EMERGING MARKETS FOR U.S. PORK IN CHINA

By

Maolong Chen

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Agricultural, Food, and Resource Economics – Master of Science

2015

ABSTRACT

EMERGING MARKETS FOR U.S. PORK IN CHINA

By

Maolong Chen

Economic globalization has opened up international markets for U.S. food products, especially new markets in emerging economies. While opportunities for increased demand for U.S. pork in China look promising, little is known about this emerging market. The objective of this thesis is to provide an analysis of Chinese consumer demand for pork and evaluate the potential for U.S. pork in China. Two essays are developed to achieve this goal. The first essay explores the determinants of Chinese consumer perception of pork quality and identifies the relationship between Chinese consumer perception of pork quality and their attitude towards pork attributes including credence, experience and search attributes. The empirical model is applied to survey data from consumers in three major cities in mainland China and Hong Kong collected in 2014 summer, and is estimated using a seemingly unrelated regression method. After investigating consumer's perception of pork quality in the first essay, the second essay aims to provide a closer look at factors that influence consumer purchasing decisions of pork from China and developed countries. A choice experiment approach is employed to examine consumer's willingness to pay (WTP) for select quality attributes in pork. Marketing and agribusiness implications of the findings are discussed.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

KEY TO ABBREVIATIONS

AHA   Animal welfare standards

APSRI Animal   Product Safety Research Institute

CN   China

EU   European Union

FAOSTAT   Food and Agriculture Organization Corporate Statistical Database

FSMA   Food Safety Modernization Act

GMO   Genetically modified organism

HACCP   Hazard Analysis & Critical Control Points

IO   International Other

ISO   International Organization for Standardization

KCAL   Kilocalorie

LCM   Latent class model

OLS   Ordinary least square method

RPL   Random parameter logit

RUM   Random utility model

SUR   Seemingly unrelated regression

UHT   Ultra high temperature

US   United States

USDA   U.S. Department of Agriculture

WSPA   World Society for Protection of Animals

WTP   Willingness to Pay

WTO   World Trade Organization

1. Introduction

1.1 The U.S. pork market

The pork industry in the U.S. has faced multiple threats. Increased feed prices and decreased buying power of U.S. meat consumers are threatening the competitiveness and sustainability of U.S. pork industries. Increased feed prices are primarily a result of increases in corn price, which is the major feed component for hog production. In 2012, corn price reached to a record high of $8.43 per bushel; prices were just $2 per bushel in 2007 (Hunt 2012). This drastic change was mainly a result of the surging demand from corn-based ethanol industries, which has developed rapidly in recent years. Even though corn prices have decreased recently, price fluctuations still significantly and negatively affects the profitability of suppliers, as feed cost comprises approximately 60 percent of the cost of raising hogs. In addition, decreased buying power of U.S. consumers has suppressed domestic market growth, further contributing to low market prices. The weakened buying power of U.S. consumers was mainly a result of the economic recession. Due to the financial crisis of 2008, median household income experienced a sharp decrease, directly influencing consumers' purchasing power in the U.S. Although the U.S. economy is incrementally recovering in recent years, many researchers believe that it will take a long period to bounce back; median household income will not get back to the level in 2007 until 2019 (Snyder 2014). Also, as substitutes for pork are available in the U.S. market, such as chicken, consumer desire of purchasing pork would be weakened if pork prices remain relatively unattractive (Hunt 2012). Therefore, serious questions arise as to how U.S. pork suppliers will remain profitable and seek growth when facing these market constraints.

Economic globalization has opened up international markets for U.S. goods, especially new markets in emerging economies. China, with one-fifth of the world's population and a significant share of its citizenry entering the middle class, has become a major customer for high quality products. Pork, as the staple meat in China, accounts for over 50% of total meat expenditures (Ortega et al. 2009). The Chinese pork market was historically self-sufficient. However, due to the recent price fluctuation of domestic pork and increased demand for safe and high quality pork, China has become a net pork importer since 2008. In 2011, China (including Hong Kong) became the third largest export destination for U.S. pork accounting for 910 million USD and 483 thousand metric tons of product—a new record.

With increased production costs as well as rising concerns over food safety, animal disease epidemics and environmental challenges, the role of China as a major pork importer will likely keep growing. While the Chinese market looks promising for U.S. pork suppliers seeking to expand business and growth, additional information is needed in order to assess the potential of China as an emerging market for U.S. pork. A good starting point is an understanding of China's domestic pork economy.

1.2 China's domestic pork economy

1.2.1 Pork supply in China

China is the largest pork producer in the world, followed by the European Union (EU) and the United States. The Chinese mainland produced 49 million metric tons of pork in 2012 accounting for about half of the world's pork production. For comparison, the E.U. produced 27.2 million metric tons and the U.S. produced 10.6 million metric tons. China has a long history

of producing and consuming pork, and historically Chinese domestic supply has sufficiently fulfilled domestic demand. Before 2007, China was a net pork exporter, and became a net pork importer since 2008 (FAOSTAT). Information about China's pork exports and imports during 1961 to 2011 can be found in Figure 1.
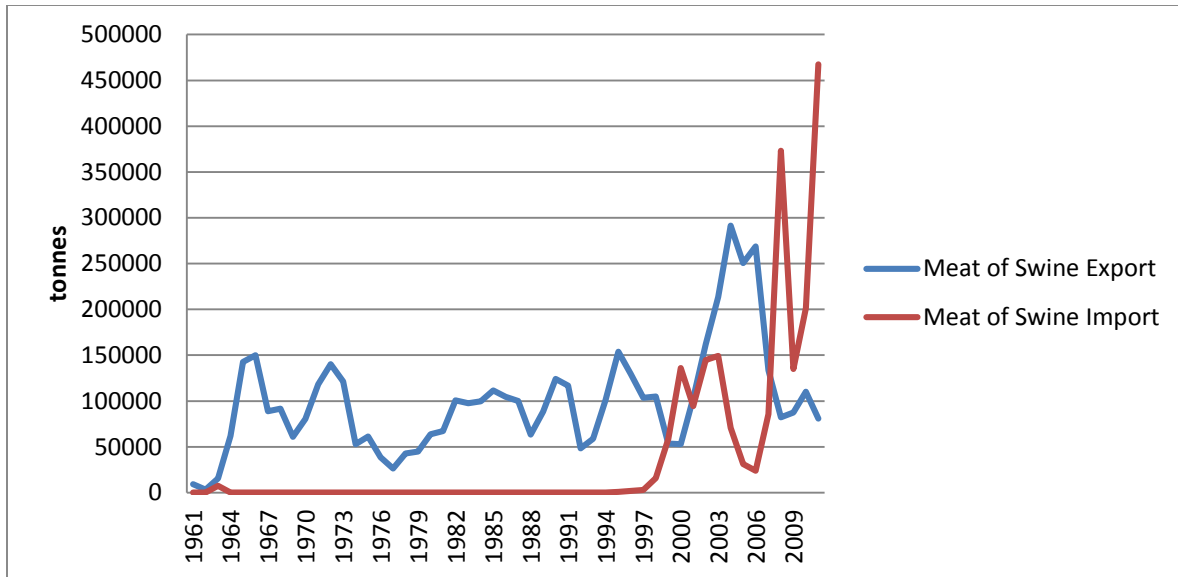
Figure 1: Trend of pork trade in China from 1961 to 2011
Source: FAOSTAT

The high productivity and commercial value of raising pigs is giving rise to a thriving domestic pork industry in China. China's highly productive pork industry is characterized by low farming requirements and a short production cycle (McOrist et al. 2011). In China, hog farmers can easily raise pigs in their backyards and make profits in the short run. The high commercial value is a result of Chinese diet, which is centered on pork. For Chinese consumers, pork meat is not the only desirable product from the animal. They also consume organ meat and other parts such as ear, tail and feet, which are common in traditional Chinese dishes. Therefore, processors are able to take full advantage of pigs, whose every part is valuable to Chinese consumers.

3

Pork production is mainly carried out in three ways in China. Backyard farming was the primary method of production in the past, accounting for about 74 percent of total hog production in 2001 (Ramzy 2009; Pan and Nelson 2012). This number has experienced a sharp decrease recently due to concerns about food safety; hogs from scattered farming accounted for about 37 percent in 2012 (Pan and Nelson 2012). With technological and economic development, intensive pig industries, including small and large commercial farms, are growing fast in China. McOrist et al. (2011) indicated that farms with more than 30 sows account for about 60% of the total pig population in China in 2009. Large farms are mainly supplying in major cities in China such as Beijing and Shanghai, but small farms also supply a considerable amount of pigs and pork in their own provinces. The main pork suppliers in China can be classified in several ways. From the perspective of reputation, Shuanghui, and Yurong are the most popular pork processing companies in China. Shuanghui, as one of the largest pork processors in China, has attracted much attention from all over the world due to its acquisition of the world's largest meat processor: Smithfield,Inc. According to the financial report of Shuanghui in 2012, their total revenue from pork business was about 31.6 billion Yuan (5.0 billion USD), and fresh-chilled products contributed to over 40% of total revenues. Yurong, another leading pork processor and the largest slaughtering company in China, also accounts for a large share of pork sales. Their main product is fresh-chilled pork, which made up about 90% of total revenues in 2012 and earned about 21 billion HKD (2.7 billion USD). Compared to these large processors, who have expanded their business throughout the world, several relatively smaller companies are mainly focusing on regional markets. For example, Shunxin had over 40% meat market share in Beijing in 2011, Gaojin is the largest processed pork supplier in Sichuan, and Yihaotuzhu is a major

player in Guangdong province. Given their nature and regional scope, it is rare to see these brands in other provinces.

In terms of business region, China's pork companies can be classified as either international or domestic companies. International companies such as Shuanghui, Yurong, Jinluo, Zhongpin and Gaojin, not only supply fresh pork in domestic market, but also export frozen pork to other countries. Domestic companies, such as Yihaotuzhu and Shunxin, only focus on regional markets in China. Table 1 presents basic supply-chain information on the main Chinese pork suppliers. Two points are worth highlighting. First, for most international companies who expand their business in other countries, their production process is governed by international food safety standards. As a result, certifications are provided, such as HACCP and ISO9001, aiming to meet the export requirements and attract foreign consumers. However, domestic companies do not implement these standards in their production. Instead, they provide products with informal Chinese certification such as "pollution-free label" to attract domestic consumers. Second, most international companies have multiple breeder sources including domestic, foreign, and self-sourcing, whereas the domestic companies mainly rely on self-sourcing. These differences are consistent with the fact that international companies are trying to supply their products to various consumers in different markets while the domestic companies are just focusing on consumers in regional and local markets.

Table 1: Information on main pork suppliers in China

| Company | Business region beside China mainland | Food safety certification | Other meat product | Supply chain features | | | Self-slaught | Fresh chilled meat |
| | | | | Breeder source | | | | |
				Self-source	Domestic	Foreign	Rank in 2009	Rank in 2013
Shuang Hui	Export to Japan, Singapore, Korea, etc. And acquired Smithfield	ISO9001,HACCP,GAP	Chicken	×	×	×	No. 10	No.4
Yu Rong	Export to Russia, North Korea, HK and South East Asia etc.	HACCP,ISO14001,QS	Cattle, sheep, chicken, duck, rabbit, goose, etc.	×	×	×	No. 1	No.6
Jin Luo	Branch office and company in Russia, Singapore and Hong Kong, etc. for export	ISO9001,ISO14001,ISO22000,HACCP	Chicken	×		×	No. 3	No.5
De Li Shi	Export to Russia, HK and Singapore, etc.	HACCP,SGS	Bi-products from big bone, skin, blood and offal.	×			No. 5	No.7
Wen Shi	Export to HK and Macau	No International Food Safety Certification	Major in chicken and pork, minor in duck and cow	×		×		
He Mei Er	Joint venture with Hormel(U.S.); Export to Japan, HK and Philippines, etc.	HACCP, TQC	Beef, chicken, turkey			×		
Yi Hao Tu Zhu	Mainly Guangdong and started to expand to other provinces since 2013.	Pollution-free	None	×				
Shun Xin	Mainly Beijing	Pollution-free, HACCP	None	×				
Zhong Pin	Export to southeast Asia and east Europe, etc.	ISO9001,ISO14000,GMP,GAP,SSOP, HACCP, Pollution-free	Beef	×			No.2	No.3
Gao Jin	Mainly eastern China; Export to Russia, Korea, Japan, etc.	ISO9001, ISO14001，HACCP, Pollution-free,	Processed beef, chicken		×		No.6	No.2

In addition to domestic pork production, pig meat from the E.U., the U.S., Canada and Brazil is known to have made its way to the mainland through a "grey channel" originating in Hong Kong to avoid high tariffs (Peter 2004; Collins and Sun 2010); imports into Hong Kong were estimated at over 266 thousand metric tons of pig meat in 2011 (FAOSTAT). This amount was significantly higher than the amount of annual pork consumption in this area. Therefore, Gale et al. (2012) indicated that this illegal trade contributed to a large amount of pork supply in China's pork market, although the actual amount of re-exported pig meat is uncertain. Hong Kong has minimal trade barriers for imports since there are no custom duties on food imports required in this region, whereas food imports into China are subject to 10-35 % custom duties and additional value-added taxes of approximately 17 % (Ngulu 2014). This policy may help explain why the illegal pork re-exportation from Hong Kong to the mainland is so rampant. Two main problems arise from the grey channel. First, meat transported through this unregulated channel may pose a danger to consumers since it is difficult to inspect quality, and poor transportation condition may lead to food safety problems (Cooper 2012). In addition, this grey channel would result in a loss of brand as the pork being imported in this way ends up in food service processed channels. The Chinese consumers do not know they are eating pork from developed countries. As a result, foreign pork suppliers may miss out on price premiums (Collins and Sun 2010; Montlake 2013).

1.2.2 Domestic pork demand in China

As the most populous country, China is also the world's largest food consumer. Meat consumption in China grew rapidly in the past three decades and has become the most important category of food consumption in recent years. Data from FAO, presented in Figure

2, reveals how the Chinese dinner plate has changed in the past half a century. In the 1960s,

cereals[1] and starchy roots provided 84% of total calories for Chinese people, while meat[2]

contributed to only 4%. As a result of economic development from 1980 to 2000, meat,

poultry, fish, eggs and dairy became a key source of calories for Chinese people and

provided 19% of total calories in the 2000s. Among all kinds of meat, pork is the most

favored animal protein; its consumption increased rapidly during this period. The data from

U.S. Department of Agriculture (USDA) shows that annual pork consumption increased from

16 million metric tons in 1985 to 52 million metric tons in 2012, while annual consumption

of meat increased from 16.7 to 71 million metric tons. The rising trend of meat consumption

is highlighted in Figure 3.

---

[1] Cereals include cereals and pulses but exclude beer.
[2] Meat includes meat and offal.
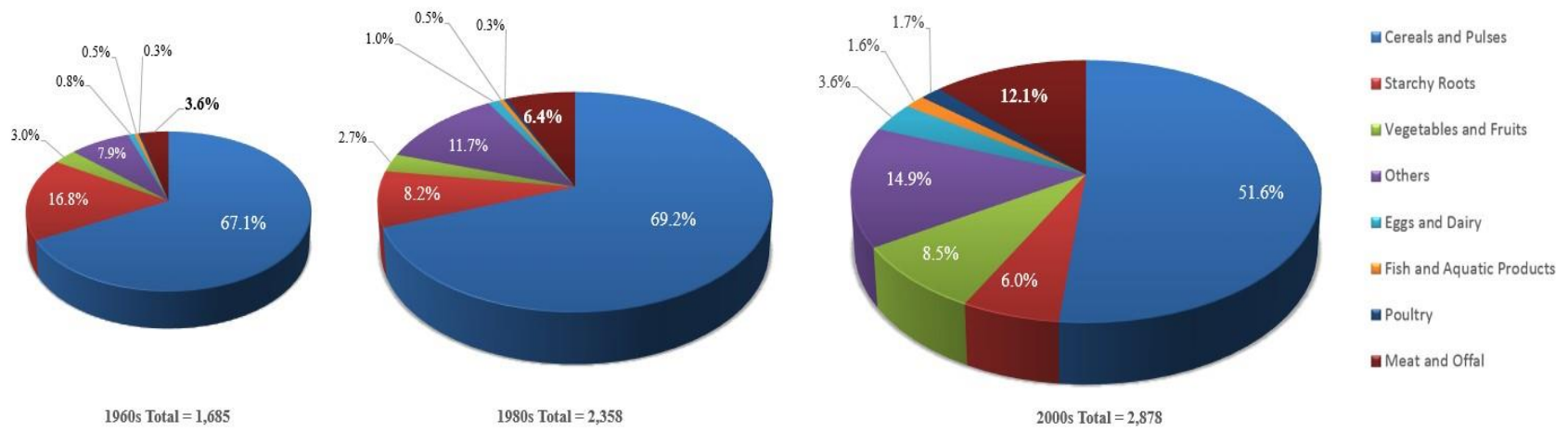
Figure 2: Food consumption shares in decades (KCal/Day/Capita)
Source: Figure is made by Author, using the data from FAOSTAT.
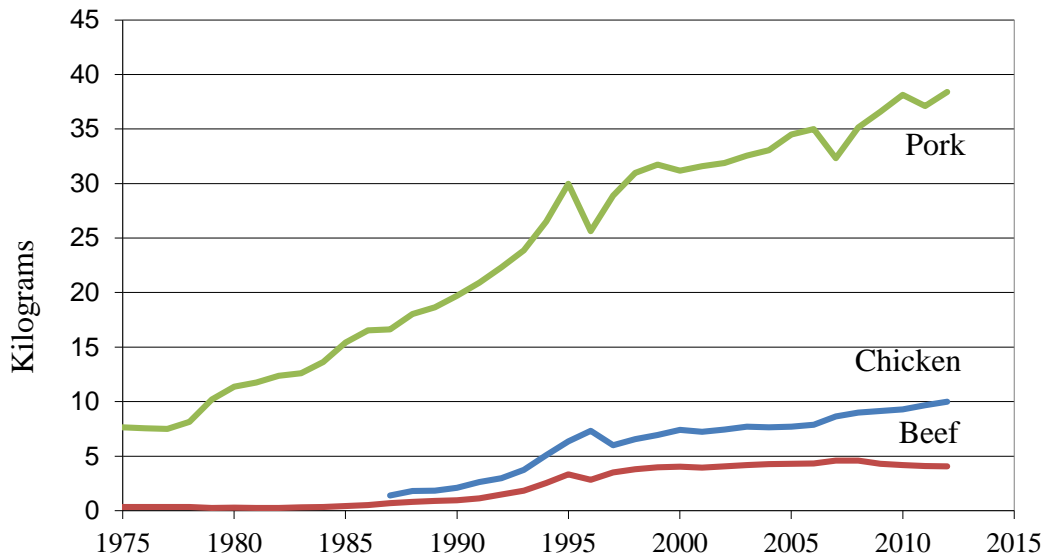
Figure 3: Annual consumption per capita of meat in China from 1975 to 2012, by meat product
Source: USDA 2012

Multiple factors have led to increased consumption of meat, especially pork, in China. For example, due to the economic reform of the 1980s the economy grew rapidly, significantly improving the quality of life. Rising incomes generated by the development of the economy allowed Chinese citizens to consume more high-value food. Also, urbanization, through its effect on food consumption patterns and food availability, is another driver that significantly spurred meat consumption. As the negative effect of urbanization on cereal grains in high income Asian countries has been noted by Huang and David (1993), the increasing demand for meat is not surprising in China, where the urbanization level has doubled in the past 30 years and has reached about 50 percent (Chen 2007). Additionally, better food availability in urban areas guarantees consumer's ability to purchase their desirable food as their incomes increase.

1.2.3 China as a pork importer

With the rising appetite for pork, Chinese consumers are no longer only focusing on domestic pork products. China has been a net pork importer since 2008. Net imports of swine meat increased from 291 thousand metric tons in 2008 to 387 thousand metric tons in 2011 (FAOSTAT). Main foreign pork suppliers for China are listed in Table 2. As the largest pork exporter to China, U.S. pork suppliers increased their sales in China from 439.7 million to 1068.8 million USD. Multiple factors have led China to increase its pork imports. The first set of factors originates from the domestic supply, including higher prices and a tarnished reputation due to the occurrence of several food safety incidents. The second set of factors is from domestic demand, and changing consumer preferences and lifestyle.

