

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

Cindy Cheng*

Bavarian School of Public Policy

Abstract

As food safety problems proliferate world-wide, numerous studies have investigated consumer willingness to pay for food safety attributes. However, less work has explicitly explored whether a regulator's perceived credibility influences such purchasing decisions. Indeed, it follows that if consumers do not widely possess the tools and knowledge necessary to autonomously evaluate their food safety, neither can they validate regulatory efforts that purport to do so on their behalf. Using survey data from China, this article finds evidence to suggest that trust plays an important role in explaining consumers' willingness to purchase certified pork, more important than even price. By employing different frames for ascertaining consumers' willingness to purchase certified food, I further find that the relationship between trust and regulatory buy-in is sensitive to status quo bias.

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With 582 million incidences of foodborne disease and 351,000 associated deaths in 2010 (WHO, 2015), the consumption of unsafe food poses significant risks to both global health and economic growth. In the face of these risks, food regulatory bodies play an important role in safeguarding public health. Indeed, that regulatory bodies are necessary at all for ensuring food safety is a function of the invisibility of food safety problems: consumers are neither able to rely on heuristics like sight, taste and smell to detect biological and chemical contaminants, nor do they possess the knowledge or resources needed to do so. Further, consumers are similarly incapable of validating the food safety evaluations that regulatory bodies make on their behalf. As such, consumer *perceptions* of whether regulatory bodies safeguard food safety may be as important as whether such bodies *actually* do so with regards to regulatory efficacy (Frewer et al., 1996; Kuran and Sunstein, 1999; Grunert, 2005).

While regulatory efficacy is to a large extent dependent on the regulatory body's capacity to implement and enforce food safety regulation, whether the consumer ultimately purchases the regulated product is also a crucially important factor. Though we know much about how economic and demographic considerations affect purchasing decisions for food safety attributes, we know little about how much social and cognitive factors matter. In investigating this issue, I hypothesize that the extent to which a consumer is willing to purchase regulated food is conditional on how much she trusts the responsible regulatory body to have either the public interest at heart or the ability to adequately enforce food safety regulation.

I test these hypotheses in the context of food safety certification schemes in China. For one thing, the pervasiveness of food safety problems in China makes it an appropriate place to test these arguments. For another, the findings in this paper have particular policy relevance for a country that is actively building the regulatory capacity to ensure the safety of its food.

In what follows, I first give a brief overview of the food safety situation in China before fleshing out the rationale for why regulatory trust might affect regulatory efficacy. I evaluate this hypothesized relationship by using a survey experiment to assess Chinese consumers' willingness to purchase pork certified by 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. In so doing, I employ both willingness to pay (WTP) and willingness to accept (WTA) questions to account for potential question framing effects. To preview, though the relative strength of these relationships is indeed sensitive to the different framing effects that the WTP and WTA questions provoke, overall, trust is found to play a large substantive role in regulatory efficacy, larger than even price.

Food Safety in China

While food safety scandals have been a fixture of Chinese politics since the early 2000's, the 2008 infant powder scandal is perhaps the most well-known case to date. Conservative 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 processing techniques,¹ the selling of expired meat,² and the proliferation of fake

¹Fisher, 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/>

²Burkitt, 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>

alcohol,³ among many others.

The Chinese central government has undertaken extensive measures to address these assaults on domestic food safety.⁴ 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, former President Hu Jintao⁵ and Premier Wen Jiabao⁶ publicly pledged to improve food safety and product quality in the wake of the 2007 pet food contamination scandal. 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."⁷ 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 may face an uphill battle in regaining public trust, however.

³Melchior, 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>

⁴It 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.

⁵"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.

⁶Jiao, 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

⁷Hakobyan, 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>

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 the author conducted in China in 2015, in which both the government and corporate greed were named as culprits in propagating the food safety crisis more generally.

Trust in government regulation

What, however, does “trust” mean? While there is no universal definition, Levi and Stoker (2000, 576) emphasize both its relational and conditional nature 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.” Extrapolating trust to the context of food safety, an individual makes herself vulnerable to an institution when she purchases products regulated by it without having the ability to verify whether that institution actually executed the regulatory safeguards it purported to. Trust can thus theoretically play an important role in regulatory efficacy — 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 purchase the said product, what is referred to in this article as *regulatory buy-in*.

Mayer, Davis and Schoorman (1995) further unpack trust into three dimensions: benevolence, ability and integrity. Building on this work, this article assesses the degree to which the first two dimensions of trust, benevolence and ability, affect regu-

latory buy-in. Benevolence refers to the degree to which “a trustee is believed to want to do good *to the trustor* [sic], aside from an egocentric profit motive” (Mayer, Davis and Schoorman, 1995, 718-719). In the context of food safety, the extent to which a consumer buys into a regulatory scheme may depend on how much she believes the regulator is acting in the best interest of the consumer. Ability meanwhile, refers to whether the trustee has domain-specific “skills, competencies and characteristics that enable a party to have influence” (Mayer, Davis and Schoorman, 1995, 717-718). This suggests that regulatory buy-in is more likely when consumers have greater confidence in the regulator’s technical and administrative expertise to implement a regulatory scheme.

