and thus cheating for an approval by any fraudulent means; or disturbing the examination as conducted by the CSRC or the Issuance and Verification Committee thereof or fabricating or altering the seal or signature of an issuer or any director, supervisor or senior manager thereof;
- (4) Its application materials submitted for issuance this time having any false record, misleading statement or major omission;
- (5) It is investigated by the judicial organ for its involvement in a suspected crime without explicit conclusion; or
- (6) Other circumstances under which the legitimate rights and interests of investors or social and public interests are seriously injured.

Article 26 An issuer's constitution shall clarify the authority of examination and approval of its external guaranty as well as the relevant procedures for deliberation thereabout. There shall be no rule-breaking guaranty as provided for its controlling shareholder, actual controller or any other enterprise under its control.

Article 27 An issuer shall have strict rules for capital management and shall not be under any circumstance where its capital is embezzled by any controlling shareholder, actual controller or any other enterprise under its control by loaning, compensatory repayment, advance payment or any other way.

Sector IV Finance and Accounting

Article 28 An issuer shall have a sound asset quality, reasonable structure of assets and liabilities, comparatively strong profit-making capacity and normal cash flows.

Article 29 The internal control of the issuer shall be effective in all substantial aspects, for which an

authentication report on internal control shall be produced by an accounting firm, carrying an unreserved conclusion thereon.

Article 30 The accounting rules of the issuer shall be standardized. The formulation of its financial statements shall satisfy the provisions on enterprise accounting standards as well as the relevant accounting rules, which shall reflect its financial status, business achievements and cash flows thereof at arm's length in all substantial aspects. An auditing report shall be provided by a certified public accountant giving an unreserved conclusion thereon.

Article 31 The financial statements of the issuer shall be formulated based on the transactions and issues that have actually occurred and its accounting recognition, measurement or reporting shall be prudent, and a uniform accounting policy for a same or identical business operation shall be applied, which shall not be altered at random.

Article 32 An issuer shall fully disclose its relationship with associated parties and shall disclose their associated transactions in accordance with the principles of importance. The prices in associated transactions shall be at arm's length and there shall be no manipulation of profits through associated transactions.

Article 33 An issuer shall meet the requirements as follows:

- (1) Having a positive net profit of over 30 million Yuan accumulatively within the latest 3 accounting years, which are computed in the light of the comparatively low net profits upon deduction of non-regular profits/losses;
- (2) Having a net cash flow of over 50 million Yuan accumulatively, or having a business income of over 0.3 billion Yuan accumulatively within the latest 3 accounting years;
- (3) The total amount of stock capital is no less than 30 million Yuan before issuance;
- (4) The proportion of its intangible assets (upon deduction of its land use right, right to aquatic breeding and right to mining) in its net assets at the end of the latest period shall be not higher than 20 %; and
- (5) No uncovered deficit in the latest period.

Article 34 An issuer shall pay taxes in accordance with law, and all tax preferences shall comply with the provisions of the relevant laws and regulations. An issuer's business achievements shall not seriously depend on tax preferences.

Article 35 An issuer shall have no major debt-paying risk or shall not be involved with any major contingent issue such as guaranty, litigation and arbitration that may negatively affect its business operations.

Article 36 An issuer's documents on application shall not be under the circumstances as follows:

- (1) Omitting or making up, purposely, any transaction, item or any other important information;
- (2) Abusing any accounting policy or accounting estimate; or
- (3) Manipulating, fabricating or tampering the relevant accounting records or credence that form the basis of financial statements.

Article 37 An issuer shall not be under any of the circumstances as follows where its capability of making profits continuously is negatively affected:

- (1) Its operational mode or variety structure of products and services has been or will be greatly changed, thereby inflicting a major negative impact on its capability of making profits continuously;
- (2) Its industrial status or business environment has or will greatly change, thereby inflicting a major negative impact on its capability of making profits continuously;
- (3) Its business income or net profit largely depends on its associated party or on any client with great uncertainty within the latest accounting year;
- (4) Its net profit mainly comes from the proceeds as generated from investment beyond the range of consolidated financial statements within the latest accounting year;
- (5) It exists serious risks of negative change in obtaining or utilizing such important assets and technologies as trademark, patent, exclusive technologies and franchise; or
- (6) Other circumstance where its capability of making profits continuously is negatively affected.

Section IV Utilization of Raised Funds

Article 38 The raised funds shall be utilized for specified purposes and shall be used in its main business

operations in principle.