Table 2: Top 5 pork exporters to China (Values in thousands of US dollars)

	Rank in 2012	2008	2009	2010	2011	2012	Changes from 10-12
United States	1	439,708	82,213	236,233	1,234,857	1,068,791	352%
Denmark	2	259,858	196,369	357,902	316,367	364,439	2%
Germany	3	69	176	42,949	78,547	287,514	569%
Canada	4	111,381	129,121	222,532	204,677	237,720	7%
Spain	5	234	41,426	54,633	124,313	186,198	241%

Source: United Nations Commodity Trade Statistics, United Nations Statistics Division

Factors from the supply side are mainly a result of the unstable nature of China's pork industry. First, given the positive relationship between China's pork price and its imports (Gale et al. 2012), the fluctuation of domestic pork price creates opportunities for foreign pork suppliers. Higher prices in China relative to western countries are a result of complementary preference for pork cuts and rising production costs. Complementary preferences refers to the fact that less desirable pork cuts for western consumers, such as offal, pig ears and tail, are given higher value by Chinese consumers. Additionally, Chinese

11

consumers prefer fattier meat, while western consumers prefer leaner pork. These complementary preferences have led to a lower price of imported pork and have encouraged trade between countries. In addition, rising costs are also contributing to increased pork prices. Production cost is comprised of feed cost, labor and capital. In China, the rapidly rising feed cost, which accounts for over 50% of total cost, is the main driver behind rising pork production costs (Gale et al. 2012). Second, the tarnished reputation of domestic pork suppliers may also help to increase China's pork imports. As a result of recent pork safety scandals, such as Clenbuterol-tainted pork in 2011 and the Huangpu river dead pig incident in 2013, Chinese consumers' trust on their domestic pork suppliers has been weakened. This distrust may potentially increase western pork suppliers' sales due to their relatively well-established reputations.

Despite the significant role of domestic pork suppliers, factors from the demand side may also impact pork imports. First, with the rising income generated by the development of the Chinese economy, consumers will demand higher quality and improved food safety, which in turn will possibly boost sales of imported pork in China. Ortega et al. (2009) found that food-safety-sensitive consumers in Beijing and Shanghai had a positive willingness to pay for U.S. pork. This implies that, as more and more people are jumping into the middle class in urban China, imported pork may be one of the options for pork consumers in the wealthier cities, who are seeking safer and higher quality food. Second, busier lifestyles in China resulting from economic and social development imply that consumers have less time to purchase and prepare fresh food. Consequently, convenient foods such as frozen meat products and online retailing are becoming more popular in urban China. As Ortega et al. (2009) noted that

consumers having purchased frozen meat before are more likely to accept imported pork, increased demand for frozen pork arising from the trend of busy lifestyles would motivate pork imports in China.

Given the drivers from both supply and demand side, China is becoming promising for western pork suppliers. The emergence of foreign imported pork will motivate the Chinese market to be more competitive and diverse, meaning that Chinese consumers will be confronted with various pork products from different countries and with differentiated quality attributes. Knowing how Chinese consumers perceive imported pork, and what their preferences are, will allow for a better understanding of the potential of the Chinese pork market for western pork suppliers.

1.3 Thesis objective

The objective of this thesis is to provide an analysis of Chinese consumer's preference for pork along with an evaluation of the potential for U.S. pork in China. Two essays are developed in order to achieve these goals. The first essay is trying to explore the determinants of Chinese consumer perception of pork quality. Empirical models are developed to capture the relationship between Chinese consumer perception of pork quality and their attitude towards pork quality characteristics including credence, experience and search attributes. The model is applied to survey data from consumers in four major cities in China, and estimated using a seemingly unrelated regression method in order to provide comparisons between pork from China and other countries. Results from the first essay will

broaden our understanding of how current Chinese consumers evaluate pork quality from domestic and international markets.

After investigating consumer's perception of pork quality in the first essay, the second essay in chapter 5 aims to provide a closer look at factors that influence consumer purchasing decisions of pork from China and developed countries. A choice experiment approach is employed to examine consumer's willingness to pay (WTP) for select quality attributes in pork. Specifically, consumer's WTP for food safety, animal welfare, environmental issues, as well as country of origin will be estimated. Also, another particular interest in this research is to explore how consumer's level of patriotism will affect their WTP for domestic and imported pork. The monetary importance of the product attributes for Chinese consumers generated in this essay will help quantify the results from the first essay.

This thesis is organized as follows: chapter 2 will present background information on determinants of consumer preference for pork and offers a comparison between pork from China and the U.S. in terms various attributes. Chapter 3 will describe the data used in this study. Chapter 4 will present the first essay entitled "Chinese consumers perception of pork quality". Chapter 5 will present the second essay entitled "Chinese consumers' willingness to pay for pork credence attributes". Copies of surveys and supplementary information for both essays are contained in the Appendices at the end of this thesis.

2. Determinants of consumers' preference for pork

2.1 Definition and classification of pork attributes

Consumers no longer treat pork products as a single commodity since multiple attributes are incorporated during the production process. Product-specific characteristics, such as appearance, food safety assurances, animal welfare and environmental certifications will play an increased role in determining consumers' perception of pork quality and will affect their purchasing decisions (Meuwissen et al. 2007). Researchers and economists traditionally categorized product characteristics as search, experience and credence attributes (Nelson 1970; Caswell et al. 1996). A search attribute is one that consumers can recognize before purchase. For pork products, price, expiration date and appearance are examples of search attributes. Experience attributes such as taste and tenderness are evaluated after consumption. Researchers define credence attributes as those that cannot be discern even after consuming the product; examples include food safety, animal welfare, environmental impact and country of origin. Nevertheless, information signaling such as food safety certification, animal welfare assurance, environmental-friendly assurance and country of origin labeling, can help transform credence attributes into search attributes (Caswell et al. 1996).

Previous research has investigated consumer preferences for pork-specific quality attributes (Grunert 2005; Bernués et al. 2003; Cicia et al. 2010). According to these studies, consumers may rely on multiple attributes to judge product quality, but the relative importance of these attributes for consumers may differ between countries. For example, food safety attributes have acquired price premiums from consumers in both developed and developing countries (Loureiro et al. 2007; Ubilava et al. 2009), but the amount of premium consumers are willing

to pay is different depending on their trust and perceptions. For instance, Loureiro et al. (2007) found that the willingness to pay of U.S. beef consumers for quality certification is four times higher than traceability. However, Ubilava et al. (2009) found a different result in the Republic of Georgia, where consumers are willing to pay about 48% more for product traceability compared to quality certification. This is a result of consumer mistrust of their own country's quality certification system. Janssen and Hamm (2012) presented a similar finding based on their study in European countries, where consumers were capable of distinguishing differentiated products; only labels under strict standards received a relatively high premium.

Given that pork produced in different countries could be composed of different quality attributes, a comparison between pork from China and the U.S. with respect to quality attributes is necessary. We select attributes that encompass food safety, animal welfare, environmental impact and country of origin to explore, as these are receiving increased attention from Chinese consumers and they have a potential to affect purchasing decisions.

2.2 Differences in credence attributes between Chinese and U.S. pork

2.2.1 Different policies and regulations on food safety

Due to the important links between food and human health, such as food-borne illness, food safety concerns are shared by consumers in both developed and developing countries. Food safety risks may arise at any point of the food production chain since the product goes through many stages to get from the farm to the consumer. For example, pathogens can be introduced into the product if pigs are fed with contaminated water or feed. Also, pork may

16

be contaminated if the pig is slaughtered under poor sanitary conditions. Therefore, many countries have implemented different policies and regulations to enhance food safety throughout the whole supply chain. Moreover food producers are making efforts to differentiate their products from their competitors by providing food safety assurances. For example, producers will present some food safety certification on the package to state that their pigs are produced under certain inspection and quality management systems. Also, some countries require producers to implement traceability systems to improve the efficiency of product recall and ensure food safety. This type of information will be signaled through labels certified by legal organizations, and potentially affect consumer purchasing decision. In accordance with previous studies, we specify food safety attributes as certification, traceability and additive-free labels (McCarthy and Henson 2003; Ortega et al. 2011; Krystallis et al. 2006), and compare differences in standards, policies and implementation between China and the United States.

Food safety certification will be provided for products that are produced under specific safety inspections and quality management systems. Several food safety systems and standards have been developed and introduced in the food industry, in order to ensure food safety and quality. For example, Hazard Analysis and Critical Control Point (HACCP) is a system designed to prevent biological, chemical and physical hazards in production processes. Products produced under this system will be labeled "HACCP". Many other global certifications such as ISO certifications and World Trade Organization (WTO) standards are also used worldwide. These international food safety systems have been awarded and implemented in China's food industries. In addition to these global food safety certifications,

17

many countries have developed their own standards and labels to certify food safety and quality. The Chinese government has introduced several food safety assurance schemes in recent years. These programs established a number of standards that provide certification labels, including organic, 'green', pollution-free, and 'safe' labels (Paull 2008; Calvin et al. 2006). However, given that Chinese consumers' confidence in their domestic food was discouraged after the exposure of many high-profile food incidents, they have presented a level of doubt about whether the Chinese government is able to manage these standards well (Sun and Collins 2012). In the U.S., pork producers can choose to participate in the certification programs granted by U.S. Department of Agriculture's Agricultural Marketing Service (USDA-AMS), and their pork products will be labeled with USDA-backed certifications. In contrast to China, these assurance labels certified by the U.S. government enjoy a good reputation and receive price premiums from U.S. consumers (Schumacher and Tonsor 2012). Although Chinese consumers may not be familiar with these foreign labels or assurances, their potential distrust in domestic certifications may create opportunities for imported food products, which are produced under strict standards and are certified by governments or organizations in developed countries.

Traceability is defined as the ability to track the history, location or use of an entity, by means of recorded identifications (Baines and Davies, 1998). As food safety risks may arise at any point in the food production process, traceability systems- assuring the transparency in food supply chain- are regarded as a useful technique to reinforce food safety. Pouliot et al. (2008) indicated that traceability is linked to food safety by increasing producer's incentives to supply safer food. In addition to the economical motivations to suppliers, both the U.S.

and China have implemented policies and regulations to incentivize producers to implement traceability systems. In the United States, The Food Safety Modernization Act (FSMA), signed into law in January 2011, requires all food processors in compliance to enhance traceability systems. In China, the government also noticed the importance of traceability and published a new food safety law in 2009 that explicitly implements traceability systems. However, due to the fragmented nature of Chinese agriculture, it is not certain whether this system can be implemented successfully (Ramzy 2009). As traceability systems play an important role in ensuring food safety, and has been well introduced in pork production in developed countries, foreign imported pork carrying such attribute could be attractive to food safety-sensitive consumers in China.

Additive-free claims are another characteristic that consumers use to evaluate food safety, as unfamiliar chemical terms have emerged following the exposure of recent food safety scandals. For example, after the clenbuterol-tainted pork incident occurred in China, several kinds of lean-meat powder including clenbuterol and ractopamine were explicitly prohibited in pork production in China. However, as ractopamine is completely safe for human consumption, it is legally allowed in U.S. pork production, which gave rise to a sharp decline of U.S. pork export to China in the beginning of 2013 (USDA 2012). Antibiotics are another example that has been hotly debated among researchers and policy makers for a long time. The use of antibiotics can promote production efficiency and benefit suppliers by destroying or slowing down the growth of bacteria, but creates potential health risks to consumers (Lust et al. 2006). Both China and the U.S. are legally allowed to use these substances to keep animals healthy, but the overuse of antibiotic drugs in China's livestock production has given

19

rise to significant concerns amongst scientists and policy makers. Philpott (2013) indicated that half of China's antibiotics goes to livestock and massive antibiotic resistance strains have been found in Chinese pig farms (Zhu, et al. 2013). Regarding Chinese consumer's food safety sensitivity after various food safety incidents, their attitudes towards these additives used in pork production can potentially influence their purchasing decision. Thus, further research is required to examine consumer's purchasing behavior regarding additive-free claims or other certifications that guarantee food safety.

2.2.2 Increasing awareness of animal welfare in China

In recent years, animal welfare has gained attention and importance in China. Large government-funded projects on farm animal welfare have been established to build Chinese standards for animal welfare (Nielsen et al. 2012). For example, a humane slaughter program was implemented by the World Society for Protection of Animals (WSPA) and the Beijing ChaoyangAnhua Animal Product Safety Research Institute (APSRI) in 2007. The aim of the program is to improve the welfare of animals slaughtered in China by developing and implementing pre-slaughter and slaughter animal welfare curricula for undergraduate veterinarians.

Animal welfare encompasses various aspects that include housing condition, feed, stock density, method of slaughter, transportation and farming method (Den Ouden et al.1997; Harper et al.2001; Liljenstolpe 2008). For some consumers, who are trying to maximize their utility from consuming pork, a well-treated pig means better quality pork. But the following question arises: what type of information will consumers rely on in order to evaluate this

credence attribute? According to research conducted by Mayfield et al. (2007) in Europe, the most important information for consumers is the animal-welfare assurance label, followed by grading system, information on housing condition and information on feed.

However, animal welfare certifications and grading systems have still not been established in China. In contrast, the U.S. has organizations that help to verify animal welfare standards. For example, the American Humane Association is the first welfare certification program in the United States to ensure the humane treatment of farm animals and provides third-party independent certification for producers who meet the animal welfare standards (AHA). In addition, some other programs in the U.S. such as the National Organic Program and the non-profit Humane Farm Animal Care also provide animal welfare certifications. The standards of these programs include raising condition, humane slaughter, and certified animal transportation. As consumers may count on these characteristics to evaluate animal welfare and judge the quality of pork, animal welfare certifications can possibly become another tool for imported pork suppliers to differentiate their products in China. Therefore, additional research is needed to understand Chinese consumers' attitude towards animal welfare.

2.2.3 Rising concerns on the environmental impacts of China's pork industry
With the rapid economic development, many environmental problems such as air pollution, water pollution and soil contamination have been plaguing China in recent years. For example, recently, the most hazardous pollution is PM 2.5 particles; which are small enough that they can penetrate into lungs and enter the bloodstream. The average level of PM 2.5 in China is 20 times higher than the safe limit, and over 800 million people in China are

affected (Peng et al. 2013). Heavy industrial dust, as well as coal burning and automobile exhaust, are the main contributors to this toxic air pollution. Water pollution is another big problem in China. According to China's State Environmental Protection Administration (SEPA) in 2006, 60% of the country's rivers are polluted and cannot be used as drinking water sources, and the main contributors include industrial emission and extensive use of pesticides and fertilizers. In addition, soil contamination is becoming increasingly prevalent while more than 2% of the farmland in China cannot be used to grow food because of pollution (Osborne 2013). This farmland is polluted with heavy metals and some other chemicals released by various industries.

Pork production, which highly depends on concentrated feed and land inputs, is linked to these various environmental issues. Several types of environmental pollution associated with Chinese livestock industry have been observed (Zhang et al. 2010; Li et al. 2005). For example, heavy metal contents have increased in pig manure, which can cause metal pollution in the soil (Jiang et al. 2010; Cang et al. 2004; Wang et al. 2013). Water pollution, such as algae bloom, has also been noted, which is mainly a result from the nutrients in animal manure (Gu et al. 2008; Sun et al. 2012; Wang et al. 2010; Gao et al. 2013). Moreover, Fu and Yu (2013) indicated that the livestock industry in China has become a major source of methane, one kind of greenhouse gas, resulting in air pollution.

Given the association between environmental pollution and the livestock industry, Chinese pork consumers who are concerned about environmental issues have two potential options to remedy the situation. One is purchasing environmental-friendly pork products, such as

pollution-free pork, and the other is to purchase imported pork; the latter having no direct impact on the domestic environment. With this understanding, imported pork seems to be competitive since environmental-friendly attributes will have a relatively high price. Thus, research on Chinese consumers' awareness of environmental issues and attitudes towards environmentally friendly products is of great importance. Moreover, additional research on consumer attitudes towards environmentally friendly pork products is needed to help evaluate the potential of imported pork in China.

2.3 Difference in experience and search attributes of Chinese and U.S. pork

Search attributes of pork include appearance, packaging, and price—characteristics that can be recognized before purchase. Examples of experience attributes of pork include freshness, tenderness, and taste, which can only be perceived after consumption. One of the differences between Chinese and U.S. pork in terms of these tangible attributes is that U.S. pork is leaner, or has less marbling than Chinese pork. This is driven by both consumer preferences and producer's farming method. Western consumers prefer lean meat while Chinese consumers are drawn to pork with a certain fat content (Ortega et al. 2009). In response to this demand, producers in the U.S. supply more lean meat by feeding hogs with a lean-meat powder called ractopamine. Currently over 80% of hogs raised in the U.S. are fed with this type of additive (Couch 2014). In contrast, Chinese pork used to involve more external fat, which was a result of the traditional backyard farming method, the primary production method in China in the past. Most of the hogs raised in backyards were fed with less strict diets compared to modern industrialized production. As a result, the growth rates of hogs were slow and the amount of external fat was high (Wang et al. 1998). This situation has

changed recently as many farms have transferred into specialized or commercial farms with advanced equipment and modern production method.

Some other attributes may also differ based on the fact that Chinese pork can be found in various retail channels such as wet markets, meat stores and supermarkets, while imported pork is only accessible for Chinese consumers in high-end supermarkets. China used to import frozen U.S. pork, which ended up in food service channel and was not able to be recognized directly by consumers (Montlake 2013). As retailers have realized the high margins of U.S. pork, chilled U.S. imported pork is starting to emerge in international supermarkets in China. Therefore, in terms of packaging, imported pork sold in the high-end supermarket must be more attractive than Chinese pork sold in the wet market. However, in terms of freshness, imported pork (chilled or frozen) in the supermarket may possibly be less attractive for consumers who are used to purchase fresh pork in wet markets. Pork imported from the U.S. will be chilled and shipped a long distance; whether transportation will significantly affect freshness is hard to say. Therefore, it is of interest to explore whether consumers will perceive chilled imported pork sold in the supermarket as fresh as the pork sold in the wet market, which is easier for consumers to judge the quality and freshness of. Given the potential difference among Chinese and U.S. imported pork in terms of tangible characteristics, additional research is needed to examine how Chinese consumers evaluate the quality of pork from different countries.

3. Data

3.1 Data sources

Because information on consumer preferences for the pork attributes of interest is not available in the marketplace, the collection of primary data was necessary. The data utilized in this study was collected via consumer interviews in four major cities in China including Beijing, Shanghai, Guangzhou and Hong Kong in summer 2014. These four tier one cities are the wealthiest in China. Beijing being the capital, is the second largest city in China by urban population (after Shanghai), and is the political and educational center of China. Shanghai, with the most urban population, is the economic and financial center of China. 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 viewed as a 'world city'.

The surveys were conducted through in-person interviews with consumers, and the questionnaires were executed at point of purchase. A multi-stage sampling procedure was used to construct the sample. First, in each city, we randomly selected 3 to 5 districts that had supermarkets selling imported meat products. For example, in Shanghai 5 districts (Yangpu, Xuhui, Pudong, Minhang and Changning) were randomly selected from a total of 18 districts. In the second stage, various food retail outlets were randomly selected from a roster compiled by the researchers that included domestic and international supermarkets in each district. Within each store, consumers were selected using a quasi-random technique that entailed intercepting every 3rd customer upon completion of a questionnaire. In each city, we

surveyed 200 respondents and local university students were hired and trained to conduct the interviews.