Meanwhile, integrity refers to the, “trustor’s perception that the trustee adheres to a set of principles that the trustor finds acceptable” (Mayer, Davis and Schoorman, 1995, 719-720). As applied to food safety regulation then, integrity can be interpreted as the extent to which a consumer believes that the food safety regulator regulates food according to principles the consumer finds acceptable. While it would also be valuable to test whether the regulator’s perceived integrity affects purchasing decisions, measuring consumer perceptions of integrity is far from straightforward. That is, some consumers may expect different types of regulatory institutions, (i.e. public vs. private) to adhere to different sets of principles (i.e. social good vs. profit-seeking) while other consumers may hold different regulatory institutions to the same principles, which would make interpretation of the subsequent responses difficult. Meanwhile, given the constraints of the survey methodology employed in this paper, it would be challenging to efficiently ascertain the standards of integrity that different consumers ascribe to different regulatory bodies on a large scale. While generally the methodology should fit the research question and not the other way around, I opt to first forward our understanding of the relationship between the first two dimensions of

trust on regulatory efficacy for a large sample of respondents (which a survey makes possible), reserving the privilege of untangling the relationship between integrity and regulatory efficacy for a separate paper.

Indeed, there can be much to be gained from exploring the relationship between even just the first two dimensions of trust and regulatory efficacy. Though much work hints at the importance of public trust in regulatory buy-in, few studies have systematically explored the nature of this relationship. For example, 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 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.

Moreover, the larger literature on the relationship between trust and regulation also suggests that exploring this relationship in the context of Chinese food safety regulation may be fruitful. As Bratspies (2009) argues, when regulators make high-stakes regulatory choices in the face of uncertainty, trust can play an important role in legitimizing their actions. For example, while the French public has expressed as much concern over nuclear energy as the American public has (Slovic et al., 2000), 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 energy⁸ compared to only 20% in the United States.⁹ Trust can thus have large consequences for regulatory buy-in.

Based on the discussion above then, I seek to evaluate the following hypotheses:

Hypothesis 1: The more a citizen perceives a food regulatory institution to be acting in the public interest, the more likely she is to purchase food regulated by it.

Hypothesis 2: The more a citizen perceives a food regulatory institution to be capable of regulating food safety, the more likely she is to purchase food regulated by it.

⁸“France – Country Statistics.” *IAEA*. Last Accessed May 2017: <https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=FRLast>

⁹“United States of America – Country Statistics.” *IAEA*. Last Accessed May 2017: <https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=US>

Survey Design

Survey Questionnaire Overview

I test the relationship between trust and food safety regulation using a telephone survey experiment of Chinese consumers. 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 the public interest (Q4-Q7) and the degree to which they have confidence in these institutions to implement food safety regulations (Q8-Q11). The exact question formulations are 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.¹⁰

- 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(No answer)

¹⁰Adapted 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:

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(No answer)

Next, followed by a brief description of what food certification is, half of the respondents are randomly selected to be asked about whether they would be willing to purchase certified pork using a WTP question frame. That is, they are asked whether they are willing to pay X amount more for food certified by a particular institution given the availability of uncertified pork for a lower price. Meanwhile, a WTA question frame is used for the other half of respondents. These respondents are asked whether they would be willing to accept uncertified pork given the availability of certified pork for X amount more (Q12, Q14, Q16, Q18). The amount X, also known

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.’

as the bid price, is randomly assigned across respondents but remains constant for each respondent.

The questionnaire also assesses respondents' baseline concerns, interest, experience and knowledge of food safety problems and certification schemes (Q1-Q3, Q21-23). Socio-demographic questions, including age, gender, *hukou* status,¹¹ education, number of children, household size, and household income were also included as controls (Q21-Q33).

In what follows, I first review the rationale for evaluating consumers' willingness to purchase 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. Next I discuss the why I include both WTP and WTA questions in my survey questionnaire. I then explain the reasoning behind the decision to use a single-bounded contingent valuation method (CVM) to elicit purchasing decisions for certified pork. Finally, I outline the methodology I used to determine which range of prices, what is known as the bid design, to conduct the CVM.

Food safety and pork

Pork was chosen as the food item of choice not only because China is a large producer¹² and consumer of pork,¹³ but also because it has experienced a spate of food

¹¹The *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*

¹²China is the world's largest pork producer, producing half of the world's total (Schneider and Sharma, 2014).

¹³China'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

safety scandals regarding pork.¹⁴ Among the most famous was the 2013 incident in which 16,000 diseased pigs were found floating in a river near Shanghai.¹⁵ As such, pork represents both a substantive and salient food of interest with regards to food consumption, production and safety in China.

