

Acting on Faith: How Regulatory Trust Affects Demand for Food Safety in China

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Abstract

Unprecedented economic growth has led to a proliferation of regulatory policies over a wide range of governance issues, not only in developed countries but increasingly in developing ones. Governments often present the adoption of such policies as a way to achieve the public interest or meet societal demands, e.g. for food safety or consumer protection. Yet we know little about what drives demand for such regulation. In this paper, I argue that, because citizens generally cannot independently validate the integrity of regulatory efforts, trust in the regulator is a major factor in how much citizens demand regulation. Testing this argument using a survey experiment of Chinese demand for food safety regulation, I find that trust plays a larger role than even price in explaining demand for certified foods relative to uncertified foods. By employing different question frames, I further find that this relationship is sensitive to status quo bias.

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Introduction

Unprecedented economic growth and substantial technological advancements have not only dramatically upended how ordinary citizens eat, work and live, such trends have also prompted a similarly substantial shift in how their lives are governed, from governance by the purse, to governance by rule-making. In the food realm for instance, though constraints in growing seasons and transportation technologies have historically dictated what most ordinary people could eat, many now enjoy access to fresh produce year-around on a scale that would have been previously unimaginable. At the same time however, the inability of citizens to rely on heuristics like sight, taste and smell to assess whether something as banal as an apple is afflicted by biological and chemical food contaminants and perhaps more importantly, their general lack of food safety-related know-how, has fueled a proliferation of food safety regulations in both the public and private domains. Similar dynamics in other governance areas like industrial policy, environmental conservation and financial market development have spurred analogous regulatory responses. But while a large body of work has investigated “the rise of the regulatory state” (Majone, 1994; Glaeser and Shleifer, 2003) and more recently, the diffusion of “regulatory capitalism” (Levi-Faur, 2005; Braithwaite, 2008), our understanding of the extent to which regulatory governance actually fulfills popular needs and demands, and by extension the success of regulatory outcomes, is still remarkably underdeveloped

Rather, scholars have often used the quality of regulatory supply as their primary prism for evaluating regulatory success (Moran, 2002; Morgan and Yeung, 2007). To that end, public interest scholars have sought to understand whether and when regulation can successfully correct market failures (Prosser, 1986; Sunstein, 1993; Majone, 1997; Ogus, 2004) while the public choice field has investigated the extent to which regulation propagates government ones (Wolfe, 1977; Wilson, 1980; Vogel, 1986; Croley, 1998). Parallel work further explores when regulation is needed at all and has investigated the conditions under which

self-regulation can be successful (Gunningham and Rees, 1997; Ogus, 1995).

However, while supply-side factors are undoubtedly important to regulatory outcomes, whether ordinary citizens evaluate regulatory success using similar criteria is doubtful. Realistically, they generally have neither the time nor ability to evaluate the seriousness of any given societal risk in the first place. By the same token, they are also further unable to verify the integrity of regulatory efforts that seek to manage these risks on their behalf. To return to the food safety example, if people cannot evaluate for themselves if an apple is contaminated by a pesticide, they are likewise similarly incapable of assessing the integrity of food safety regulation that seeks to limit pesticide contamination. As such, how people evaluate regulatory outcomes can be strongly influenced by their *perceptions* of how the regulation in question affects their interests (Grunert, 2005). Specifically, I argue that trust in regulatory institutions can play a significant role in mediating these perceptions, and ultimately, regulatory success. The more one trusts the regulatory institution in question, the more likely one is to value regulation generated by it.

I test this argument through the lens of food safety in China, which may be especially fruitful for a number of reasons. For one, recent developments in food safety regulation in the developing world, to say nothing of regulatory state formation more broadly is as yet greatly under-researched compared to that of the developed world (Henson and Caswell, 1999; Grunert, 2005; Verbeke et al., 2007; Morgan and Dubash, 2012). Though a number of scholars have investigated how the rise of private or third party food safety standards in developed countries might affect developing countries' access to export markets (Henson and Jaffee, 2008; Henson and Humphrey, 2010), less research has explored the potential domestic market implications for developing countries.

Indeed, there is ample reason to think that the development of a food safety regulatory framework may differ substantially in China. What work which does exist argues that consumer demand for better food safety has led to the proliferation of private food safety standards in both the developed and developing world (Henson and Reardon, 2005; Hatanaka,

Bain and Busch, 2005). In developing countries in particular, when public standards are missing, private firms are thought to have sufficient market incentive to develop private ones to respond to citizen concern over food safety problems (Reardon et al., 2001). However, in China, decade-long problems with food safety have instead led to greater development and reform of its public food safety regulatory apparatus, with much less development of private standards targeting the domestic market (Yan, 2012; Jia and Jukes, 2013). This paper not only shows that regulatory trust plays a significant role in explaining regulatory demand, but suggests that this link may help explain the discrepancy between China's food safety regulatory development and that of other developing countries.

To do so, I conduct a survey experiment of a representative sample of Chinese citizens. More concretely, I first ask respondents about their trust in four different regulatory institutions that, *a priori*, they might be expected to have different levels of trust toward: the central government, the provincial government, private industry and NGOs. I then assess Chinese consumers' demand for pork certified by each of them, using both willingness to pay (WTP) and willingness to accept (WTA) questions to account for potential question framing effects. The central question that I seek to analyze with this survey questionnaire is: how much does regulatory trust affect regulatory demand?

To preview the findings, though the relative strength of this relationship is indeed sensitive to framing effects, overall, trust is found to play a large substantive role in regulatory demand. While a number of studies have examined what economic factors influence demand for food safety certifications in China and as such have limited themselves to investigating the extent to which price affects regulatory demand. My analysis suggests that consumers are driven far more by political and social dynamics given that consumers appear to give far greater weight to regulatory trust compared to price when demanding regulation. Moreover, trust in public food safety standards is found to significantly outstrip that for private food safety standards, suggesting that at least in the case of China's domestic market, concerns about the legitimacy challenge private standards pose may be overblown.

Trust and Regulatory Outcomes

While the risk literature actively interrogates how trust affects public perceptions of risk and regulation across a variety of issue areas, relatively little work directly explores how such perceptions might affect public behavior and ultimately regulatory outcomes. An exception is Slovic et al. (2000), who find that while the French public has expressed as much concern over nuclear energy as the American public has, French citizens have also expressed greater trust in scientists, industry and government officials to design, build, and regulate nuclear power plants safely. This discrepancy helps explain why France relies on nuclear power for more than 70% of its energy¹ compared to only 20% in the United States.² Their work, however, explores the relationship between trust and regulatory demand indirectly, that is via democratic institutions.

Indeed overall, work on regulation and risk has taken place in democratic, developed countries which have distinct mechanisms for translating popular preferences into political outcomes. Investigating this relationship in an authoritarian setting not only greatly increases the variation of the sample cases, but also allows us to test for a more direct relationship between regulatory trust and regulatory demand as authoritarian regimes generally possess few formal institutions for managing mass preferences.

Food safety regulation in China

The ubiquity of food safety scandals in China over the past decade makes it both an important and appropriate developing country case to test these arguments. Perhaps the most well-known Chinese food safety scandal to date is the 2008 infant powder one. Conservative

¹“France – Country Statistics.” *IAEA*. Last Accessed May 2017: <https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=FRLast>

²“United States of America – Country Statistics.” *IAEA*. Last Accessed May 2017: <https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=US>

estimates suggest that as many as 300,000 babies were put at risk because they were unknowingly fed melamine-laced milk. More recent scandals include the so-called “gutter oil” phenomenon, wherein discarded oil is reused using rudimentary reprocessing techniques,³ the selling of expired meat,⁴ and the proliferation of fake alcohol,⁵ among many others.

The Chinese central government has undertaken extensive measures to address these transgressions to domestic food safety.⁶ Ultimately, however, China’s political leadership seeks to redress not only the food safety problems themselves, but the underlying societal grievances that such problems engender as well. Consequently, they have vigorously publicized their regulatory reform efforts in a bid to enhance consumer perceptions of food safety. For example, in the wake of the 2007 pet food contamination scandal, former President

³Fisher, Max. “You may never eat street food in China again after watching this video.” *Washington Post*. 28 October 2013. Last accessed August 2017: <https://www.washingtonpost.com/news/worldviews/wp/2013/10/28/you-may-never-eat-street-food-in-china-again-after-watching-this-video/>

⁴Burkitt, Laurie. “McDonald’s Overhauls Food Safety Strategy in China.” *The Wall Street Journal*. 2 September 2014. Last accessed August 2017: <https://www.wsj.com/articles/mcdonalds-overhauls-food-safety-strategy-in-china-1409643383>

⁵Melchior, Jillian. “China’s Fake Alcohol”. *National Review*. 13 April 2013. Last accessed August 2017: <http://www.nationalreview.com/article/345434/chinas-fake-alcohol-jillian-kay-melchior>

⁶It ratified its first major piece of domestic legislation, the Food Safety Law, to deal specifically with food safety in 2009 (previous legislation dealt solely with the issue of food hygiene), updating it in 2015. In 2013, the central government also consolidated responsibility for food safety in the newly created Chinese Food and Drug Administration.

Hu Jintao⁷ and Premier Wen Jiabao⁸ publicly pledged to improve food safety and product quality. Following his ascension to office, President Xi Jinping has gone so far as declaring, “whether we can provide a satisfying solution on food safety to the people is an important test on our capacity of governance.”⁹ At stake is not only the public health, but the public trust.

