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Emerging Markets for U.S. Pork in China: Experimental Evidence from Mainland and Hong Kong Consumers

David L. Ortega, Maolong Chen, H. Holly Wang, and Satoru Shimokawa

A major concern for international marketers is how products will be received by foreign consumers in other markets. This study uses choice modeling to assess Chinese consumer preferences for pork and evaluate the potential demand for U.S. pork in the cities of Guangzhou and Hong Kong. We find that differences in preferences for domestic versus imported pork can be explained, in part, by consumers' level of patriotism. Marketing pork with a food safety claim can increase market demand for U.S. products, and accounting for differences in nationalistic attitudes can aid marketing efforts.

Key words: choice experiment, consumer preferences, food quality, food marketing, patriotism

Introduction

Economic globalization has opened up new international markets—especially in emerging economies—for U.S. food products. At the same time, sociocultural differences and political events in emerging countries pose challenges for market access and promotional efforts. International marketing and consumer research information are particularly important for industries experiencing stagnant growth or decline domestically. In the United States, per capita red meat consumption has been decreasing since the 1970s and per capita pork consumption has been below 50 pounds (22.7 kg) for the past five years (U.S. Department of Agriculture, Economic Research Service, 2015). As a result, U.S. livestock industries are exploring international markets as one avenue to increase profitability. While increased demand for U.S. pork in China looks promising, little is known about this emerging market. Moreover, political and socioeconomic differences between mainland China and its special administrative regions, such as Hong Kong, often complicate market entry for U.S. products. As a result, many firms have historically relied on grey channels as access points for bringing foreign food products to the Chinese domestic market (Collins and Ximing Sun, 2010). Hong Kong has its own import policy and has been a major importer of U.S. pork; import volumes are comparable to those for mainland China (figure 1). Despite these challenges, China remains the foremost foreign market opportunity for U.S. pork.

A major concern for U.S. pork marketers is whether Chinese consumers prefer domestic pork to U.S. pork. A number of studies have documented what is now known as "domestic country

David L. Ortega is an assistant professor and Maolong Chen is a graduate student in the Department of Agricultural, Food, and Resource Economics at Michigan State University. H. Holly Wang is a professor in the Department of Agricultural Economics at Purdue University. Satoru Shimokawa is an associate professor in the School of Political Science and Economics at Waseda University in Japan.
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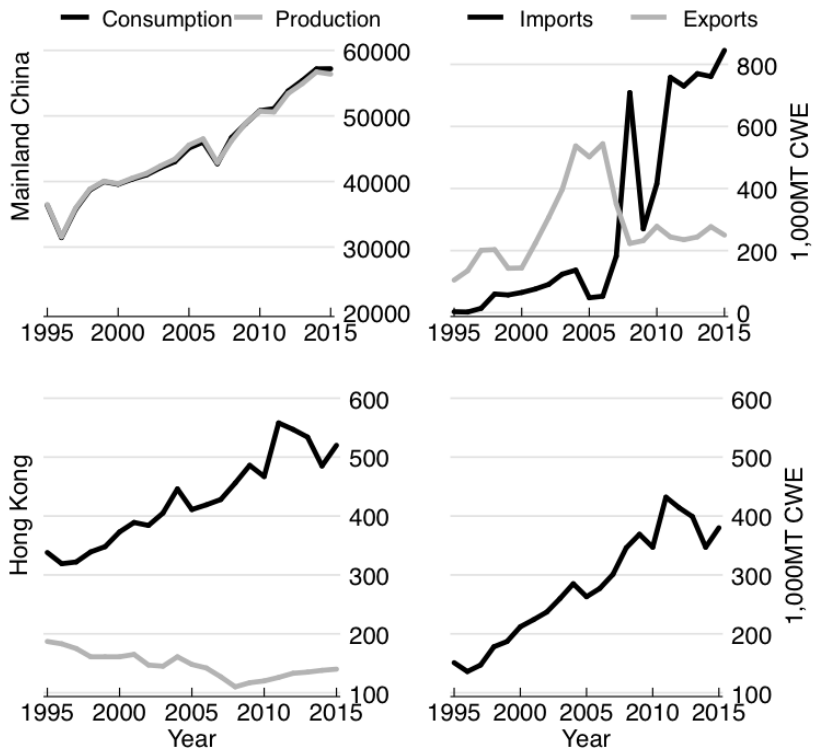

Figure 1. Consumption, Production, and Trade of Pork in Mainland China and Hong Kong

Source: United States Department of Agriculture, Foreign Agriculture Service..

bias," a behavior that is manifested in both product perceptions and buying intentions (Baughn and Yaprak, 1993; Peterson and Jolibert, 1995; Pecotich and Rosenthal, 2001; Balabanis and Diamantopoulos, 2004). Baughn and Yaprak (1993) note that one of the more significant advances in the country-of-origin literature was the development and operationalization of the construct of consumer nationalism, or the idea that individuals' patriotic emotions have a significant effect on attitudes and purchase intentions. Shimp and Sharma (1987) use the term "consumer ethnocentrism" to exemplify the beliefs held by consumers about the morality of purchasing foreign-made goods, noting that—from the point of view of ethnocentric consumers—purchasing imported products is wrong because it is unpatriotic, among other reasons. They measure this construct using a seventeen-item scale (CETSCALE) and find a significant negative relationship between consumer ethnocentrism and evaluations of foreign product characteristics and purchasing behavior. Using a structural equation modeling approach, Han (1988) also found that consumer patriotism affects both cognitive evaluations and purchase intention. While a number of studies in the agricultural and applied economics literature have assessed consumer preferences and attitudes for country of origin, few have explored links between consumers' patriotism, country of origin, and food choices (one exception is work by Meas, 2014).[1]