Except for financial enterprises, no raised fund may be utilized in such financial investments as the holding of transactional financial assets or salable financial assets, loaning to others and entrusted financial management or be directly or indirectly invested in any company that mainly engages in the purchase and sale of securities.

Article 39 The amount of raised funds and investment projects shall be matched up to an issuer's present business scale, financial status, technical level and management capability.

Article 40 The investment projects of raised funds shall meet the relevant state industrial policies, investment management, environmental protection, land administration as well as the provisions of other relevant laws, regulations and rules.

Article 41 The board of directors of an issuer shall implement an earnest analysis on the feasibility of a project as invested by raised funds so as to ensure that the investment project may have a better market perspective and profit-making capability, to effectively prevent any investment risk and to elevate the benefits as generated from the use of the raised funds.

Article 42 Where an investment project of raised funds is implemented, it shall not incur any intra-trade competition or have any negative impact on the issuer's independency.

Article 43 A special reserve system for raised funds, which shall be deposited in a special account as decided by the board of directors, shall be established.

Chapter III Procedures for Issuance

Article 44 A resolution shall be made by the board of directors of an issuer on the specific plans of stock issuance, on the feasibility regarding the utilization of the raised funds as well as on any other item that shall be clarified, and shall submit them to the shareholders' assembly for approval.

Article 45 A resolution made by the shareholders' assembly of an issuer shall at least include the items as follows:

- (1) Kinds and quantity of the stocks as publicly offered;
- (2) Issuance targets;
- (3) The scope of price or method of pricing;
- (4) The purposes of utilization of raised funds;
- (5) A distribution plan of the accumulation profits before issuance;
- (6) The effective term of the resolution;
- (7) Authorization of specific matters in the issuance by the board of directors; and
- (8) Other matters that require clarification.

Article 46 An issuer shall formulate its documents of application, which shall be recommended and reported to the CSRC by its recommender in accordance with the relevant provisions of the CSRC.

An issuer of special industry shall provide the opinions of the relevant administrative department.

Article 47 The CSRC shall make a decision on whether to accept it within 5 workdays after receiving any application material.

Article 48 The relevant functionary department thereof shall implement a preliminary examination thereon and the Issuance and Verification Committee shall implement an examination thereon as well after the CSRC accepts any application document as reported by an issuer.

Article 49 During it carries out a preliminary examination, the CSRC shall inquire the opinions of the provincial people's government where the relevant issuer is registered about whether the government agrees to the stock issuance or not, and shall inquire the opinions of the National Development and Reform Commission about whether the investment project of raised funds meets the state industrial policies and the relevant provisions on investment management.

Article 50 In accordance with the statutory requirements, the CSRC shall decide whether to approve an issuer's application for issuance and produce the relevant documents as well.

The relevant issuer shall make the stock IPO within 6 months since the day when the CSRC approves an

issuance. If it fails to do so within 6 months, the relevant approval document shall be deemed as invalid and therefore it shall reapply for the CSRC's approval before any IPO is conducted.

Article 51 After an application for issuance is approved and before the stock issuance is concluded, if the major event occurs to the relevant issuer, it shall suspend the stock issuance, report the situation to the CSRC in time and also perform its obligation of information disclosure. If the requirement for issuance is thus affected, the procedures for verification shall be gone through again.

Article 52 If it is not disapproved for stock issuance, an issuer may submit again an application for stock issuance within 6 months after the CSRC makes a decision on disapproval.

Chapter IV Information Disclosure

Article 53 An issuer shall formulate and disclose a prospectus in accordance with the relevant provisions of the CSRC.

Article 54 The Rules of the Contents and Format of Prospectuses shall be the minimum requirements for information disclosure. Whether there is any explicit provision in the aforesaid Rules, the information that may have the major impact on the investors' decisions on investment shall be disclosed.

Article 55 An issuer as well as all the directors, supervisors and senior managers thereof shall affix its seal and their signatures to its prospectus so as to ensure the authenticity, accuracy and integrity of the contents thereof. The relevant recommender as well as the representative of recommendation thereof shall implement an examination on the authenticity, accuracy and integrity of the prospectus and shall affix its seal and his signature to the opinions about examination.

Article 56 The financial statements as cited in a prospectus shall be effective within 6 months upon expiration of the latest accounting term. Under the special circumstance, an issuer may apply for proper extension, which shall not exceed 1 month at most. The day of expiration for financial statements shall be based on the end of a year, 6-month or a quarter.