3.2 Data description

Descriptive statistics of the survey data is shown in Table 3 and Table 4. Table 3 presents demographic statistics of respondents by region. The average age of the respondents in mainland China (Beijing, Shanghai and Guangzhou) is 37.5, and the average age of the respondents in Hong Kong is 41.7 years. About 30 percent of respondents are male in both regions; this is expected, as women are the primary shopper. As for the education level, about 33% of mainland respondents completed a university degree; the most frequent level in our sample. Secondary school is the most frequent education level among Hong Kong respondents, accounting for 46.23% of responses. In both regions, over 60 percent of respondents are married and the average household size is about 3.5 individuals. The average monthly household income level of mainland respondents is in the range of 8000 to 10000 RMB (1282 to 1603 USD[3]), and the average level of Hong Kong respondents is between of 20000 to 25000 HKD (2580 to 3225 USD[4]).

---

[3] USD to CNY exchange rate in 2014 June was 6.239.
[4] USD to HKD exchange rate in 2014 June was 7.752.

Table 3: Demographic statistics

Variables	Description	Mean or distribution	
		Mainland China	Hong Kong
Observations		N=600	N=200
Age	Age as of June 2014	37.51 (13.71)	41.74 (14.90)
Gender (%)	Share of male	34.57	31.13
Education (%)	Primary school	3.44	14.62
	Secondary school	29.56	46.23
	Two-year college	25.97	8.49
	University	33.00	27.83
	Graduate school	8.03	2.83
Marital Status (%)	Married	68.01	63.33
	Single	30.70	32.86
	Other	1.29	3.81
Household size	Number of family members	3.47 (1.30)	3.83 (1.14)
Children	Number of children < 6 years old	0.62 (0.79)	0.72 (0.80)
Senior	Number of persons> 60 years old	0.75 (0.94)	0.47 (0.74)
Monthly household income (%)	First range is for mainland and unit is in RMB. Number in "()" is for Hong Kong and unit is in HKD		
	< 2,000 (5,000)	2.16	1.89
	2,000-4,000 (5,000-10,000)	12.50	7.08
	4,000-6,000 (10,000-15,000)	16.38	13.68
	6,000-8,000 (15,000-20,000)	13.22	21.70
	8,000-10,000 (20,000-25,000)	14.94	15.57
	10,000-12,0000 (25,000-30,000)	13.36	8.96
	12,000-14,000 (30,000-35,000)	6.61	8.49
	14,000-16,000 (35,000-40,000)	4.17	5.19
	16,000-18,000 (40,000-45,000)	4.17	1.42
	18,000-20,000 (45,000-50,000)	4.74	5.19
	20,000-22,000 (50,000-55,000)	3.59	2.36
	> 22,000 (55,000-60,000)	4.17	1.89
	(>60,000)	/	6.60

Note: Standard deviation in parentheses.

Information regarding food and pork shopping behaviors is presented in Table 4. As expected, almost all of the respondents were pork consumers. Most of respondents in both mainland and Hong Kong chose to walk to purchase pork, and the average travel time to a supermarket and wet market for mainland respondents was 17 minutes, while Hong Kong respondents spent about 9.9 and 10.9 minutes to go to supermarket and wet market, respectively. For mainland respondents, 19 percent of them indicated having purchased imported pork and 6 percent of them noted having purchased U.S. pork in the past. For Hong Kong respondents, 51 percent of them had purchased imported pork and 27 percent of them had purchased U.S. pork. In both regions, most of the respondents frequented wet markets as the primary place to purchase pork, and the share of frozen pork purchased was relatively low (in mainland it is 10% and in Hong Kong 7%). The average prices of fresh chilled pork loin that mainland and Hong Kong respondents recently purchased were 17.78 RMB and 35.13 HKD, respectively. Chinese pork was the most purchased product for both mainland and Hong Kong respondents in the last month, accounting for 94.55% and 54.25% of pork purchases, respectively. In terms of quality claims, 55.67 % of pork purchased by mainland respondents was known to contain a food safety claim, followed by an environmental-friendly claim (20.63%) and an animal welfare claim (12.20%). Similarly, for Hong Kong respondents, 28.30% of pork possessed a food safety claim, followed by an environmental-friendly claim (10.85%) and an animal welfare claim (8.49%).

Table 4: Purchasing behavior statistics

Variables	Description	Mean or distribution	
		Mainland China	Hong Kong
Observations		N=600	N=200
Food purchaser (%)	Equal to 1 if yes	72.43	55.19
Food preparer (%)	Equal to 1 if yes	72.78	56.13
Pork eater (%)	Equal to 1 if yes	99.28	99.53
Supermarket time	Travel time to supermarket (min)	17.12 (14.18)	9.88 (8.40)
Wet market time	Travel time to wet market (min)	16.99 (15.12)	10.89 (5.60)
Supermarket Mode (%)	Walk	63.45	95.92
	Bike	13.53	0.00
	Car	8.06	2.04
	Public transportation	14.96	2.04
Wet market Mode (%)	Walk	68.70	93.94
	Bike	16.38	0.00
	Car	6.52	2.53
	Public transportation	8.41	3.54
Imported pork purchase (%)	Equal to 1 if purchased imported pork in past	18.71	51.18
US pork purchase (%)	Equal to 1 if purchased U.S. pork in past	5.71	27.49
Purchase location (%)	Wet market	48.35	56.73
	Specialized Meat Store	8.44	9.62
	Low-end domestic supermarket	10.30	29.33
	High-end domestic supermarket	28.76	14.90
	International supermarket	8.44	3.85
	Other	2.26	0.96
Chilled (%)	Share of chilled pork	51.94	25.67
Fresh (%)	Share of fresh pork	39.86	67.38
Frozen (%)	Share of frozen pork	8.20	6.95
Information on purchased pork			
Price	Price of pork purchased last month[5]	17.78 (5.94)	35.13 (11.23)
Country of Origin (%)	China	94.55	54.25
	US	0.86	6.60
	IO[6]	0.14	2.83
	Do not know	4.45	36.32

[5] The price is in RMB in mainland China, and in HKD in Hong Kong.
[6] IO stands for other international countries.

Table 4 (cont'd)

Food safety claim (%)	Equal to 1 if purchased pork with food safety claim	55.67	28.30
Animal welfare claim (%)	Equal to 1 if purchased pork with animal welfare claim	12.20	8.49
Environmental-friendly claim (%)	Equal to 1 if purchased pork with environment-friendly claim	20.63	10.85

Note: Standard deviation in parentheses.

4. Chinese consumers' perception of pork quality

4.1 Introduction

The definition of quality given by the International Organization of Standardization (ISO), is "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" (ISO 8402). According to this definition, product quality is a complicated and multifaceted concept, which is determined by multiple characteristics of a product. These characteristics such as physical properties, special production method and quality control system developed throughout the agricultural marketing system will objectively affect or influence product quality, regarded as objective quality. However, as the objective quality of a product will be judged subjectively by consumers relying on the available intrinsic and extrinsic cues, the delivery of quality information from suppliers to consumers may not be efficient. Morgan (1985) indicated that there is a "quality perception gap" between supplier and consumer, by presenting an example that manufacturer's quality perception is largely different from consumers'. Therefore, a user-oriented approach, which emphasized the consumer perspective, was underlined. Researchers employing this approach believed that the valuation of quality by consumers, regarded as subjective quality, is dependent on their perceptions, needs and goals (Garvin 1984, Steenkamp 1990). Brunsø et al. (2005) concluded that there are two major approaches to studying subjective quality: multidimensional and hierarchical approaches. The multidimensional approach assumes that consumers evaluate product quality based on a combination of multiple product attributes. According to a summary made by Issanchou (1996), potential factors playing a role in influencing consumer's quality perception and purchasing decision include convenience, animal welfare, safety, healthiness, intrinsic and extrinsic quality cues. By contrast, the

hierarchical approach postulates that quality itself is not the aim that consumers desire;

rather, consumers are pursuing the value obtained by purchasing the quality of the product.

Many empirical studies following the multidimensional approach have been conducted.

These works incorporate multiple product attributes categorized as search, experience and

credence attributes, or intrinsic and extrinsic attributes, to investigate how these factors

influence consumer's perception of food quality (Bernués et al. 2003; Banović et al. 2009;

Becker et al. 2000; Verbeke and Ward 2006; Espejel et al. 2007). For example, Bernués et al.

(2003) conducted surveys in Europe to investigate which extrinsic attributes of red meat

could impact consumer's quality perception. Respondents were asked to report on the

importance of multiple attributes to achieve quality in beef and lamb. Through a multi-

attribute model estimated by principal component analysis, they found that animal feeding is

the most important attribute, followed by environmental-friendly production and animal

welfare concerns. Similarly, Becker et al. (2000) asked consumers to rate both intrinsic and

extrinsic quality cues from the perspective of helpfulness of evaluating meat quality. They

found that country of origin and place of purchase are the most helpful cues, followed by

color, brand/label, leanness and marbling. Rather than incorporate attributes into one model,

Verbeke and Ward (2006) examined consumer's interest in quality indicators separately.

They conducted a survey in Belgium in 2000 and asked respondents Likert-scale questions

such as "to what extent do you pay attention to the information cue" and "to what extent is

this cue important for you when purchasing". The authors employed an ordered probit model

to assess the impact of individual characteristics and a labeling information campaign. They

found that certified quality marks and seals of guarantee received the highest interests from consumers.

As food quality is a subjective and multi-dimensional concept, consumers in different countries with different history, background and tradition, may present different attitudes towards quality attributes. With this understanding, several empirical studies have been conducted to investigate what type of quality attributes Chinese consumers may rely on to evaluate the quality of food products (Ngapo et al. 2005; Balestrini and Gamble 2006; Wong et al. 2008). For example, Balestrini and Gamble (2006) conducted a questionnaire in Shanghai to investigate the type of cues Chinese wine consumers use to judge the wine quality. By using a paired-sample t-test to measure the difference among the Likert-scale scores of the wine cues, they found that Chinese wine consumers are more likely to use extrinsic cues, such as country of origin, to evaluate wine quality. Ngapo et al. (2007) examined which appearance attributes Chinese consumers may use to assess pork quality, by asking consumers to select their preferred pork chop from multiple alternatives. The result showed that color and fat cover are the most important appearance characteristics for consumers.

However, the quality of food is not only a multi-dimensional concept, but also a dynamic one where the importance of quality attributes to consumer is changing rapidly (Issanchou 1996; Grunert and Valli 2001). Consumers will rely more on food safety attributes to evaluate food quality after they become exposed to food incidents (Latouche et al. 1998). Also, while consumers' concerns on animal welfare and environment rise, their quality perception of the

food that is not animal- or environmental-friendly will be negatively affected (Wandel and Bugge 1997; Mayfield et al. 2007). Therefore, it is necessary to re-evaluate Chinese consumers' perception of pork quality, especially after recent food safety incidents were exposed in China. This may raise the following concerns: Will Chinese consumers pay more attention to food safety aspects while they judge the pork quality? Given that animal welfare is becoming a hot topic in China, is this trend related to the quality of pork products? Will the increasing concern on pollution among Chinese consumers lead them to care more about the environmental aspect of pork production? How will Chinese consumers evaluate imported pork from developed countries? The present study seeks to answer these questions.

The focus of this chapter is on two objectives. The first objective is to evaluate the relationships between Chinese consumers' pork quality perception and their preferences for meat credence attributes including food safety, animal welfare and the environment. The second objective is to examine how specific pork characteristics influence consumer's perception of pork quality in China. Pork characteristics including appearance, taste, price and origin, are classified as search and experience attributes. The effects of other key factors including patriotism, past experience on imported pork will also be evaluated. Given that the socio-political nature is much different between China and Western countries, the effects patriotism is of great interest in this study, as it is likely to induce consumer's preference for domestic products. In addition, as imported pork has been scarce in China, past purchasing experience can be crucial in determining Chinese consumer's perception of foreign pork, since most of them are only familiar with domestic pork.

Both mainland China and Hong Kong data are applied to examine regional effects on quality perceptions. As the special administrative region of China, Hong Kong is viewed as a 'world city', due mainly to its role as an international finance center with minimal trade barriers. Regarding the differences in history, politics, economics and culture between mainland China and Hong Kong, heterogeneity in consumer's perception and attitude towards pork from China and developed countries will be significant. With this understanding, a comparison between these two regions will also be explored.

4.2 Methodology

A system of linear equations is used to analyze Chinese consumers' perception of pork quality, Y.

(1) $\qquad Y_{ij} = X_{ij}^{'}\beta_j + u_{ij}$

Where i denotes individual; $j=1, 2,..., m$, indicates the jth equation; $X_{ij}^{'}$ is individual i's independent variable vector of the jth equation; and u_{ij} is the error term.

With the assumption that the error terms have zero mean and independence across individuals and homoskedasticity, we stack the system of equations into a seemingly unrelated regression (SUR) model as follows:

$$(2) \quad \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_m \end{bmatrix} = \begin{bmatrix} x_1 & 0 & \cdots & 0 \\ 0 & x_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & x_m \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_m \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_m \end{bmatrix}$$

Based on the framework above, we specify the following empirical model given in equation (3).

$$
\begin{aligned}
Y_{CN} &= X'_{C,CN}\beta_C + X'_P\beta_P + C'\delta_C + \delta_P P + \delta_F F + \delta_I I + u_{CN} \\
(3) \quad Y_{US} &= X'_{C,US}\beta_C + X'_P\beta_P + C'\delta_C + \delta_P P + \delta_F F + \delta_I I + u_{US} \\
Y_{EU} &= X'_{C,EU}\beta_C + X'_P\beta_P + C'\delta_C + \delta_F F + \delta_I I + u_{EU}
\end{aligned}
$$

As our interest is not only to reveal the quality perception of Chinese pork, but also to compare the difference in quality perceptions across Chinese and other imported pork, multiple equations with respect to individual countries are developed. The countries/regions under consideration include the major players in the Chinese pork market: China (CN), the United States (US) and European Union (EU). All three equations have the same independent or explanatory variables except for the E.U. equation, which does not incorporate the patriotism variable (denoted by P), as this is measured on a relative scale between China and the U.S.

In this context Y are the country-specific dependent variables, indicating consumer's quality perception of pork from different countries. This variable is measured by asking respondents to rate the pork quality score on a scale from 1 to 5, where 1 is the lowest rating and 5 is the highest. X'_C is a 3x1 vector of country-specific scores of pork regarding credence attribute claims including food safety, animal welfare and environmental issues. Likert-scale questions

such as " how would you rate the food safety standard of pork produced in China/the United

States/the European Union" were asked to obtain such information. $X_P^{'}$ (which is not country

specific) is a 10 x1 vector of scores for search and experience attributes including color, fat

cover, drip, marbling, freshness, packaging, price, taste, tenderness and origin. $C^{'}$ is a vector

of basic demographic variables including gender, age, household size, education , children,

senior, income and city dummies to control the city fixed effects[7,8]. P is a variable that

captures the relative level of patriotism and is defined as $P = CN/US$, where CN is the score

of consumer's 'love' [9] for China (on a Likert scale) and US is the score of consumers' 'love'

for the US (on the same Likert scale). We use P as a proxy to measure the relative level of

patriotism of Chinese consumers, and use this as a control variable in our quality models as

we hypothesize that Chinese consumer's level of patriotism will potentially influence the

perception of domestic vs US pork. I is a dummy variable indicating consumers past

experience on imported pork (where a value of 1 denotes that respondent have purchased

imported pork in the past) and F is a variable capturing the share of frozen pork purchased.

Given the basic structure of models that have multiple equations and categorical dependent

variables, it is appropriate to employ a multivariate ordered logit/probit to estimate the

empirical model. The advantage of using a multivariate approach rather than a single

equation approach is that we can conduct tests of coefficients across equations to test whether

the coefficients on our variables of interest are significantly different among countries. Such

---

[7] While we run the mainland regression, city dummy is included in this vector to control the fixed city effects.

[8] A description of these variables can be found in Table 3.

[9] More precisely we used a Chinese character that represents a patriotic feeling when conveying this question.

hypothesis test will help us understand the difference in Chinese quality perception among pork from different countries. Nevertheless, given the complexity of implementing a multivariate ordered logit/probit model, we use an alternative SUR method to achieve the same goal.

As an estimation method dealing with a linear equation system, SUR requires dependent variables to be continuous. Although the dependent variables, in our case, are ordered scores generated from Likert-scale questions, we can employ SUR as a substitute or proxy for multivariate ordered regression given the compatibility between the two approaches. To illustrate this compatibility, we show that the results generated by SUR and multivariate ordered logit/probit are similar in terms of significant variables and average partial effects-- the main indicators of interest.

Since the average partial effect is one of the main indicators we are using to test for compatibility, it is worth noting that the coefficients from the result of the ordered logit regression are log odds ratios, rather average partial effects. To illustrate this, suppose we have an ordered response model as:

(4) $Y = X'\beta + u$

Where Y is the ordered dependent variable whose value is ranging from m_1 (1) to m_j (5) and X is a vector of independent variables. The coefficients of the regression using the ordered logit are:

$$(5) \qquad \frac{\partial P(y = m_1 \mid x)}{\partial X_k}, \; \frac{\partial P(y = m_2 \mid x)}{\partial X_k}, \; ..., \; \frac{\partial P(y = m_j \mid x)}{\partial X_k}$$

Whose standard interpretation is that for one unit increase in the predictor, the response variable level is expected to change by its respective regression coefficient in the ordered log-odds scale (while all other variables in the model are held constant). The average partial effect we desire can be computed as follows:

$$(6) \qquad \frac{\partial E(y \mid x)}{\partial X_k} = m_1 \frac{\partial P(y = m_1 \mid x)}{\partial X_k} + m_2 \frac{\partial P(y = m_2 \mid x)}{\partial X_k} + ... + m_j \frac{\partial P(y = m_j \mid x)}{\partial X_k}$$

Therefore, we calculate the average partial effect based on (5) before comparing these two estimation methods. **Error! Reference source not found.** shows the result of the comparison etween the OLS and ordered logit regressions. Taking the regression results of the Hong Kong data as an example, we can see that significance levels of variables in both estimation methods are the same and the average partial effects are very similar. We therefore find it appropriate to employ SUR instead of multivariate ordered regression to estimate the models in this case. One advantage of using such continuous linear estimation method is that it is computationally simple to conduct hypothesis tests directly with the model coefficients, which inherently are the average partial effects we desire, and are more straightforward to interpret and compare.

4.3 Data summary

Table 5 presents information about Chinese consumer's evaluation of pork attributes as well as the patriotism score and past experience regarding imported pork. Two observations are worth noting. First, for both mainland China and Hong Kong consumers, their evaluations of Chinese pork are much lower than U.S. and E.U. pork in terms of food safety, animal welfare and environment issue. Thus, how these evaluations relate to consumer's perception of pork quality is of particular interest given our objective. Second, the patriotism score of consumers in mainland China is 2.46, indicating that their stated 'love' for China is much higher than that for U.S. Therefore, whether patriotism will affect Chinese consumer's attitude towards pork from both countries is of great interest given the scope of our study.

Table 5: Perception statistics

Variables	Description		Mean or distribution	
			Mainland China	Hong Kong
Observations			N=600	N=200
Experience and search attributes				
Color			4.66 (0.61)	4.45 (0.70)
Fat Cover			4.30 (0.87)	4.23 (0.78)
Drip			4.23 (0.93)	3.81 (1.05)
Marbling			3.92 (1.04)	3.70 (1.05)
Fresh		5 if highest importance	4.37 (0.89)	4.68 (0.58)
Packaging		1 if lowest importance	3.45 (1.20)	3.19 (1.14)
Price			4.16 (1.00)	4.26 (0.88)
Taste			4.52 (0.79)	4.12 (0.95)
Tenderness			4.52 (0.83)	4.09 (0.95)
Origin			3.61 (1.28)	3.47 (1.09)
Credence attributes				
Food safety	China		3.39 (1.10)	2.79 (1.01)
	U.S.	5 if highest score 1 if lowest score	3.77 (0.96)	4.00 (0.69)
	E.U.		3.88 (0.91)	3.91 (0.77)
Animal welfare	China		3.00 (1.23)	2.51 (1.02)
	U.S.	5 if highest score 1 if lowest score	3.66 (0.92)	3.64 (0.82)
	E.U.		3.76 (0.92)	3.74 (0.77)
Environment	China		2.91 (1.23)	2.32 (1.04)
	U.S.	5 if highest score 1 if lowest score	3.70 (0.94)	3.71 (0.81)
	E.U.		3.82 (0.94)	3.78 (0.80)
Quality	China		3.57 (1.05)	3.19 (1.00)
	U.S.	5 if highest score 1 if lowest score	3.68 (0.92)	4.01 (0.67)
	E.U.		3.82 (0.91)	3.85 (0.71)
Other variables				
Patriotism		China/U.S.	2.46 (1.49)	1.30 (0.97)
Imported pork purchase (IPP) (%)		1 if purchased imported pork before	18.71	51.18
Frozen (%)		The share of frozen pork	8.20	6.95

Note: Standard deviation in parentheses.

