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COFFEE MARKET IN CHINA

Ran Zhu

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Ran Zhu, Student

Dr. Yuqing Zheng, Major Professor

Dr. Carl Dillon, Director of Graduate Studies

COFFEE MARKET IN CHINA

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in
the College of Agriculture, Food and Environment
at the University of Kentucky

By

Ran Zhu

Lexington, Kentucky

Director: Dr. Yuqing Zheng, Professor of Agricultural Economics

Lexington, Kentucky

2018

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ABSTRACT OF THESIS

COFFEE MARKET IN CHINA

Although China is generally known as a tea-consuming country, both the production and consumption of coffee in China has seen double-digit growth in the last decade. This upward trend is projected to continue as long as investment is sustained and levels of disposable income continue to increase. In this rapidly expanding market, it is important for coffee producers and retailers in China to understand the preferences of emerging Chinese coffee consumers. Using survey data from Hubei and Zhejiang, China, we apply a Tobit regression model to analyze Chinese coffee consumers. Results show that the length of time consumers have been regularly drinking coffee, their self-assessed knowledge of coffee, and their taste preferences with regard to a variety of coffee products are all important factors in explaining Chinese coffee consumer trends. We suggest that coffee producers and retailers in China focus on improving the quality of their products to achieve long-term success.

KEY WORDS: Coffee, Market, Tobit, China, Consumer

Ran Zhu

November 20, 2018

COFFEE MARKET IN CHINA

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Coffee

Although coffee plants were first discovered in Africa, coffee is today cultivated across all low-latitude continents as a commercial crop. Coffee plants are germinated and spend their first 6 months in a coffee nursery before being transplanted to a farm. For the first 3 years, coffee plants only produce green berries and no mature coffee beans. After 3 crop years, coffee beans can finally be harvested and processed for consumption. They are then stripped of multiple layers of protective skin and are roasted, ground, and brewed to become the coffee products we enjoy daily (Mattingly, 2016).

Coffee is one of the most popular beverages worldwide with 1.5 billion cups consumed per day. To meet increasing global demand, more than 125 million farmers from over 80 countries, particularly developing countries, grow coffee and depend on the coffee industry for their livelihood.

Since the plants take three years to mature, farmers must initially invest labor, money, and time with no immediate returns and much risk. Coffee is very particular about temperature and sensitive to direct sunlight and frost. Moreover, coffee plants are quite susceptible to a number of diseases including common coffee leaf rust and coffee berry borer diseases. Years of investment in these plants can be and are often lost due to illness. Coffee plantations also face significant price uncertainty. In rural areas, farmers have limited access to financial information and may not receive market price for their beans. Furthermore, although the futures market is a good place to reduce price risk with hedging, most farmers unfortunately do not currently have sufficient training and/or resources to utilize the futures market.

Improving agricultural technology is the first step to increasing profits for farmers. With better technology, coffee planation yields could increase considerably, coffee plants could be made more resistant to disease, and growers would receive better prices due to increases in coffee bean quality. Finally, marketing knowledge is essential for farmers to avoid huge price risks. Not only is hedging is a common way to reduce price fluctuation, but coffee-growing decisions must also be made in consideration of the full market scenario. It is therefore beneficial for farmers to gain knowledge of the market.

1.2 Chinese Coffee Market

According to the International Coffee Organization (ICO), Chinese coffee production, which was ranked 14th in the world in 2015, has surpassed that of both Kenya and Tanzania combined. China has had a strong tea drinking tradition for over 2000 years. Today, retail tea sales are still 9 times larger than coffee sales. Thousands of farmers live from growing tea. However, the ICO highlights the interesting observation that coffee production in China has doubled in the last 5 years and has experienced a significant increase in the last twenty years. A primary reason for this growth is that tea prices have steadily declined in recent years. Many growers in traditional tea-growing regions switched from tea to coffee beans to increase their profit. Specifically, they reportedly doubled their income per land area by replacing tea with coffee (ICO, 2015). Thus, coffee is directly claiming shares from tea in the beverage market.