Existing survey research suggests that despite legislative and regulatory reforms, the Chinese government nevertheless faces an uphill battle in regaining public trust. In their survey of Beijing residents for example, Zhang and Zhao (2007) find that the overwhelming majority of respondents, 89.1%, stated that food safety problems are difficult to resolve because of ineffective governmental management. Meanwhile, in his analysis of social media posts, Yang (2013) finds that most netizens blamed government agencies and officials for tainted milk scandals. This corresponds to original interviews that I conducted in China in 2015, in which both the government and corporate greed were named as culprits the food safety crisis.¹⁰ Exploring how trust might potentially affect regulatory demand is especially interesting in an authoritarian setting where mechanisms for expressing grievances in the political realm are generally informal and under-institutionalized. Unfortunately, existing

⁷“Chinese President Stresses Importance of Farm Produce Safety.” *People’s Daily*, April 25, 2007. Accessed August 2017. http://english.people.com.cn/200704/25/eng20070425_369431.html.

⁸Jiao, Wu. “Premier: Food Safety a Top Priority.” *China Daily*. July 26, 2007. Accessed August 2017. http://www.chinadaily.com.cn/china/2007-07/26/content_5443513.htm

⁹Hakobyan, Artavazad and Paavo Eliste. “Food Safety in China: Addressing Common Problems Requires Unusual Approaches ” *Voices: Perspectives on Development*.” 30 March 2015. Accessed August 2017: <http://blogs.worldbank.org/voices/food-safety-china-addressing-common-problems-requires-unusual-approaches>

¹⁰This field work was sponsored by a Fulbright-Hays Doctoral Dissertation Research Abroad award.

research that explicitly looks at the demand for food safety regulation in China has generally found that some consumers are willing to pay a premium for food safety attributes but do not further explore the determinants for this demand (Wang, Mao and Gale, 2008; Yin et al., 2010; Ortega, Wang, Wu and Olynk, 2011; Ortega, Wang, Olynk, Wu and Bai, 2011; Wu, Xu and Gao, 2011; Zhang, Bai and Wahl, 2012; Zheng et al., 2012).

Nevertheless, complementary work provides anecdotal evidence that trust is an important factor in shaping citizen behavior. For instance, Giovannucci (2005) observes that at a time when public trust in Chinese regulatory institutions has yet to be established, urban consumers are increasingly seeking alternatives which allow them to establish direct relationships with farmers. These efforts include community supported agriculture (CSA), urban gardening, farm-community linkages and collective purchasing. Indeed, in their study of a single Beijing CSA, Shi et al. (2011, 556) find that 41% of surveyed participants indicated that they, “wanted to know where the food they ate was grown and by whom and the same percentage indicated that they trusted the cultivation practices of CSA farm personnel.” Meanwhile, in their investigation of citizen’s willingness to pay for food safety attributes, Wu, Xu and Gao (2011) conduct a principal components analysis of potential reasons why consumers declined to pay a premium for traceable food. They identified a grouping they dubbed, “unfamiliarity with certified traceable food and doubts regarding its function,” as the first principal component. While this grouping clearly pertains to trust, it is unclear from this wording alone the degree to which it is important nor which dimensions of trust are more salient. Similarly, Yin et al. (2010) find that “distrust of organic food” helps explain why consumers are unwilling to pay for it. However, with this wording it is unclear whether respondents are distrustful of the scientific rationale for organic food or of the regulatory institution vouching for it. Overall, the extent to which trust can affect regulatory demand is still not very well understood both generally and in the specific case of Chinese food safety.

Trust in government regulation

What however, does “trust” mean? While there is no universal definition, the act of trusting is often characterized as involving both vulnerability and uncertainty. Political scientists Levi and Stoker (2000, 576) emphasizes the former by stating that it occurs when, “an individual mak[es] herself vulnerable to another individual group or institution that has the capacity to do her harm or to betray [her]” and that it is, “given to specific individuals or institutions over specific domains.” Meanwhile, coming from the field of business management, Rousseau et al. (1998) invoke both vulnerability and uncertainty when they define trust as, “the psychological state comprising the intention to accept vulnerability based upon the behavior of positive expectations of the intentions of or the behavior of another.” Bratspies (2009), a lawyer by training, drills down on the definition of regulatory trust in particular, and describes it as, “the unique form of social trust invoked when regulatory agencies make decisions under conditions of uncertainty.” Distilling these conceptions of trust to the regulatory realm then, an individual makes herself vulnerable to a regulatory institution when she accepts that the institution in question has faithfully supplied a regulatory good without having the ability to verify whether it actually has. Trust can thus theoretically play an important role in regulatory efficacy. With regards to food safety regulation for example, even if a regulator faithfully certifies a food product, its ability to safeguard food safety is moot if people do not trust the regulator enough to use or to purchase the aforementioned product, what is referred to in this article as *regulatory demand*.

Building on work that has further explored different potential dimensions of trust, this article identifies two dimensions, perceived ability and perceived benevolence, that may theoretically affect regulatory demand. These two dimensions were found to be common to the most widely used operationalizations of trust, likely because they also seek to redress the state of vulnerability and uncertainty that the act of trusting induces.

Note however, scholars have also identified other dimensions of trust that may plausibly

be important. These include transparency¹¹, objectivity,¹² fairness¹³, consistency or predictability,¹⁴ and integrity.¹⁵ However it would be challenging to efficiently ascertain the extent to which each of them affect regulatory demand on a large scale. Meanwhile, the ubiquity of the dimensions of perceived benevolence and perceived ability across different definitions suggest that these two dimensions are of greatest substantive interest to any investigation between the relationship between trust and regulatory demand. Therefore, I opt to first forward our understanding of the relationship between these dimensions of trust on regulatory demand for a large sample of respondents.

Perceived Benevolence

Perceived benevolence meanwhile refers to the intentions of the trustee toward the trustor and in particular, it specifies the extent to which the trustor perceives the trustee as acting in the interest of the trustor. In so doing, it highlights the vulnerability of the trustor's position relative to the trustee. While scholars have used different variations of and labels for perceived benevolence in their work, this general sentiment has been found across virtually

¹¹For Bratspies (2009, 607), transparency refers not only to, “the provision of accurate and useful information; it also includes a commitment to capacity-building and an active solicitation of plural voices.”

¹²Renn and Levine (1991) refer to this as the absence of bias.

¹³Renn and Levine (1991) define this as whether the trustor accounts for all relevant viewpoints.

¹⁴Interestingly, Renn and Levine (1991) defines consistency as predictability and Kasperson, Golding and Tuler (1992) defines predictability as consistency. We can perhaps broadly summarize this dimension as referring to the extent to which a trustee's expectations matches the trustor's actions.

¹⁵For Mayer, Davis and Schoorman (1995, 719-720), integrity refers to the, “trustor's perception that the trustee adheres to a set of principles that the trustor finds acceptable.”

all of them. For example, Hovland, Janis and Kelley (1953) label their first dimension of trust as *trustworthiness*, or the degree to which the trustee is seen to have no ulterior motive. Meanwhile, in identifying *stewardship* as a component of regulatory trust, Bratspies (2009, 618) invokes a number of concepts similar to benevolence, including: the “ascription of benign intent,” “fiduciary responsibility,” and a “belief in the goodwill of the other,” which she argues is necessary for regulatory institutions to be, “stewards of the public interest.” Using the label *faith*, Renn and Levine (1991) also emphasize the importance of the goodwill of the trustee in any trust relationship. Mayer, Davis and Schoorman (1995, 718-719) meanwhile define benevolence as the degree to which, “a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive.” This echoes Kasperson, Golding and Tuler (1992) conceptualization of *commitment*, the extent to which the trustee is committed to the mission of the trustor coupled with their conceptualization of *caring*, the extent to which the trustor is perceived to show concern for the trustor. A synthesis of the above characterizations of perceived benevolence suggests that the extent to which a person demands a regulatory policy depends on how much she believes the regulator is acting in her best interest. This leads to the following hypothesis:

Hypothesis 1: The more a person perceives a regulatory institution to be acting in her interests, the more likely she is to demand regulation from it.

Perceived Ability

Perceived ability refers to the competency and capacity of the trustee. It specifies the degree to which the trustor perceives the trustee to be capable of executing the task that the trustor is delegating to the trustee. It thus responds to the lack of agency and consequently, the uncertainty on the part of the trustor inherent in the act of surrendering responsibility to a trustee. Hovland, Janis and Kelley (1953); Renn and Levine (1991); Kasperson, Golding and Tuler (1992) all identify this trait as *competence*, or the degree to which the trustee is seen as

an expert and thus reliable. Meanwhile, in Mayer, Davis and Schoorman (1995, 717-718)'s definition, ability refers to whether the trustee has domain-specific, "skills, competencies and characteristics that enable a party to have influence." Bratspies (2009, 607) takes another tack by emphasizing the importance of what she calls *expertise*. For her, expertise signifies not only technical mastery but also, "a keen appreciation of the limits of expertise and an ability to work respectfully with diverse groups."

Taken together, these various definitions emphasize the importance of competence in bolstering trust, though these authors cite different causal mechanisms for why this might be, which as outlined above, include bolstering reliability, power, or self-knowledge. Overall, the above discussion suggests that regulatory demand is more likely when citizens have greater confidence in the regulator's technical and administrative expertise to implement a regulatory scheme, leading to the following hypothesis:

Hypothesis 2: The more a citizen perceives a regulatory institution to be capable of implementing regulatory policy, the more likely she is to demand regulation from it.