Article 57 The effective term for a prospectus shall be 6 months, which shall be computed as of the last day of signature when the CSRS approves an application for issuance.

Article 58 After an application document is accepted and before the Issuance and Verification Committee implements an examination, an issuer shall disclose its prospectus (application version) on the CSRC's website (www.csrc.gov.cn) in advance. An issuer may publicize its prospectus (application version) on its enterprise website, on which the disclosed contents shall be identical to those as disclosed on the CSRC's website and the time of disclosure shall not be earlier than that on the CSRC's website.

Article 59 An issuer as well as all the directors, supervisors and senior managers thereof shall ensure its prospectus (application version) is authentic, accurate and full as disclosed in advance.

Article 60 A prospectus (application version) as disclosed by an issuer in advance is not an official document for stock issuance, which shall not include any information on price. The relevant issuer shall not take it as a basis for stock issuance.

An issuer shall announce in an eye-catching position of its prospectus (application version) as disclosed in advance: "The application for this issuance has not been granted by the CSRC. This Prospectus (application version) shall not be applied as a legal ground for stock issuance and is merely used for advance disclosure. The relevant investors shall make their investment decisions in the light of the full text of the Prospectus as officially announced."

Article 61 Before making any stock issuance, an issuer shall publicize an extract of its prospectus on at least one of the newspapers or periodicals as designated by the CSRC, at the same time, publicize the full text of its prospectus on the websites as designated by the CSRC, and posted the full text of its prospectus in its domicile, the stock exchange for its stock IPO, domiciles of its recommender, major underwriter as well as other underwriting institution for public reference.

Article 62 A Recommendation Letter of Issuance provided by a recommender and the relevant documents provided by a securities trading service institution shall be considered as reference to the relevant prospectus,

which shall be disclosed on the websites as designated by the CSRC and be posted in the relevant issuer's domicile, the stock exchange for stock IPO, as well as the domiciles of the relevant recommender, major underwriter and any other underwriting institution for public reference.

Article 63 An issuer may publicize an abstract and the full text of its prospectus as well as the relevant documents of reference on any other newspaper or website, on which the disclosed contents shall be identical to those as disclosed on the CSRC's website and the time of disclosure shall not be earlier than that on the CSRC's website.

Chapter V Supervision and Punishments

Article 64 If the document of application sent by an issuer to the CSRC carries any false record, misleading statement or major omission, where an issuer fails to meet the relevant requirements and thus obtains an approval by any fraudulent means, where an issuer disturbs the examination as conducted by the CSRC or the Issuance and Verification Committee thereof by any unjustifiable means, or where any seal or signature as affixed by an issuer or any of its directors, supervisors or senior managers is fabricated or altered, the CSRC shall, in addition to giving a punishment according to the relevant provisions of the Securities Law, adopt the supervisory measures for terminating the relevant examination and refusing to accept the application of the said issuer for stock issuance within 36 months.

Article 65 If the Recommendation Letter of Issuance provided by a recommender carries any false record, misleading statement or major omission, where a recommender interfere with the examination as conducted by the CSRC or the Issuance and Verification Committee thereof by any unjustifiable means, where any seal or signature as affixed by a recommender or any person in charge of signing is fabricated or tampered or where a recommender fails to perform its other statutory functions and duties, it shall be handled according to the relevant provisions of the Securities Law and the recommendation system.

Article 66 If a securities trading service institution fails to fulfill its due diligence obligations or if any document it has provided carries any false record, misleading statement or major omission, the CSRC shall, in addition to giving a punishment according to the relevant provisions of the Securities Law as well as the related laws, administrative regulations and rules, adopt the supervisory measures of refusing to accept the special documents of securities issuance as produced by the relevant institutions within 12 months and refusing to accept the special documents of securities issuance as produced by the relevant signatory persons.

Article 67 If the documents as formulated or provided by an issuer, recommender or securities trading service institution fails to meet the relevant requirements, or where any issuer, recommender or securities trading service institution unlawfully alters any documents as submitted or refuses to reply to the relevant questions as raised by the CSRC in the process of examination, the CSRC shall, according to the circumstances, adopt such supervisory measures as a supervisory interview and an order of correction, record the case into the archives of creditworthiness and publicize it. In the case of any particularly serious circumstances, a warning shall be given.