Stronger examples of market development can be seen on the retail side. In 2018, the amount of coffee in storage reached 100,000 bags – a 14% increase from 2017. Starbucks, for example, plans to operate over 3,000 stores in China by 2019, while online

coffee sales are also growing by 30% annually. Finally, three railroad connections dedicated to coffee transportation have been built from Yunnan to Europe via Singapore since 2015.

China, as a traditionally tea-consuming country, counts a growing number of coffee drinkers, most of which are young and for whom coffee symbolizes a modern western lifestyle. With this market expansion, coffee consumption in China has been increasing at double-digit rates in recent years. This trend does not seem likely to abate as the primary consumers of coffee are becoming major wealth makers (ICO, 2015).

China has been moving towards large-scale coffee consumption for approximately a decade, similarly to Japanese coffee market trends in the 1960s and 1970s, as shown in Figure 1. Japan became a top Asian coffee consumer as it experienced economic growth, just as China is today. This trend continued until Japan was ranked fourth in coffee consumption in the mid-2000s. However, Japan took 30 to 40 years to establish an advanced coffee culture. Therefore, if Chinese trends continue to echo those in Japan, China, although still in the very early stages of its coffee market development, can be predicted to be the largest coffee consumer by 2020, surpassing Brazil and the U.S. (ICO, 2015). As such, the Chinese coffee market will become a dominant player with global interest shifting towards China in the near future.

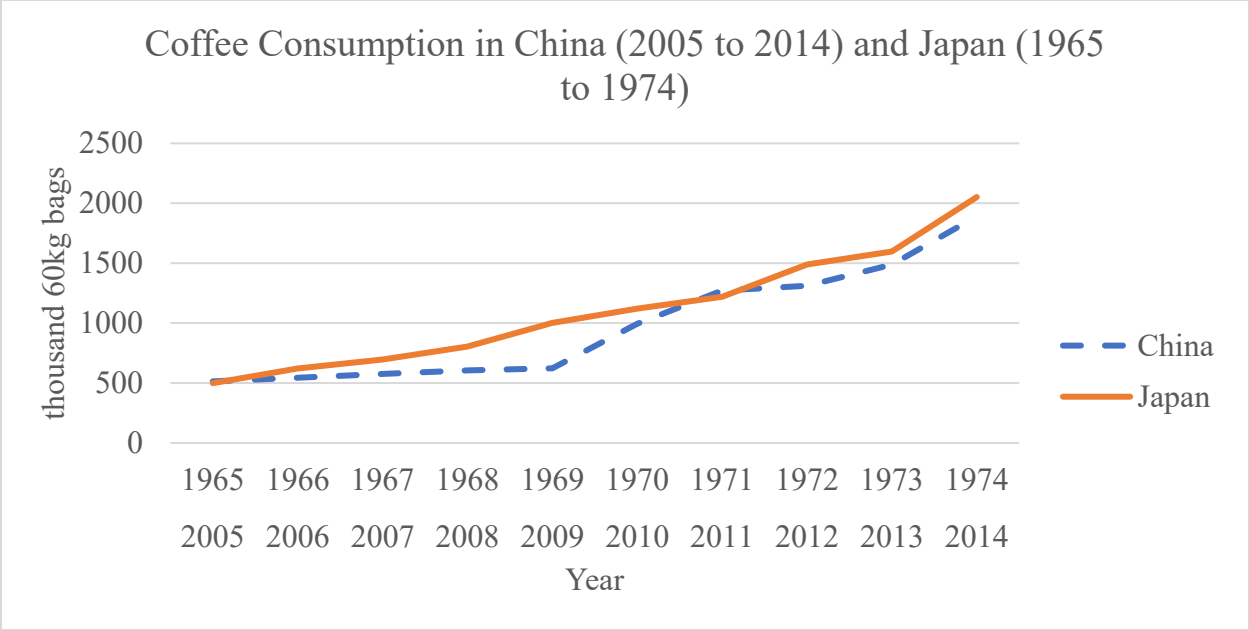

Figure 1: Coffee Consumption in China and Japan

Source: International Coffee Council 115th Session (ICO, 2015)

1.3 Objective and Outline

This study looks at the Chinese coffee market as representative of other developing countries, surveying willingness to pay for a range of coffee products. Our efforts are focused on understanding Chinese coffee consumers. This study seeks to help coffee retailers market their products and coffee growers maximize their revenue from coffee farming. For retailers, such research provides them with access to direct contact with consumers. Information on Chinese coffee consumption trends would benefit them most in improving market share in the short term and by helping them to predict future market trends. At the farm level, sufficient knowledge of the Chinese coffee market scenario could help farmers choose between selling domestically or exporting to other countries with the goal of maximizing their profit.