This study assesses Chinese consumer preferences for pork and evaluates the potential demand for U.S. pork in mainland China and Hong Kong. Special consideration is given to how differences in patriotism affect consumer preferences and demand for domestic versus foreign products. We employ discrete choice modeling to assess preferences for products not readily available in the marketplace (e.g., U.S. pork in mainland China). Discrete choice modeling has become an increasingly important tool for studying consumer demand to inform product marketing strategies

[1] Lusk et al. (2006) provide a good review of the literature on country-of-origin effects from the business and marketing disciplines that are relevant to agricultural and applied economics.

and food policy. By assessing consumer behavior, this method allows researchers to estimate marginal values for various characteristics embodied in different goods. Choice modeling has been applied to nonmarket goods such as food quality, for which marginal valuations are difficult or impossible to measure in the marketplace. Within the agricultural and applied economics literature, this method has been used to analyze Chinese consumer preferences for food safety (Ortega et al., 2011, 2012), country-of-origin labeling (Yu et al., 2009), product traceability (Bai, Zhang, and Jiang, 2013), organic and green food certification (Zheng, Li, and Peterson, 2013; Yu, Gao, and Zeng, 2014), and animal welfare (Ortega et al., 2015) and to estimate the welfare effects of food policies (Ortega et al., 2012).

Background

Pork Demand in China

As the world's most populous country, China is also the world's largest food consumer. Using FAO data, Ortega, Wang, and Chen (2015) illustrate how the Chinese dinner plate has changed over the past half century. In the 1960s, cereals and starchy roots provided 84% of total calories for Chinese people, while meat contributed only 4%. Multiple factors have led to increased consumption of meat, especially pork, in China. First, rising incomes have allowed Chinese citizens to consume more high-value foods. Better food availability and increased urbanization in mainland China have also allowed consumers access to more desirable foods as their incomes increased. Although there is no strong evidence of a recent, exceptional increase in income or meat consumption in Hong Kong, use of pork in food processing and "re-exports" to mainland China are notable (Yuen, 2014).

As a result of economic development between 1980 and 2000, meat, poultry, fish, eggs, and dairy became a key source of calories for Chinese people, providing 19% of total calories by the 2000s. Among all types of meat, pork is the most favored animal protein in China. Among urban households, per capita annual purchases in 2012 were 21.2 kg for pork, 10.8 kg for chicken, 3.7 kg for beef and mutton, and 15.2 kg for aquatic products (National Bureau of Statistics of China, 2013). Data from the U.S. Department of Agriculture (USDA) shows that annual pork consumption in China increased from 36 million metric tons in 1995 to 57 million metric tons in 2015 (figure 1).

China as a Pork Importer

Given rising appetites for pork, Chinese consumers are no longer focused solely on domestic pork products. Although the share of imported pork to total pork supply is still low (2.4%), China has been a net pork importer since 2008, and net imports of pork meat increased from 486 thousand metric tons in 2008 to 600 thousand metric tons in 2015 (figure 1). The United States is the largest pork exporter to China, and U.S. pork suppliers increased their sales to China from $440 million in 2008 to $762 million in 2014 (United Nations Statistics Division).

Multiple factors have led China to increase pork imports. These can be classified as either production or demand related. Production-related factors are mainly a result of the unstable nature of China's pork industry. Given the relationship between China's domestic pork supply and imports discussed in Gale, Marti, and Hu (2012), the fluctuation of domestic pork supply creates opportunities for foreign pork suppliers. Domestic producers face a number of challenges, including a lack of arable land, high production costs, and various disease issues. Rapidly rising feed costs account for over 50% of total productions cost and are the main driver behind rising production costs, contributing to increasing pork prices (Gale, Marti, and Hu, 2012).

Moreover, disease outbreaks and food safety events have tarnished the reputation of domestic pork suppliers and helped increase China's pork imports. For example, a spike in imports coincided with a domestic production dip in 2007 (figure 1) caused by both the wide spread outbreak of porcine reproductive and respiratory syndrome virus (McOrist, Khampee, and Guo, 2011; Cha, 2007) and

the liquidation of sows due to an unfavorable hog-to-corn price ratio in 2006 (Anonymous, 2011). In 2013, media coverage of farmers disposing of dead pigs in the Huangpu River following an outbreak of porcine diarrhea (Park and Zhang, 2013) weakened consumers' trust of domestic suppliers.

Demand-side factors have also driven the increase in pork imports. Rising incomes have resulted in Chinese consumers demanding higher quality and improved food safety, boosting sales of imported pork. Ortega, Wang, and Wu (2009) found that food-safety-sensitive consumers in Bei jing and Shanghai had a positive willingness to pay (WTP) for U.S. pork, implying that imported pork may be an alternative for urban consumers, who seek safer and higher-quality food products, as more people become part of the Chinese middle class. Increases in urbanization and improvements to infrastructure and transportation have led to the proliferation of supermarkets in small cities and the use of cold storage both at home and in retail outlets. As a result, imported pork and processed pork products have become widely available. Busier lifestyles in China resulting from economic and social development imply that consumers have less time to purchase and prepare fresh food. Consequently, fast food restaurants, convenient foods such as refrigerated meat products, and online retailing are becoming more popular in urban China.