Food safety and food certification

Food certification was chosen over other possible food safety attributes because previous studies have found that consumers have higher WTP 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 why consumers are willing or are not willing to pay 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.

Meanwhile, existing research on food safety regulation in China has largely consisted of cut and dried studies that generally find that some consumers are willing

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>).

¹⁴Bottemiller, 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 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>

¹⁵Davison, 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>.

to pay a premium for food safety attributes but do not further explore whether such willingness is predicated on regulatory trust (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).

WTP vs. WTA

In a typical WTP experiment, researchers seek to ascertain the maximum amount she is willing to pay for a particular good. Meanwhile, in a typical WTA experiment, participants are first given a 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 in theory a consumer's WTP and WTA should be equivalent, in reality, 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 this discrepancy 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 they would accept to give it up.¹⁶ To better

¹⁶Note, 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.

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 phrasing has the added benefit of testing for the existence of a different cognitive bias in people's food purchase decisions. 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).

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 WTP from respondents (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, 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 buy-in. 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. However, there is again no reason to think that such potential uncertainty might be systematically related to levels of trust in different food safety regulators.

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. See Appendix A.3 for more details.

Survey Logistical Overview

To better adapt the survey to the Chinese context, I convened a focus group of 5 graduate students with backgrounds in Chinese politics from my home institution. Their comments and suggestions were incorporated into the final survey design. As previously discussed, I then conducted a pilot internet survey to construct the optimal bid design for the main telephone survey. Further information about how the internet survey was conducted can be found in Appendix A.1.

The main 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. The audio for each survey response was recorded and reviewed by the survey coordinator to ensure its quality and fidelity.

The sample pool was based first on randomly generated cell phone numbers that were then validated with an automatic dialer. A total of 12,772 people were sampled from this pool of valid cell phone numbers to get 1000 respondents, 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 96% of the population, possessing a mobile phone by the end of 2016.¹⁷¹⁸

Data

Before presenting the descriptive statistics of the telephone survey, note that there was some item non-response for some survey questions.¹⁹ Figure 1 shows a visualization of the amount of missingness in the data. In particular, it is clear that respondents were especially reluctant to reveal their household income. Existing papers on consumer's WTP for food safety attributes in China generally deal with missingness by employing list-wise deletion, though a robust body of literature suggests that such a strategy can lead to biased parameter estimates (Honaker and King, 2010). As such, to deal with

¹⁷'Number of mobile cell phone subscriptions in China from June 2016 to June 2017 (in millions).' *Statista*. Accessed September 2017: '<https://www.statista.com/statistics/278204/china-mobile-users-by-month/>'

¹⁸While this still misses the approximately 4% of the population who do not possess mobile phones, note that the coverage is still quite high and it is unlikely that the market for certified foods has much relevance for this group of people.

¹⁹There was no item non-response for the dependent variables.

this missing data problem, 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 Tables 2 and 3) provide evidence of the validity of this imputation method for this dataset.

[Figure 1 about here.]

Turning now to the descriptive statistics, note first that 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 (municipalities controlled directly by the central government), Harbin and Changchun (municipalities in Northeast China), Hohhot and Taiyuan (municipalities in Northern China), Kunming and Chengdu (municipalities in Southwest China), Wuxi and Changsha (municipalities in China's Southeast). The sample was further balanced on gender and age, to reflect population demographics as closely as possible (see Table 1).

[Table 1 about here]

The mean and standard deviation for both the unimputed and imputed data for Likert and continuous scale variables are shown in Table 2. Note, the sample distribution largely reflects the population distribution with regards to the measures for which there are ready population statistics to compare them to (i.e. age, urban/rural *hukou*, household size, income).

[Table 2 about here]

Meanwhile, from Table 3, we can see that most respondents say that they themselves are responsible for food preparation in their household, 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 rate. Finally, respondents in the telephone survey represent a wide sector of society with regards to occupation.

[Table 3 about here]

Empirical Analysis

Modeling the relationship between trust and decisions to purchase food safety attributes

The basic model that I use to assess the degree to which trust affects regulatory buy-in can be described 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 or not. $Price_i$ 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. $Perceived\ Benevolence_i$ is the extent to which the respondent believes the regulatory institution acts in her interests and $Perceived\ Ability_i$ is the extent to which the respondent believes the regulatory institution is capable of implementing food safety regulation.

Estimating the relationship between trust and willingness to purchase certified pork, WTP framing

Using a logistic regression,²⁰ I first estimate the effect of perceived levels of trust on consumer’s willingness to purchase certified pork when the WTP question framing is used. The results are shown in Models 1 and 2, Table 4. While Models 1 and 2 use the same covariates,²¹ in Model 1, I treat variables 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 4 about here.]