The remaining sections of this paper are organized as follows: in Chapter 2, we provide background information with an overview of the coffee industry, both globally and

in China and from producer and consumer perspectives; Chapter 3 cites literature relevant to our research including references to and past studies on coffee production and price transmission, household beverage consumption, and key factors behind coffee prices and rates of consumption; Chapter 4 describes the data-collection process, survey design, our sample's descriptive statistics, and why the selected cities are representative of the Chinese market; we then, in Chapter 5, discuss the theoretical framework, our solution for missing data in the sample, and the implementation of a Tobit model; Chapter 6 interprets and explains the SAS regression results; and, lastly, in Chapter 7, we conclude and highlight certain implications and limitations of our study, ultimately followed by references and appendices.

CHAPTER 2: BACKGROUND

2.1 The Global Coffee Industry

According to the United States Department of Agriculture (USDA) Foreign Agricultural Service (FAS) (2018), global coffee production for 2018/19 will be 11.4 million bags higher than the previous crop year, at a record of 171.2 million bags, primarily driven by Brazil's output. The USDA FAS (2018) shows that Brazil, Vietnam, Colombia, and Indonesia are currently the top 4 largest producers and exporters of coffee. Brazil's combined Arabica and Robusta harvest is expected to increase by 9.3 million bags to 60.2 million bags due to favorable weather conditions during bean maturation stages. Similarly, cooler weather and off-season rains are projected to help Vietnam add 600,000 bags to a record 29.9 million bag production year. Colombia is recovering from a coffee-leaf-rust crisis which occurred a decade ago by implementing a renovation program that replaces older trees with rust-resistant varieties. The USDA FAS (2018) predicts that Colombia and Indonesia will supply 14.5 million bags and 11.1 million bags respectively, the same as the previous year.

The USDA FAS (2018) has also indicated that global coffee exportation is expected to increase due to high consumer demand of 163.2 million bags. As such, the 4 largest exporting countries are all expected to increase exports, with estimated amounts of 5,308 thousand, 250 thousand, 485 thousand, and 310 thousand bags in Brazil, Vietnam, Colombia, and Indonesia, respectively (USDA FAS, 2018). On the other hand, the world's two largest importers, the European Union and the United States, are expected to increase imports by 1,000 and 2,325 bags, respectively (USDA FAS, 2018).

As we can see in Figure 2, Brazil and Vietnam have experienced noticeable increases in overall coffee production from 1997 to 2017, despite persistent fluctuation, while production from two other major exporters were generally stable during this 21-year period. A primary cause for this dramatic output increase over two decades is technological innovation, including, for example, farm machinery updates for Robusta coffee and development breakthroughs on disease resistant seeds. However, we note that the variation of annual production in Brazil is relatively greater than that of the other 3 countries. These variations in output can be explained by the fact that most coffee-planting regions in Brazil have on-years and off-years in a biennial production cycle (harvest is usually greater in on-years) and different weather conditions between years. Hence, as compared to these countries, Chinese production at this early stage currently represents a supplement (See Figure 5) in the world coffee industry, but has great potential to catch up to the larger players, especially if investments and favorable weather conditions exist.

