Impact of Chinese acquisition of a US Company on Consumer Willingness to Pay

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Abstract

In this study, we explore how the acquisition of Smithfield, the world's larger pork producer, by a Chinese firm Shuanghui, on consumers' WTP to meat product using experimental auctions. Our results indicate that the acquisition benefits Shuanghui in particular and other Chinese firms in general in terms of consumer's willingness to pay. On the other firms, the general impacts on US firms might be negative, probably due to expected lower price or reduced perceived difference between domestic and imported meat products.

JEL Codes: C91, D44, D12, F23, Q13

Introduction and Preliminary Results

As the income growth is transforming food demand in the world, the agricultural and food industry has become a leading sector in cross-border Merger and Acquisition (M&A) activities (Herger et al. 2008). The U.S. is the major acquirer and the main target of M&A activities among developed countries, while China is the top acquirer and the main target among developing countries (Bhagat et al. 2011). Advocates of cross-border M&As argue that they might benefit agricultural producers as it would promote consumer demand and increase exports. On the other hand, cross-border M&As have drawn criticism from some lawmakers, industry groups, and consumers. For example, in 2009 the Chinese Ministry of Commerce blocked Coca Cola's proposed acquisition of the Chinese Huiyuan Fruit Group Ltd based on concerns that the transaction would adversely impact China's domestic industry and increase prices for consumers.

In September 2013, Smithfield Foods Inc., the world's largest hog farmer and pork processor, was acquired by Shuanghui International Holdings Ltd, China's largest pork producer. The $4.7 billion acquisition marks the largest Chinese takeover of a U.S. company. After the acquisition, Virginia-based Smithfield retains its existing brands and operates as a subsidiary of Shuanghui International Holdings. Smithfield stated that the acquisition would open more of the Chinese market to Smithfield products as pork consumption is growing rapidly in China. Despite the concerns about national security, food safety and the deal's impact on the food supply system of U.S. and China, the acquisition might benefit the US producers and Chinese consumers as it would secure steady demand for pork and increase exports to fast-growing markets in China and Asia.

The goal of this study is to understand how multinational business operations influence consumer demands in the agricultural and food markets of the U.S. and China. Knowledge about consumers' willingness-to-pay (WTP) of a product plays a crucial role in many areas of marketing management such as, pricing decisions, forecasting market response, developing new products, and estimating the added values of different product attributes such as brand names, nutrition facts, labeling, food safety, country of origin, etc. In this study, we explore how consumers in the U.S. and China react to the cross-border M&As in the agricultural and food sectors, in particular, the recent Shuanghui-Smithfield Acquisition using experimental auctions. A novel aspect of this study is that we conducted carefully designed experiments *before* and *after* the pending Shuanghui-Smithfield Acquisition. This design allows us to examine if and how consumer preferences evolved during the course of this historical acquisition and its economic implications.

Research Methodology

There are a huge variety of methods for measuring WTP, such as customer surveys, conjoint analysis, choice analysis, experiments, and auctions (Breidert et al., 2005). The methods based on survey data are called stated preference method, and the methods based on price-responses data are called revealed preference method (Louviere at al. 2000). Stated preference methods include direct survey and indirect surveys. Expert judgments can be obtained in direct surveys but experts can make mistakes or sometimes have no incentive to tell the truth. Selected consumers might also be directly asked about how much they would be willing to pay for a product. This approach is called "contingent valuation" method. However consumers may not have incentive to reveal their true willingness to pay in the surveys (Nagle and Holden, 2002). Overall, direct survey is not an incentive compatible method to elicit consumer WTP accurately (Brown et al., 1996). In contrast to directly asking consumers about their WTP, some researchers present product profiles with different prices to consumers and ask them to rate or rank the profiles. This method is called conjoint analysis (Carroll and Green, 1995). The traditional conjoint analysis does not study consumer choice behavior. In the discrete choice analysis, the respondents indicate whether they would refuse or accept a product at a certain price level. However it is difficult to directly estimate the added value of particular product attributes quantitatively because usually there are too few data points elicited for each respondent (Elrod and Louviere, 1992). For the revealed preference method, price response data can be obtained from market directly or from economic experiments. WTP estimation based on market data is often infeasible when the historical data do not contain the necessary price variation to cover the desired spectrum of WTPs. Small range of observed variations often appears to be a pitfall of

this method. The restriction of estimating demand curves based upon sales data is that it is only possible when the requirement of the independent variables are met (Breidert et al., 2005). Considering the restrictions of the above methods, in our study we opt to use experimental auctions, which is an incentive compatible mechanism that mimic the real market to obtain the accurate estimation of consumer WTP.