4.4 Results

We apply the empirical model to both mainland China and Hong Kong data, in order to identify consumer's preferences in both regions. Comparison among mainland China and Hong Kong will help to understand preference heterogeneity among Chinese consumers. Estimation results for mainland China and Hong Kong are presented in Table 6 and Table 7.

Table 6: Mainland China regression

Variables	China		U.S.		E.U.	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Male	-0.07	-0.06	0.05	-0.05	-0.05	-0.05
Age	0.00	0.00	0.00	0.00	0.00	0.00
Household Size	-0.01	-0.02	0.00	-0.02	0.02	-0.02
Education	-0.06*	-0.03	0.03	-0.03	0.08***	-0.03
Children	-0.08	-0.06	-0.09*	-0.05	-0.09*	-0.05
Senior	0.04	-0.06	0.05	-0.05	0.06	-0.05
Income	0.01*	0.00	0.00	0.00	0.00	0.00
CityBJ	0.00	-0.07	0.05	-0.06	0.09	-0.06
CitySH	-0.11*	-0.07	-0.07	-0.06	-0.05	-0.06
Patriotism	-0.01	-0.02	-0.05***	-0.01	/	/
IPP	-0.08	-0.07	0.17***	-0.06	0.06	-0.06
Frozen	0.00	0.00	0.00	0.00	0.00	0.00
Color	-0.05	-0.05	0.02	-0.04	-0.01	-0.04
FatCover	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03
Drip	-0.01	-0.03	-0.02	-0.03	-0.02	-0.03
Marbling	-0.02	-0.03	0.02	-0.03	0.01	-0.03
Fresh	0.11***	-0.03	-0.07**	-0.03	0.01	-0.03
Packaging	-0.06**	-0.02	0.06***	-0.02	0.02	-0.02
Price	0.01	-0.03	0.02	-0.02	0.02	-0.02
Taste	0.14***	-0.05	0.02	-0.04	0.06	-0.04
Tenderness	0.00	-0.04	0.08**	-0.04	0.07*	-0.04
Origin	-0.01	-0.03	-0.01	-0.02	0.01	-0.02
Food Safety	0.54***	-0.04	0.47***	-0.03	0.48***	-0.03
Animal Welfare	0.05	-0.04	0.19***	-0.03	0.15***	-0.04
Environment	0.18***	-0.04	0.05	-0.03	0.14***	-0.04
Constant	1.00***	-0.34	0.66**	-0.30	0.03	-0.29
Observations	600	/	600	/	600	/
R-squared	0.61	/	0.60	/	0.62	/

Note: SE means Standard Errors.
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Hong Kong regression

Variables	China		U.S.		E.U.	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Male	0.10	0.11	0.11	0.10	0.14	0.09
Age	-0.00	0.00	0.00	0.00	0.00	0.00
Household Size	0.02	0.05	-0.00	0.04	-0.03	0.04
Education	0.10*	0.06	0.11**	0.05	0.04	0.05
Children	-0.08	0.10	-0.04	0.09	0.03	0.09
Senior	-0.13	0.11	-0.05	0.10	-0.06	0.10
Income	-0.00	0.00	0.00	0.00	-0.00	0.00
Patriotism	0.12**	0.05	-0.00	0.04	/	/
IPP	-0.11	0.10	0.06	0.09	-0.17**	0.08
Frozen	-0.00	0.00	-0.00	0.00	0.01**	0.00
Color	-0.02	0.08	-0.08	0.07	-0.09	0.07
Fat Cover	-0.01	0.07	-0.02	0.07	0.00	0.06
Drip	0.06	0.06	-0.02	0.05	0.03	0.05
Marbling	0.08	0.06	0.02	0.06	-0.01	0.05
Fresh	0.01	0.10	-0.02	0.08	-0.04	0.08
Packaging	-0.03	0.05	-0.03	0.05	0.00	0.04
Price	0.07	0.06	0.08	0.05	0.00	0.05
Taste	0.02	0.08	0.16**	0.07	0.12*	0.07
Tenderness	-0.12	0.08	0.01	0.07	-0.01	0.07
Origin	0.00	0.06	0.05	0.05	0.08*	0.05
Food Safety	0.55***	0.07	0.24***	0.07	0.34***	0.06
Animal Welfare	0.12	0.09	0.07	0.06	-0.10	0.07
Environment	0.06	0.08	0.08	0.06	0.32***	0.06
Constant	0.73	0.56	1.38***	0.53	1.29***	0.50
Observations	200	/	200	/	200	/
R-squared	0.58	/	0.25	/	0.42	/

Note: SE means Standard Errors.

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

4.4.1 Pork Credence Attributes

In terms of credence attributes (food safety, animal welfare, and environmental issues), food safety is the most important criterion for both mainland and Hong Kong consumers when evaluating pork quality. This result is not surprising given their exposure to numerous food incidents in China over the past decade. Through hypothesis testing we find that, for mainland consumers, the relationships between food safety and quality are not significantly different among pork produced in the three regions. This indicates that mainland consumers have strong preference for food safety attributes in pork regardless of origin. For Hong Kong consumers, however, the role of food safety is more important when evaluating the quality of pork from China. This is evidenced by the hypothesis test, where the relationship between food safety and quality of Chinese pork is significantly higher than for pork from developed countries. As Hong Kong consumers perceive that the safety of Chinese pork is worse than that of other developed countries pork (see Table 3), their preference for safe pork explains why Hong Kong consumers are not satisfied with the quality of pork imported from mainland China.

The role of environmental issues is also observed in the mainland regression, where the relationships between environment and quality are significant for pork from all three regions. The hypothesis test indicates that the relationship for Chinese pork is significantly stronger than for pork produced in the U.S. and the E.U. This finding indicates that environmental issues play a more important role in determining the quality of domestic pork. Given that consumer rating of Chinese pork in terms of environment is much lower than that of U.S. and E.U. pork (Table 3), this result reveals that environmental concern is another reason why

45

mainland consumers perceive domestic pork to be of lower quality. In contrast, Hong Kong consumers do not relate environmental issues to pork quality, and this could be attributed to the fact that pork from all these regions is imported, which has a lesser impact on the local environment.

For mainland consumers, the relationship between animal welfare and quality are significant for U.S. and E.U. pork (which is not significant for Hong Kong consumers), indicating that mainland consumers recognize foreign animal-friendly production. For consumers who support animal-friendly production, animal welfare is an important production process attribute used to evaluate pork quality. However it is worth noting that this result only applies to imported but not domestic pork.

4.4.2 Pork Search and Experience Attributes

In terms of pork search and experience attributes, freshness and packaging are significant in the mainland regression, while there is no significant attributes (search and experience) in Hong Kong regression. The result can be interpreted as follows: the more mainland consumers prefer freshness, the more likely they are to perceive pork to be of higher quality. This result is plausible since for mainland consumers, Chinese pork means domestic production and fresh products, whereas pork from other countries means long-distance transportation and often frozen or chilled product. Moreover, the more consumers care about packaging, the more likely they are to attribute higher quality to pork from developed countries. This can be explained by the fact that imported pork can only be purchased in high-end supermarkets in the mainland, which are often sold pre-packaged.

As there is little pork production in Hong Kong, pork from all these three regions is imported, which explains why freshness and packaging are no longer significant in the Hong Kong model. Moreover, search/experience attributes are not significant, indicating that Hong Kong consumer preferences for these attributes do not affect their quality perception.

4.4.3 Patriotism Effect

The effect of patriotism on Chinese consumer food preferences is revealed in the mainland regression. The more mainland consumers 'love' China, the more likely they are to give a low quality score to U.S. pork, even though their level of patriotism does not affect their perception of domestic pork. This is due primarily to the fact that Chinese patriotism or nationalism is affected by political and economic issues; that is, the political affairs or the economic conflict between China and other countries will give rise to a negative impression of foreign products for Chinese consumers (Sean 2013).

This patriotism effect is also present for Hong Kong consumers, but in a slightly different form. Patriotism is found to have a positive effect on Chinese pork quality perception, but does not negatively affect the perception of US or E.U. pork products. This can be attributed to the fact that Hong Kong is often viewed as an international metropolis, where people are used to consuming products from all over the world. Also, as Hong Kong had a long history of being a British colony, consumers there could be relatively more 'world-minded'; they welcome cultures as well as products from all over the world. Thus, consumer's patriotism is not likely to induce a negative impression on foreign product, but rather a positive impression on their own product.

4.4.4 Demographic Impacts

In the mainland China regression, education has a significantly negative effect on the quality perception of Chinese pork and a positive effect on the quality perception of U.S. and E.U. pork, indicating that more educated consumers in mainland China are more likely to perceive pork produced in developed countries (U.S. and E.U.) to be of higher quality. This is due to the fact that more educated consumers are more likely to know and understand that pork from developed countries is produced under strict and well-organized systems. Past experience consuming imported pork also significantly influences consumers' perception of pork quality, which has a negative effect on Chinese pork quality and a positive effect on U.S. and E.U. pork. This indicates that for consumers who have purchased (and therefore consumed) imported pork, they are more familiar with pork produced in developed countries and place a higher quality value on them.

In the Hong Kong regression, income has a significantly negative effect on the quality perception of Chinese pork and a significantly positive effect on U.S. pork. One potential explanation is that, for Hong Kong consumers, they always make purchasing decisions among imported pork including both Chinese pork and U.S. pork. Consumers with higher income are more likely to purchase U.S. pork, which is often more expensive. As a result, they are more familiar with the product and thus perceive it to be of higher quality. However, for mainland China consumers, pork from developed countries is less accessible as it can only be found in limited international supermarket or high-end markets, and domestic pork is much more popular and dominant in mainland China. Therefore, even though some mainland

consumers with high income can afford imported pork, they are not as familiar with imported pork products. This can also help explain why the income effect in mainland China is insignificant.

4.5 Conclusions

Consumers in mainland China and Hong Kong exhibit different preferences for pork, in terms of both tangible and intangible pork attributes. Specifically, among the three credence attributes evaluated, food safety is the most important criteria for consumers in mainland and Hong Kong to evaluate pork quality, no matter whether the pork is domestic or imported. Therefore, for foreign pork suppliers, their advantages on food safety control and quality management may help them explore sales in China. In addition, due to the rising concerns over the domestic environment, the environmental aspect of pork production is likely to influence mainland consumer's perception of domestic pork quality.

In terms of tangible attributes (search and experience attributes), mainland consumers care more about the freshness and packaging of pork while they compare the quality of pork from China and other countries, while Hong Kong consumer's preferences for these attributes are not related to their quality perception. We attribute the insignificance of other physical pork characteristics to the fact that mainland consumers are not familiar with foreign pork. With this understanding, freshness and packaging, which are the more tangible attributes under consideration, play a larger role in shaping mainland consumer's perception of pork quality. The role of patriotism in determining pork quality is also identified in this study; the more patriotic mainland consumers are, the more likely they are to perceive foreign pork to be of

lower quality while patriotic Hong Kong consumers are more likely to perceive Chinese pork to be of higher quality. This suggests that, U.S. pork suppliers should promote U.S. pork carefully-- labeling U.S. pork could potentially help boost sales in China if marketing efforts promote the safety aspect of the product, however, these advantages may be neglected by consumers who are more patriotic.

5. Consumer WTP for quality attributes in domestic vs. imported pork

5.1 Introduction

In this chapter, we evaluate consumers' preferences for credence attributes through a choice experiment approach, and estimate willingness to pay (WTP) for select attributes. The advantage of measuring WTP is that it provides pricing information and helps compare the relative importance of specific pork characteristics. As we have shown the relative importance of credence attributes for Chinese consumers evaluating pork quality, measuring consumers' WTP will help understand their current attitudes toward domestic and imported pork by revealing the monetary values of these pork characteristics.

A classification of various WTP measurement methods is shown in Figure 4. Breidert et al. (2006) divided WTP measurement approaches into the revealed preference approach and the stated preference approach, based on data collection methods. According to the definition given by Louviere et al. (2000), revealed preference refers to consumer's actual preference for the existing product, which only explains the existing situation. Stated preference refers to consumer's preference for both existing and proposed choices, which can encompass hypothetical scenarios. Stated preference approaches allow researchers to test various scenarios or hypotheses by adding shifts or shocks to existing markets in order to forecast market development and make policy suggestions. Given that our goal is to evaluate the potential for US pork in China – a market not widely accessible to Chinese consumers to this point—this study focuses on consumer's stated preferences.
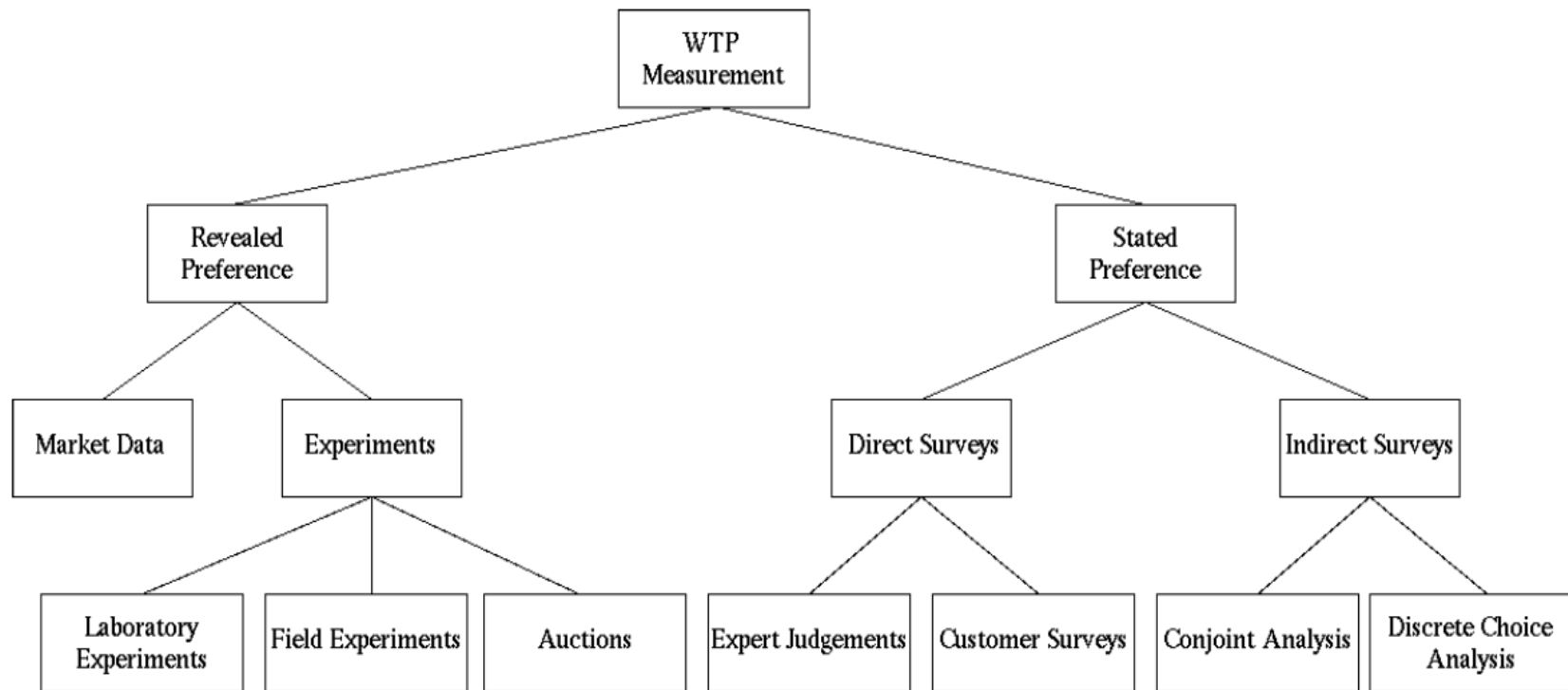
Figure 4: Classification of WTP measurement methods
Source: Breidert et al. 2006

There are two branches of the stated preference approach, direct and indirect surveys. The former directly asks respondent's WTP, while the latter presents commodity profiles with various prices and asks respondents to choose the one they prefer to purchase (Marbeau 1987). As consumers have no incentive to reveal their true WTP in the direct surveys, and their valuation is hard to relate to the actual purchasing decision, a direct survey approach may result in extremely unreasonable outcomes (Hanna and Dodge 1995). With this understanding, we will employ the indirect approach, specifically a choice experiment method, to estimate consumer's WTP.

Choice experiments have been commonly used to investigate consumer's behavior and preferences regarding food products (Tonsor et al. 2009; Ubilava and Foster 2009; Loureiro and Umberger 2007; Lust et al. 2003). The main idea of this analysis is to model consumer's decision making process and to identify consumer's preferences according to their choice among various alternatives. Based on the Lancastrian approach to consumer theory, choice experiments assume that the choice of the decision maker depends on both the objective characteristics embodied in the product *per se* (e.g., quality attributes) and the subjective characteristics of the decision maker (e.g., education level, income level, etc.). This can be explained as follows: Lancaster (1966) indicated that the utility derived by the consumer does not arise from the good *per se*, but rather from the characteristics possessed by the good. In addition, he pointed out that goods can capture various characteristics that could be shared by other goods, but in aggregate the goods could encompass characteristics different from others. With this understanding, the combination of multiple characteristics of the good

53

jointly determines the utility to the consumer after a choice is made. The basic premise of consumer theory is that individuals seek to maximize their utility subject to their resource allocations or budget constraints. Consumer's subjective characteristics determine their preferences, which in turn will determine the level of satisfaction (utility) obtained from purchasing goods. Therefore, the essence of choice experiments is to simulate real purchasing situations and ask consumers to make a choice over multiple alternatives. It is through consumers' choices that their latent preferences are revealed.

As the alternatives in the choice sets can be differentiated by tangible and intangible characteristics in the products, many studies have been conducted to investigate consumer preferences for various attributes. For example, in order to compare consumers' preferences for pork appearance in 23 countries, Ngapo et al. (2007) differentiated 16 different pork chops in terms of color, fat cover, marbling, and drip and found that consumers from different countries have heterogeneous preferences for these tangible attributes. Specifically, color and fat cover played an important role on affecting Chinese consumer's purchasing decision.

There are also many studies investigating consumer preferences for intangible attributes. For example, in an attempt to compare western beef consumers' preferences for food safety attributes, Lusk et al. (2003) designed a choice experiment in which consumers from France, Germany, the U.K., and the U.S. were asked to make choices upon various types of rib-eye steak. They found consumers from these countries represented heterogeneous preferences: French consumers perceived beef produced without hormones having higher value than U.S.

consumers did, and European consumers perceive beef produced without genetically

modified corn as having higher value than U.S. consumers.

In terms of animal welfare attributes, Tonsor et al. (2009) conducted a choice experiment

with a focus on investigating the role of crate-free production on pork consumer's preference

in the U.S. state of Michigan. Pork chops varied in the choice experiment in terms of price,

farm size, production practice (gestation crate-free or typical), and country of origin.

Through a random parameter logit model (RPL) and latent class models (LCM), they

identified consumers' heterogeneous preferences for pork chop attributes. As there are two

ways to promote crate-free production (voluntary versus a formal ban), the results indicated

that the former received a significant premium from consumers, while the latter failed to

increase consumer's benefit.