Given production and demand drivers, China is becoming a promising market for global pork suppliers. In 2014, the United States, Denmark, and Germany were the main exporters to China, accounting for $1.5 billion in pork value. The emergence of imported pork is expected to increase market competition and provide consumers with origin- and quality-differentiated products. Chinese preferences for imported pork will be affected by a country's quality reputation and consumers' views of various countries, which are likely shaped by international relations and current events (Olsen, 1999). Knowing how Chinese consumers perceive imported pork and their preferences for these products will allow for a better understanding of the market potential for U.S. pork in China.

Study Sites, Experimental Design, and Data

To assess heterogeneity in consumer preferences for imported pork between mainland Chinese and Hong Kong consumers, we focus on two major adjacent metropolitan areas: Guangzhou and Hong Kong. Guangzhou, the third largest city in China, is the key transportation hub and trading center in southern China. Hong Kong, a special administrative region of China, is famous for its low taxation and free trade and is considered a "world city." The geographic proximity of these two cities (approximately 120 km) helps control for unobserved factors not explicitly controlled for in our data—such as domestic food availability, regional tastes, diets, and other cultural factors—and makes the cities prime candidates for comparison.

People in both Guangzhou and Hong Kong commonly speak Cantonese and eat Cantonese-style dishes. Moreover, the food supply in Hong Kong heavily depends on mainland China (i.e., similar food products are available in both cities). Because Hong Kong produces almost no pork, the pork supply comes predominantly from mainland China. For example, in Hong Kong, 97.0% of available pork in January-February 2015 came from mainland China followed by the United States (1.1%) and Malaysia (0.8%) (Hong Kong Census and Statistics Department, 2015).

Because consumer-level preference data for specific pork attributes are not available, it was necessary to collect primary data via consumer surveys in both cities in May–June 2014.[2] Surveys were conducted through in-person consumer interviews and questionnaires were executed at point of purchase in grocery retailers. The questionnaires were developed to extract basic consumer sociodemographic information, pork consumption behavior, and patriotic and nationalistic attitudes. A choice experiment on fresh-chilled pork loin, a popular pork product being marketed to urban consumers, was administered in conjunction with a survey in order to elicit consumer WTP for country of origin and select pork quality attributes. The surveys were developed in English and

[2] The timing of the data collection preceded the height of the pro-democracy protests in Hong Kong by approximately three months.

Table 1. Attributes and Levels Used in Choice Experiments

Attributes	Levels Considered
Country of Origin	China
	United States
	Imported Other (Europe, Canada, or Brazil)
Food Safety Claim	Yes
	No
Animal Welfare Claim	Yes
	No
Environmental Claim	Yes
	No
Price (Local Currency Units/500g)	20 Chinese Yuan (CNY)/ 30 Hong Kong Dollar (HKD)
	30 CNY /45 HKD
	40 CNY / 60 HKD
	50 CNY/ 75 HKD

Notes: Exchange rates at the time of the study were 1 US$: 6.239 CNY and 1 US$: 7.752 HKD.

translated into both Mandarin and Cantonese. Backwards translation and pretesting of the survey were performed to ensure accuracy.

A multi-stage sampling procedure was used to construct the sample. Given the structure and concentration of food retailers in each city and our ability to obtain within-store research permits, the sampling frame for the two cities differed, but it was developed to capture comparable segments of consumers. In Guangzhou, we first selected five districts (Liwan, Yuexiu, Tianhe, Baiyun, and Haizhu) that contained grocery retailers selling imported meat products. In the second stage, ten food retail outlets were randomly selected from a roster compiled by the researchers, including Carrefour, Wal-Mart, Tesco, and Taste grocery stores. In each store, consumers were selected using a quasi-random technique that entailed intercepting every third customer upon completion of a questionnaire. Two hundred and twenty respondents were surveyed in Guangzhou, with equal numbers of consumers in each district. In Hong Kong, we restricted our selection of grocery store sites to five Park-n-Shop stores, the city's leading supermarket retailer. Given the sociogeographical nature of the city, store availability, and access for our study, our sample was unequally distributed among the city's three main regions (96 respondents from Kowloon, 68 from New Territories, and 49 from Hong Kong Island). Sample size considerations for this study were based on the parameters of our choice experiment design and theoretical sample size requirements discussed in Bliemer and Rose (2005). Overall, we obtained 432 useable observations: 220 in Guangzhou and 212 in Hong Kong.

The choice experiment focused on fresh-chilled pork loin, a pork cut being promoted by the United States and other exporting countries in China. The attributes of the product profiles included country of origin (domestic Chinese, imported from the United States, and imported from another country),[3] as well as food safety, animal welfare and environmental safety claims, and product price (table 1).[4] The choice sets, comprising two hypothetical alternatives and a "no choice" option, were created using a D-optimal design created from the full-factorial candidate set using a modified Federov search algorithm that allowed for the estimation of interaction effects between country-of-origin and quality claims (Kuhfeld, Tobias, and Garratt, 1994). To reduce the probability of

[3] "Imported from another country" referred to pork coming from Europe, Canada, or Brazil.