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.²² However, statistical significance does not substantive significance make. As such, Figures 2 and 3, illustrate how consumer’s purchasing decisions vary over the range of the independent variable of interest, holding all other control variables constant at the median. Meanwhile, Table 5 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

²⁰I also ran models which 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. As such, I chose to present the simpler model without random effects.

²¹Since all the covariates could potentially affect a consumer’s willingness to purchase 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 robustness checks.

²²Note that because of the difficulty in interpreting parameter estimates for logistic regressions, I instead focus on assessing the substantive effect of a given independent variable on the willingness to purchase certified pork.

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.

[Figures 2 and 3 about here.]

First, Figure 2 clearly shows a strong substantive and positive relationship between *Perceived Benevolence* and regulatory buy-in. More specifically, 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 91.9% more likely to purchase food certified by it relative to a person who is deeply skeptical of this sentiment. This is equivalent to a 36.5% increase in likelihood on an absolute scale, suggesting strong support for Hypothesis 1. Meanwhile, Figure 3 shows 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 157.3% more likely to purchase 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 the likelihood of purchasing certified pork, suggesting strong support for Hypothesis 2.

[Table 5 about here]

Compare the effect of trust to that of price on a consumer's willingness to purchase certified pork (see Figure 6). All else equal, a consumer is 15.9% relatively more likely to purchase certified pork if it is 16 yuan a half kilo as opposed to 22 yuan a half kilo. The absolute difference in the likelihood of purchasing the certified pork between the two scenarios is around 9.4%. Note, that both the relative and absolute effects of price on purchasing decisions 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 efficacy.

[Figures 6 and 7 about here.]

Estimating the relationship between trust and willingness to purchase certified pork, WTP framing

I further model consumer's willingness to purchase certified pork when using the WTA question framing in Models 3 and 4. Again, 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 willingness to purchase certified pork. However, unlike the WTP framing, there is little evidence of a statistically significant relationship between perceived benevolence and willingness to purchase certified pork.

[Figures 4 and 5 about here.]

Before drawing any firm conclusions, I again assess the substantive effect of trust on willingness to purchase certified pork. To that end, despite the lack of statistical significance for the *Perceived Benevolence* parameter, the slight positive slope exhibited in Figure 4 does suggest a small substantive effect of perceived benevolence on willingness to purchase certified pork. Specifically, 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 5). As such, though its effect is substantially subdued when using a WTA framing, the substantive relationship between *Perceived Benevolence* and willingness to purchase pork found here does suggest some support for Hypothesis 1.

Meanwhile, the predicted effect of *Perceived Ability* on the likelihood of purchasing certified pork, shown in Figure 5, suggests robust support for Hypothesis 2 when using the WTA framing. Moreover, as Table 5 shows, the relative difference in willingness to purchase 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 a consumer's willingness to purchase 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 flat (see Figure 7). Meanwhile, the relative difference on purchasing decisions when certified pork is priced at 22 yuan relative to 16 yuan is only around 0.02%. The absolute difference, around .012%, is similarly negligible. These results suggest that when the purchase of certified pork is framed as a WTA question, issues of price have no substantive impact on consumers' decision-making process.

Discussion

Overall, the model results suggest that trust plays an important role in influencing the degree to which people 'buy-in' to 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 decisions to pay for food safety attributes.

However, the degree to which perceptions of trust color people’s propensity to purchase certified pork is also highly suggestible to framing effects. When people are asked if they are willing to pay for certified pork, 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 purchasing decisions when a WTA framing is used.

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 encourages. 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.

Robustness Checks

As a robustness check, I further model the relationship between the two dimensions of trust and each institution separately (central government, provincial government, private industry and NGOs). I present the parameter estimates for the trust variables in In Table 6.²³ Here, we can see that as before, *Perceived Benevolence* and *Perceived Ability* are still positive and statistically significant predictors of the willingness to

²³The full models with covariates are available upon request.

purchase certified pork for each institution type using a WTP framing (Models 5-12). Meanwhile, as before, only *Perceived Ability* is found to have a positive and statistically significant effect on purchasing decisions using a WTA framing (Models 13-20). Note that *Perceived Ability* is not a significant predictor of willingness to purchase certified pork (Model 17 and 18) at the 5% level. However, *Perceived Ability* (Model 17), *Perceived Ability - Confident* and *Perceived Ability - Very Confident* (Model 18) are significant at the 10% level which suggests that such a relationship does exist, albeit to a weaker degree than for other regulatory institutions. Similarly, for NGO certified pork *Perceived Ability* (Model 19) is also significant at the 10% level, though not at the 5% level. Irrespective of the levels of statistical significance, the substantive relationship between these two dimensions of trust and regulatory buy-in across all institution types remain robust. Mirroring the paper's main models, the relationship is stronger when using the WTP framing (figures available upon request).

I also validate the relationship between trust and willingness to purchase certified pork 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 the dependent variable, whether any of them actually do is an empirical question.