As the negative effects from meat production on environment have been increasingly

understood, the choice experiment approach has also been used to study meat consumer's

preferences for environmental-friendly attributes. Zanoli et al. (2013) studied Italian beef

consumers' stated preferences for environmentally friendly attributes through a hypothetical

choice experiment. They differentiated beef alternatives by production method (organic,

conventional, or GM), production location (domestic or abroad), breed origin (local or non-

local), animal welfare, and appearance. Specifically, they introduced domestic production

and breed origin as proxies for environmental attributes; the former was a proxy for food

mileage, and the latter was a proxy for biodiversity conservation. As the results showed a

significant WTP for organic beef and a relationship between the environmental issues and the

variation in WTP for organic, the authors concluded that environmental concerns played a role on Italian consumers' demand for beef.

In China, choice experiments have only recently been used to study consumer preferences for various food products (e.g., Ortega et al. 2011; Bai et al. 2013). For example, as Chinese consumers' concerns over food safety have risen as a result of various food safety scandals, Ortega et al. (2011) administered a choice experiment to estimate urban Chinese consumers' WTP for multiple food safety attributes in pork. To take consumer heterogeneity into consideration, the authors constructed an RPL model and LCM models and found that Chinese consumers have a strong demand for food safety assurance. Specifically, among the attributes evaluated, government certification received the highest premium, followed by third-party certification, traceability, and a product-specific information label. Another study conducted by Ortega et al. (2011) investigated Chinese consumers' preference for ultra-high temperature (UHT) fluid milk with respect to food safety attributes. Five two-level attributes including price, shelf life, government certification, third-party certification, and brand were incorporated in the choice experiment, and a RPL model was used to capture consumer preference heterogeneity. They found that government certification received the highest WTP from consumers, followed by the product brand and third-party certification. Longer-shelf-life UHT milk (longer than three months) was less valuable for consumers, receiving a negative WTP.

In order to understand the role of traceability on Chinese consumers' purchasing decisions, Bai et al. (2013) designed a choice-based conjoint experiment to study consumer preferences

for traceable milk. The authors used a conditional logit model to analyze the choice experiment data and found that consumers have positive preference for milk with traceability. Consumer WTP was related to the certificate issuer, where government certification received the highest WTP, followed by industrial association certification and third-party certification.

As animal welfare and environmental issues have received increased attention in China, a few studies have been conducted to estimate consumers' preferences for these credence attributes. For example, Zhao et al. (2011) interviewed visitors to gardens and zoos in China. The result of the direct survey showed that Chinese citizens have a positive willingness to pay for animal welfare improvement. However, this work does not directly concern animals for food consumption, and thus more research is required to investigate consumer preference and demand for animal-friendly food products. To the best of our knowledge, no existing research has addressed Chinese consumers' preferences for these attributes in food products. In chapter 4, we have shown that Chinese consumers may relate animal welfare and environmentally friendly attributes to pork quality. In this study, a choice experiment will be employed to help understand whether these credence attributes can receive a positive price premium from Chinese consumers.

In addition to pork credence attributes, country of origin, another important pork attribute, is also of great interest in this study. Specifically, we examine Chinese consumers' WTP for domestic pork versus pork imported from the U.S. and other countries. This will allow us to assess the market potential for US pork in China. To achieve this goal, the potential effects of patriotism are also of importance. There is a substantial literature which has revealed

consumers' tendencies to purchase domestic products due to a feeling of patriotism or nationalism (Hong and Wyer 1989; Shimp and Sharma 1987; Zajonc 1980; Han 1988). Consumers who are patriotic may think that purchasing foreign products can be viewed as being dishonest to their country, and will hurt the domestic economy and result in job losses (Shimp and Sharma 1987; Han 1988). Also, the feeling of patriotism may bias consumer's perception of product quality; a highly patriotic consumer is more likely to overestimate domestic product quality and underestimate that of imported products (Netemeyer et al. 1991; Umberger et al. 2003).

In our case, a comparison between mainland China and Hong Kong will help understand the effect of patriotism on Chinese consumer behavior. Given the extreme difference in socio-political nature between mainland China and western countries, patriotism may result in mainland Chinese consumers obtaining negative utility from consuming foreign pork. However, as Hong Kong has a long history of being a British colony and international city, Hong Kong consumers are more likely to be more "world-minded," and their patriotism may just increase their favor of Chinese pork as opposed to receiving disutility from foreign pork. We have shown in chapter 4 that mainland consumers' patriotism has a negative effect on their perception of imported pork, and Hong Kong consumers' patriotism has a positive effect on their perception of Chinese pork. In this chapter, we will study whether the relative level of patriotism gives rise to different purchasing decisions in mainland China and Hong Kong.

This study has three objectives. The first objective is to examine the monetary importance of the pork credence attributes by estimating consumers' WTP for them. The second objective is to estimate consumers' WTP for imported pork, especially U.S. pork, in order to reveal the potential of U.S. pork in the Chinese market. The last objective is to understand how consumers' level of patriotism affects their purchasing decision of domestic and imported pork, which will help understand the nature of the Chinese market.

5.2 Theoretical framework

The theoretical framework of this study follows Lancaster's theory of demand and consumer theory. The main highlights of Lancaster theory are as follows: 1) characteristics in the good give rise to utility; 2) a good can incorporate multiple characteristics, which can be shared by other goods; and 3) goods in aggregate can embody different characteristics from those embodied in the goods separately. Applying this idea to our case, pork can be viewed as a combination of multiple attributes, including search attributes (price, expiration date, appearance, etc.), experience attributes (tenderness, taste, etc.), and credence attributes (food safety, animal welfare, environmental issues). In concordance with our objective, we focus on credence attributes and examine how country of origin affects consumer preferences utilizing a choice experiment.

As choice experiments are designed to imitate the real purchasing decisions the consumer faces, it is worth illustrating consumers' purchasing decision making process. Louviere et al. (2000) summarize this process stage-by-stage in Figure 5.
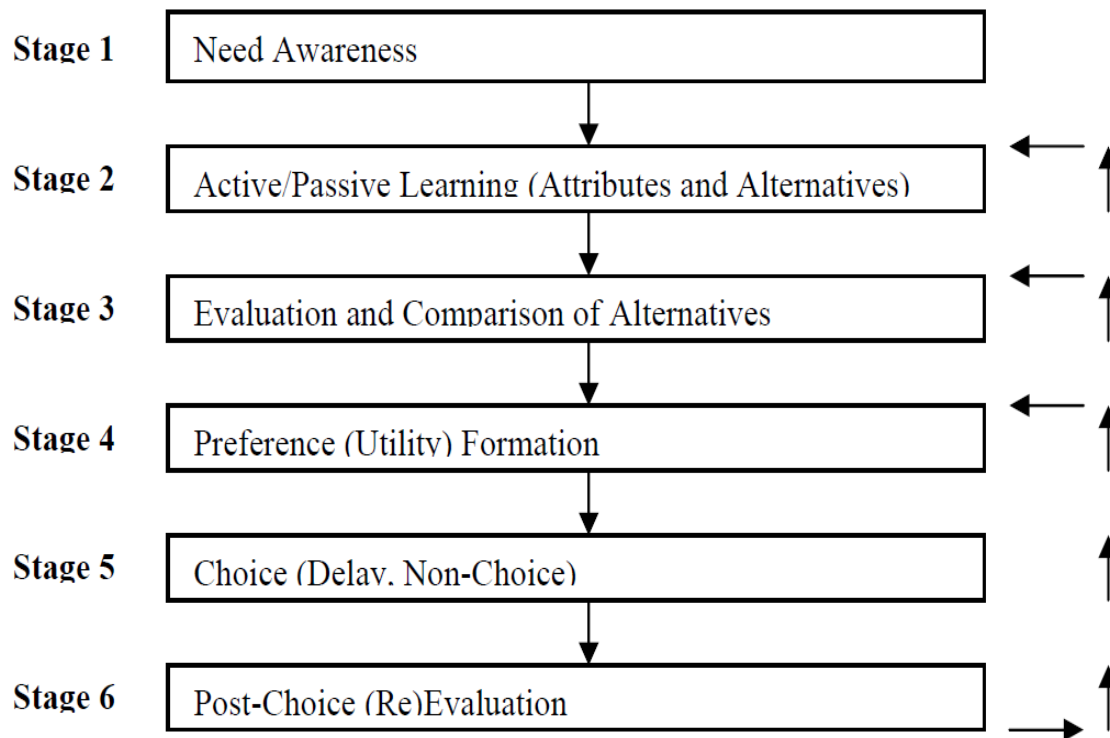
Figure 5: Consumer's choice process stages.
Source: Louviere et al. (2000)

As shown in Figure 5, the consumer must be motivated to purchase the product in stage 1 (e.g., family hopes to eat pork for dinner). Then, in stages 2 and 3, the consumer needs to evaluate and compare the attributes represented by the pork alternatives. Based on their needs and preferences, the appropriate type of pork will be chosen in stage 4 and 5 to maximize utility. After consumption, the credence attributes are re- evaluated. This re-evaluation in stage 6 helps determine future purchasing decisions.

The basic idea behind this decision making process is that consumers select the product (from multiple alternatives) that maximizes their utility. The random utility model (RUM) is used in this study, which has been widely applied to studying consumers' demand for

products with multiple attributes (Manski 1977; McFadden 1973). Regarding the assumption

discussed above, individual n maximizes his or her utility, U_{nit}, from selecting a good i from a

finite bundle of J alternatives in choice set C in scenario t (Train 2003). Therefore, individual

n will choose product i from J alternatives if and only if:

(7) $U_{nit} > U_{njt} \quad \forall j \neq i,$

Specifically, utility U_{nit} is a combination of both a deterministic and stochastic term:

(8) $U_{nit} = V_{nit} + \varepsilon_{nit}$

Based on equations (7) and (8), we obtain the probability of individual n choosing good i

from J alternatives in choice set C:

(9) $P_{nit} = Prob(V_{nit} + \varepsilon_{nit} > V_{njt} + \varepsilon_{njt}; \ \forall j \in C, \forall j \neq i)$

And:

(10) $P_{nit} = Prob(\varepsilon_{nit} > V_{njt} - V_{nit} + \varepsilon_{njt}; \ \forall j \in C, \forall j \neq i)$

In order to identify the above probability, it is necessary to know the distribution of the error

term ε_{nit}. The typical way is to use the conditional logit model and assume that the error terms

are independently and identically distributed and follow an extreme value (Weibull) distribution. Then, the probability of choosing good i can be expressed as:

(11) $P_{nit} = \frac{\exp(V_{nit})}{\sum_{j=1}^{J} V_{njt}}$

The deterministic term V_{njt}, also called indirect utility, is defined as:

(12) $V_{nj} = \sum_{a=1}^{A} \beta_{nja} X_{nja}$

Where X_{nja} is the ath attribute in product j, and β's are the respective coefficients. Using the conditional logit model to estimate the utility equation assumes that the coefficients of the product attributes are all constants. With this assumption, consumer preferences are treated as homogeneous, which could be very restrictive.

The RPL model is introduced as a more robust tool to estimate random utility models, which allows heterogeneity in consumer preferences (McFadden and Train 2000). Under RPL, the coefficients of product attributes β's are treated as random parameters, allowing for heterogeneous preferences among consumers. To specify the RPL model, researchers have typically assumed a normal or lognormal distribution for the attribute coefficients. One flaw of this assumption is that a normal or lognormal distribution could yield values for the price coefficient that are either negative or close to zero, resulting in a counter-intuitive output for WTP (Scarpa et al. 2008).

A potential solution employed in this study is to assume that the coefficient for price is constant and the coefficients for other variables follow normal distributions. This assumption facilitates the interpretation of WTP as it follows a normal distribution. However, a fixed price assumption could also prove to be unrealistic since consumers' preferences for cost are assumed to be homogeneous. Therefore, researchers face a tradeoff between computational convenience and robustness. Following Train (2003), the probability given in equation (9) becomes:

$$(13) \quad P_{nit} = \int \frac{\exp(V_{nit})}{\sum_i \exp(V_{nit})} f(\beta) d\beta$$

Where the distribution of all the random parameters f (·) is normal, except for price, which is fixed in this study.

5.2.1 The choice experiment

To investigate Chinese consumers' preferences for credence attributes in pork, face-to-face consumer interviews were conducted at point of purchase in Guangzhou and Hong Kong in the summer of 2014. In each city, the sample size is 200. Guangzhou is the third largest city in China and the capital of Guangdong province. As consumers in both cities have similar eating habits (Cantonese cuisine), choosing Guangzhou as the representative of mainland China could minimize unobserved differences in terms of tastes and other regional issues. In the choice experiment, respondents are facing three alternatives: two pork products with five different attributes (price, country of origin, food safety claim, animal welfare claim, and an environmentally-friendly claim), and an opt-out option so that the respondent can choose

63

neither of the pork alternatives. A description of the attributes with their corresponding levels is shown in **Error! Reference source not found.**. Before the respondents took the choice xperiment, the description of each pork attribute was provided. The details are given in Table 9.

Table 8: Attributes used in choice experiment

Attribute	Levels	Description
Price	20, 30, 40, 50 (30, 45, 60, 75)[10]	Price expressed in RMB (HKD) per 500 g of pork
Country of origin	CN, US, IO	Pork from China, the U.S., or international other countries
Food safety claim	Yes, No	Yes if the pork has food safety claim; otherwise no.
Animal welfare claim	Yes, No	Yes if the pork has animal welfare claim; otherwise no.
Environmental-claim	Yes, No	Yes if the pork has an environmentally-friendly claim; otherwise no.

---

[10] The numbers in parentheses are the price levels for Hong Kong in HKD.

Table 9: Choice experiment description

Choice Experiment

Next you will be provided ten choice situations, which contain the following attributes:

Price	Price is expressed in RMB (yuan) per jin of fresh chilled pork loin (500g).
Country of Origin	Origin where the pork was produced: mainland China, Imported--US or Imported--Other.
Food Safety Claims	Yes, indicates this product has any claims indicating the use of food safety practices that will reduce your likelihood of becoming ill. For example: certification, additive information and traceability.
Animal Welfare Claims	Yes, indicates this product has any claims regarding the use of animal welfare practices. For example: type of production, standards and procedures to ensure that pigs are treated without cruelty and are fed with food of a certain quality.
Environmental Claims	Yes, indicates this product has any claims regarding environmental standards in the pig farms. For example: water quality, soil quality, standards for limiting the carbon footprint and for maintaining a sustainable ecosystem.

The choice sets were created using a D-optimal design generated from the full-factorial candidate set using a modified Federov search algorithm using the software Ngene[11]. The experimental design was based on a linear (in parameters) utility specification with null priors. Our design allowed for estimation of main and specific two-way interaction effects between country of origin and the credence attributes. A no purchase or opt-out option was

---

[11] D-optimal designs minimize the D-error of the design, which is calculated as the weighted determinants of the variance-covariance matrix of the design, where the weight is an exponential weight equal to the reciprocal of the number of parameters to be estimated.

included to better simulate a real-world decision scenario (Adamowicz *et al.*, 1998). To reduce the probability of respondent fatigue, the choice sets were blocked into four groups, with each survey participant evaluating ten choice scenarios.

5.2.2 Empirical model and willingness-to-pay estimation

According to the design of the choice experiment, we construct two empirical models for indirect utility. Model I is given below:

$$(14) \quad V = \alpha + \beta_1 P + \beta_2 US + \beta_3 IO + \beta_4 FS + \beta_5 AW + \beta_6 EN + \beta_7 US * FS + \beta_8 IO * FS + \beta_9 US * AW + \beta_{10} IO * AW + \beta_{11} US * EN + \beta_{12} IO * EN$$

Where P stands for price, US and IO are the country of origin, the U.S. and international other countries, respectively. FS, AW and EN are the dummy variables indicating whether the pork is provided with food safety, animal welfare, and environmentally friendly claims. As we incorporate the opt-out option in this experiment, the constant α in this model refers to the 'alternative specific constant', which is the opt-out option, indicating consumers prefer domestic pork without any quality attributes. To eliminate potential confounding effects between the intercept and the attribute variables, the data was effect coded, by which, the constant α is just the coefficient for opt-out. With effect coding, the estimated WTPs have to be multiplied by 2 to generate appropriate marginal WTP values.

Following the empirical model, the measure of the WTP for attributes is given by:

$$(15) \quad \text{WTP}_k = -\frac{2\beta_k}{\beta_1}$$

Where WTP_k[12] is the willingness to pay for k^{th} attribute, β_k is the estimated coefficient for k^{th} attribute, β_l is the estimated coefficient for price. The multiplication by 2 here only applies to the attributes, which are effect coded. The above WTP is generated as follows.

Suppose we are estimating the WTP for attribute k. We can have two utility equations which are identical except that the levels of attribute k are different:

(16) $\quad V(K = 1) = \alpha + \beta_1 * X_1 + \beta_2 * X_2 + \cdots + \beta_k * 1 + \beta_n * X_n + \beta_p * P_1$

and

(17) $\quad V(K = 0) = \alpha + \beta_1 * X_1 + \beta_2 * X_2 + \cdots + \beta_k * 0 + \beta_n * X_n + \beta_p * P_0$

If we set these two utilities equal, then we will have:

(18) $\quad P_1 - P_0 = -\beta_k/\beta_p$

With effect coding, the two levels of attribute k becomes 1 and -1, then equation (17) becomes:

(19) $\quad V(K = -1) = \alpha + \beta_1 * X_1 + \beta_2 * X_2 + \cdots + \beta_k * (-1) + \beta_n * X_n + \beta_p * P_{-1}$

---

[12] Technically, β_k is the partial derivative of the utility function with respect to k^{th} attribute while the other attributes are not present. This is due to the existence of the interaction terms in the utility function.

And the monetary difference (WTP) becomes:

(20) $P_1 - P_{-1} = -2\beta_k/\beta_p$

We do not incorporate the patriotism variable in model I, so this model mainly focuses on estimating consumer's WTP for selected pork attributes without considering the potential effect of patriotism on a consumer's decision making. However, as we have shown in chapter 4, Chinese consumers' patriotism will influence their perception of pork from the U.S., estimating the monetary effect of patriotism is of particular interest. Therefore, model II is set up below by adding an interaction term between the patriotism score and the dummy variable US[13]. The patriotism score[14] is measured by comparing consumers' relative feelings towards China and the U.S.

(21) $V = a + \beta_1 P + \beta_2 US + \beta_3 IO + \beta_4 FS + \beta_5 AW + \beta_6 EN + \beta_7 US * FS + \beta_8 IO * FS + \beta_9 US * AW + \beta_{10} IO * AW + \beta_{11} US * EN + \beta_{12} IO * EN + \beta_{13} PA * US$

Where PA stands for the patriotism score. The WTP for U.S. pork is measured by:

(22) $WTP = -\dfrac{2(\beta_2 + \beta_{13} * PA)}{\beta_1}$

---

[13] We only have one interaction between 'patriotism' and 'US' because the patriotism score is measured between China and the U.S only.

[14] We used Likert-scale question to measure consumer's emotion to China and the U.S., and the associated patriotism score is equal to the ratio China/US. Specific notation is provided in chapter 4.

As different patriotism scores indicate different levels of patriotism of consumers, this measurement will help understand how consumers' WTP evolves as the corresponding patriotism level changes. A nonparametric test proposed by Poe et al. (2005) is employed to examine whether the patriotism has a significant effect on consumers' WTP.

5.3 Empirical results

5.3.1 RPL estimates and WTP for selected attributes

Results for the estimated Model I and Model II are shown in Table 10 and Table 11. We modified the WTPs in both cities by converting RMB and HKD into USD[15].

In Table 10, we can see that almost all of the attributes have significant effects on consumers' utility. All the credence attributes in pork are perceived as valuable, but consumer's perception of country of origin for pork vary between Guangzhou and Hong Kong. Specifically, without any credence attribute claims, pork from the U.S. is less valuable than Chinese pork for consumers in Guangzhou, but more valuable for consumers in Hong Kong. Similarly, pork imported from other countries is less valuable than Chinese pork for consumers in Guangzhou but is not significantly different from Chinese pork for consumers in Hong Kong. Two interaction terms have significantly positive effects on consumer utility, indicating the complementary effects among the interacted attributes (Ubilava and Foster 2009). The significantly positive estimates of the interaction between the U.S. and food safety indicates that, although U.S. pork is less valuable for consumers in Guangzhou, it can still significantly increase consumers' utility when provided with a food safety claim.