Survey Design

I test the relationship between trust and food safety regulation using a telephone survey experiment of Chinese citizens. In the questionnaire, respondents are asked about their trust in the following regulatory institutions: the central government, the provincial government, private industry, and NGOs, both in terms of the degree to which these institutions are perceived to be acting in consumer interests with regards to food safety (*Perceived Benevolence*) and the degree to which they have confidence in these institutions to implement food safety regulations (*Perceived Ability*). The exact question wording was as follows:

Perceived Benevolence: 我相信, 关于食品安全, [Insert Institution]会照顾

我的利益。

I trust [Insert Institution] to look after my interests with regards to food safety issues.¹⁶

- 非常同意(strongly agree)
- 比较同意(agree)
- 较不同意(disagree)
- 非常不同意(strongly disagree)
- [不读]:拒答([Do not read]: No answer)

Perceived Ability: 有些人对[Insert Institution]保障食品安全的能力有信心。有些人对他们的能力没有信心。您呢? 您对他们的能力非常有信心, 比较有信心,不太有信心, 还是非常没有信心?

Some people are confident in the ability of [Insert Institution] to safeguard food safety. Other people are not confident in their ability. How about you? Are you very confident, confident, unconfident, or very unconfident in its ability?

- 非常有信心(very confident)
- 比较有信心(confident)
- 不太有信心(unconfident)
- 非常没有信心(very unconfident)
- [不读]:拒答([Do not read]: No answer)

¹⁶Adapted from Shi (2001); in his survey he asked respondents the following: “Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statement: The government can be trusted to do what is right without our having to constantly check on them.” A similar statement is also used in the Asian Barometer Index: “You can generally trust the people who run our government to do what is right.”

Next, followed by a brief description of what food certification is, respondents were randomly assigned to be asked about their demand for certified pork using either a WTP or WTA question frame. In a typical WTP experiment, researchers seek to ascertain the maximum amount a subject is willing to pay for a particular good. Meanwhile, in a typical WTA experiment, participants are first given the good outright and researchers then seek to ascertain the minimum amount the participant is willing to accept to give it up. As such, WTA experiments can also be conceptualized as a test of the endowment effect, which states that people ascribe more value to things that they already own. While under rational choice assumptions, consumer WTP and WTA should be equivalent, scholars have found that WTA prices are often much higher than WTP prices (Horowitz and McConnell, 2002; Hanemann, 1991; Shogren et al., 1994). Though a number of studies have explored the extent to which such discrepancies exists more generally (Horowitz and McConnell, 2002; Hanemann, 1991; Shogren et al., 1994), no study has sought to do so with regards to food safety regulation in China.

One possible reason for this lacuna is that while WTP questions can plausibly be argued to describe how at least some people make their food purchasing decisions, WTA questions cannot. That is, in the real world, it is difficult to imagine the average person purchasing food in the following manner: being first given food and then deciding the minimum amount she would accept to give it up.¹⁷ To better simulate a more plausible scenario, I instead develop a variation of the typical WTA question by asking participants whether they are willing to accept regular pork given the availability of certified pork for a certain premium. This question wording has the added benefit of testing for the existence of a different potential cognitive bias. That is, rather than testing for the endowment effect, this phrasing tests for status quo bias, which hypothesizes that people tend to be biased toward the status quo, even if it would be better to choose the alternative (Samuelson and Zeckhauser, 1988).

¹⁷Note, WTA questions are often used to assess the minimum amount a person is willing to accept to give up a public good, which is a much more plausible real-world situation.

Concretely, respondents were randomized along two dimensions in the survey. First, respondents were randomly assigned to receive either a WTP or a WTA treatment effect. Second, respondents were then randomly assigned to be asked whether they would either be willing to pay or willing to accept a particular price, X , for certified pork. The amount X , also known as the bid price, is randomly assigned across respondents but remains constant for each respondent. As such, respondents randomly assigned the WTP treatment were asked what additional amount X they would be willing to pay for pork certified by each of the different regulatory institutions given the availability of uncertified pork for a lower price. Meanwhile respondents assigned to a WTA treatment were asked whether they would be willing to accept uncertified pork given the availability of certified pork for X amount more.

Finally, the questionnaire also assesses respondents' baseline concerns, interest, experience and knowledge of food safety problems and certification schemes. Socio-demographic questions, including age, gender, *hukou* status,¹⁸ education, number of children, household size, and household income were also included as controls. For a more extensive discussion of both the survey content and methodology, please see Online Appendix A.1.

Survey Logistical Overview

The telephone survey was administered by the Research Center for Contemporary China (RCCC) at Peking University from August 25, 2016 to October 27, 2016. 8 enumerators from the RCCC institute were tasked with implementing the survey. Each enumerator received 3 hours of training to provide them with information about the project, basic interviewing skills, and the technical skills needed to record survey responses. Each survey response was

¹⁸The *hukou* is a household registration system that officially identifies a person as a resident of a certain area. Substantial government benefits can accrue to holders of urban *hukous* relative to holders of rural *hukous*.

recorded and reviewed by the survey coordinator to ensure its quality and fidelity.

The sample pool was based on randomly generated cell phone numbers that were then validated with an automatic dialer. A total of 1000 out of 12,772 people were sampled from this pool of valid cell phone numbers, for a response rate of 7.8%. Note, mobile phones have penetrated Chinese society with astounding speed, with an estimated 1.32 billion people, around 77.3% of the population, possessing a mobile phone by the end of 2016, mitigating potential issues with selection bias with regards to the initial sampling pool.¹⁹ A pilot internet survey was also conducted and more details about it can be found in Online Appendix A.2.

Data

With regards to sampling strategy, 100 respondents each were sampled from 5 city pairs (10 cities in total). These cities were chosen to balance regional and political differences: Beijing and Shanghai (controlled directly by the central government), Harbin and Changchun (Northeast China), Hohhot and Taiyuan (Northern China), Kunming and Chengdu (Southwest China), Wuxi and Changsha (Southeast China). The sample was further balanced on gender and age, to reflect population demographics as closely as possible (see Table 1).

The sample distribution also largely reflects the population distribution with regards to measures for which there are readily available population statistics to compare them to (i.e. age, urban/rural *hukou*, household size, income). With regards to other sample characteristics, most respondents say that they themselves are responsible for food preparation at home, followed by their parents and their spouses. Meanwhile, most respondents have either high school or college education, which is consistent with China's high school enrollment

¹⁹“Mobile phone penetration in China as share of the population from 2013 to 2019.”

Statista. Accessed September 2017: ‘<https://www.statista.com/statistics/233295/forecast-of-mobile-phone-user-penetration-in-china/>’

Table 1: Breakdown of Gender and Age in the Survey Sample Compared to the General Population

<i>Age</i>	China's 6th Population Census		Survey Sample	
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
18-29	15.0%	14.5%	15.3 %	15.1%
30-39	11.4%	10.8%	10.7 %	11.0 %
40+	24.4 %	23.9%	24.0%	23.8%

rate. Finally, respondents in the telephone survey represent a wide sector of society with regards to occupation. For more detailed descriptive statistics, please see Tables A3 and A4 in Online Appendix A.3.

Empirical Analysis

Modeling the relationship between regulatory trust and regulatory demand

The base model that I use to assess the degree to which trust affects regulatory demand is as follows:

$$y_i = \beta_0 + \beta_1 * Price_i + \beta_2 \cdot Perceived\ Benevolence_i + \beta_3 \cdot Perceived\ Ability_i + \delta \cdot Controls_i + \epsilon_i$$

Here, y_i is a binary variable of whether the respondent is willing to purchase certified pork and thus represents regulatory demand for certified pork. $Price_i$ is the price of the certified pork and is randomly selected for each respondent from the following set of bid prices: 16, 17, 18, 19, 20 and 22 yuan, where the reference price for uncertified pork is given as 15 yuan.²⁰ $Perceived\ Benevolence_i$ is the extent to which the respondent believes the regulatory institution acts in her interests with regards to food safety and $Perceived\ Ability_i$ is the extent

²⁰See Appendix A.1.4 for more information on how the bids were constructed.

to which the respondent believes the regulatory institution is capable of implementing food safety regulation.

Estimating the relationship between trust and demand for food safety regulation, WTP framing

Using a logistic regression,²¹ I first estimate the effect of perceived levels of trust on demand certified pork when the WTP question framing is used.²² The results are shown in Models 1 and 2, Table 2. While Models 1 and 2 use the same covariates,²³ in Model 1, I treat variables

²¹I also ran models that included respondent and city random effects. However, the random effects were very small, the model fit was comparable and the model estimates were substantively similar. Consequently, I chose to present the simpler model without random effects.

²²Note that there was some item non-response for some survey questions (see Figure ?? in Online Appendix A.3 for a visualization of the missing data problem). To deal with this issue (Honaker and King, 2010), I multiply impute 5 datasets using the method introduced by Hoff (2007) and shown by Hollenbach, Metternich and Ward (2013) to work as well and indeed under certain conditions, more efficiently than other existing multiple imputation strategies (i.e. E-M maximization and chained equations). The trace plots of the subsequent imputations (available upon request) and the similarity in the distributions of the imputed variables to the unimputed variables (see the Online Appendix for Tables A3 and A4) provide evidence of the validity of this imputation method for this dataset. While results of the analysis are substantively the same for both the unimputed and imputed datasets, the results presented here use the imputed data as per best practice.