[4] Exchange rates at the time of the study were 1 US$: 6.239 Chinese Yuan and 1 US$: 7.752 Hong Kong Dollars.

Table 2. Sociodemographic Characteristics of the Sample

Characteristic	Guangzhou	Hong Kong
Female (%)	65.10	58.42
Age (years)	36.90	31.30
Household size (no.)	3.74	3.82
Children (no.)	0.82	0.70
Education (%)		
Grade school	69.80	68.69
Undergraduate	24.10	28.23
Graduate/professional	1.89	2.87
Household income (%)		
Low	29.00	24.20
Middle	64.10	65.70
High	6.90	10.10
Avg. weekly pork consumption (*jin*)	2.56	2.72
Avg. patriotism score	1.63	0.27
N	220	212

Notes: Low household income is defined as < 6,000 Chinese Yuan (CNY) (< 15,000 Hong Kong Dollar (HKD)) and high as > 20,000 CNY (>50,000 HKD). At the time of the study, 1 US$: 6.239 Chinese Yuan and 1 US$: 7.752 Hong Kong Dollar. 1 jin is equivalent to 500 grams or 1.10 pounds.

respondent fatigue, the choice sets were split into four blocks of ten choice tasks each. To mitigate the effects of hypothetical bias, we utilized a cheap talk strategy in which we informed respondents of this type of bias before completing the choice tasks (Cummings and Taylor, 1999). This design was evaluated *ex post* in terms of D-error for the MNL model estimated from the datasets (see Scarpa and Rose, 2008). Our design required forty design replicates to ensure significance of all estimates. Given the four blocks, this implies having obtained 160 respondents in each region. Given our sample size, our design performed adequately, with additional replicates compensating for the lack of efficiency in terms of D-error.

In order to measure consumers' level of patriotism, we developed an instrument that could easily be implemented in a field (supermarket) setting. Unlike validated measures of ethnocentrism like the CETSCALE (Shimp and Sharma, 1987), measurement of consumer patriotism is less standardized. Han (1988) measures patriotism by having respondents assess a series of statements that touch on four sub-themes: obligations, industry decline, job loss, and guilt. Juric and Worsley (1998)[5] and Meas (2014) measure patriotism by asking respondents to rate their perceived level of patriotism on a Likert scale. In this study we exploit the use of two Chinese characters, 热爱,[6] to convey feelings of patriotism and national pride and ask respondents to assess their views toward both China and the United States on a five-point Likert scale. We utilize this information to develop a relative measure of patriotism based on the difference between respondents' views of China and of the United States, with a value of 4 representing an extreme nationalistic view of China relative to the United States and a value of −4 representing an affinity for the United States.[7]

Characteristics of our sample are presented in table 2. On average, survey respondents were female, between 31–37 years of age, with at least a primary education. Household weekly pork consumption was reported to be approximately 2.7 *jin* (1.35 kg.),[8] highlighting the importance that pork plays in the Chinese diet. Results from statistical tests reveal that our two samples are similar

[5] We note that Juric and Worsley (1998) use patriotism as an element to measure ethnocentrism.

[6] The literal translation for these characters is "deep love," which we associate with patriotism and nationalistic attitudes.

[7] More specifically, our measure of patriotism is the difference between individuals' nationalistic attitudes toward mainland China and the United States. Note that individuals' attitudes toward mainland China (not toward Hong Kong) were measured in both cities.

[8] 1 *jin* equals 500 grams.