In looking at Figure 3, we see that, although coffee consumption in Japan grew very slowly from 1997 to 2017, consumption still increased by more than 1,500 thousand 60 kg bags. It is interesting to see that the E.U. and the U.S., the most well-known coffee-consuming regions of the world, have also seen increasing rates consumption during the last two decades, given that countries in the E.U. and U.S. were already at high coffee-consumption levels prior to 1997. Figure 4 supports these trends from a corresponding import perspective. Particularly, imports to the E.U. and U.S. were 28,459 and 9,148 thousand 60kg bags, respectively, higher in 2017 versus 1997. It is worth noting that a considerable increase in imports would be a huge opportunity for China, since a possible market could therefore exist for Chinese coffee. However, it will take some time before

coffee grown in China is recognized and respected by western customers. These consumers have higher willingness to pay for higher-quality coffee, but Chinese coffee is still inferior on the international market. Hence, Chinese coffee production would benefit in the long term from building Chinese-grown coffee's reputation. To reach that goal, marketing efforts should be consistently implemented in the coming years to minimize the lag between highly-rated Chinese coffee and consumer trust in the quality of this coffee.

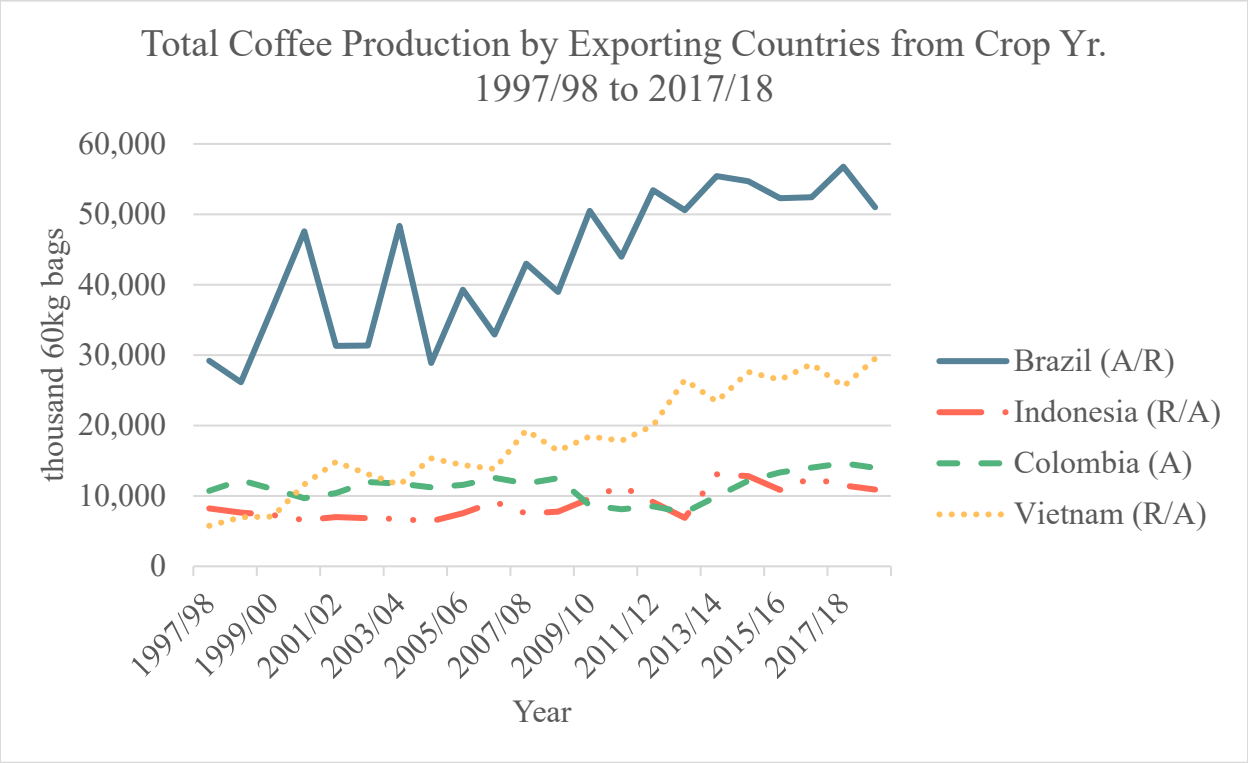

Figure 2: World Coffee Production

Source: Historical Data on the Global Coffee Trade (ICO)