The first stage of the experiment was conducted in Zhejiang University. We conducted two sets of experiments; the first part in July 2013 when the Shuanghui-Smithfield Acquisition was pending approval by the US congress, and the second in December 2013, two months after its approval. We use the Second Price Auction (SPA) in all experiments. In a standard SPA, bidding one's true value is a weakly dominant strategy (Vickery, 1961). Therefore, auction is an incentive compatible mechanism and has become a popular method in marketing research to elicit consumer willingness to pay on new products and different product attributes (Noussair et al. 2004, Wertenbroch and Skiera, 2002). College Students were recruited to participate in the experiments. The product used in this research is precooked canned meat product, which is a popular dorm food for college students. We focus on two products: one by Shuanghui and the other, Hormel, is produced by a U.S. manufacturer. [To our knowledge, no comparable products by Smithfield were available on Chinese market at the time of study]. Participants were randomly assigned to different sessions of size 12.

The second stage of the experiments was conducted in College Station, TX. Subjects in this study are the primary grocery shoppers of the households, recruited in the Bryan-College Station area of Texas using advertisements in the local newspaper and other local media. The assignment

of participants to experiment sessions is according to the overall grocery-shopper demographics in Texas. Becker–DeGroot–Marschak method (BDM) is used to elicit consumer WTP for meat products. BDM mechanism is an incentive compatible procedure widely used in economic experiments especially in the fields of agriculture and marketing. The price of the product is determined by a random number generator. If a subject's bid is greater than the price, he or she pays the price and receives the product. The products used in this experiment are two similar products of 8oz Ham Steak, a Smithfield product (now a Chinese brand) and a Hormel product (a US brand), which is one of Smithfield's major competitors in the US market. The information treatments in this experiment include brand name, country-of-origin, production sites, nutrition facts, and news of acquisition.

An eye tracking device (Tobii TX300 Eye Tracker) is used to record subjects' eye movements when reading labels of the products. Eye tracking provides insights on the important factors that influence consumers' purchasing behaviors. In addition to the eye tracker, a brain monitor (B-alert, Advanced Brain Monitoring Inc.) is used to perform the Electroencephalographic analysis of the neural processes when subjects are evaluating the labels and receiving information treatments from the experimenters.

Results

The average bids for the Shuanhui and Hormel products, pre- and post-acquisition, are reported in Figure 1 below.
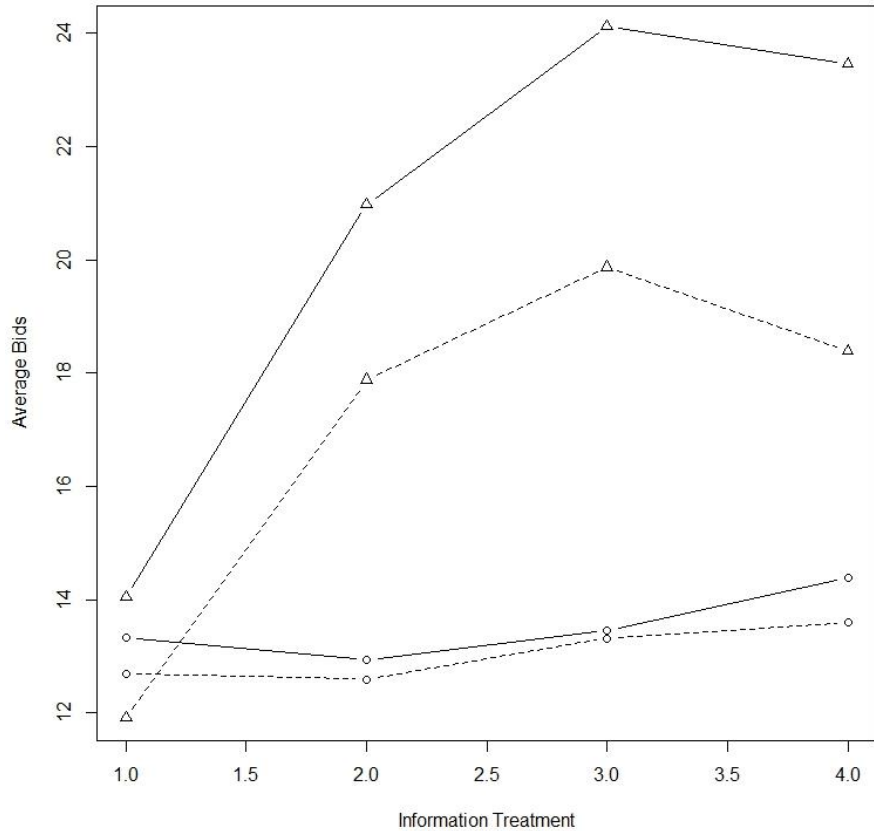
Figure 1. Average bids across treatments. The horizon axis signifies the four treatments (1: no information; 2: country of production; 3: brand; 4. acquisition). Shuanghui and Homel products are represented by circles and triangles. Pre-acquisition and post-acquisition results are connected by solid and dotted lines respectively.