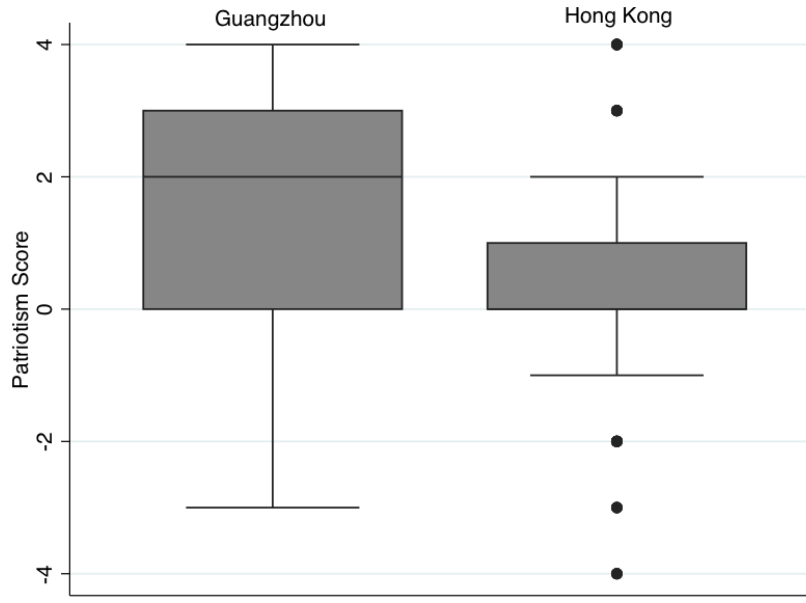

Figure 2. Distribution of Patriotism Scores in Guangzhou and Hong Kong

in terms of gender, age, household size, number of children, education, and pork consumption. While our samples are not representative of all consumers in the respective cities, they are a good representation of consumers who shop at middle- to high-end supermarkets. Descriptive statistics for consumers in our sample are comparable to those reported in other studies for Guangzhou (e.g., Maruyama, Wu, and Huang, 2016) as well as official figures available for both cities. Published statistics for Guangzhou (or the province of Guangdong in certain cases) show that 49.6% of the population is female, with a mean age of 37.5 years and average household monthly income of 8,948 Chinese Yuan (Guangzhou Survey Office of National Bureau of Statistics Office, 2015). In Hong Kong, 53.8% of the population is female, with a mean age of 42.8 years; the majority (68.3%) have average household monthly incomes greater than 15,000 Hong Kong Dollars (Information Services Department, Hong Kong Special Administrative Region Government, 2015).[9] Similarly, pork consumption statistics of our sample are congruent with urban consumption data presented in Yu and Abler (2014). On average, we find significant differences in levels of patriotism between respondent groups; consumers in Guangzhou are more patriotic (mean score of 1.63) than consumers in Hong Kong (mean score of 0.27) (figure 2).

Empirical Framework

Within the discrete choice literature, there are several ways of accounting for and modeling preference heterogeneity. A common method of evaluating preference heterogeneity is estimating random parameters logit (RPL) models, also called mixed logit (Train, 2003). Following random utility theory (McFadden, 1973), we assume that indirect utility is linear in parameters and is composed of both a deterministic and stochastic component. We can therefore express individual i's indirect utility function as

$$V^*_{ijt} = \boldsymbol{\beta}'_i \boldsymbol{X}_{ijt} + \epsilon_{ijt}, \tag{1}$$

where $\boldsymbol{X}_{ijt}$ is a vector of attributes found in the jth alternative of situation t, $\boldsymbol{\beta}_i$ is a vector of individual-specific taste parameters, and ϵ_{ijt} is a stochastic component of utility that is i.i.d.

[9] At the time of the study, 1 US$: 6.239 Chinese Yuan and 1 US$: 7.752 Hong Kong Dollars.

and takes a known (extreme value) distribution. This stochastic component of utility captures unobserved variations in tastes and errors in consumers' perceptions and optimization. Indirect utility V^*_{ijt} is not directly observed; what is observed is the actual choice, V_{ijt}, where $V_{ijt} = 1$ if $V^*_{ijt} = \max(V^*_{1it}, V^*_{i2t}, \ldots, V^*_{ikt})$ and 0 otherwise.

Following the RPL specification in Train (2009), the probability that individual i chooses alternative j in situation t is given by

$$Prob(V_{ijt} = 1 | X_{i1t}, X_{i2t}, \ldots, X_{ikt}, \Omega) = \int \frac{\exp(\boldsymbol{\beta}_{i'} \boldsymbol{X}_{ijt})}{\sum_{k=1}^{K} \exp(\boldsymbol{\beta}_{i'} \boldsymbol{X}_{ikt})} f(\boldsymbol{\beta}|\Omega) d\boldsymbol{\beta}, \tag{2}$$

where the vector Ω defines the parameters characterizing the distribution of preferences. Because the integral in equation (2) lacks a closed-form solution, the model is typically estimated via simulated maximum likelihood estimation techniques.

Operationalizing the model in equation (2) requires specifying the family of distributions from which to draw the random parameters. Typically, researchers specify most nonprice parameters to be distributed normally, allowing for potentially positive and negative preferences. Specifying the distribution of the price parameter, however, requires some careful consideration. Allowing the price coefficient to be distributed normally is problematic for several reasons, including potential violations of downward-sloping demand curves and deriving distributions of WTP estimates with infinite variances. Historically, researchers have simply restricted the price coefficient to be constant (e.g., Revelt and Train, 1998). This is analogous to assuming that preferences over prices are homogeneous in the population and "implies that the standard deviation of unobserved utility or the scale parameter is the same for all observations" (Scarpa, Thiene, and Train, 2008). Louviere convincingly argues that the scale parameter can, and indeed often does, vary randomly over observations; ignoring this variation can result in erroneous conclusions. In the context of food product choice modeling, if the price coefficient is constrained to be fixed (when in fact scale varies over observations), then the variation in scale will be incorrectly attributed to variation in WTP for product characteristics. One potential solution is to introduce heterogeneity and restrict the sign of the price coefficient by specifying a distribution whose domain lies strictly on one side of zero (e.g., log normal distribution). While congruent with demand theory, empirically amenable distributions of utility coefficients do not necessarily imply convenient distributions for WTP, and vice versa (Scarpa, Thiene, and Train, 2008).