---

[15] USD to CNY exchange rate in 2014 June was 6.239, and USD to HKD exchange rate in 2014 June was 7.752.

Similarly, for consumers in Hong Kong, US origin and food safety claim are complementary, as providing both attributes will further augment consumer's utility. Moreover, providing a US origin and environmentally friendly claim can further increase Hong Kong consumers' utility. The statistical significance of the standard deviation coefficient for each attribute asserts the hypothesis of preference heterogeneity.

Table 10: Parameter estimates of Model I from RPL

	Guangzhou			Hong Kong		
	Coefficient	S.E.		Coefficient	S.E.	
PRICE	-0.05	(0.01)	***	-0.06	(0.01)	***
US	-0.72	(0.15)	***	0.37	(0.12)	***
IO	-0.81	(0.14)	***	0.02	(0.12)	
FS	0.85	(0.11)	***	0.67	(0.10)	***
AW	0.40	(0.09)	***	0.33	(0.09)	***
EN	0.55	(0.09)	***	0.48	(0.09)	***
US*FS	0.20	(0.12)	*	0.41	(0.13)	***
IO*FS	-0.11	(0.12)		0.14	(0.11)	
US*AW	-0.11	(0.12)		0.06	(0.12)	
IO*AW	-0.05	(0.12)		-0.15	(0.12)	
US*EN	-0.09	(0.12)		-0.26	(0.11)	**
IO*EN	-0.02	(0.12)		-0.05	(0.12)	
OPTOUT	-2.38	(0.34)	***	-5.59	(0.37)	***
STDEV(US)	1.08	(0.11)	***	0.57	(0.09)	***
STDEV(IO)	0.69	(0.10)	***	0.30	(0.11)	***
STDEV(FS)	1.06	(0.10)	***	0.73	(0.10)	***
STDEV(AW)	0.24	(0.13)	*	0.32	(0.10)	***
STDEV(EN)	0.29	(0.08)	***	0.26	(0.08)	***
N	2000			2000		
No. of parameters	25			25		
Log-likelihood	-1712			-1504		
Pseudo R-squared	0.292			0.354		
AIC/N	1.579			1.442		

*** p<0.01, ** p<0.05, * p<0.1
Standard Errors (S.E.) in parentheses.
Note: The RPL model was estimated using NLOGIT 4.0.

Table 11: Parameter estimates of Model II from RPL

	Guangzhou			Hong Kong		
	Coefficient	S.E.		Coefficient	S.E.	
PRICE	-0.05	(0.01)	***	-0.06	(0.01)	***
US	-0.34	(0.20)	*	0.69	(0.16)	***
IO	-0.77	(0.15)	***	0.03	(0.13)	
FS	0.96	(0.12)	***	0.68	(0.11)	***
AW	0.39	(0.09)	***	0.33	(0.09)	***
EN	0.62	(0.09)	***	0.51	(0.09)	***
US*FS	0.22	(0.13)	*	0.47	(0.15)	***
IO*FS	-0.09	(0.13)		0.13	(0.12)	
US*AW	-0.12	(0.13)		0.08	(0.13)	
IO*AW	-0.02	(0.13)		-0.13	(0.13)	
US*EN	-0.08	(0.12)		-0.25	(0.12)	***
IO*EN	-0.09	(0.13)		-0.07	(0.13)	
PA*US	-0.16	(0.06)	***	-0.30	(0.10)	
OPTOUT	-2.37	(0.34)	***	-6.01	(0.45)	***
STDEV(US)	1.16	(0.12)	***	0.38	(0.21)	*
STDEV(IO)	0.77	(0.10)	***	0.38	(0.10)	***
STDEV(FS)	1.07	(0.11)	***	0.68	(0.10)	***
STDEV(AW)	0.23	(0.12)	**	0.35	(0.11)	***
STDEV(EN)	0.27	(0.10)	**	0.25	(0.10)	*
N	2000			2000		
No. of parameters	27			27		
Log-likelihood	-1700			-1496		
Pseudo R-squared	0.297			0.357		
AIC/N	1.571			1.438		

*** p<0.01, ** p<0.05, * p<0.1
Standard Errors (S.E.) in parentheses.
Note: The RPL model was estimated using NLOGIT 4.0.

Using the estimates of Model I, consumers' WTP for each quality attribute is calculated and shown in Table 12. To calculate the 95% confidence interval, a parametric bootstrapping technique proposed by Krinsky and Robb (1986) is employed. Specifically, the Krinsky-Robb approach is used to simulate an asymptotic distribution of the WTP by randomly drawing from a multivariate normal distribution, constructed by the combination of the

coefficient estimates and the associated variance-covariance matrix from the RPL model. Relative to estimating a standard error using the delta method, Krinsky-Robb approach produces an analogous result without the assumption that WTP is symmetrically distributed (Hole, 2007).

Table 12: Willingness to pay, mean values [95% confidence interval]

Attributes	Guangzhou			Hong Kong		
US	$-4.93	[-7.37,	-2.80]	$1.58	[0.57,	2.59]
IO	$-5.52	[-7.82,	-3.69]	$0.09	[-0.98,	1.10]
FS	$5.86	[4.17,	7.88]	$2.87	[2.02,	3.78]
AW	$2.78	[1.53,	4.18]	$1.41	[0.62,	2.19]
EN	$3.75	[2.48,	5.13]	$2.07	[1.32,	2.84]

As shown in Table 12, among all credence attributes, the food safety claim received the highest WTP from consumers (5.86 USD in Guangzhou and 2.87 USD in Hong Kong), followed by the environmentally friendly claim (3.75 USD in Guangzhou and 2.07 USD in Hong Kong), and the animal welfare claim (2.78 USD in Guangzhou and 1.41 USD in Hong Kong). This result is consistent with our previous finding that Chinese consumers view food safety as the most important criteria when evaluating pork quality. As a result, their WTP for this attribute is the highest.

Pork from foreign countries is perceived differently in each city; it is less valuable for Guangzhou consumers and more valuable for Hong Kong consumers. One potential explanation is that mainland China consumers are used to consuming domestic pork while Hong Kong consumers are more familiar with pork from other countries. Additionally, patriotism could be another factor influencing consumer preferences. As we have shown in chapter 4, patriotism has a negative effect on mainland consumers' perception of U.S. pork

73

and has a positive effect on Hong Kong consumers' perception of Chinese pork. We will examine this idea by estimating model II. Another thing worth noting here is that, even though mainland consumers have a negative WTP for U.S. pork, their WTP could be positive if U.S. pork is provided with a food safety claim (the coefficient for US*FS is significantly positive).

5.3.2 Guangzhou versus Hong Kong Consumers

After obtaining consumer WTPs for pork attributes in Guangzhou and Hong Kong, it is interesting to compare the difference of these WTPs in order to identify the potential different preferences between these two cities. To achieve this, we set up several one-sided tests using the nonparametric method[16] proposed by Poe et al. (2005) to examine the estimates from Model I. The results of the one-sided tests are shown in Table 13.

Table 13: Comparison of WTPs for pork attributes in Guangzhou and Hong Kong

Hypothesis	Guangzhou	Hong Kong	p-value
US(GZ) ≥ US(HK)	$-4.93	$1.58	0.00
IO(GZ) ≥ IO(HK)	$-5.52	$0.09	0.00
FS(GZ) ≤ FS(HK)	$5.72	$2.87	0.04
AW(GZ) ≤ AW(HK)	$2.78	$1.41	0.03
EN(GZ) ≤ EN(HK)	$3.75	$2.07	0.11
FS*US(GZ) ≥ FS*US(HK)	$2.26	$6.21	0.00

From Table 13, we see that Guangzhou consumers' WTP for U.S. pork is significantly lower than that of Hong Kong consumers. This finding is consistent with our previous discussion that mainland consumers prefer domestic pork than pork from other countries, while Hong Kong consumers have a positive perception of foreign pork. One thing worth noting is that,

---

[16] We refer to this method as the 'Poe-test' in the rest of the paper.

when provided with a food safety claim, Guangzhou consumers' WTP for U.S. pork becomes positive, but the amount is still significantly lower than Hong Kong consumers'.

In terms of the WTPs for credence attributes in pork, Guangzhou consumers' WTP for food safety is significantly higher than Hong Kong consumers', indicating that Guangzhou consumers are more sensitive to food-safety. While Guangzhou consumer's WTP for animal welfare is significantly higher, their WTP for an environmentally friendly claim is not significantly higher than that of Hong Kong consumers. This could be explained by the close geographic location between these two cities; consumers in both cities have similar surroundings and therefore similar preferences for the environmentally friendly claim.

5.3.3 Patriotism effects on WTP for U.S. pork

The distribution of the patriotism score in Guangzhou and Hong Kong is shown in Figure 6. According to Figure 6, we can see that consumers in Guangzhou are more patriotic (dominant groups have scores of 1, 1.33, 1.66, and 5). Hong Kong consumers' patriotism is more scattered, while the dominant group has a score of 1. In order to understand how consumers' patriotism affects their WTP for U.S. pork, we select different levels of patriotism for consumers in each city based on their distributions (the most frequent groups) and calculate the WTP for U.S. pork at the selected level of patriotism, using the estimates of Model II. For Guangzhou consumers, we select PA=1 (non-patriotic), PA=1.66 (slightly patriotic), and PA=5 (very patriotic). For Hong Kong consumers, we select PA=0.66 (unpatriotic), PA=1 (non-patriotic), and PA=1.5 (slightly patriotic). The WTP for U.S. pork with different combinations of attributes at each level of patriotism, along with the 95%

confidence interval, are shown in Table 14. Also, using Poe-test, we tested the hypotheses that in both cities, the WTP for U.S. pork under a higher level of patriotism is greater or equal to the WTP for U.S. pork with a lower level of patriotism.
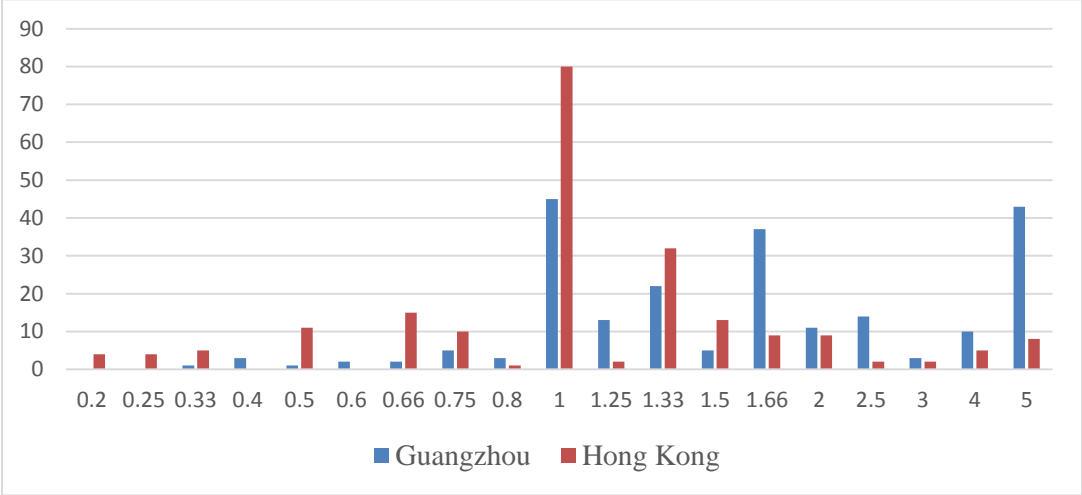
Figure 6: Frequency of patriotism scores in each city

Table 14: WTP for different types of U.S. pork

Attributes	Guangzhou			Hong Kong		
Patriotism Score=1				**Patriotism Score=1**		
US	$-3.72	[-5.89,	-1.63]	$1.71	[0.69,	2.78]
US*FS	$4.29	[2.13,	6.65]	$6.30	[5.13,	7.60]
US*AW	$-2.02	[-4.15,	0.01]	$3.31	[2.16,	4.53]
US*EN	$-0.40	[-2.31,	1.50]	$2.73	[1.72,	3.69]
US*FS*AW	$5.99	[3.48,	8.70]	$7.90	[6.57,	9.39]
US*FS*EN	$7.61	[5.27,	10.20]	$7.31	[6.10,	8.67]
US*AW*EN	$1.30	[-0.85,	3.41]	$4.33	[3.17,	5.51]
US*FS*AW*EN	$9.31	[6.44,	12.23]	$8.91	[7.51,	10.56]
Patriotism Score=1.66				**Patriotism Score=0.66**		
US	$-4.44	[-6.61,	-2.54]	$2.06	[1.04,	3.15]
US*FS	$3.54	[1.47,	5.81]	$6.63	[5.34,	7.93]
US*AW	$-2.74	[-4.85,	-0.95]	$3.65	[2.52,	4.87]
US*EN	$-1.17	[-3.01,	0.62]	$3.06	[2.00,	4.12]
US*FS*AW	$5.24	[3.01,	7.83]	$8.22	[6.80,	9.70]
US*FS*EN	$6.86	[4.75,	9.35]	$7.64	[6.33,	8.97]
US*AW*EN	$0.58	[-1.21,	2.37]	$4.65	[3.41,	5.94]
US*FS*AW*EN	$8.56	[6.07,	11.38]	$9.22	[7.75,	10.80]
Patriotism Score=5				**Patriotism Score=1.5**		
US	$-8.13	[-11.41,	-5.52]	$1.25	[0.17,	2.31]
US*FS	$-0,14	[-3.04,	2.83]	$5.82	[4.62,	7.02]
US*AW	$-6.42	[-9.54,	-3.64]	$2.85	[1.62,	4.08]
US*EN	$-4.83	[-7.78,	-2.29]	$2.23	[1.13,	3.29]
US*FS*AW	$1.57	[-1.37,	4.66]	$7.41	[6.10,	8.90]
US*FS*EN	$0.37	[3.15,	6.01]	$6.80	[5.61,	8.15]
US*AW*EN	$-3.12	[-5.92,	-0.42]	$3.82	[2.59,	5.56]
US*FS*AW*EN	$4.86	[1.85,	8.07]	$8.40	[7.01,	9.90]

As shown in Table 14, consumers in both cities present a decreased WTP for U.S. pork as their relative patriotism score increases. Three points are worth noting here. First, while all Hong Kong consumers in the three dominant groups present a positive WTP for U.S. pork without any other quality attributes, Guangzhou consumers in three dominant groups have a negative WTP. As most of respondents are included in the dominant groups, this result

reveals the fact that, in our survey, most of Guangzhou consumers perceive U.S. pork as less valuable than domestic pork if there is no other quality attributes embodied, but U.S. pork is more valuable for most of Hong Kong consumers compared to Chinese pork. We find that while Guangzhou consumers become extremely patriotic, their WTP for U.S. pork is significantly decreased (the WTP at PA=5 is significantly lower than that at PA=1 or 1.66). This result confirms the previous discussion that patriotism has a significantly negative effect on Guangzhou consumers' purchasing decisions. For Hong Kong consumers, even though their WTP is decreased as the relative patriotism score increases, the WTPs under all three levels of patriotism are not significantly different from each other. This result indicates that the patriotism effect on Hong Kong consumer's purchasing decision is not significant. One thing worth noting is that, while the patriotism score equals 1 (consumer is not patriotic) Guangzhou consumer's WTP for U.S. pork is still negative (-3.73 USD). Therefore, there might be other factors affecting mainland consumer's preference for U.S. pork.

Second, providing quality attributes can increase consumers' WTP for U.S. pork, no matter how patriotic the consumer is. Specifically, for Guangzhou consumers, who have a negative WTP for U.S. pork, providing a food safety claim can significantly improve consumer's perception of U.S. pork and receive a significantly positive WTP[17].

Third, for those consumers who are extremely patriotic (patriotism score of 5) in Guangzhou, providing food safety claims is not enough to improve their perception of U.S. pork. Only

---

[17] Accurately, it is the case for consumers whose patriotism scores are not at the level of 5. For the extremely patriotic consumers in Guangzhou, their WTP for U.S. pork is not significantly different from 0, which is also improved.

providing U.S. pork with food safety, animal welfare, and environmental-friendly claims together can obtain a significantly positive WTP from extremely patriotic Guangzhou consumers.

5.3.4 Determinants of consumers' level of patriotism

As patriotism affects Chinese consumer's perception and WTP for U.S. pork, understanding the determinants of patriotism is important for U.S. pork suppliers to promote sales in China. Therefore, we regress consumer's patriotism score on basic demographic variables including gender, age, education, household size, presence of children and senior in the household, and income, to examine what kind of consumers are likely to be more patriotic. We employ Ordinary Least Square method (OLS) to estimate the regression model, and the regression results are given in Table 15.

Table 15: Determinants of patriotism

	Guangzhou			Hong Kong		
	Coefficient	S.E.		Coefficient	S.E.	
Male	0.38	(0.23)		0.03	(0.15)	
Age	0.01	(0.01)		0.01	(0.01)	
Education	-0.18	(0.12)		-0.08	(0.07)	
H.h. Size	-0.13	(0.11)		-0.17	(0.06)	***
Children	0.43	(0.23)	*	0.05	(0.13)	
Senior	-0.22	(0.22)		-0.04	(0.14)	
Income	0.01	(0.01)		0.00	(0.01)	
Constant	2.60	(0.69)	***	1.77	(0.51)	***
Observations	200			200		
R-squared	0.04			0.08		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As shown in Table 15, the children dummy is the only significant variable in the Guangzhou regression, indicating that consumers who are raising kids are likely to be more patriotic. In Hong Kong, household size is the only significant variable, showing that consumers living in a larger household size is likely to be less patriotic. Thus, U.S. pork might be more valuable for this type of consumers. It is acknowledge that this inquiry on the determinants of consumer's level of patriotism is exploratory at best, and additional research is needed in this area.

5.4 Conclusion and implications

In this study, we used a choice experiment to analyze Chinese consumer's WTP for multiple pork attributes. The relative importance measured by monetary values in this study is consistent with our evaluation in chapter 4. Applying two empirical models to data from Guangzhou and Hong Kong, we compared the preferences of consumers in both cities. Also, the role of patriotism in determining consumer's WTP for U.S. pork has been examined.

5.4.1 Summary of the pertinent results

As all pork credence attributes are valuable for consumers in both cities, food safety received the highest WTP from consumers, followed by environmental-friendly and animal welfare claims. In terms of country of origin, Guangzhou consumers perceive foreign pork to be less valuable, while Hong Kong consumers perceive foreign pork as more valuable. Nevertheless, due to the complementary effect between U.S. origin and the food safety attribute, U.S. pork is still valuable for mainland consumers if provided with the food safety claim and other quality attributes.

We used a Krinsky-Robb bootstrapping approach and complete combinatorial test to compare the WTPs of consumers in both cities. Specifically, Guangzhou consumer's WTP for food safety is significantly higher than that of Hong Kong consumers, indicating that mainland consumers are more food-safety-sensitive. For pork from foreign countries, Guangzhou consumers' WTP is significantly lower than the WTP from Hong Kong consumers. One potential explanation for Hong Kong consumer's positive perception of foreign pork could be that, they are more used to consuming imported pork. Also, as Hong Kong consumers are relatively more world-minded, they may focus more on the quality attributes rather than whether the pork is domestic or imported.

The effects of patriotism on consumer food preferences are also identified in this study. Specifically, we selected the top three patriotism levels in each city, and compared consumer's WTP under each patriotism level to examine the effect on WTP. We found that patriotism has a significantly negative effect on mainland consumer's WTP for U.S. pork, while the effect on Hong Kong consumer is not significant. This is consistent with our previous discussion that consumer's level of patriotism could potentially result in a preference for domestic product. Hong Kong consumers seem more world-minded: their level of patriotism may not affect their evaluation of pork quality attributes.