Thus, since it is a priori unclear which variables best predict the dependent variable, I estimate a logistic LASSO model for each institution type. From Table 7 and Table 8 we can see that the measures for perceived benevolence and perceived ability are found to be important predictors for willingness to purchase certified pork across

the different model specifications, again supporting Hypotheses 1 and 2.²⁴ Meanwhile, price is not found to be a consistently important factor in determining purchasing decisions, again suggesting the relative importance of trust over price in regulatory buy-in.²⁵

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 enforce 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, though social networks and ties no longer provide an effective means to coordinate economic transactions, social attitudes and information still

²⁴The literature on variable selection with multiply imputed data is still in its infancy. Wood, White and Royston (2008) suggest a two-step procedure in which Step 1) only variables that are selected in the majority of the imputations are included in the final model Step 2) given the variables selected in Step 1, the average of the parameter estimates over the multiply imputed data is reported though they caution that further research is needed to validate the scope conditions for this approach. Despite this caveat, given available knowledge this method is currently among the best possible for conducting variable selection for multiply imputed data. As such, the variables presented in tables 7 and 8 are only presented if they are selected from at least 3 of 5 of the imputed datasets and the parameter estimates represent the average of the values over those models.

²⁵Note that no standard errors are presented in these tables — to date estimation of standard errors for LASSO regressions is still an area of active research (Kyung et al., 2010). Meanwhile, unlike the main models, the tables also report standardized coefficients. Because the LASSO estimation procedure penalizes large coefficient sizes, it is important to standardize the data beforehand. Further, note that while it is possible to estimate a standard logistic regression using the variables selected by the LASSO model, this would not be methodologically correct. That is, the subsequent significance of the parameter estimates derived from the subsequent ordinary logistic regression is conditional on those variables being selected in the first place. Despite this however, when I have gone ahead and done so the statistical significance of the trust variables and the dependent variable hold.

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 present evidence to suggest that consumers are more willing to purchase certified pork the more they trust the certifying 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 buy-in. This relationship is consistently found when using a WTP question frame. For respondents who are asked if they are willing purchase certified pork 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 buy-in.

However, though the results presented in this article suggest that different framing conditions can have substantial consequences for regulatory success, we know relatively little about 1) the distribution of citizens who naturally adopt WTP or WTA (or other) frames when making purchasing decisions, both with regards to certified pork and more generally 2) the factors which explain why citizens might naturally adopt either a WTP or WTA frame 3) how consumers can be manipulated to shift their frames toward WTP or WTA ones. This article shows that such research is especially important given that framing a purchasing decision as either a WTP or WTA question can substantially influence consumer's propensity to buy a regulated product or not, and ultimately the efficacy of the regulation itself.

Tables

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%

Table 2: Summary Statistics for Unimputed and Imputed Continuous or Likert-scale Survey Data

	Unimputed Data		Imputed Data	
	Mean	SD	Mean	SD
(Q01) Interest in Food Safety Level [‡]	2.98	1.32	2.97	1.32
(Q02) Worry About Food Safety Level [‡]	3.29	1.35	3.28	1.36
(Q04) Perceived Benevolence Level in Central Govt [‡]	3.08	0.775	3.07	0.778
(Q05) Perceived Benevolence Level in Provincial Govt [‡]	2.87	0.81	2.87	0.807
(Q06) Perceived Benevolence Level in Private Industry [‡]	2.16	0.856	2.16	0.855
(Q07) Perceived Benevolence Level in NGO [‡]	2.52	0.844	2.52	0.842
(Q08) Perceived Ability Level of Central Govt [‡]	2.96	0.833	2.96	0.834
(Q09) Perceived Ability Level of Prov Govt [‡]	2.74	0.817	2.74	0.817
(Q10) Perceived Ability Level in Private Industry [‡]	2.08	0.806	2.09	0.806
(Q11) Perceived Ability Level 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 3: Distribution of Categorical Variables for Unimputed and Imputed Survey Data

	Mean	
	Unimputed	Imputed
<i>(Q24) Responsibility for Household 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 4: 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)
Level of Interest in Food Safety	-0.028 (0.057)		0.162 (0.049)	
- A Little Interested		0.271 (0.235)		0.548 (0.196)
- Somewhat Interested		0.234 (0.245)		0.864 (0.223)
- Really Interested		0.235 (0.270)		0.215 (0.247)
- Extremely Interested		0.036 (0.275)		1.072 (0.239)
Level of Worry about Food Safety	0.038 (0.055)		0.103 (0.046)	
- A Little worried		-0.352 (0.277)		0.188 (0.212)
- Somewhat Worried		-0.569 (0.274)		0.025 (0.230)
- Really Worried		-0.371 (0.290)		0.582 (0.247)
- Extremely Worried		-0.079 (0.286)		0.439 (0.235)
Level of Pork Consumption	-0.222 (0.073)		-0.147 (0.056)	
- At least once a year		-0.347 (0.788)		0.566 (0.479)
- At least once a month		-0.755 (0.430)		0.225 (0.345)
- At least once a week		-0.755 (0.361)		-0.261 (0.295)
- At least once a day		-1.061 (0.371)		-0.413 (0.299)
Level of Perceived Unsafe Pork Consumption	0.218 (0.061)		0.287 (0.053)	
- Probably Not		0.563 (0.251)		0.350 (0.194)
- Unsure		0.842		0.451