An alternative solution is to estimate the model in WTP space, where the model is re-parameterized such that the estimated parameters are the WTP for each attribute rather than the marginal utility coefficients (Train and Weeks, 2005). To illustrate, we specify utility in equation (1) to be separable in price, p, and nonprice, $\boldsymbol{x}$, attributes. Dividing this utility function by a scale parameter, μ_i, yields

$$V^*_{ijt} = -\left(\frac{\alpha_i}{\mu_i}\right) p_{ijt} + \left(\frac{\boldsymbol{\beta}_i}{\mu_i}\right)' \boldsymbol{x}_{ijt} + \varepsilon_{ijt}, \tag{3}$$

where ε_{ijt} is i.i.d. type-one extreme value. Noting that WTP for an attribute is the ratio of the attribute's coefficient to the price coefficient, $\boldsymbol{w}_i = \boldsymbol{\beta}_i / \alpha_i$, equation (3) then becomes

$$V^*_{ijt} = -\lambda_i p_{ijt} + (\lambda_i \boldsymbol{w}_i)' \boldsymbol{x}_{ijt} + \varepsilon_{ij}, \tag{4}$$

where $\lambda_i = \frac{\alpha_i}{\mu_i}$ and $\boldsymbol{w}_i$ is a vector of normally distributed WTP estimates for the product attributes that is independent of scale.

Table 3. Model Results in Local Currency Units

Attribute	(I)				(II)			
	Guangzhou		Hong Kong		Guangzhou		Hong Kong	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
United States US	−36.73***	8.27	8.65**	3.89	−32.88***	11.02	6.00	3.66
	52.98***	7.37	16.12***	2.28	58.93***	9.03	14.53***	2.32
Imported Other IO	−45.06***	9.05	1.07	3.43	−49.46***	10.94	2.44	4.17
	37.93***	5.78	5.70**	2.61	49.47***	8.44	7.89***	2.83
Food Safety FS	41.13***	8.10	23.89***	3.01	62.82***	11.15	23.35***	3.13
	53.09***	7.71	21.65***	2.61	63.37***	9.55	20.81***	2.13
Animal Welfare AW	23.28***	4.74	7.72***	2.42	19.89***	5.38	7.06**	3.11
	9.94*	5.68	13.00***	2.48	4.60	8.70	14.20***	2.17
Environment EN	27.34***	5.50	11.84***	2.60	30.40***	6.70	15.11***	3.03
	6.48	5.01	4.63*	2.80	6.44	7.06	9.58***	1.86
US × FS	12.28*	7.09	11.60***	4.28	14.94	9.16	15.21***	4.18
	17.67***	5.97	16.04	2.93	25.01***	9.19	20.00***	3.13
IO × FS	4.84	7.03	1.28	3.10	−4.58	8.20	0.76	3.35
	3.00	9.07	3.62	4.00	11.64	10.85	4.31	3.38
US × AW	−9.61	6.81	5.78	3.55	−4.38	8.29	8.92**	3.95
	13.47	8.25	7.79	5.32	13.54	9.71	0.29	4.55
IO × AW	−0.84	6.28	−1.22	3.40	8.02**	8.18	0.09	3.75
	4.14	7.22	14.11***	2.99	21.93	9.20	5.36	3.88
US × EN	−3.13	6.85	−2.84	3.57	−6.16	8.53	−4.45	3.26
	9.50	8.97	3.12	5.72	13.44	9.32	5.50	5.08
IO × EN	7.00	7.99	−0.38	3.88	2.21	8.81	−3.46	4.29
	31.00***	5.74	0.96	4.82	9.86	7.26	0.57	5.20
Patriotism × US					−9.92***	3.33	−4.49***	1.59
					7.72***	2.97	7.40***	2.15
No choice constant	−71.54***	9.71	−99.81***	5.16	−78.71***	11.07	−94.90***	4.82
	88.54***	12.16	51.92***	3.91	110.45***	17.20	50.75***	4.06
λ	−2.45***	0.32	−1.38***	0.23	−2.11***	0.32	−1.22***	0.24
Log likelihood	−1,680		−1,470		−1,686		−1,458	
AIC/n	1.55		1.41		1.56		1.40	

Notes: The first row of each attribute is the mean, and the second row is the standard deviation estimates. Single, double, and triple asterisks (*,**,***) represent significance at the 10%, 5%, and 1% level. At the time of the study, 1 US$: 6.239 Chinese Yuan and 1 US$: 7.752 Hong Kong Dollar.

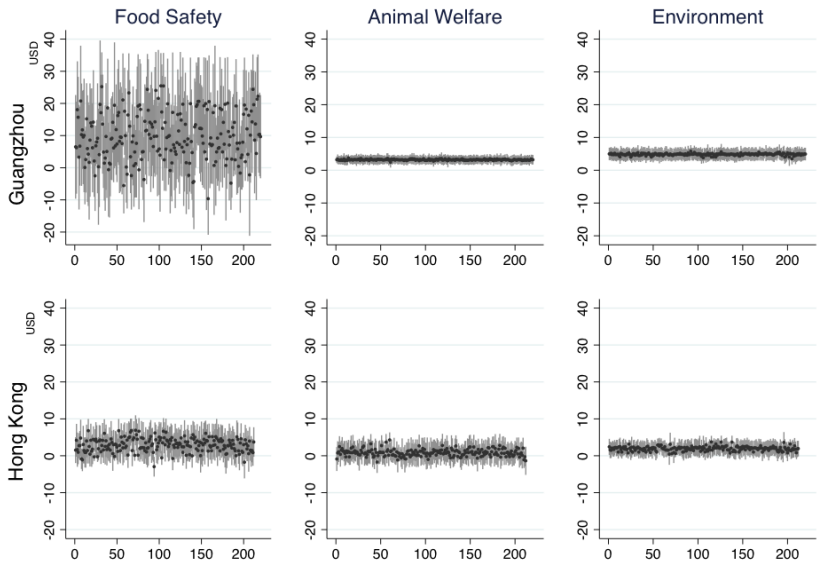

Figure 3. Individual-Level (Conditional) Estimates of WTP for Pork Quality Claims in USD

Notes: Each dot represents an individual's expected WTP from conditional estimates. Bands represent each individual's 95% confidence interval.