5.4.2 Implications

As Chinese consumers become more sensitive to food quality, the rising demand for higher food safety standards creates opportunities for U.S. pork suppliers. Since U.S. suppliers have

the advantages of food safety control and quality management, making consumers aware of these quality attributes could help U.S. pork receive a price premium in China. However, as consumer's patriotism may disturb their evaluation of quality attributes in U.S. pork, it is important for U.S. suppliers to understand this issue by segmenting and understanding consumers with different levels of patriotism prior to implementing marketing strategies. Highlighting the quality advantages and noting that US products have improved safety characteristics, are essential for U.S. pork suppliers to promote sales on the Chinese market.

APPENDICES

Appendix A. Method Comparison

Table A-1: Comparison between ordered logit regression and OLS

Quality China	Regression result		Average partial effect	
	Ordered Logit	OLS	Ordered Logit	OLS
Observations	200	200		
Gender	0.25	0.10	0.08	0.10
	-0.32	-0.11		
Age	0.00	0.00	0.00	0.00
	-0.01	0.00		
Education	0.19	0.07	0.06	0.07
	-0.17	-0.06		
Children	-0.12	-0.02	-0.04	-0.02
	-0.28	-0.10		
Senior	-0.33	-0.10	-0.11	-0.10
	-0.32	-0.11		
Income	-0.01*	-0.01**	0.00	0.00
	0.00	0.00		
Patriotism	0.33**	0.12**	0.11	0.12
	-0.16	-0.05		
Food Safety	1.91***	0.58***	0.62	0.58
	-0.26	-0.07		
Animal Welfare	0.20	0.09	0.07	0.09
	-0.25	-0.08		
Environment	0.15	0.06	0.05	0.06
	-0.23	-0.08		
Other Variables	Y	Y	Y	Y

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

Appendix B. Original Survey

样本编号： _____

选择试验组号（**Block number**）#： <u>1</u>

城市（打"√"）： a.北京　　　b.上海　　　c.广州　　　d.香港

城区： _____

超市/地点： _____

地址： _____

日期： _____

调研员： _____

基本信息

1.您的性别:_____ 　　　　a. 男　　　　　　　b. 女

2.您的出生年份： _____

3.您的学历： _____

　　　a.小学　　b.中学　　c.专科或同等学历　　d.大学本科　　e.研究生及以上

4.您的婚姻状况： _____ 　　　a.已婚　　　b.未婚　　c.其他

5.您家中一共多少人(包含自己，家人和跟您每周至少四天在一起吃饭的人)：_____

6.家中住着几位低于 18 岁的人员？ 　　　_____

7.家中住着几位高于 60 岁的人员？ 　　　_____

8.您是家里主要负责买菜的吗？ 　　　是　　　　否

9.您是家里主要负责做饭的吗？ 　　　是　　　　否

10.您或您家里的其他人吃猪肉吗？ 　　　吃　　　　不吃

11.从您家去距离您家最近的超市需要多长时间？使用什么交通工具？

_____小时_____分钟。交通工具:_____　　a.走路　b.骑车 c.开车 d.公交车或者地铁

12.从您家去距离您家最近的农贸市场需要多长时间？使用什么交通工具？

_____小时_____分钟。交通工具:_____　　a.走路　b.骑车 c.开车 d.公交车或者地铁

猪肉消费信息

13.您过去的一年里购买过进口猪肉吗？　_____　　　　a.是　b.否　c.不确定

14.您过去的一年里购买过美国进口的猪肉吗？____　　a.是　b.否　c.不确定

15.您主要在哪里购买猪肉？_____

　　　a.农贸市场　　　　b.肉品专卖店或连锁店　　c.国内小型超市

　　　d.国内大型超市　　e.国际超市　　　　　　　f.其他:_____

16. 您家平常购买猪肉的频率？____

　　　a.每天　　　　　　b.每周 3-4 次　　　c.每周 1-2 次

　　　d.两周 1 次　　　e.每月一次　　　　f.每月不足一次

17.您家每周吃多少斤猪肉（不包括在例如食堂，饭店，熟食店购买的熟猪肉，）？____

　　　a.少于 1 斤　b.1-2 斤　　c.2-3 斤　　d.3-4 斤　　e.4-5 斤

　　　f.5-6 斤　　g.6-7 斤　　h.7 斤以上，_____斤

18.您家里购买的猪肉中最主要有以下哪些部位 _____（最多选 3 项）？

　　　a.里脊(通脊)肉　b.肋条肉　c.排骨　　　　d.前肘　e.后肘　　　　　f.猪肉馅

　　　g. 臀尖肉　　h.猪内脏　　i.五花肉　　j.其他部位,注明_____

19.在您家今年购买的猪肉中，冷鲜肉占_____%；热鲜肉占_____%；冷冻肉占_____%。

20.您了解中国的食品安全问题吗？_____　a.了解　　　b.不了解

21.您认为吃猪肉有多大可能导致您生病？请为您的选择打"√"。

　　　a.极有可能　b.很大可能　c.有可能　　d.不太可能　e.完全没可能

22. 您认为吃国产猪肉有多大可能导致您生病？

　　　a.极有可能　b.很大可能　c.有可能　　d.不太可能　e.完全没可能

23.您认为吃进口猪肉有多大可能导致您生病？

        a.极有可能 b.很大可能 c.有可能   d.不太可能 e.完全没可能

24.您认为吃超市的猪肉有多大可能导致您生病？

        a.极有可能 b.很大可能 c.有可能   d.不太可能 e.完全没可能

25.您认为吃农贸市场的猪肉有多大可能导致您生病？

        a.极有可能 b.很大可能 c.有可能   d.不太可能 e.完全没可能

26.您认为吃猪肉有多大可能导致普通民众生病？

        a.极有可能 b.很大可能 c.有可能   d.不太可能 e.完全没可能

27. 当您考虑食品安全时，您对以下信息的信任程度如何？用 1-5 来表示，"1"为完全不信任，"5"为完全信任，请选择你认为的比较合适的状况，打"√"。

a.中国政府官方提供的食品安全信息和认证标志

完全信任	5	4	3	2	1	完全不信任

b.中国食品企业提供的食品安全信息和认证标志

完全信任	5	4	3	2	1	完全不信任

c.美国提供的的食品安全信息和认证标志

完全信任	5	4	3	2	1	完全不信任

d.中国食品行业的可追溯系统

完全信任	5	4	3	2	1	完全不信任

e. 美国食品的可追溯系统

完全信任	5	4	3	2	1	完全不信任

f.欧洲食品的可追溯系统

完全信任	5	4	3	2	1	完全不信任

g.食品添加剂的相关标识

完全信任	5	4	3	2	1	完全不信任

28. 您对以下说法的态度？"5"表示同意，"3"表示不关心，"1"表示不同意。请打"√"

a.饲养时对猪优待，其肉质量更好

同意	5	4	3	2	1	不同意

b.饲养时对猪优待，其肉味道更好

同意	5	4	3	2	1	不同意

c.将饲养时对猪优待，其肉更安全

同意	5	4	3	2	1	不同意

29．您对以下说法的态度？"5"表示同意，"3"表示不关心，"1"表示不同意。请打"√"

a. 中国人普遍关心环境

同意	5	4	3	2	1	不同意

b. 中国人普遍关心养猪场对土地的污染

同意	5	4	3	2	1	不同意

c. 中国人普遍关养猪场产对空气的污染

同意	5	4	3	2	1	不同意

d. 中国人普遍关心养猪场肉对水的污染

同意	5	4	3	2	1	不同意

e. 我很关心环境

同意	5	4	3	2	1	不同意

选择试验

接下来，您需要在十种购买猪肉的情形当中做出选择，每种情形包含了两组冷鲜猪里脊肉产品供您选择，猪肉产品分别包含了以下信息：

价格　　　　价格单位是**元/每斤**（人民币）。

原产地　　　猪肉原产地包括**中国、美国**和**其他国家**。（其他国家中包含**欧洲，**

加拿大和巴西）

食品安全信息　在食品安全信息一栏会出现"有"或"无"两种情况。"有"代表

该商品有食品安全信息表明该商品食用安全。例如食品安全认证，

可追溯系统认证以及添加剂等相关信息。"无"代表该商品没有任

何食品安全信息

动物福利信息　在动物福利信息一栏会出现"有"或"无"两种情况。"有"代表

该商品有动物福利信息表明其商品的生产过程中遵循动物福利的相

关要求。例如在生猪的饲养中提供了适宜的生长环境以及优质的饲

料。"无"代表该商品没有任何动物福利信息。

环境保护信息　在环境保护信息一栏会出现"有"或"无"两种情况。"有"代表

该商品有环境保护信息表明其商品在生产过程中遵循了环保的标

准。例如生产中不造成水污染、土地污染以及达到废气限排标准

等。"无"代表该商品没有任何环境保护信息。

每一次选择都是一次单独的冷鲜猪里脊肉购买决定。请在每一个选择集的三个选项中挑选最适合您的一项。研究表明消费个体有倾向高估自己的支付意愿，所以请将每一次选择当作您的真实购买选择。

在试验开始前，请您回答下列有关您通常购买的冷鲜猪里脊肉的信息：

30. 您上月购买冷鲜猪里脊肉时支付的平均价格：　　　　　　　　　_____元/每斤

31. 您通常购买的猪肉的主要原产地：_____　a. 中国　b. 美国　c. 其他国家 d. 不确定

32. 您通常购买的猪肉是否有食品安全信息或标识：　_____　　　　　a. 是 b. 否

33. 您通常购买的猪肉是否有动物福利信息或标识：　_____　　　　　a. 是 b. 否

34. 您通常购买的猪肉是否有环保信息或标识：　_____　　　　　a. 是 b. 否

选题 1			
	选项 1	选项 2	选项 3
价格	-1 元/500 克	1 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	其他国家	其他国家	
食品安全信息	有	有	
动物福利信息	有	无	
环境保护信息	有	无	
我会购买：	◯	◯	◯

选题 2			
	选项 1	选项 2	选项 3
价格	-0.33 元/500 克	0.33 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	中国	美国	
食品安全信息	有	无	
动物福利信息	无	无	
环境保护信息	无	无	
我会购买:	⬭	⬭	⬭

选题 3			
	选项 1	选项 2	选项 3
价格	-0.33 元/500 克	0.33 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	美国	其他国家	
食品安全信息	无	有	
动物福利信息	有	有	
环境保护信息	无	无	
我会购买:	⬭	⬭	⬭

选题 4			
	选项 1	选项 2	选项 3
价格	0.33 元/500 克	0.33 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	美国	美国	
食品安全信息	无	有	
动物福利信息	无	有	
环境保护信息	有	无	
我会购买:	⬭	⬭	⬭

选题 5			
	选项 1	选项 2	选项 3
价格	1 元/500 克	1 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	其他国家	美国	
食品安全信息	有	有	
动物福利信息	无	无	
环境保护信息	无	无	
我会购买:	⬭	⬭	⬭

选题 6			
	选项 1	选项 2	选项 3
价格	0.33 元/500 克	-0.33 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	中国	其他国家	
食品安全信息	无	有	
动物福利信息	有	有	
环境保护信息	有	有	
我会购买:	⬭	⬭	⬭

选题 7			
	选项 1	选项 2	选项 3
价格	1 元/500 克	0.33 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	其他国家	其他国家	
食品安全信息	无	有	
动物福利信息	有	无	
环境保护信息	无	有	
我会购买:	⬭	⬭	⬭

选题 8			
	选项 1	选项 2	选项 3
价格	-1 元/500 克	1 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	中国	中国	
食品安全信息	无	有	
动物福利信息	无	无	
环境保护信息	无	无	
我会购买:	⬭	⬭	⬭

选题 9			
	选项 1	选项 2	选项 3
价格	-1 元/500 克	-0.33 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	其他国家	其他国家	
食品安全信息	有	无	
动物福利信息	无	有	
环境保护信息	无	无	
我会购买:	⬭	⬭	⬭

选题 10			
	选项 1	选项 2	选项 3
价格	1 元/500 克	1 元/500 克	选项 1 和选项 2 都不符合我的选择
原产地	中国	中国	
食品安全信息	有	有	
动物福利信息	有	有	
环境保护信息	有	无	
我会购买:	⬭	⬭	⬭

35. 在之前的选择试验中，您关注以下猪肉特征信息的频率如何？请为您的选择打
"√"

| 价格 | a. 一直 | b. 经常 | c. 有时 | d.很少 | e. 从未 |

| 原产地 | a. 一直 | b. 经常 | c. 有时 | d.很少 | e. 从未 |

| 食品安全 | a. 一直 | b. 经常 | c. 有时 | d.很少 | e. 从未 |

| 动物福利 | a. 一直 | b. 经常 | c. 有时 | d.很少 | e. 从未 |

| 环境保护 | a. 一直 | b. 经常 | c. 有时 | d.很少 | e. 从未 |

猪肉特征偏好

36. 请在图表中指出以下猪肉销售点所售猪肉品质的特征，请选择你认为的比较合适
的状况，打"√"。

	质量更高	食品更安全	性价比更高	动物福利更好	更环保
农贸市场					
国内超市					
国际超市					

37. 请指出在您选购猪肉时，以下特征对于您的购买行为起到的影响作用。"5"代表
非常重要，"1"代表非常不重要。请为您的选择打"√"。

特征	非常重要				非常不重要
色泽	5	4	3	2	1
肥瘦	5	4	3	2	1
水分	5	4	3	2	1
纹理	5	4	3	2	1
冷鲜度	5	4	3	2	1
包装	5	4	3	2	1

	最高质量				
价格	5	4	3	2	1
口味	5	4	3	2	1
质嫩	5	4	3	2	1
原产地	5	4	3	2	1

原产地信息

38. 您认为以下国家或地区生产的冷鲜猪肉的**品质**如何？请为您的选择打"√"。

	最高质量				最低质量
中国	5	4	3	2	1
巴西	5	4	3	2	1
美国	5	4	3	2	1
欧洲	5	4	3	2	1
加拿大	5	4	3	2	1

39. 您认为以下地区生产的冷鲜猪肉的**食品安全情况**如何？请为您的选择打"√"。

	最安全				最不安全
中国	5	4	3	2	1
巴西	5	4	3	2	1
美国	5	4	3	2	1
欧洲	5	4	3	2	1
加拿大	5	4	3	2	1

40. 您认为以下国家或地区生产的冷鲜猪肉所遵循的**动物福利标准**如何？动物福利标准包括不对生猪使用残酷方法，喂一定品质的饲料等。请为您的选择打"√"。

	最高标准				最低标准
中国	5	4	3	2	1
巴西	5	4	3	2	1
美国	5	4	3	2	1
欧洲	5	4	3	2	1
加拿大	5	4	3	2	1

41. 您认为以下国家或地区对其生猪肉饲养的**环境保护标准**如何？环境保护标准包括水质、土质、碳排放，以及保持可持续生态等。请为您的选择打"√"。

	最高标准				最低标准
中国	5	4	3	2	1
巴西	5	4	3	2	1
美国	5	4	3	2	1
欧洲	5	4	3	2	1
加拿大	5	4	3	2	1

42. **王女士**每周在当地的国内超市购买猪肉。超市很干净而且有将猪肉冷藏。超市内有标志注明该猪肉是产于距离该市不远的农场并且不含任何添加剂。王女士从未听说有人因食用该超市猪肉而生病。

您认为王女士有多大可能因食用该超市猪肉而生病？请为您的选择打"√"。
  a.极有可能 b.很大可能 c.有可能 d.不太可能 e.完全没可能

43. **李先生**每周在下班回家的路上会去农贸市场买猪肉。农贸市场周围满是苍蝇而且猪肉并没有被冷藏。由于农贸市场售卖的猪肉没有任何关于猪肉质量的信息，他不能从猪肉卖家那里获得任何有关猪肉质量以及产地的信息。李先生得知有人因食用了该农贸市场的猪肉而生病。

您认为李先生有多大可能因食用农贸市场猪肉而生病？请为您的选择打"√"。
  a.极有可能 b.很大可能 c.有可能 d.不太可能 e.完全没可能

44.**张小姐**每周在国际超市购买猪肉。国际超市内的猪肉被包装好并且冷藏。张小姐购买的是进口品牌猪肉。该猪肉品牌有着很好的口碑因为其猪肉生产遵循国际最高标准，并且有着良好的食品安全记录以及不含任何添加剂。张小姐从未听说有人因食用该国际超市猪肉而生病。

您认为张小姐有多大可能因食用该超市猪肉而生病？请为您的选择打"√"。
   a.极有可能 b.很大可能 c.有可能 d.不太可能 e.完全没可能

45.**孙先生**每周在当地的猪肉店购买猪肉。猪肉在猪肉店有被冷藏。猪肉店虽有苍蝇但还算比较干净。猪肉店老板没有任何关于猪肉质量的信息。孙先生得知有人因食用了该猪肉店的猪肉而生病。

您认为孙先生有多大可能因食用该猪肉店猪肉而生病？请为您的选择打"√"。
   a.极有可能 b.很大可能 c.有可能 d.不太可能 e.完全没可能

46.**您全家**的平均月收入在如下哪个范围（人民币）？＿＿＿＿＿＿

   a. ＜ 2,000   g. 12,000–14,000
   b. 2,000–4,000   h. 14,000–16,000
   c. 4,000–6,000   i. 16,000–18,000
   d. 6,000–8,000   j. 18,000–20,000
   e. 8,000–10,000   k. 20,000–22,000
   f. 10,000–12,000   l. ＞22,000

47.您认为现如今中国的食品安全问题有多严重？"5"代表非常严重，"1"代表没有问题。请为您的选择打"√"。

非常严重	5	4	3	2	1	没有问题

48.您或者您认识的人中有过因食用问题食品而生病的吗？＿＿＿＿ a. 有 b. 没有

49. 请指出您对中国的热爱程度。"5"代表非常热爱，"1"代表不热爱。请打"√"。

非常热爱	5	4	3	2	1	不热爱

50. 请指出您对美国的热爱程度。"5"代表非常热爱，"1"代表不热爱。请打"√"。

非常热爱	5	4	3	2	1	不热爱

非常感谢您的支持与帮助！

调查员总体感觉这份问卷完成的质量如何？_____
　　①非常不好　②低于平均水平　　③平均水平　④高于平均水平　　⑤非常好

REFERENCES

REFERENCES

Adamowicz, W., Boxall, P., Williams, M., & Louviere, J. (1998). Stated preference approaches for measuring passive use values: choice experiments and contingent valuation. American journal of agricultural economics, 80(1), 64-75.

Bai, J., Zhang, C., & Jiang, J. (2013). The role of certificate issuer on consumers' willingness‐to‐pay for milk traceability in China. Agricultural Economics, 44(4-5), 537-544.

Baines, R. N., & Davies, W. P. (1998). Quality assurance in international food supply. In Proceedings of the third international conference on chain management in agribusiness and the food industry. Wageningen, The Netherlands: Wageningen University.

Balestrini, P., & Gamble, P. (2006). Country-of-origin effects on Chinese wine consumers. British Food Journal, 108(5), 396-412.

Bech, M., & Gyrd‐Hansen, D. (2005). Effects coding in discrete choice experiments. Health economics, 14(10), 1079-1083.

Becker, T. (2000). Consumer perception of fresh meat quality: a framework for analysis. British Food Journal, 102(3), 158-176.

Breidert, C., Hahsler, M., & Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. Innovative Marketing, 2(4), 8-32.

Bernués, A., Olaizola, A., & Corcoran, K. (2003). Extrinsic attributes of red meat as indicators of quality in Europe: an application for market segmentation. Food Quality and Preference, 14(4), 265-276.

Brunsø, K., Bredahl, L., Grunert, K. G., & Scholderer, J. (2005). Consumer perception of the quality of beef resulting from various fattening regimes. Livestock Production Science, 94(1), 83-93.

Calvin, L., Gale, F., Hu, D., & Lohmar, B. (2006). Food safety improvements underway in China. Amber Waves, 4(5), 16-21.

Cang, L., Wang, Y. J., Zhou, D. M., & Dong, Y. H. (2004). Heavy metals pollution in poultry and livestock feeds and manures under intensive farming in Jiangsu Province, China. Journal of Environmental Sciences, 16(3), 371-374.

Caswell, J. A., & Mojduszka, E. M. (1996). Using informational labeling to influence the market for quality in food products. American Journal of Agricultural Economics, 1248-1253.