		(0.232)		(0.176)
- Probably		0.690		1.329
		(0.285)		(0.248)
- Definitely		0.983		1.137
		(0.287)		(0.272)
Level of Familiarity with Food Certification	0.422		-0.336	
	(0.099)		(0.086)	
- Heard of it but not very familiar		0.525		-0.531
		(0.229)		(0.203)
- Moderately familiar		0.940		-0.778
		(0.251)		(0.225)
- Very familiar		1.072		-1.537
		(0.449)		(0.387)
Food Responsibility (Respondent)	0.332	0.383	-0.126	-0.225
	(0.196)	(0.196)	(0.156)	(0.157)
Food Responsibility (Respondent's Spouse)	-0.289	-0.239	0.096	0.075
	(0.213)	(0.215)	(0.193)	(0.199)
Food Responsibility(Respondent's Parents)	0.256	0.260	-0.200	-0.195
	(0.210)	(0.213)	(0.178)	(0.185)
Number of Children	0.034	-0.011	0.137	0.178
	(0.121)	(0.125)	(0.112)	(0.115)
Household Size	0.100	0.133	0.011	-0.011
	(0.068)	(0.070)	(0.056)	(0.058)
Age	0.017	0.019	0.013	0.017
	(0.007)	(0.007)	(0.006)	(0.006)
Urban Hukou Dummy	0.135	0.203	0.489	0.467
	(0.154)	(0.158)	(0.118)	(0.124)
Gender Dummy (Female)	0.148	0.132	0.169	0.068
	(0.136)	(0.143)	(0.116)	(0.120)
Log Income	0.086	0.083	0.066	0.068
	(0.042)	(0.043)	(0.023)	(0.024)
Intercept	-4.713	-2.778	-2.797	-2.719
	(0.996)	(0.979)	(0.806)	(0.843)
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

Notes: Standard errors in parentheses. Parameters that are statistically significant at the 5% level are in bold. Occupation, city and education dummy variables included but not shown. The occupation dummy reference category is 'Unemployed' and city dummy reference city is Shanghai. The education reference category is 'Some elementary school or less.' Reference category for Likert scale variables is the 'lowest' category. Reference category for 'Food Responsibility' is 'Whoever has time.'

Table 5: 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%	79.6.0%	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

Table 6: Logistic Regression of WTP/WTA 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)
<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 7: 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 8: 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.'