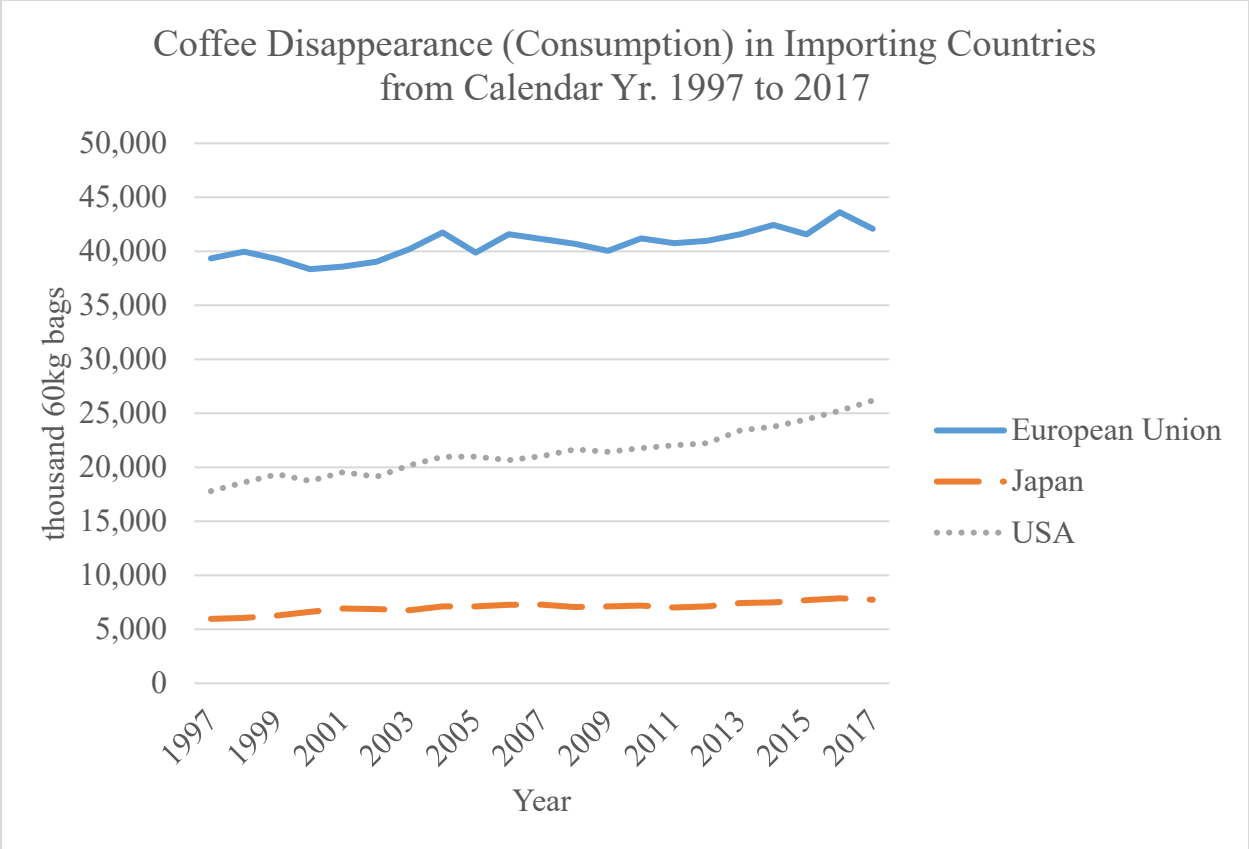

Figure 3: World Coffee Consumption

Source: Historical Data on the Global Coffee Trade (ICO)