Chen, J. (2007). Rapid urbanization in China: A real challenge to soil protection and food security. Catena, 69(1), 1-15.

Collins, R., & Sun, X. (2010). China's grey channels as access points for foreign food products to the Chinese domestic market. China Information, 24(1), 61-74.

Cicia, G., & Colantuoni, F. (2010). Willingness to pay for traceable meat attributes: a meta-analysis. International Journal on Food System Dynamics, 1(3), 252-263.

Cooper, B. Aus frozen meat in smuggling bust. 2012, June 21. Queensland Country Life. Retrieved from: http://www.queenslandcountrylife.com.au/news/agriculture/cattle/beef/aus-frozen-meat-in-smuggling-bust/2597788.aspx

Couch, N. In I.P.O., a Quest to Satisfy China's Appetite for Pork. 2014, April 10. DealBook. Retrieved from: http://dealbook.nytimes.com/2014/04/10/china-pork-companys-listing-could-raise-more-than-5-billion/?_r=1

Dalgaard, R. (2007). The environmental impact of pork production from a life cycle perspective (Doctoral dissertation, Videnbasen for Aalborg UniversitetVBN, Aalborg UniversitetAalborg University, Det Teknisk-Naturvidenskabelige FakultetThe Faculty of Engineering and Science, Institut for PlanlægningDepartment of Development and Planning).

Den Ouden, M., Nijsing, J. T., Dijkhuizen, A. A., & Huirne, R. B. M. (1997). Economic optimization of pork production-marketing chains: I. Model input on animal welfare and costs. Livestock Production Science, 48(1), 23-37.

Dransfield, E., Ngapo, T. M., Nielsen, N. A., Bredahl, L., Sjödén, P. O., Magnusson, M., & Nute, G. R. (2005). Consumer choice and suggested price for pork as influenced by its appearance, taste and information concerning country of origin and organic pig production. Meat Science, 69(1), 61-70.

Enneking, U. (2004). Willingness-to-pay for safety improvements in the German meat sector: the case of the Q&S label. European Review of Agricultural Economics, 31(2), 205-223.

Espejel, J., Fandos, C., & Flavián, C. (2007). The role of intrinsic and extrinsic quality attributes on consumer behaviour for traditional food products. Managing Service Quality, 17(6), 681-701.

Food and Agriculture Organization of the United Nations, FAOSTAT database (FAOSTAT, 2013). Available online at http://faostat3.fao.org/download/FB/FBS/E

Font i Furnols, M., Realini, C., Montossi, F., Sañudo, C., Campo, M. M., Oliver, M. A., & Guerrero, L. (2011). Consumer's purchasing intention for lamb meat affected by country of origin, feeding system and meat price: A conjoint study in Spain, France and United Kingdom. Food Quality and Preference, 22(5), 443-451.

Fu, C., & Yu, G. (2010). Estimation and spatiotemporal analysis of methane emissions from agriculture in China. Environmental management, 46(4), 618-632.

Gale, F., Marti, D., & Hu, D. (2012). China's volatile pork industry. A Report from the Economic Research Service. 2

Gao, Z., Ma, W., Zhu, G., & Roelcke, M. (2013). Estimating farm-gate ammonia emissions from major animal production systems in China. Atmospheric Environment.

Garvin, D. A. (1984). What does product quality really mean? Sloan management review, 26(1).

Grunert, K. G., Bredahl, L., & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector—a review. Meat science, 66(2), 259-272.

Grunert, K. G. (2005). Food quality and safety: consumer perception and demand. European Review of Agricultural Economics, 32(3), 369-391.

Grunert, K. G., & Valli, C. (2001). Designer-made meat and dairy products: consumer-led product development. Livestock Production Science, 72(1), 83-98.

Gu, P., Shen, R. F., & Chen, Y. D. (2008). Diffusion pollution from livestock and poultry rearing in the Yangtze Delta, China. Environmental Science and Pollution Research, 15(3), 273-277.

Harper, G., & Henson, S. (2001). Consumer concerns about animal welfare and the impact on food choice. EU FAIR CT98-3678, Centre for Food Economics Research, The University of Reading.

Han, C. M. (1988). The role of consumer patriotism in the choice of domestic versus foreign products. Journal of Advertising Research, 28(3), 25-32.

Hanna, N., & Dodge, H. R. (1995). Pricing Policies and Procedures. New York University Press.

Hoffmann, R. (2000). Country of origin–a consumer perception perspective of fresh meat. British Food Journal, 102(3), 211-229.

Hole, A. R. (2007). A comparison of approaches to estimating confidence intervals for willingness to pay measures. Health economics, 16(8), 827-840.

Hong, S. T., & Wyer Jr, R. S. (1989). Effects of country-of-origin and product-attribute information on product evaluation: An information processing perspective. Journal of Consumer Research, 175-187.

Huang, J., & David, C. C. (1993). Demand for cereal grains in Asia: the effect of urbanization. Agricultural Economics, 8(2), 107-124.

Hunt, N. Higher feed costs to drive up meat prices in 2013. 2012, November 8. Reuters. Retrieved from http://www.reuters.com/article/2012/11/08/meat-prices-idUSL5E8M7F3O20121108

Issanchou, S. (1996). Consumer expectations and perceptions of meat and meat product quality. Meat Science, 43, 5-19.

Janssen, M., & Hamm, U. (2012). Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos. Food Quality and Preference, 25(1), 9-22.

Jiang, P., Jin, S. Y., Hao, X. Z., Zhou, D. M., Li, L. Z., & Lv, J. L. (2010). Distribution characteristics of heavy metals in feeds, pig manures, soils and vegetables. J Agron Environ Sci, 29, 942-947

Krinsky, I., & Robb, A. L. (1986). On approximating the statistical properties of elasticities. The Review of Economics and Statistics, 715-719.

Krystallis, Athanasios, and Ioannis S. Arvanitoyannis. "Investigating the concept of meat quality from the consumers' perspective: The case of Greece."Meat Science 72.1 (2006): 164-176.

Lancaster, K. J. (1966). A new approach to consumer theory. The journal of political economy, 132-157.

Latouche, K., Rainelli, P., & Vermersch, D. (1998). Food safety issues and the BSE scare: some lessons from the French case. Food policy, 23(5), 347-356.

Liljenstolpe, C. (2008). Evaluating animal welfare with choice experiments: an application to Swedish pig production. Agribusiness, 24(1), 67-84.

Li, Y. X., & Chen, T. B. (2005). Concentrations of additive arsenic in Beijing pig feeds and the residues in pig manure. Resources, Conservation and Recycling,45(4), 356-367.

Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). Stated choice methods: analysis and applications. Cambridge University Press.

Loureiro, M. L., & Umberger, W. J. (2003). Estimating consumer willingness to pay for country-of-origin labeling. Journal of Agricultural and Resource Economics, 287-301.

Loureiro, M. L., & Umberger, W. J. (2007). A choice experiment model for beef: What US consumer responses tell us about relative preferences for food safety, country-of-origin labeling and traceability. Food policy, 32(4), 496-514.

Lusk, J. L., Nilsson, T., & Foster, K. (2007). Public preferences and private choices: effect of altruism and free riding on demand for environmentally certified pork. Environmental and Resource Economics, 36(4), 499-521.

Lusk, J. L., Roosen, J., & Fox, J. A. (2003). Demand for beef from cattle administered growth hormones or fed genetically modified corn: a comparison of consumers in France,

Lu Wang, C., & Xiong Chen, Z. (2004). Consumer ethnocentrism and willingness to buy domestic products in a developing country setting: testing moderating effects. Journal of Consumer Marketing, 21(6), 391-400.

Lukovitz, K. Survey: 78% Of U.S. Families Report Buying Organics. 2011, November 30. MarketingDaily. Retrieved from http://www.mediapost.com/publications/article/163210/survey-78-of-us-families-report-buying-organic.html

Manski, C. F. (1977). The structure of random utility models. Theory and decision, 8(3), 229-254.

Marbeau, Y. (1987). What value pricing research today. Journal of the Market Research Society, 29(2), 153-182.

Mayfield, L. E., Bennett, R. M., Tranter, R. B., & Wooldridge, M. J. (2007). Consumption of welfare-friendly food products in Great Britain, Italy and Sweden, and how it may be influenced by consumer attitudes to, and behaviour towards, animal welfare attributes. International Journal of Sociology of Food and Agriculture, 15(3), 59-73.

Mccarthy, Mary B., and Spencer J. Henson. "Irish consumer perceptions of meat hazards and use of extrinsic information cues." Food Economics-Acta Agriculturae Scandinavica, Section C 1.2 (2004): 99-106.

McFadden, D. (1973). Conditional logit analysis of qualitative choice behavior.

McFadden, D., & Train, K. (2000). Mixed MNL models for discrete response. Journal of applied Econometrics, 15(5), 447-470.

McOrist, S., Khampee, K., & Guo, A. (2011). Modern pig farming in the People's Republic of China: growth and veterinary challenges. Revue scientifique et technique (International Office of Epizootics), 30(3), 961-968.

Meuwissen, M. P., Van Der Lans, I. A., & Huirne, R. B. (2007). Consumer preferences for pork supply chain attributes. NJAS-Wageningen Journal of Life Sciences, 54(3), 293-312.

Montlake, S. Why Chinese Purchase Of Smithfield Could Be Game Changer For Pork Trade. 2013, May 30. Forbes. Retrieved from http://www.forbes.com/sites/simonmontlake/2013/05/30/why-chinese-buyout-of-smithfield-could-be-game-changer-for-pork-trade/

Morgan, L. A. (1985). The importance of quality. In Perceived Quality (pp. 61-64). Lexington Books Lexington, MA.

Nelson, P. (1970). Information and consumer behavior. The Journal of Political Economy, 311-329.

Netemeyer, R. G., Durvasula, S., & Lichtenstein, D. R. (1991). A cross-national assessment of the reliability and validity of the CETSCALE. Journal of Marketing Research, 320-327.

Ngapo, T. M., Martin, J. F., & Dransfield, E. (2007). International preferences for pork appearance: I. Consumer choices. Food Quality and Preference, 18(1), 26-36.

Ngulu, F. Hong Kong strategic entry point into mainland China. 2014, June 13. The Namibia Economist. Retrieved from http://www.economist.com.na/2011-12-07-11-05-31/agriculture/5609-hong-kong-entry-strategy-point-into-mainland-china

Nielsen, B. L., & Zhao, R. (2012). Farm animal welfare across borders: A vision for the future. Animal Frontiers, 2(3), 46-50

Osborne, H. China: Eight Million Acres of Farmland too Polluted to Grow Food. 2013, December 30. International Business Times. Retrieved from: http://www.ibtimes.co.uk/china-eight-million-acres-farmland-too-polluted-grow-food-1430641

Ortega, D. L., Wang, H. H., & Eales, J. S. (2009). Meat demand in China. China Agricultural Economic Review, 1(4), 410-419.

Ortega, D. L., Wang, H. H., & Wu, L. (2009). Food Safety and Demand: Consumer Preferences for Imported Pork in Urban China. Journal of food distribution research, 40(3).

Ortega, D. L., Wang, H. H., Wu, L., & Olynk, N. J. (2011). Modeling heterogeneity in consumer preferences for select food safety attributes in China. Food Policy, 36(2), 318-324.

Osborne, H. China: Eight Million Acres of Farmland too Polluted to Grow Food. 2013, December 30. International Business Times. Retrieved from: http://www.ibtimes.co.uk/china-eight-million-acres-farmland-too-polluted-grow-food-1430641

Pan, C., & Nelson, D. Industrialisation of China's Pork Supply Chain. 2012, September. Rabobank Industry Note. Retrieved from: http://www.farminguk.com/content/knowledge/20120919_China%20Pork__Revised%20FINAL%20Approved_WS.PDF

Pan, C., & Kinsey, J. (2002). The supply chain of pork: US and China (pp. 02-01). Food Industry Center, University of Minnesota.

Peng et al. Haze, air pollution, and health in China. 2013, December 21. The Lancet. Retrieved from: http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2813%2962693-8/fulltext

Peter, S. Gray-Channel Economics: Drivers of Smuggling of Food and Agricultural Products into China. 2004. Columbia Business School. Retrieved from: https://www0.gsb.columbia.edu/mygsb/faculty/research/pubfiles/2091/Gray-Channel_Smuggling_v02.pdf

Philpott, T. Half of China's Antibiotics Now Go to Livestock. 2013, September 10. MotherJones. Retrieved from: http://www.motherjones.com/tom-philpott/2013/09/chinas-antibiotic-meat-livestock

Pig Progress. US: Pork price recovery threatened. 2013, March 14. Pig Progress. Retrieved from http://www.pigprogress.net/Pork-Processing/Markets/2013/3/US-Pork-price-recovery-threatened-1199992W/

Poe, G. L., Giraud, K. L., & Loomis, J. B. (2005). Computational methods for measuring the difference of empirical distributions. American Journal of Agricultural Economics, 87(2), 353-365.

Pouliot, S., & Sumner, D. A. (2008). Traceability, liability, and incentives for food safety and quality. American Journal of Agricultural Economics, 90(1), 15-27.

Ramzy, A. Will China's New Food-Safety Laws Work? 2009, March 3. Time. Retrieved from: http://www.time.com/time/world/article/0,8599,1882711,00.html

Rawwas, M. Y., Rajendran, K. N., & Wuehrer, G. A. (1996). The influence of worldmindedness and nationalism on consumer evaluation of domestic and foreign products. International Marketing Review, 13(2), 20-38.

Scarpa, R., Thiene, M., & Train, K. (2008). Utility in willingness to pay space: a tool to address confounding random scale effects in destination choice to the Alps. American Journal of Agricultural Economics, 90(4), 994-1010.

Schumacher, T., Schroeder, T. C., & Tonsor, G. T. (2012). Willingness-to-Pay for Calf Health Programs and Certification Agents. Journal of Agricultural and Applied Economics, 44(02).

Sean. Nationalism in China. 2013, September 18. Learn Chinese Business. Retrieved from: http://learnchinesebusiness.com/2013/09/18/nationalism-in-china-%E7%88%B1%E5%9B%BD%E4%B8%BB%E4%B9%89/

Shimp, T. A., & Sharma, S. (1987). Consumer ethnocentrism: construction and validation of the CETSCALE. Journal of marketing research, 280-289.

Snyder, M. "Economic Recovery" for the U.S. Middle Class: Significantly Less Purchasing Power than Before the 2008 Financial Crisis. 2014, September 22. Global Research. Retrieved from: http://www.globalresearch.ca/economic-recovery-for-the-u-s-middle-class-significantly-less-purchasing-power-than-before-the-2008-financial-crisis/5403937

Song, M., Liu, L. J., Wang, Z., Nanseki, T., & Nanshi, H. (2008). Consumers' attitudes to food traceability system in China: Evidences from the pork market in Beijing. Journal of the Faculty of Agriculture, Kyushu University, 53(2), 569-574.

Steenkamp, J. B. E. (1989). Product quality: An investigation into the concept and how it is perceived by consumers. Assen: Van Gorcum.

Sun, X., & Collins, R. (2012). A preliminary study of chinese consumers' willingness-to-pay for fruit produced with sustainable attributes. Acta Horticulturae, 1006, 349-354.

Supphellen, M., & Grønhaug, K. (2003). Building foreign brand personalities in Russia: the moderating effect of consumer ethnocentrism. International Journal of Advertising, 22(2), 203-226.

Sun, C., & Wu, H. (2012). Pollution from animal husbandry in China: a case study of the Han River Basin. Water Science & Technology, 66(4).

Ubilava, D., & Foster, K. (2009). Quality certification vs. product traceability: Consumer preferences for informational attributes of pork in Georgia. Food Policy, 34(3), 305-310.

Tonsor, G. T., Olynk, N., & Wolf, C. (2009). Consumer preferences for animal welfare attributes: The case of gestation crates. Journal of Agricultural and Applied Economics, 41(3), 713-730.

Train, K. Discrete choice methods with simulation. 2003. Cambridge University Press, 24, 25-26

Ubilava, D., & Foster, K. (2009). Quality certification vs. product traceability: Consumer preferences for informational attributes of pork in Georgia. Food Policy, 34(3), 305-310.

Umberger, W. J. (2003). Country-of-origin labeling of beef products: US consumers' perceptions (Doctoral dissertation, University of Nebraska-Lincoln).

U.S. Department of Agriculture, Foreign Agricultural Service. Global Agricultural Trade System Online. Available online at http://apps.fas.usda.gov/gats/default.aspx

U.S. Department of Agriculture, Foreign Agricultural Service. Production, Supply and Distribution Online. Available online at http://apps.fas.usda.gov/psdonline/psdHome.aspx

Verbeke, W., & Ward, R. W. (2006). Consumer interest in information cues denoting quality, traceability and origin: An application of ordered probit models to beef labels. Food Quality and Preference, 17(6), 453-467.

Verlegh, P. W., & Steenkamp, J. B. E. (1999). A review and meta-analysis of country-of-origin research. Journal of economic psychology, 20(5), 521-546.

Wang, F., Dou, Z., Ma, L., Ma, W., Sims, J. T., & Zhang, F. (2010). Nitrogen mass flow in China's animal production system and environmental implications. Journal of environmental quality, 39(5), 1537-1544.

Wang, H., Dong, Y., Yang, Y., Toor, G. S., & Zhang, X. (2013). Changes in heavy metal contents in animal feeds and manures in an intensive animal production region of China. Journal of Environmental Sciences, 25(12), 2435-2442.

Wandel, M., & Bugge, A. (1997). Environmental concern in consumer evaluation of food quality. Food quality and preference, 8(1), 19-26.

Wang, Q., Fuller, F., Hayes, D., & Halbrendt, C. (1998). Chinese consumer demand for animal products and implications for US pork and poultry exports. Journal of Agricultural and Applied Economics, 30, 127-140.

Wong, C. Y., Polonsky, M. J., & Garma, R. (2008). The impact of consumer ethnocentrism and country of origin sub-components for high involvement products on young

Chinese consumers' product assessments. Asia Pacific Journal of Marketing and Logistics, 20(4), 455-478.

Wu, L., Xu, L., & Gao, J. (2011). The acceptability of certified traceable food among Chinese consumers. British Food Journal, 113(4), 519-534

Xu, L., & Wu, L. (2010). Food safety and consumer willingness to pay for certified traceable food in China. Journal of the Science of Food and Agriculture, 90(8), 1368-1373.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. American psychologist, 35(2), 151.

Zanoli, R., Scarpa, R., Napolitano, F., Piasentier, E., Naspetti, S., & Bruschi, V. (2013). Organic label as an identifier of environmentally related quality: A consumer choice experiment on beef in Italy. Renewable Agriculture and Food Systems, 28(01), 70-79.

Zhang, T., Sun, H. W., Wu, Q., Zhang, X. Z., Yun, S. H., & Kannan, K. (2010). Perfluoro chemicals in meat, eggs and indoor dust in China: assessment of sources and pathways of human exposure to perfluoro chemicals. Environmental science & technology, 44(9), 3572-3579

Zhang, X. (2005). Chinese consumers' concerns about food safety: case of Tianjin. Journal of international food & agribusiness marketing, 17(1), 57-69.

Zhang, C., Bai, J., & Wahl, T. I. (2012). Consumers' willingness to pay for traceable pork, milk, and cooking oil in Nanjing, China. Food Control, 27(1), 21-28.

Zheng, S., Xu, P., Wang, Z., & Song, S. (2012). Willingness to pay for traceable pork: evidence from Beijing, China. China Agricultural Economic Review, 4(2), 200-215.

Zhao, Y., & Wu, S. (2011). Willingness to Pay: Animal Welfare and Related Influencing Factors in China. Journal of Applied Animal Welfare Science, 14(2), 150-161.

Zhu, Y. G., Johnson, T. A., Su, J. Q., Qiao, M., Guo, G. X., Stedtfeld, R. D., & Tiedje, J. M. (2013). Diverse and abundant antibiotic resistance genes in Chinese swine farms. Proceedings of the National Academy of Sciences, 110(9), 3435-3440.