Figures

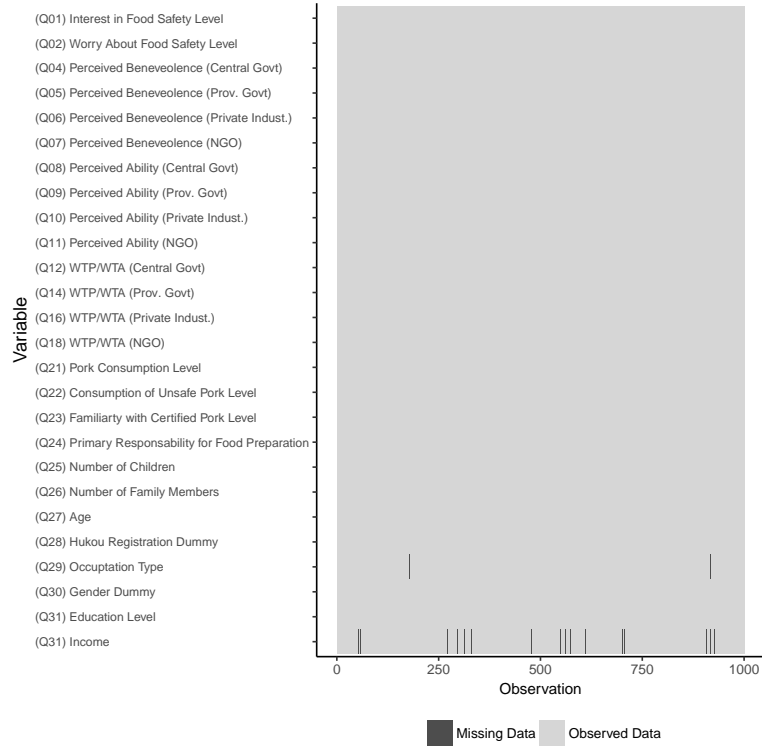


Figure 1: Missing data plot

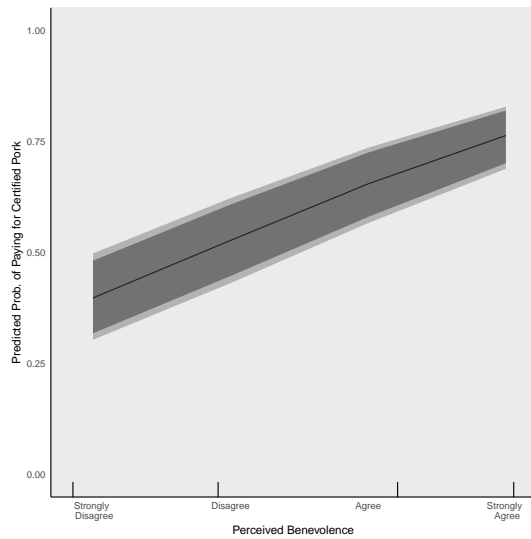


Figure 2: Predicted effect of perceived benevolence of a regulatory institution on the willingness to purchase certified pork, using WTP question framing, holding all else constant at the median

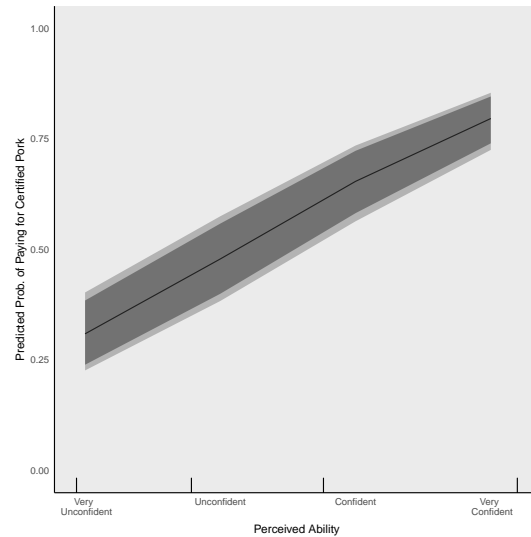


Figure 3: Predicted effect of perceived ability of a regulatory institution on the willingness to purchase certified pork, using WTP question framing, holding all else constant at the median

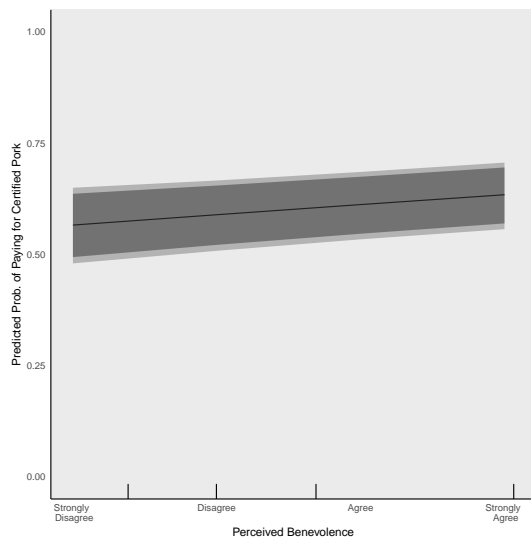


Figure 4: Predicted effect of perceived benevolence of a regulatory institution on the willingness to purchase certified pork, using WTA question framing, holding all else constant at the median

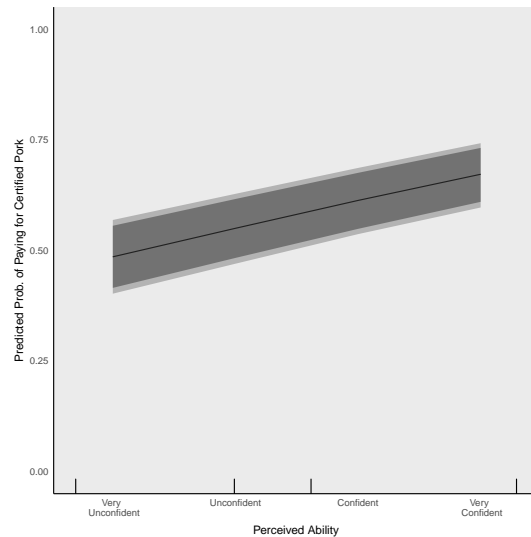


Figure 5: Predicted effect of perceived ability of a regulatory institution on the willingness to purchase certified pork, using WTA question framing, holding all else constant at the median