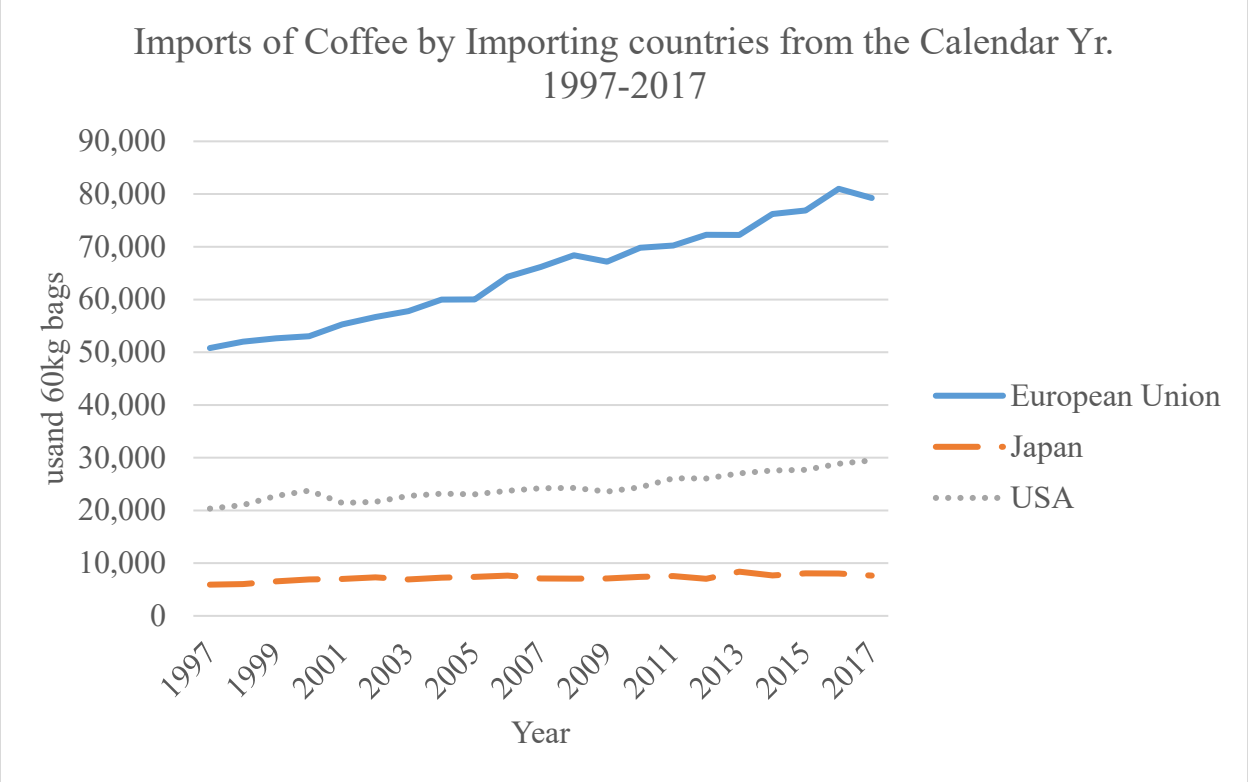

Figure 4: World Coffee Import

Source: Historical Data on the Global Coffee Trade (ICO)

2.2 Coffee Industry in China

According to the ICO (2015), coffee beans were introduced in the Yunnan Province of China in the late 1800s by a French missionary, but coffee was not considered a commercial crop until 1988. At that point, the Chinese government decided to invest in coffee production and initiated, with the World Bank and the United Nations Development Program, a coffee-specific sector in the Ministry of Agriculture. At the same time, outsiders contributed to rapid growth of coffee production, such as Nestlé entering the Chinese market and supporting coffee growing in this region.

The Yunnan Province borders Vietnam, Laos, and Myanmar, countries in latitudes very well suited for coffee production (ICO, 2015). The mountainous landscape in Yunnan boasts average altitudes of about 2,000 meters and appropriate humidity levels in misty climates. Mattingly (2016) noted that Arabica should be optimally grown in altitude ranges of 1,000 to 2,000 meters in tropical weather with shade trees. Based on these geographic conditions, Yunnan is an ideal place to grow Arabica coffee and, indeed, is responsible for over 95% of current Chinese coffee production. In addition, there are small areas in the Fujian and Hainan Provinces that grow Robusta coffee. The ICO (2015) demonstrated that there is potential to enlarge coffee production in Yunnan due to the large amount of available land in the province.