Estimation Results and Discussion

We carried out a model specification search that included estimation in preference and WTP space, various distributional assumptions of the estimated parameters, and specifications regarding the patriotism variable. Overall, estimation in WTP space with normal distributions of the random parameters and a lognormal specification of the scale factor was found to fit our data better than estimation in preference space for both datasets. The patriotism variable was interacted with the United States as the country of origin, which resulted in improved model fit and aligns with the study objectives. Models were estimated in NLOGIT 5.0 using 1,000 Halton draws for the simulations. Table 3 reports the unconditional mean and standard deviation coefficients for the different product attributes estimated by maximum simulated likelihood in WTP space. In this table, we present results for two model specifications by city: one not accounting for patriotism (column I) and the other including the patriotism term (column II).

Several observations emerge from our model results. Given the objective of this study, we focus our interpretation of the results on the models presented in column II of table 3.[10] Mainland (Guangzhou) consumers show strong evidence of preference heterogeneity for country-of-origin information and food safety claims (i.e., estimated standard deviations are statistically significant); demand for animal welfare and environmental claims was found to be homogeneous (i.e., estimated standard deviations are statistically insignificant). For Hong Kong consumers, we find evidence of demand heterogeneity for country of origin and the three credence attributes: food safety, animal welfare, and environmental claims.

The sign and significance of the average WTP estimate for U.S. country of origin differs between consumers in Guangzhou and Hong Kong. Our models suggest that—absent any quality claims—Guangzhou consumers prefer domestic pork (relative to imported pork), while Hong Kong consumers are on average indifferent. A significant interaction effect in the model results for Hong Kong suggests the presence of an (imperfect) complementary relationship between U.S. origin and food safety claims. Results obtained for mainland consumers are in line with those of other studies

[10] The model fit criteria favor Model I for the Guangzhou dataset.

Table 4. Simulated WTP for U.S. Pork in USD

Product Attributes	Guangzhou	Hong Kong
US	−7.78	0.64
	[−11.23, −4.51]	[−0.24, 1.51]
US + FS	4.62	5.60
	[1.43, 7.51]	[4.56, 6.59]
US + AW	−5.34	2.67
	[−8.11, −2.70]	[1.59, 3.82]
US + EN	−3.95	2.01
	[−6.94, −0.95]	[0.95, 3.02]
US + FS + AW	7.05	7.64
	[3.36, 10.47]	[6.35, 8.92]
US + FS + EN	8.44	6.97
	[4.85, 11.91]	[5.70, 8.13]
US + AW + EN	−1.51	4.05
	[−4.13, 1.13]	[2.78, 5.33]
U..+ FS + AW + EN	10.88	9.01
	[6.51, 14.87]	[7.55, 10.55]

Notes: 95% confidence intervals are presented in brackets.

that find strong consumer preference for domestic meat products (e.g., Alfnes, 2004; Loureiro and Umberger, 2007; Chung, Boyer, and Han, 2009; Peterson and Burbidge, 2012).

These findings suggest that the U.S. pork industry needs to employ different marketing strategies in the two cities. Given that Hong Kong consumers are nearly indifferent between domestic pork and U.S. pork, traditional advertising and marketing campaigns should be effective at capturing market share. These same strategies, however, may not prove successful in Guangzhou, where there is a stronger need to emphasize and successfully communicate significant differences in quality.

Despite diverging preferences for country of origin, demand for pork quality claims as positive for both groups of consumers (table 3). In figure 3, we present individual-level (conditional) estimates of WTP for the various quality attributes.[11] Of notable interest is the difference in demand heterogeneity between the quality claims for Guangzhou and Hong Kong consumers. Guangzhou consumers are much more concerned about food safety relative to the other claims, while Hong Kong consumers tend to value the three claims more comparably. This could be due to Guangzhou consumers being relatively less informed about animal welfare and environmental claims or having heightened concern for food safety, which may dominate their preferences.

In order to assess demand for U.S. pork with different quality claims, we simulate WTP using 100,000 hypothetical subjects with preferences drawn from posterior (unconditional) moments from our model II estimates in each city (table 4). Our results suggest that—despite a lack of preference for imported pork with no quality information—demand for U.S. pork is significant and positive (relative to domestic pork) when marketed with a food safety claim in mainland China or a food safety, animal welfare, or environmental claim in Hong Kong. By comparing the simulation results, it is evident that food safety information will have the greatest returns in terms of generating demand for U.S. pork in both mainland China and Hong Kong. For example, analysis of our simulation data reveals that marketing U.S. pork with a safety claim increases effective (positive) quantity demanded by 335% and 28% in Guangzhou and Hong Kong, respectively.