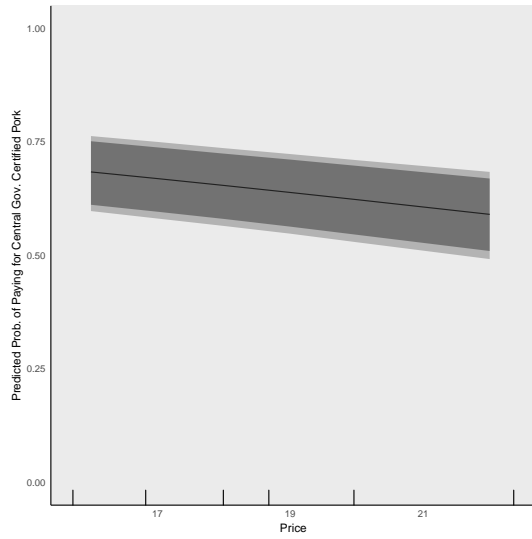


Figure 6: Predicted effect of price of a regulatory institution on the willingness to purchase certified pork, using WTP question framing, holding all else constant at the median

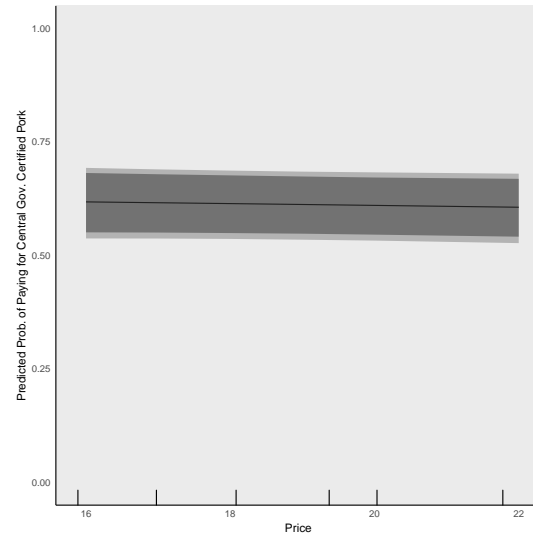


Figure 7: Predicted effect of price of a regulatory institution on the willingness to purchase certified pork, using WTA question framing, holding else constant at the median

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Appendix

A.1 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 a link of the survey is posted on **zhubajie.com** 2) The participant clicks on a link to a survey 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 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 Zheijiang. The geographic distribution for the internet survey respondents is shown in Figure 8.

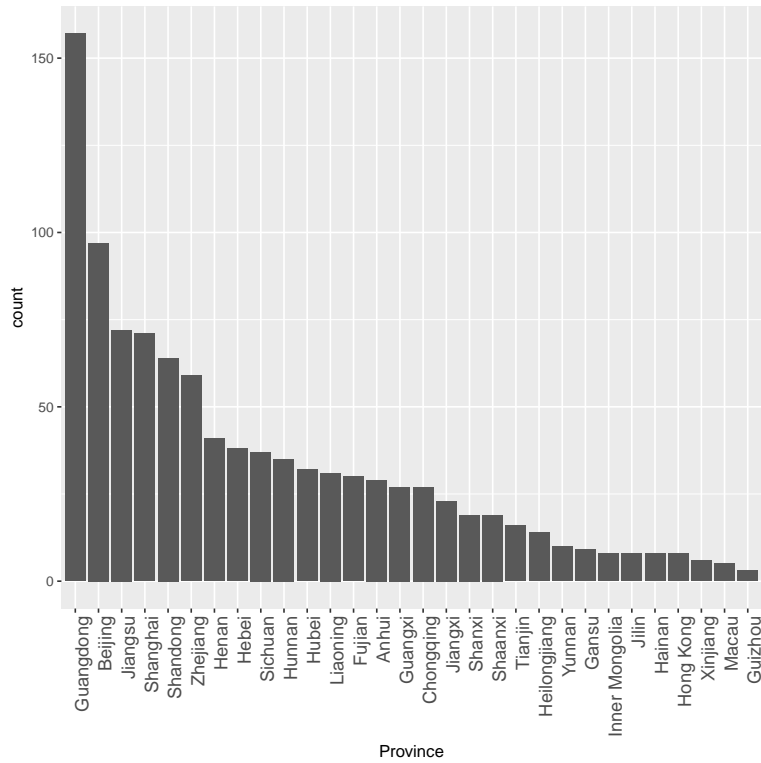


Figure 8: Geographic Distribution of Internet Sample

Demographic statistics are presented in Table 9. 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 9: 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
N	1007			

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

Table 10: 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 Methodology of Bid Design

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.3.1 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’²⁶ 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.²⁷ 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.

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.²⁸ 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, a reasonable bid range for the internet survey is 15-30 yuan. Though such a range would allow WTP for certified pork to be as large as

²⁶This survey does not make the distinction between private or non-governmental third party certifiers.

²⁷Note 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.

²⁸Wang, 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.

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 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.3.2 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 willingness to purchase 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 not be valid.

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.²⁹ Respondents who were unwilling to purchase certified pork were asked the following question:

²⁹Similar questions were asked of people who received WTA questions.

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?

- 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 assessing whether the bids themselves are signals of the legitimacy of the certified pork but also serve to

validate whether respondents explicitly take trust into account when deciding whether or not to buy certified pork or not.

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.