²³Since all the covariates could potentially affect a consumer's demand for certified pork, they were all included in the model. Potential problems with multicollinearity were assessed using variation inflation factor scores and no covariate was found to have a score larger than 10 across the different datasets. Variable selection strategies are further explored in

that are measured on a Likert scale as continuous variables — I drop this assumption in Model 2 to see whether the effects of the Likert-scale variables still hold when estimated individually.

Table 2: Logistic Regression of WTP/WTA for Certified Pork by All Institutions

	WTP		WTA	
	Model 1	Model 2	Model 3	Model 4
Perceived Benevolence	0.553 (0.094)		0.098 (0.074)	
- Disagree		0.371 (0.214)		0.103 (0.207)
- Agree		1.223 (0.237)		0.056 (0.219)
- Strongly Agree		1.336 (0.310)		0.257 (0.247)
Perceived Ability	0.757 (0.097)		0.268 (0.074)	
- Unconfident		0.494 (0.199)		0.707 (0.191)
- Confident		1.519 (0.236)		1.093 (0.206)
- Very Confident		1.870 (0.334)		0.690 (0.249)
Price	-0.071 (0.034)	-0.064 (0.036)	-0.009 (0.027)	-0.008 (0.028)
Institution Type Dummy (Private Industry)	-1.572 (0.193)	-1.514 (0.197)	-0.753 (0.152)	-0.853 (0.158)
Institution Type Dummy (NGO)	-1.463 (0.189)	-1.448 (0.192)	-0.755 (0.145)	-0.878 (0.151)
Institution Type Dummy (Prov. Govt.)	-0.077 (0.209)	-0.086 (0.212)	-0.228 (0.140)	-0.305 (0.143)
N	2008	2008	1992	1992
No. of Respondents	502	502	498	498
AIC	1851.659	1858.296	2507.284	2478.201
BIC	2126.299	2233.824	2781.532	2853.193

Standard errors in parentheses. Parameters that are statistically significant at the 5% level are in bold. Control variables included but not shown. Available upon request. The institution type dummies are measured relative to the central government.

robustness checks.

In Models 1 and 2, I find that both *Perceived Benevolence* and *Perceived Ability* are positively and statistically associated with a greater likelihood of purchasing certified pork. However, statistical significance is not the same as substantive significance. Table 3 shows the magnitude of the substantive effect for each variable of interest on the likelihood of purchasing certified pork. The first column shows the estimated effect when the variable of interest is at its lowest level. The second column shows the estimated effect when the variable of interest is at its highest level. The third column then calculates the absolute difference between the low and high columns and the fourth column calculates the relative difference.

As shown in Table 3, I find that a consumer who strongly agrees with the sentiment that a given regulatory institution looks after the public interest vis-a-vis food safety is, on average, 91.9% more likely to demand food certified by it relative to a person who strongly disagrees with this sentiment. This is equivalent to a 36.5% increase in likelihood on an absolute scale. This shows a strong substantive and positive relationship between *Perceived Benevolence* and regulatory buy-in and thus strong support for Hypothesis 1. I find an even stronger relationship between *Perceived Ability* and regulatory buy-in. Indeed, a citizen who is very confident in the regulatory institution's ability to safeguard her food safety is, all else equal, 157.3% more likely to demand pork certified by it relative to a citizen who is very unconfident in the regulatory institution's ability. On an absolute scale, this is associated with a 48.7% increase in demand for certified pork, suggesting strong support for Hypothesis 2.

Table 3: Estimated Substantive Effects for All Certified Pork

		Low [†]	High [‡]	Absolute Difference*	Relative Difference
WTP	Benevolence	39.8%	76.2%	36.5%	91.9%
	Ability	30.9%	79.6%	48.7%	157.3%
	Price	68.4%	59.1%	9.4%	-15.9%
WTA	Benevolence	56.6%	63.5%	6.8%	12.0%
	Ability	48.4%	67.1%	18.6%	38.5%
	Price	61.8%	60.6%	0.012%	-0.020%

[†] ‘Low’ is operationalized as: Benevolence = ‘Strongly Disagree’;

Ability = ‘Very Unconfident’; Price = ‘16 yuan’

[‡] ‘High’ is operationalized: Benevolence = ‘Strongly Agree’; Ability =

‘Very Confident’; Price = ‘22 yuan’

* All absolute differences significant at the 95% level

Compare these findings to the effect of trust to that of price on demand for certified pork. All else equal, a citizen is 15.9% relatively more likely to demand certified pork if it costs 16 yuan a half kilo (the minimum bid price) as opposed to 22 yuan a half kilo (the maximum bid price). The absolute difference in the demand for certified pork between the two scenarios is around 9.4%. Note, that both the relative and absolute effects of price on regulatory demand are noticeably smaller than that of perceived benevolence and perceived ability. These results suggest that trust is an even more important factor than price in influencing regulatory demand.

Estimating the relationship between trust and demand for food safety regulation, WTA framing

I further model demand for certified pork when using the WTA question framing in Models 3 and 4. I drop the assumption that Likert-scale variables are continuous in Model 4 while I operate on this assumption in Model 3. Both models suggest that a regulatory institution’s

perceived ability to safeguard food safety is an important factor in influencing a respondent's demand for certified pork. However, unlike the WTP framing, there is little evidence of a statistically significant relationship between *Perceived Benevolence* and demand for certified pork.

However, of primary interest is whether there is a substantive relationship and not just a statistical one. Indeed, despite the lack of statistical significance for the *Perceived Benevolence* parameter, a citizen who strongly agrees with the sentiment that the regulatory institution looks after her interests with regards to food safety is 12% more likely to purchase certified pork relative to a person who strongly disagrees with this sentiment. Meanwhile, the absolute difference between the two likelihoods is around 6.8% (see Table 3). As such, though its effect is substantially subdued when using a WTA framing, the substantive relationship between *Perceived Benevolence* and demand for certified pork found here does suggest some support for Hypothesis 1.

Meanwhile, the predicted effect of *Perceived Ability* on the likelihood of purchasing certified pork suggests robust support for Hypothesis 2 when using the WTA framing. As Table 3 shows, the relative difference in demand for certified pork between people who have very low and very high confidence in the regulating institution's ability is around 38.5%, with an absolute difference of around 12%. These results further bolster support for Hypothesis 2.

By comparison, the predicted effect of price on demand for certified pork using the WTA framing is negligible. The parameter estimate for price is not found to be statistically significant and more importantly, the marginal effect of price on purchasing decisions is found to be negligible. That is, the relative difference on demand when certified pork is priced at 22 yuan relative to 16 yuan is only around 0.02%. The absolute difference, around .012%, is similarly trivial. These results suggest that when the purchase of certified pork is framed as a WTA question, issues of price have no substantive impact on peoples' decision-making process.

Discussion

Overall, the model results suggest that trust plays an important role in influencing the degree to which people demand food safety regulation. This relationship holds when parsing out different levels of trust toward a broad swath of regulatory institutions. Indeed, trust is found to have a larger influence than even price on regulatory demand.

However, the degree to which trust colors people's propensity to demand certified pork is also highly suggestible to framing effects. As is evident from Figure 1, when people are asked about their demand for certified pork using a WTP frame, both perceptions of whether the certifying institution is acting in the public interest *and* perceptions of the certifying institution's ability to faithfully implement the certification protocol seem to matter a great deal. Meanwhile, perceived ability appears to have a substantively stronger effect than perceived benevolence on decision-making when the question is framed as a WTA one. Further underscoring the importance of framing, price appears to have no effect on regulatory demand with a WTA frame.

These results suggest that when consumers are prodded to think about how much they might value certified pork, which a WTP framing encourages, the perceived intentions of the certifying institution matter much more than when consumers are prodded to think about how much they are willing to relinquish access to certified pork, which a WTA framing promotes. Note however, that overall, people are less likely to say they are willing to purchase certified foods at all when a WTA framing is used, suggesting that status quo bias also plays a role. In general, how food safety regulation is framed appears to have important policy implications for its efficacy.

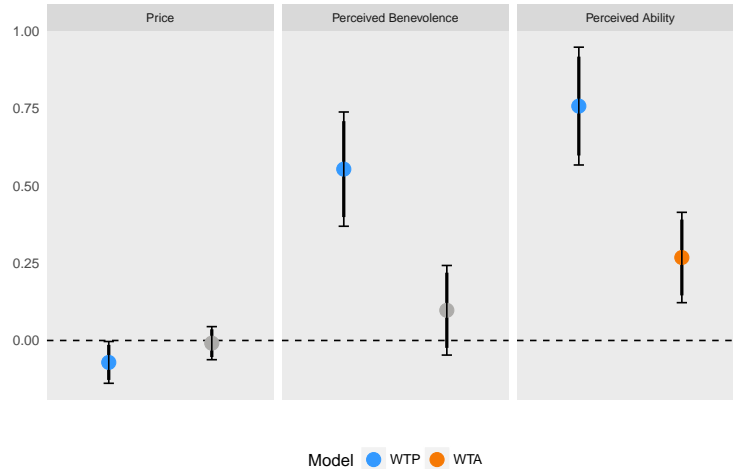


Figure 1: Comparison of how the Parameter Estimates of the effect of Price, Perceived Benevolence, Perceived Ability on Regulatory Demand change according to WTP or WTA framing

Robustness Checks

As a robustness check, I further model the relationship between the two dimensions of trust and regulatory demand for each institution separately. As before, *Perceived Benevolence* and *Perceived Ability* are still positive and statistically significant predictors of demand for certified pork for each institution type using a WTP framing. Meanwhile, using a WTA framing, *Perceived Ability* is found to have a positive and significant effect on regulatory demand at either the 5 or 10% level of significance while *Perceived Benevolence* is not a statistically significant predictor. Irrespective of the levels of statistical significance, the substantive relationship between these two dimensions of trust and regulatory demand across all institution types remains robust. Mirroring the paper’s main models, the relationship is stronger when using the WTP framing. See Tables A5 and A6 as well as Figures ?? to ?? in Online Appendix A.3 for more details.