Our results showed that when no product information was provided to the participants (T1), average bids for all four sessions are similar (around 13 RMB). For Shuanghui products, information about country of productions reduces the bids slightly, while brand information increases the bids. Last, information about the Shuanghui-Smithfiled acquisition boosts the bids, especially in the pre-acquisition period. The overall pattern for the US product is rather different.

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The information about country of productions increases the bids substantially, by around 6-7 RMB or 50% of the average bids in the first treatment. Brand name information further raises the average bids, albeit at a smaller extent. Lastly, revelation of the Shuanghui-Smith acquisition leads to a significant decline in average bids, especially post-acquisition.

Next we use regression analysis to examine how various factors affect participants' bids. We run four regressions to the two products, pre- and post-acquisition. The models take the following form

$$bid_{its} = \beta_1 + \beta_2 S_2 + \beta_3 S_3 + \beta_4 S_4 + \gamma t + Z_i \alpha' + c_i + e_{its,}$$

where the subscripts i,t,s index individual, rounds of auctions in each treatment, and treatment separately, Z_i is a vector of individual characteristics, c_i is a time invariant individual effect, and e_{its} is an error term with mean zero and finite variance, which is i.i.d. across the individuals, rounds and treatment sessions. The effects of different information treatments are captured by the treatment dummies S_2, S_3 and S_4, which are defined as $S_j=1$ if $s \geq j$ and 0 otherwise, for $j=2,3,4$. These treatment dummies are defined such that β_2 captures the effect of information of country of productions relative to the baseline case of no information, β_3 captures the effect of brand information given the information of country of production, and lastly β_4 captures the effect of information on Shuanghui-Smithfield acquisition given the information on country of production and brand. We use this particular design to reflect the accumulative nature of information treatment in our experiments – once a piece of information is revealed to the participants, it effects may persist in subsequent treatments. Therefore, instead of the common practice of comparing the outcome of each treatment to the baseline case, we compare the outcome under a new information treatment to that of prior information set. This modeling strategy facilitates the

interpretation of our regression analysis, where the coefficient of the treatment dummies captures the net effect of new information along the course of the auctions.

Variable	Shuanghui				Hormel			
	Pre-acquisition		Post-acquisition		Pre-acquisition		Post-acquisition	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
Treatment 1 (baseline)	11.87	<.001	10.93	<.001	12.24	<.001	9.88	<.001
Treatment 2	-0.39	0.148	-0.09	0.752	6.93	<.001	5.98	<.001
Treatment 2+3	0.52	0.057	0.72	0.016	3.15	<.001	1.98	<.001
Treatment 2+3+4	0.92	<.001	0.28	0.35	-0.67	0.216	-1.72	<.001
Round	0.33	<.001	0.39	<.001	0.41		0.45	<.001
sigma_c	4.38		4.92		9.02		5.26	
sigma_u	2.61		2.85		5.27		2.64	

Table 1. Estimation results. Treatment 1: no information; Treatment 2: country of production; Treatment 3: brand; Treatment 4: information on Shuanghui-Smithfield acquisition.