Article 68 If an issuer discloses any profit estimation and if the realized profit fails to reach 80% of the estimation, except for the case of force majeure, the legal representative thereof as well as the certified accountant that has affixed his signature onto the report on verification of profit estimation shall give an explanation and make a public apology on the relevant journals as designated by the CSRC. The CSRC may give a warning to the legal representative thereof.

Where the realized profit fails to reach 80% of the estimation, except for the case of force majeure, the CSRC shall not accept any application of the relevant issuer for securities issuance within 36 months.

Chapter VI Supplementary Provisions

Article 69 The administration measures of stock IPO without listing shall be separately provided for by the CSRC within the territory of the People's Republic of China.

Article 70 The present Measures shall enter into force as of the day of May 18, 2006. The Circular on Several Provisions on Stock Issuance (Zheng Jian [1996] No. 12), Circular on Doing a Good Job in 1997 Stock Issuance (Zheng Jian [1997] No. 13), Supplementary Circular on Several Issues regarding Stock Issuance (Zheng Jian

[1998] No. 8), Circular on the Investigation into the Stock Reform of Those Enterprises to Be Listed (Zheng Jian Fa Zi [1998] No. 259), Circular on the Investigation into the Stock Reform of the Enterprises that Plan to Make Stock IPO (Zheng Jian Fa [1999] No. 4), Circular on the Employment of Auditing Institutions by Those Enterprises that Plan to Make Stock IPO (Zheng Jian Fa Xing Zi [2000] No. 131) and Circular on Further Regulating the Stock IPO (Zheng Jian Fa Xing Zi [2003] No. 116) shall be simultaneously abolished.

Appendix 2: List of Variables coded from S-1 filings

Basic Information

IPO year (i.e. year 0): year in which S-1 was document was filed with the CSRC;

Province: IPO applicant's province of incorporation;

Industry: 3-digit CSRC industry code;

Underwriter: IPO underwriter;

Law firm: law firm advising the IPO applicant;

Auditor: auditor of pre-IPO financial reports;

Pre-IPO equity: pre-IPO equity, in 10,000 RMB;

Planned equity issuance: equity to be issued, in 10,000 RMB;

Tax: corporate income tax rate at IPO year;

Hi-Tech: a dummy variable equal to one if IPO applicant is identified as a hi-tech firm for corporate income tax purposes;

Foreign: a dummy variable equal to one if IPO applicant is identified as a foreign-owned firm for corporate income tax purposes;

SOE: a dummy variable equal to one if the IPO applicant reports its de facto controller as central SASAC or one of the local SASACs.

Financial Statements Variables

Asset, revenue, operating profit, net profit in RMB at year -3, -2 and -1;

D/E, D/A: debt/equity, debt/asset at year -3, -2 and -1;

ROA, ROS, ROE: return on assets, return on sales and return on equity at year -3, -2 and -1;

Account receivable turnover, inventory turnover (if available) at year -3, -2 and -1.

Corporate Governance

Intragroup_purchase: Purchase of goods and services from related firms/operating costs at year-3, -2 and -1;

Intragroup_sales: Sales of goods and services to related firms/operating revenue at year-3, -2 and -1

Anti-takeover: de facto controller owns >50% of shares at year 0.

Industry Characteristics

Permit: firm operating in an industry requiring special government permit to enter;

Competitive: a dummy variable equal to one if (1) firm reports the industry is dispersed and thus its market share is not easily calculated, or (3) firm reports itself as industry top 5 by revenue but its reported market share is less than 1%.

Competitive Position

Industry Top 1, 3, 5: a set of dummy variables indicating if firm self-reports as industry top 1,3 and 5 by dollar sales;

No. of Patents: number of patents owned by firm.

Patent: dummy variable equal to one if a firm owns patent.

Business Risk

A set of dummy variables indicating whether firm highlighted a specific type of business risk in its “Major Risks” section, which is located in the first page of the S-1 filing. These risks include, but not limited to

Product market competition: heightening product market competition

Falling returns: operating returns are expected to fall

Property rights: risk of infringement of trademark, product design or core technology

Industrial policies: change in industrial policies that might result in significant reduction of government subsidies

Tax Benefits: increase in corporate income tax rates following tax holidays

Undiversified business lines: volatility resulting from undiversified business lines

Concentrated customers or suppliers: vulnerability resulting from heavy reliance on single customer(s) or supplier(s)

Product safety: firm operates in consumer goods industry and there is a risk for products being recalled.