I also validate the relationship between regulatory trust and demand by estimating a LASSO variable selection model. That is, in the original model specification, I use all the available control variables from the survey questionnaire. However, while one might have

strong theoretical reasons to suspect that these variables may confound the estimation of the relationship between the main independent variables of interest (trust) and regulatory demand, whether any of them actually do is an empirical question. Since it is *a priori* unclear which variables are the best predictors, I estimate a logistic LASSO model for each institution type. *Perceived Benevolence* and *Perceived Ability* are found to be important predictors for demand for certified pork across the different model specifications, again supporting Hypotheses 1 and 2. Meanwhile, price is not found to be a consistently important factor in determining regulatory demand, again suggesting the relative importance of trust over price. See Tables A7 and A8 in Appendix A.3 for details.

Separately estimating the relationship between trust and regulatory demand not only allows me to validate the robustness of the relationship but also to compare its relative strength across these institutions. As such, we can further see that trust plays a much larger role in explaining regulatory demand for public food safety certification relative to private or third-party food safety certification. Given that trust levels in both central and provincial government food safety certifications are significantly higher than private or third-party ones (see Table A3), it is unlikely that this is because trust is an important factor for driving demand for public regulation but not an important factor in driving demand for private or third-party certifications. More likely, trust is an important factor driving regulatory demand overall and because citizens trust public food safety certifications more than non-public ones, their demand for public food safety regulation is higher. These results have important implications for our understanding of how food safety crises in China have affected political legitimacy. While both private and public corruption have been publicly held culpable for poor food safety in China, these results suggest that the consequences for the private sphere have been far more severe. Moreover, it also suggests that at least in the case of China, concerns about private or third-party standards having an undue influence on the domestic governance of agri-food chains are, so far, not applicable.

Conclusion

To be a citizen in a modern society is to make economic decisions that are supported not by a web of social networks and obligations but by market rules and regulations that set and delimit certain standards of conduct. Regulatory institutions can perform an important role in setting these standards and regulations. While depending on the kindness of strangers is not an impossible proposition, in an increasingly globalized and anonymized world, to do so blindly is an increasingly risky one.

At the same time, while social networks and ties no longer provide an effective means to coordinate many economic transactions, social attitudes and information still play an important role in buttressing market-based rules and regulations. Though the exercise and application of such rules and regulations gives them their bite, trust that such rules and regulations will actually be faithfully executed gives them their efficacy.

In this article, I have presented evidence to suggest that people have greater demand for certified pork the more they trust the responsible regulatory institution. In particular, I find that two dimensions of trust, the perception that a regulatory institution has the best interests of the consumer at heart (*Perceived Benevolence*) and the perception that a regulatory institution is actually capable of implementing regulation (*Perceived Ability*), can have a significant and substantive impact on regulatory demand. This relationship is consistently found when using a WTP question frame. By contrast, when using a WTA question frame, perceived ability of the regulatory institution is found to have a much stronger effect than perceived benevolence on purchasing decisions, and thus regulatory demand.

At a time in which countries everywhere, especially developing countries, are constructing and reconstructing their regulatory reach, this analysis suggests that states that are able to create regulatory apparatus that build and retain trust will be crucial to the ultimate success of their regulatory policies. In short, paying attention to the drivers of regulatory demand may be just as important as examining factors which affect regulatory supply. How regulation

is framed in particular may deserve particular attention as it can have a substantive effect on regulatory demand.

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Online Appendix

A.1 Survey Design and Methodology

In what follows, I first outline the rationale for evaluating demand for pork, as opposed to other food products, to test my hypotheses. I then discuss why I chose to concentrate on food certification over other possible food safety attributes. I then explain the reasoning behind the decision to use the contingent valuation method (CVM) to elicit purchasing decisions for certified pork. Finally, I outline the methodology I used to determine which range of prices, that is, the bid design, to conduct the CVM.

A.1.1 Food safety and pork

Pork was chosen as the food item of choice not only because China is a large producer²⁴ and consumer of pork,²⁵ but also because it has experienced a spate of food safety scandals regarding pork.²⁶ Among the most famous was the 2013 incident in which 16,000 diseased

²⁴China is the world's largest pork producer, producing half of the world's total (Schneider and Sharma, 2014).

²⁵China's per capita consumption of 35.6 kg of pork in 2011 was not only double the world's average, it also constituted 60% of China's total meat consumption (Cai, Lexin, Aidan Pongrace, Christian Butts and Saier Wang. "China's astounding appetite for pork: recent trends and implications for international trade." Penn Wharton PPI, University of Pennsylvania. 2 April 2015 Last accessed August 2017: <https://publicpolicy.wharton.upenn.edu/live/news/644-chinas-astounding-appetite-for-pork-recent-trends#ftn9>).

²⁶Bottemiller, Helena. "Severe Penalties in China Clenbuterol Pork Scandal." *Food Safety News*. 29 July 2011. Last accessed August 2017: <http://www.foodsafetynews.com/2011/07/china-dishes-severe-penalties-for-clenbuterol-pork-scandal/#.VsvPlJMrIcg>; "China orders crackdown on illegal pig feed." *Xinhua*. 2011 March 22. Last

pigs were found floating in a river near Shanghai.²⁷ As such, pork represents both a substantive and salient food of interest with regards to food consumption, production and safety in China.

A.1.2 Food safety and food certification

Food certification was chosen over other possible food safety attributes because previous studies have found that consumers are more willing to pay for food certification over other food safety measures, including food traceability and food labeling. As such, it represents the most relevant food safety attribute in China today and makes understanding the determinants of demand for it substantively important. Moreover, moving from a regime in which food safety violators are caught after the fact to one in which there are few incentives to commit food safety violations to begin with, which a certification system encourages, marks an important step in building a modern food safety regulatory regime.

A.1.3 Contingent valuation method

Following Zhang, Bai and Wahl (2012) this survey employs a single-bounded dichotomous choice contingent valuation method (CVM) to operationalize the WTP and WTA questions. Under CVM, the respondent is only required to answer yes or no when asked if she is willing to pay a given (randomized) amount for a good.

Despite the simplicity of this approach, directly eliciting consumer's willingness to pay

accessed August 2017: http://china.org.cn/china/2011-03/22/content_22195419.htm; "China hit by new food safety scandal." *The Associated Press*. Last accessed August 2017: <http://www.cbc.ca/news/world/china-hit-by-new-food-safety-scandal-1.2897425>

²⁷Davison, Nicola. 2013. "Rivers of Blood: the dead pigs rotting in China's water supply." *The Guardian*. 29 March 2013. Last accessed August 2017: <https://www.theguardian.com/world/2013/mar/29/dead-pigs-china-water-supply>.

(which single-bounded CVM is a specific method of) is not without potential methodological problems, which Breidert, Hahsler and Reutterer (2006, 14) summarize as follows:

1. “By directly asking the customers for a price, there is an unnatural focus on price which can displace the importance of a product’s other attributes;
2. Customers do not necessarily have an incentive to reveal their true WTP and may overstate or understate their true WTP because of prestige effects;
3. Even if customers reveal their true valuations, this does not necessarily translate into real purchasing behavior; and
4. Directly asking for WTPs for complex or unfamiliar goods is cognitively challenging and may lead to overstating or understating.”

For this survey, such concerns are likely to be muted. With regards to the first issue, since this survey asks about willingness to purchase a *food safety attribute*, the potential bias from asking directly about price is likely subdued. Moreover, an overemphasis on price should bias against the main argument of this paper, should it exist. Meanwhile, with regards to the second issue, unlike similar studies, this study is agnostic about the absolute WTP/WTA value, as it is focused primarily on assessing factors that affect regulatory efficacy. As such, whether consumers give biased responses to the WTP questions is relatively unproblematic if biases are constant across different certifiers, which, lacking evidence to the contrary, seems to be a reasonable assumption. With regards to the third issue, again, the primary focus of this paper is to understand how regulatory trust affects regulatory demand. Though understanding how these perceptions may translate into actual purchasing behavior is also important, it would be prudent to first establish some evidence for this relationship at all. More potentially problematic is the fourth issue, that is the potential cognitive challenge in asking for a consumer’s willingness to pay for complex or unfamiliar goods, which food certification may be for many consumers. This is mitigated somewhat by the fact that respondents are

first provided with a short explanation of what food certification is before they are asked the WTP or WTA questions. While some respondents may still feel answering the question is cognitively challenging, there is again no reason to think that such potential uncertainty might be systematically related to levels of trust in different food safety regulators.

A.1.4 Methodology of Bid Design

The WTP bids were constructed with an emphasis on ensuring the efficiency of the subsequent analysis. To draw an extreme example, bids can be designed such that all respondents must choose whether to buy certified pork at 50 yuan per half kilo, given the availability of regular pork at 15 yuan per half kilo. If so, most respondents will likely decline to purchase certified pork because of its relatively high expense, reducing the statistical power of any subsequent analysis of the relationship between trust and regulatory buy-in. Prior to the main telephone survey then, I conducted a pilot internet survey to calibrate appropriate WTP bids.