The estimation results are reported in Table 1. In our exploratory regression analyses, we control for the effects of many possibly influencing participants' characteristics such as age, gender, social economic backgrounds, academic performance and so on. Since all these variables turn out to not be statistically significant, we drop them in our analyses. The coefficients on the baseline case range from 9.88 to 12.24, indicating little systematic difference in consumers' WTP across different sessions. The coefficients of auction rounds are also similar across sessions, suggesting that participants' bidding behaviors do not vary across sessions. On the other hand,

the coefficients of information treatments vary across products, and also seem to evolve overtime between the two points of time when the auctions were conducted.

Let's first look at the auctions conducted on a Shuanghui product before the acquisition in July of 2013. The average baseline bid is 11.87 RMB, not much different from that of the other three sessions. The information on country of production seems have a negative effect of 0.39 Yuan, although the effect is only marginally significant. The brand information effect is positive at 0.52 with a penalty of 0.057, indicating that Shuanghui is a major brand in China and consumers are willing to pay a premium for this brand. Lastly, the information on the then pending Shanghui-Smithfiled has a positive effect of 0.92 Yuan, which is highly statistically significant. Apparently, this event boosts consumers' confidence in Shuanghui product considerably.

The same auction design was used after the approval of Shuanghui-Smithfield acquisition. The results of the various information treatment on the Shuanghui product appear to be qualitatively similar to those before the acquisition, but quantitatively rather different. First of all, there appears to be little negative effects of the country of production, as indicated by the coefficients for the second treatment. We stress that this is a general impact as the brand information is not revealed in the second information treatment. Next, the effects of brand information of Shuanghui now is larger compared to the pre-acquisition case and is highly significant. Lastly, the further announcement of the now approved Shuanghui-Smithfield acquisition seems to have little effect. The overall results suggest that the acquisition increase consumers' general confidence in Chinese meat product. As for as Shuanghui is concerned, this brand appears to benefit from this event. This is evident from the more pronounced brand information effect. It is

not surprising that no further increase in WTP is observed upon the announcement of the acquisition since this event had been widely publicized in the Chinese media and the higher WTP signaled by the participants in the third information treatment is probably associated with this event.

Now let turn our attention to the Homel product, an American brand. In the pre-acquisition session, the information about country of production brought a large increase in the WTP at 6.93 Yuan. This is probably due to the higher prices of imported meat products on the markets and that U.S. products are perceived to be of higher quality. Next the brand information has a further positive effect of 3.15 Yuan, probably reflecting its brand recognition on the Chinese market. Lastly, the announcement of the then pending Shuanghui-Smithfield acquisition has little effects. This is not unexpected since this event is not directly pertinent to the Homel brand and the acquisition was still pending approval.

Compared with the pre-acquisition results, the effects of country of product and band information remain positive and highly significant, albeit slightly smaller. One noticeable difference is that the now approved Shuanghui-Smithfield acquisition has a significant negative impact on participants' WTP of 1.72 Yuan. There are two possible explanations of this decrease in consumers' WTP. First, with the major acquisition, Chinese consumers may expect lower prices of US meat products; second, thanks to this successful acquisition, the perceived difference between domestic and US products by the Chinese consumers might be reduced, leading to a smaller premium in their WTP to US products.

Discussions and Conclusion

Several interesting results of our experimental auctions merits further discussions. First, Shuanghui apparently benefits from this acquisition in terms of consumers' WTP, which are elicited in our experiments. Second, there is a positive spillover effects to Chinese meat product manufactures. This is suggested in our post-acquisition experiment, where the "discount" of domestic products decreased, which can plausibly be attributed to Chinese consumers' enhanced confidence of domestic product thanks to the acquisition. The impacts of the acquisition on Smithfield products cannot be elicited directly in our experiments since its products were not available on the Chinese markets at the time of our experiments. Our experiment results with the Homel product, however, indicate a small negative spillover effects to US meat products by other producers. We conjecture this effect might be due to expected lower price of imported meat products and/or reduced perceived difference between domestic and US products.

Our study provides a timely assessment of how the Shuanghui-Smithfield acquisition affects the many firms, domestic and international, in the Chinese markets and the Chinese consumers. We expect that a similar study conducted on US consumers' reactions to this acquisition might provide further insight into how the cross-border acquisition may affect the Chinese and US meat product markets and its long term consequences.

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