Our results confirm our hypothesis that patriotism has an effect on consumer preferences and demand for domestic versus imported pork. A significant negative coefficient on the U.S. patriotism interaction term suggests that more patriotic consumers have lower WTP (and therefore lower

[11] Individual estimates are derived using the population distributions in conjunction with consumers' observed choices over different choice sets. These distributions represent an estimate of individual-specific preferences, conditional upon observed choices and the distribution of preferences in the population (Train, 2003).

Table 5. WTP for U.S. Pork (USD) by Patriotism Level

	Type A-Least Patriotic (GZ: −3, HK: −1)	Type B (GZ: 0, HK:0)	Type C (GZ: 0.27, HK:1.63)	Type D-Most Patriotic (GZ: 2, HK:4)
Guangzhou				
US	−0.52	−5.15	−7.78	−11.56
	[−5.99, 4.61]	[−8.69, −1.85]	[−11.23, −4.51]	[−16.27, −6.95]
US + FS	11.96	7.21	4.62	0.89
	[6.34, 16.99]	[3.79, 10.44]	[1.43, 7.51]	[−3.13, 4.86]
Hong Kong				
US	1.38	0.79	0.64	−0.37
	[0.39, 2.36]	[−0.11, 1.72]	[−0.24, 1.51]	[−1.59, 0.70]
US + FS	6.35	5.76	5.60	4.60
	[5.20, 7.54]	[4.68, 6.82]	[4.56, 6.59]	[3.34, 5.84]

Notes: Patriotism scores for each type are in parenthesis. 95% confidence intervals are presented in brackets.

demand) for U.S. pork. Using our model results as a representation of the distribution of consumer demand for pork in the region, we can further explore the effects that consumers' level of patriotism has on their WTP for U.S. pork. Table 5 contains simulated WTP values for four types of consumers with select patriotism scores in each city. These patriotism scores were selected given the empirical distribution of the data for this variable in each city (figure 2).

Consumer type A represents an individual with an extreme affinity for the U.S. relative to China, indicated by the lowest patriotism scores in each sample (−3 and −1 in Guangzhou and Hong Kong, respectively). Consumer type B represents individuals with indifferent nationalistic attitudes between China and the U.S. (a patriotism score of 0). Consumer type C represents a consumer with the average patriotism score (scores of 1.63 and 0.27, respectively). Consumer type D represents an extremely patriotic consumer, indicated by the highest patriotism scores in each of the samples (4 and 2, respectively). From this analysis, it becomes evident that nationalistic attitudes significantly affect consumer demand for U.S. products in China, with a more pronounced effect among mainland consumers. U.S pork producers and their supporting industries could maximize their marketing efforts by improving the value of their product. Our analysis suggests that this would be best achieved by communicating the safety of American pork products.

Conclusion

We use discrete choice experiments to study Chinese consumer demand for imported and domestic pork and understand how preferences differ between mainland and Hong Kong consumers. Our results indicate that, in addition to taste heterogeneity, differences in preference for domestic over imported pork can also be explained by consumers' nationalistic attitudes and view of their country relative to those of the foreign country. Despite little preference for imported pork (relative to a domestic product), demand for U.S. pork can be increased by focusing marketing efforts on the positive quality aspects of the product. We note that only adding a food safety claim may not be enough because some domestic products have started emphasizing food safety, and average consumers may prefer domestic pork to U.S. pork if both are equally safe. This tendency is more evident among mainland consumers, given the dire food safety situation affecting the domestic food marketing system.

Our study highlights the importance of knowing exactly to whom a company or exporting industry is marketing in a foreign market. Not all Chinese consumers have the same set of preferences, and promotional strategies that work for one set of consumers may not be received well by another. We find that this is the case between mainland Chinese and Hong Kong consumers. Preferences and demand can vary significantly between two adjacent urban centers. Moreover, our research underscores the significance of accounting for nationalistic and patriotic attitudes when

marketing foreign products in a new market. This is particularly critical in our context given the heightened political climate in this region in the wake of the political protest that took place between September and December 2014 in Hong Kong. At the same time, the political protests were made up of a younger generation than the individuals included in our analytical sample. Thus, we expect that the level of patriotism in Hong Kong may become lower than our analysis indicated in the near future.

From an experimental design perspective, our approach highlights the importance of accounting for higher-order effects between attributes in order to capture consumers' overall perception of the value derived from purchasing a country-specific product with quality claims. We find that estimation in WTP space fits our two datasets best, but we obtain mixed results in model fit when incorporating patriotism as a covariate in our model specification. While our experimental design does not allow for estimation of non-U.S. country-specific effects, additional research is needed to better understand how preferences for other countries affects demand for product specific attributes.

One caveat worth reiterating is that our results are based on a sample of urban supermarket shoppers in one mainland Chinese city, Guangzhou, and in Hong Kong, and should not be taken to be representative of all Chinese urban consumers. Our findings illustrate the importance of understanding regional consumer preferences and attitudes before marketing recommendations are developed. This study serves as a benchmark for future research on consumer demand for imported pork in other regions of China, as additional research is needed to fully understand the dynamic Chinese consumer. Little is known about the drivers of emerging demand for animal welfare, environmental, and other credence attributes. Preferences for these characteristics could be related to product taste or other experience attributes that we were unable to capture with our experimental design. We also note the need for a standardized approach to measuring individuals' patriotic attitudes to allow for cross-study comparisons and validation of results. Given the scope of our study, we suggest these topics as areas worthy of further inquiry.

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