However, one is similarly confronted with the problem of how to design the bids for the pilot survey. Following Hanemann and Kanninen (1999), rather than resort to infinite regress (wherein a pre-pilot survey must be launched to calibrate the WTP bids for the pilot survey *ad infinitum*), I rely on what has been learned from prior WTP studies. Studies that focus specifically on WTP for food safety attributes for pork in China were given the greatest weight though I also took into account WTP studies for food safety attributes for other foods in China. After analyzing the results of the pilot survey, the following bid design was used for the main telephone survey: 16, 17, 18, 19, 20, or 22 yuan for certified pork, with regular pork set at 15 yuan.

In what follows, I first provide an overview of how the previous literature was used to design the WTP/WTA bids for the internet survey. I then give an overview of how I used the results from the internet survey to guide the creation of the bid design for the telephone survey.

A.1.5 Literature on bid design for WTP for certified pork in China

With regards to WTP for pork, researchers report their findings in either yuan or percentages, sometimes both. In their study, Ortega, Wang, Wu and Olynk (2011) find that consumers are willing to pay anywhere from 2 - 10 rmb per half kilo of pork for various food safety attributes. Specifically, consumers were willing to pay 10.59 rmb/half kilo for government certified pork, 6.9 rmb/half kilo for NGO certified pork, 5.86 rmb/half kilo for traceable pork and 2.89 rmb/half kilo for product-specific information labels. Wu et al. (2015) estimated similar WTP values, finding that consumers are willing to pay 13.8, 15.8 and 4.8 yuan respectively for “government certification,” “domestic third-party certification”²⁸ and “international third-party certification” of a half a kilo of pork, with standard errors of 4.5 yuan, 3.6 yuan and 4.1 yuan.

Other studies estimated smaller levels of WTP for pork. Zheng et al. (2012) find that consumers were willing to pay 4.5 rmb/half kilo more for traceable pork, or a 11.25% premium.²⁹ In their survey of consumers in Wuxi (Jiangsu Province) conducted the summer and fall of 2013, Wu et al. (2016) find that consumers were willing to pay 2.79 yuan more for government certification of pork. Meanwhile in their survey of consumers in Wuxi (Jiangsu Province) conducted in the summer of 2014, Wu, Wang and Zhu (2015) find that consumers are willing to pay approximately 2.11 yuan for government certified food. Zhang, Bai and Wahl (2012) also use a continuous valuation method (CVM) to elicit the WTP from survey respondents, though with regards to traceable pork. They set their bid range for traceable pork at prices 5-30% greater than regular pork, at 5% intervals.

²⁸This survey does not make the distinction between private or non-governmental third party certifiers.

²⁹Note that the original study reported their results in rmb/kilo. In order to maintain consistency of units across the studies and with the unit of measurement used in this study, I converted the results to rmb/half kilo.

In addition, WTP studies for other certified foods in China were also taken into account. Across these studies, consumers' WTP for safer food ranged from 10-33 percent.³⁰ Finally Xu et al. (2012) set their WTP range for green and eco-labeled seafood at prices 3-15% greater than regular seafood, at 3% intervals.

Given these previous studies, I determined that a reasonable bid range for the internet survey was 15 to 30 yuan. Though such a range would allow WTP for certified pork to be as large as 100% greater than regular pork, which is a larger effect than previously estimated for pork studies, it is in line with the WTP amounts estimated for food safety attributes for food in general in China.

The next point of consideration is the number of bids to use within that range. Though *prima facie*, including one bid for each one yuan increment (so that there is a bid for 16 yuan, 17 yuan, 18 yuan and so forth until 30 yuan is reached) seems reasonable, previous literature suggests that doing so may lead to biased and inefficient results.

Indeed, a number of studies have shown that the estimated mean WTP may be sensitive to the inclusion of bids in the upper tail of the distribution, thereby biasing estimates upward Cooper and Loomis (1992); Kanninen (1995); Boyle et al. (1998); Hanemann and Kanninen (1999). Relatedly, Alberini (1995) finds, for example, that the more bids are included the WTP experiment, the lower the power of the subsequent statistical analysis for a fixed sample size. In her simulation study, Alberini (1995) recommends bid vectors between 6 and 12 for $n = 960$ and 8 and 12 for $n = 1200$ in order to ensure of the power of any subsequent analysis.

Taking into account the lessons learned from the previous literature, the bid vector that I use in the internet pilot survey is: 16, 17, 18, 19, 20, 21, 25, and 30 yuan. Note that I use

³⁰Wang, Mao and Gale (2008) find that Beijing residents are willing to pay a 5% premium for HACCP-certified milk. Meanwhile Wu, Xu and Gao (2011) found that while respectively, 53, 11.3 and 3.1 percent of respondents were willing to pay 1-15, 16-30 and 31-50 percent more for certified greens. However, only 0.5% of people were willing to pay more than 51 percent for certified greens.

the same bid design for WTA questions as well. One benefit of using the same bid design as the WTP questions is that it facilitates comparability. Perhaps more relevantly, because no previous WTA studies have been conducted on food safety attributes for pork in China, information on WTP bids is the closest substitute.

A.1.6 Validating the Internet survey bid design

I further assess whether the bids might unwittingly signal the quality of the good being bid on, which could potentially confound the validity a subsequent analysis of the relationship between trust and demand for certified pork. For example, a respondent presented with the option of buying certified pork at 16 yuan a half kilo given that regular uncertified pork is available at 15 yuan a half kilo may decline to purchase the pork because the one yuan difference between certified and uncertified pork signals to the respondent that the certification is not to be trusted. If such respondents were also systematically less inclined to trust the certifying institution, then any subsequent analysis that found a relationship between a lack of trust in that certifying institution and unwillingness to pay would be invalid.

To address this issue, in the pilot internet survey, I include additional questions which ask *why* respondents were willing or unwilling to pay for certified pork.³¹ Respondents who were unwilling to purchase certified pork were asked the following question:

- i. 你刚刚说你不愿意赔[Insert Bid Price Here]元去买[Insert Institution Here]认证的猪肉。？ 其中哪一个原因最描述为什么你不愿意买[Insert Institution Here]认证的猪肉？

You have just stated you were unwilling to pay [Insert price from Q4 here] yuan for pork certified by the [Insert Institution Here]. Which of the following reasons most closely describes the reason why you were unwilling to pay for [Insert Institution Here] certified pork?

³¹Similar questions were asked of people who received WTA questions.

- 认证猪肉的价钱太高了，我付不起
The price was too high for me to afford
- 认证猪肉的价钱太低了，我不确定中央政府认证的猪肉会这么便宜
The price seemed too low to cover the cost of certification
- 我不相信中央政府认证的猪肉会维护我的利益
I do not trust that the [Insert Institution Here] is looking after my interest when certifying pork
- 我对中央政府认证的能力没有信心
I do not have confidence in [Insert Institution Here]'s ability to implement the certification process
- 其他: _____
Other:

Meanwhile respondents who were willing to purchase certified pork were asked the subsequent follow-up question:

ii. 相比于15元一斤的普通猪肉，您愿意买[Insert Bid Price Here]元一斤的[Insert Institution Here]认证猪肉，请问是由于以下那一个原因？

You have just stated you were willing to pay [Insert price from Q4 here] yuan for pork certified by [Insert Institution Here]. Which of the following reasons most closely describes the reason why you were willing to pay for [Insert Institution Here] certified pork?

- 我很关心食品安全问题，所以愿意多付一点钱去买由中央政府认证的猪肉
Food safety is an important concern for me and I would pay for [Insert Institution Here] certified pork at most prices
- 我相信中央政府仍证猪肉会维护我的利益

I trust [Insert Institution Here] is looking after my interests when it certifies pork

- 我对中央政府仍证猪肉的能力有信心

I have confidence in the [Insert Institution Here]'s ability to implement the certification process

- 我不确定由中央政府认证的猪肉真的比较安全，但是我还是愿意买

I am not sure how much safer this [Insert Institution Here] certified pork is, but I am willing to buy it.

- 其他: _____

Other:

The inclusion of such questions also has the benefit of not only allowing assessment of whether the bids themselves are signals of the legitimacy of the certified pork but also serves to validate whether respondents explicitly take trust into account when deciding whether or not to buy certified pork or not.

To briefly summarize the results, the internet survey responses suggest that price does not act as a signal of the credibility of the certification scheme. Meanwhile, the propensity for respondents to cite the benevolence or ability of the certifying institution as the predominant driver of their decision making does not appear to vary with price. However, the responses do suggest that price is related to people's propensity to cite affordability as the reason they are unwilling to pay for certified foods (results available upon request).

This raises the possibility that the inclusion of higher level bids may falsely inflate the degree to which benevolence and ability of the certifying institution affect respondent's WTP or WTA. As such, in the telephone survey, I readjust the bids in the telephone survey to be 16, 17, 18, 19, 20, and 22 yuan. A maximum of 22 yuan still puts the highest WTP/WTA bid amount at 46%, well above what most previous studies have estimated. Meanwhile removing extreme bids and the reducing of the bid distribution from 7 to 6 bids should also increase the efficiency of the subsequent results, as Alberini (1995) argues.

A.2 Internet survey

The internet pilot survey was conducted through the Chinese crowd-sourcing site **zhubajie.com** from June 28, 2016 to November 15, 2016. **zhubajie.com** is a Chinese crowd-sourcing website similar to Amazon MTurk (Berinsky, Huber and Lenz, 2011; Goodman, Cryder and Cheema, 2012). The popularity of such websites has taken off in China in recent years, with 9 million users signing up for **zhubajie.com** since its launch in 2005 (Yang, Adamic and Ackerman, 2008). Its use in academic research outside the US is relatively new, with Huang (2017) being among the first to do so.

The survey was implemented as follows: 1) A description of the project and the link of the survey is posted on **zhubajie.com** 2) The participant clicks on the link to the survey, which is hosted by Qualtrics, a commonly used survey software 3) At the end of the survey, the respondent receives a randomly generated code that shows that she has completed the survey. The participant then returns to **zhubajie.com** and posts the code to **zhubajie.com**. After a spot check of the survey responses for completeness, I then award each participant 1 USD. Note that I also make use of the option to seal the usernames of respondents and to hide the survey from search engines to keep the survey as confidential as possible. Ultimately 8366 people viewed the posting, of which there were 1007 valid responses, for a response rate of around 12%.

A.2.1 Descriptive Statistics for Internet Survey

Survey responses were collected from 30 Chinese provinces. Most respondents come from populous and relatively well developed provinces with high internet access penetration – the top 5 being Guangdong, Beijing, Jiangsu, Shandong and Zhejiang. The geographic distribution for the internet survey respondents is shown in Figure A1.

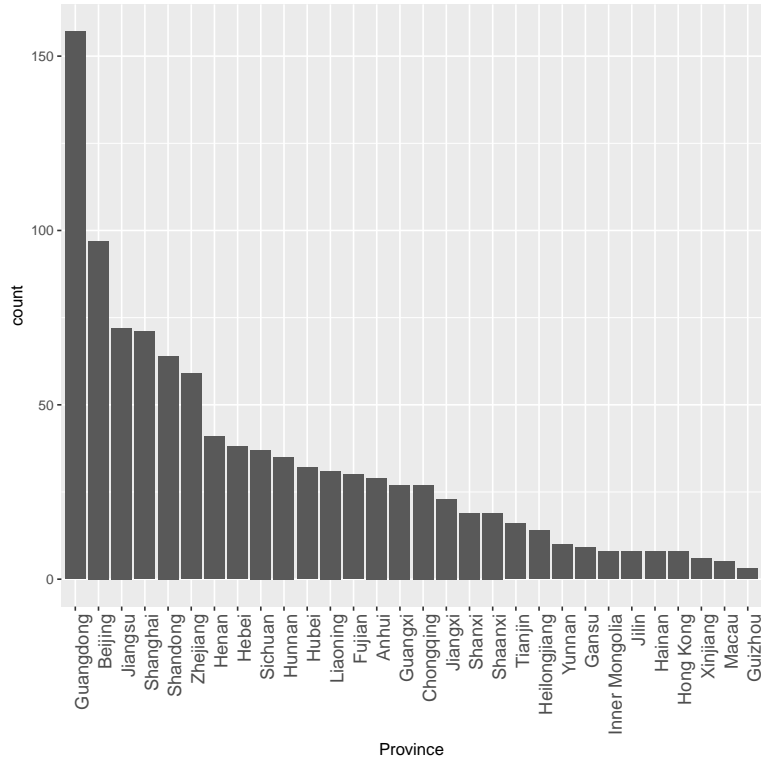


Figure A1: Geographic Distribution of Internet Sample

Demographic statistics are presented in Table A1. Here, we can see that while the sample skews male, urban, educated and young, there is good representation of women and rural *hukou* holders. Meanwhile such a distribution mirrors the demographics of the Chinese internet population as a whole, which also skews male, urban, educated in young. Most respondents live in a household with at least 3 or more people with a median household income of 10,000 yuan though the range and variation of this variable is quite large.

Table A1: Summary Statistics for Unimputed and Imputed Internet Survey

	Unimputed Data		Imputed Data	
	Mean	SD	Mean	SD
(Q01) Interest in Food Safety Level [‡]	1.99	1.37	1.99	1.37
(Q02) Worry About Food Safety Level [‡]	2.09	1.01	2.08	1.01
(Q04) Perceived Benevolence of Central Govt [‡]	2.99	0.774	2.99	0.774
(Q05) Perceived Benevolence of Provincial Govt [‡]	2.71	0.722	2.71	0.722
(Q06) Perceived Benevolence of Private Indust [‡]	2.07	0.721	2.07	0.722
(Q07) Perceived Benevolence of NGO [‡]	2.61	0.784	2.61	0.784
(Q08) Perceived Ability of Central Govt [‡]	2.84	0.786	2.84	0.786
(Q09) Perceived Ability of Prov Govt [‡]	2.54	0.746	2.54	0.746
(Q10) Perceived Ability in Private Indust [‡]	1.99	0.719	1.99	0.719
(Q11) Perceived Ability in NGO [‡]	2.4	0.732	2.4	0.732
(Q12) WTP/WTA Central Govt	0.621	0.485	0.62	0.486
(Q14) WTP/WTA Provincial Govt	0.554	0.497	0.554	0.497
(Q16) WTP/WTA Private Indust	0.342	0.474	0.342	0.474
(Q18) WTP/WTA NGO	0.421	0.494	0.421	0.494
(Q21) Pork Consumption Level [‡]	1.68	0.675	1.68	0.675
(Q22) Consumption of Unsafe Pork Level [‡]	2.65	0.76	2.65	0.76
(Q23) Familiarity with Certified Pork Level [‡]	2.22	0.53	2.22	0.531
(Q25) Number of Children	0.265	0.509	0.262	0.51
(Q26) Number of Family Members	3.43	1.12	3.43	1.12
(Q27) Age	26.2	6.4	26.2	6.4
(Q28) Hukou Registration Dummy	0.633	0.482	0.633	0.482
(Q30) Gender Dummy	0.413	0.493	0.412	0.493
(Q31) Income	1.88e+04	6.04e+04	1.88e+04	6.14e+04

[‡] Variables are measured on the Likert scale where higher numbers connote high levels of a particular measure.

Table A2: Distribution of categorical variables for unimputed and imputed data, internet survey

	Unimputed	Imputed
<i>(Q24) Responsibility for Household Food preparation(%)</i>		
Me (Respondent)	0.239	0.239
My spouse or partner	0.101	0.101
My parents	0.372	0.372
My children	0.00795	0.00794
Whoever has time	0.28	0.28
<i>(Q32) Education Level (%)</i>		
Some elementary school or less	0.00199	0.00199
Elementary School	0.00298	0.00298
Middle School	0.00994	0.00993
High School	0.172	0.172
College	0.656	0.656
Graduate School	0.157	0.157
<i>(Q33)Occupation (%)[†]</i>		
Upper level management	0.0129	
Middle management	0.0646	
White collar worker	0.307	
Educator/Researcher	0.0815	
Blue collar worker	0.0408	
Service sector worker	0.00696	
Agricultural/forestry worker or miner	0.0109	
Professional (Lawyer, Accountant, Reporter etc.)	0.0606	
Self-employed	0.0358	
Unemployed (Xiagang)	0.000994	
Unemployed (Wuye)	0.0288	
Unemploye(Shiye)	0.0109	
Student	0.288	
Military	0.000994	
Housewife	0.0149	
Other	0.0338	

[†] The multiple imputation model was unable to converge when occupation dummies were included. As such, these variables were not imputed.

A.3 Supplementary Tables and Figures

To briefly summarize how the survey sample compares with the overall population for common control variables, the average household size of the sample is 3.54 persons, which tracks with the 2015 (the latest available year) national average household size of 3.1.³² The average household income per month is around 30,000 RMB or around 4,500 USD.³³ This is equivalent to around 15,000 USD per capita, which is consistent with China's GDP per capita of around 15,500 USD³⁴ for the cities represented in the sample. For reference, this is a little less than double China's national GDP per capita for 2015 of 8,000 USD (in 2015 dollars). The sample does include more urban hukou holders relative to the general population, 57.7% as opposed to 42.1%³⁵ though there is still good representation from both populations.

³²“2-10 Household, Population, Sex Ratio and Household Size by Region (2015).” *China Statistical Yearbook 2016*. Accessed September 2017: <http://www.stats.gov.cn/tjsj/ndsj/2016/indexeh.htm>

³³This conversion is based on RMB to USD exchange rate reported for September 26, 2016 the midway point in time for the telephone survey execution.

³⁴This number was derived by finding the average GDP per capita of the 10 cities included in the telephone survey using 2013 data, which the most recent statistics available (Wang, 2014)) in the cities included in the telephone survey. The approximate GDP per capita for these cities in 2016 was derived by multiplying the 2013 GDP per capita by the national growth rate for 2014, 2015 and 2016.

³⁵“41.2% of Chinese hold urban hukou in 2016.” *Xinhua*. 10 Feb 2017. Accessed September 2017: http://english.gov.cn/state_council/ministries/2017/02/10/content_281475563833334.htm

Table A3: Summary Statistics for Unimputed and Imputed Continuous or Likert-scale Telephone Survey Data

	Unimputed Data		Imputed Data	
	Mean	SD	Mean	SD
(Q01) Interest in Food Safety [‡]	2.98	1.32	2.97	1.32
(Q02) Worry About Food Safety [‡]	3.29	1.35	3.28	1.36
(Q04) Perceived Benevolence of Central Govt [‡]	3.08	0.775	3.07	0.778
(Q05) Perceived Benevolence of Provincial Govt [‡]	2.87	0.81	2.87	0.807
(Q06) Perceived Benevolence of Private Industry [‡]	2.16	0.856	2.16	0.855
(Q07) Perceived Benevolence of NGO [‡]	2.52	0.844	2.52	0.842
(Q08) Perceived Ability of Central Govt [‡]	2.96	0.833	2.96	0.834
(Q09) Perceived Ability of Prov Govt [‡]	2.74	0.817	2.74	0.817
(Q10) Perceived Ability in Private Industry [‡]	2.08	0.806	2.09	0.806
(Q11) Perceived Ability in NGO [‡]	2.33	0.815	2.33	0.814
(Q12) WTP/WTA Central Govt	0.756	0.43	0.756	0.43
(Q14) WTP/WTA Provincial Govt	0.708	0.455	0.708	0.455
(Q16) WTP/WTA Private Industry	0.429	0.495	0.429	0.495
(Q18) WTP/WTA NGO	0.489	0.5	0.489	0.5
(Q21) Pork Consumption Level [‡]	3.24	0.969	3.24	0.969
(Q22) Consumption of Unsafe Pork Level [‡]	2.77	1.06	2.77	1.06
(Q23) Familiarity with Certified Pork Level [‡]	2.27	0.661	2.27	0.661
(Q25) Number of Children	0.465	0.556	0.465	0.556
(Q26) Number of Family Members	3.54	1.13	3.54	1.13
(Q27) Age	37.6	12.5	37.6	12.5
(Q28) Hukou Registration Dummy	0.577	0.494	0.579	0.494
(Q30) Gender Dummy	0.5	0.5	0.5	0.5
(Q31) Household Income	2.98e+04	2.93e+05	2.78e+04	2.73e+05

[‡] Variables are measured on the Likert scale where higher values connote high levels of a particular measure.

Table A4: Distribution of Categorical Variables for Unimputed and Imputed Telephone Survey Data

	Mean	
	Unimputed	Imputed
<i>(Q24) Responsibility for Household</i>		
<i>Food Preparation (%)</i>		
Me (Respondent)	0.383	0.382
My spouse or partner	0.161	0.161
My parents	0.252	0.252
My children	0.00307	0.0032
Whoever has time	0.202	0.202
<i>(Q32) Education Level (%)</i>		
Some elementary school or less	0.0255	0.025
Elementary School	0.047	0.046
Middle School	0.138	0.135
High School	0.266	0.26
College	0.465	0.455
Graduate School	0.0592	0.058
<i>(Q33) Occupation (%)</i>		
Upper level management	0.0103	0.0104
Middle management	0.0277	0.028
White collar worker	0.132	0.133
Educator, Researcher	0.0997	0.0996
Blue collar worker	0.0863	0.0858
Service sector worker	0.0946	0.0946
Agricultural/forestry worker or miner	0.0627	0.0632
Professional (Lawyer, Accountant, Reporter etc.)	0.0658	0.0664
Self-employed	0.0915	0.0916
Retired	0.0483	0.0494
Student	0.0761	0.0752
Military	0.00617	0.0062
Housewife	0.0668	0.0662
Other	0.0134	0.0134
Unemployed (Xiagang)	0.01131	
Unemployed (Wuye)	0.1069	0.118 (Total Unemployed) †
Unemployed (Shiye)	0.00102	

† The multiple imputation model showed convergence only after collapsing the difference unemployment types.

Table A5: Logistic Regression of WTP for Certified Pork by Each Institution

<i>WTP</i>	Central Gov.		Prov. Gov.		Priv. Indust.		NGO	
	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Perceived Benevolence	0.768 (0.279)		0.601 (0.249)		0.495 (0.156)		0.629 (0.164)	
- Disagree		1.305 (0.844)		0.992 (0.623)		0.263 (0.327)		-0.056 (0.410)
- Agree		1.873 (0.830)		1.490 (0.699)		0.812 (0.399)		1.400 (0.439)
- Strongly Agree		2.243 (0.985)		1.958 (0.825)		1.507 (0.554)		0.847 (0.558)
Perceived Ability	1.062 (0.288)		1.001 (0.259)		0.885 (0.170)		0.585 (0.163)	
- Unconfident		1.101 (0.784)		0.415 (0.563)		0.918 (0.340)		0.515 (0.364)
- Confident		2.532 (0.887)		2.294 (0.714)		2.140 (0.422)		1.252 (0.416)
- Very Confident		4.029 (1.081)		2.434 (0.860)		1.918 (0.645)		1.460 (0.610)

Notes: Standard errors in parentheses. Parameters that are statistically significant at the 5% level are in bold. Control variables not shown. The reference category for ‘Perceived Benevolence’ is ‘Strongly Disagree’ and the reference category for ‘Perceived Ability’ is ‘Very Unconfident.’

Table A6: Logistic Regression of WTA for Certified Pork by Each Institution

<i>WTA</i>	Central Gov.		Prov. Gov.		Priv. Indust.		NGO	
	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20
Perceived Benevolence	0.103 (0.155)		0.123 (0.156)		0.072 (0.159)		0.062 (0.152)	
- Disagree		-0.049 (0.653)		0.573 (0.566)		-0.033 (0.324)		0.278 (0.437)
- Agree		-0.119 (0.622)		0.339 (0.579)		-0.354 (0.409)		0.223 (0.453)
- Strongly Agree		0.138 (0.634)		0.604 (0.609)		0.644 (0.549)		-0.007 (0.561)
Perceived Ability	0.318 (0.146)		0.356 (0.153)		0.282 (0.167)		0.276 (0.162)	
- Unconfident		0.890 (0.513)		1.480 (0.490)		0.553 (0.328)		0.818 (0.410)
- Confident		1.172 (0.479)		2.227 (0.503)		0.772 (0.409)		1.251 (0.452)
- Very Confident		1.319 (0.517)		1.215 (0.552)		0.424 (0.645)		0.177 (0.656)

Notes: Standard errors in parentheses. Parameters that are statistically significant at the 5% level are in bold. Control variables not shown. The reference category for ‘Perceived Benevolence’ is ‘Strongly Disagree’ and the reference category for ‘Perceived Ability’ is ‘Very Unconfident.’

Table A7: Variable Selection Using LASSO Logistic Regression for WTP

	Central Govt Model 21	Prov Govt. Model 22	Private Indust. Model 23	NGO Model 24
Price	-0.14			
Perceived Benevolence	0.33	0.16	0.36	0.35
Perceived Ability	0.71	0.69	0.66	0.45
Level of Worry about Food Safety				0.02
Level of Pork Consumption	-0.04		-0.14	
Level of Perceived Unsafe Pork Consumption	0.17	0.04	0.02	
Level of Familiarity with Food Certification	0.46	0.20	0.16	0.07
Number of Children	0.27			
Age			0.01	
Urban Hukou Dummy	0.19			
Education Level (Undergraduate)			-0.11	
<i>Food Responsibility</i>				
- Respondent's Spouse	-0.13	-0.05		
- Respondent's Parents		0.12		
Gender Dummy (Female)	0.22	0.19		
Log Income	0.06	0.06	0.06	0.02
<i>Occupation Dummy</i>				
- Educator/Researcher	0.25			
- Blue collar worker	-0.58	-0.19		
- Service sector worker	0.41		0.23	0.18
- Agricultural/ forestry worker or miner	-0.34			
<i>City Dummy</i>				
- Beijing			-0.24	
- Harbin	0.04		-0.27	
- Taiyuan			0.26	
- Chengdu			0.50	
- Kunming			0.22	
- Changsha	-0.65	-0.14	-0.50	-0.20

Notes: Table reports standardized coefficients. Occupation reference category is 'Unemployed.' The reference city is Shanghai. The education reference category is 'Some elementary school or less.'

Table A8: Variable Selection Using LASSO Logistic Regression for WTA

	Central Govt Model 25	Prov Govt. Model 26	Private Indust. Model 27	NGO Model 28
Price		-0.03		
Perceived Benevolence	0.01	0.06	0.01	0.03
Perceived Ability	0.16	0.16		0.05
Level of Interest in Food Safety	0.06	0.11	0.08	0.14
Level of Worry about Food Safety	0.14	0.02	0.02	0.06
Level of Perceived Unsafe Pork Consumption	0.18	0.19	0.05	0.05
Level of Familiarity with Food Certification	-0.11	-0.29		
Number of Children				0.09
Age	0.00	0.00	0.01	0.01
Urban Hukou Dummy	0.20	0.31		
Log Income		0.02		0.01
<i>Food Responsibility</i>				
-Respondent's Spouse				0.20
<i>Occupation Dummy</i>				
- Middle management		0.52		
- White collar worker	0.39	0.28	0.16	0.35
- Blue collar worker		0.08	0.21	0.35
- Service sector worker		-0.28		0.06
- Self-employed				-0.04
- Retired	0.19	0.56	0.18	0.04
- Student		-0.37	-0.41	
- Military		-0.51		
- Housewife		-0.21	-0.20	-0.83
<i>City Dummy</i>				
- Hohhot	0.17	0.35		0.03
- Chengdu	-0.09			
- Changsha				-0.03

Notes: Table reports standardized coefficients. Occupation reference category is 'Unemployed.' The reference city is Shanghai. The education reference category is 'Some elementary school or less.'

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