As previously mentioned by the ICO (2015), China moved up 16 places over the past 15 years to became the 14th largest coffee producer in the world. At the beginning of 2016, the land area dedicated to coffee cultivation in China exceeded 1.2 billion square meters, 1.5% of total worldwide coffee production (ICO, 2018). This rapid growth rate is not expected to slow down as long as current investments do not disappear, although total output was slightly influenced by large-scale droughts last year (See Figure 5). To enlarge the coffee-growing area and increase yield, the Coffee Association of Yunnan has invested over $500 million in coffee and has established research institutions since 2015 (Mattingly, 2016). Moreover, Starbucks and Nestlé have begun to implement extension-like programs with coffee farmers to introduce new coffee varieties and operate a regional coffee center in China (ICO 2015).

Although Chinese coffee production has soared in the last decade, the quality of coffee produced in China has increased slowly over a long period of time (ICO, 2018).

Two elements curb quality development: a lack of improved coffee seeds and an immature coffee market. The Chinese government could allow international trade to introduce premium coffee seeds such as the Typica and Bourbon varieties of Arabica. Farmers growing these two kinds of coffee would receive higher prices than they would with the traditional Catimor plants (Mattingly, 2016). Furthermore, cultivating coffee culture is important for increasing coffee quality since production is motivated by market demand. Currently, Chinese consumers do not have enough knowledge of coffee and so cannot differentiate between high- and low-quality coffee products. Therefore, customers would not be willing to pay a higher price for higher quality coffee (ICO, 2015). Growers would benefit from applying higher-grade seeds over the long term as the Chinese coffee market will mature gradually in coming decade (ICO, 2018).

According to the ICO (2018) and the USDA FAS (2018), China became the 10th largest consumer of coffee in 2017, with consumption reaching 3,655 thousand 60kg bags per year. The USDA FAS (2018) also showed that the growth rate of coffee consumption in China is around 20% annually while the global growth rate was only 2% in 2017. Furthermore, coffee chain brands' sales reached $5.2 billion.

The ICO (2015) indicates that although per capita numbers are still low throughout the country at 83 grams (5 cups) per year, it reached 2kg in cities such as Hong Kong, Beijing, and Shanghai, which is not far from per capita rates of 4.9kg and 4.4kg in the E.U. and U.S., respectively. Urban areas dominate coffee consumption due to current development imbalances in China. According to the National Bureau of Statistics of China (NBS), per capita half-year disposable income was an average of $2,636 for urban residents versus $883 for rural residents. This income gap has led to coffee's popularity in China as

a high-end rather than a daily beverage, at least during this last decade (ICO, 2015). The price of a cup of Starbucks brewed coffee in some cities remains too high for ordinary office workers.

Propelled by increasing demand and incentive policies, local branded coffee stores have been popping up in last 10 years. However, with the shock of online shopping and increasingly high brick-and-mortar operations costs, more than 10,000 local stores had to close their doors in 2016. Actually, giant brands dominate the China brewed coffee service market. For instance, Starbucks accounted for about 60% of sales on brewed coffee in China in 2017 (CNB, 2018).

On the other hand, online coffee sales and convenience store coffee have flourished in the last 3 years. According to CNB Data (2018), online sales of coffee increased at an average annual growth rate of 30% from 2015 to 2017. CNB data (2018) also found that some convenience stores in Shanghai sold an average of over 2,100 cups of coffee per week. Online companies and convenience stores mainly sell instant coffee. Instant coffee represented 87% of market share in China in 2017, while brewed coffee accounted for 76% sales worldwide (CNB data, 2018). Nestle took up 72.3% of market share in instant coffee sales, while second-placed Maxwell only had 3.1% of market share in total. (CNB data, 2018). ICO (2018) findings echo this trend: Chinese instant coffee imports tripled from 2016 to 2017. Many instant coffee consumers shift their preference to brewed coffee as they gain coffee-drinking experience. In fact, in 2015, freshly ground coffee represented only 2% of total sales in the Chinese coffee market (Mattingly, 2016). With growing levels of disposable income, the consumption structure in China would typically indicate a shift towards higher-quality goods.

In addition, a new business model has appeared in the coffee market. Luckin Coffee, established in 2017, is the first 'New Retail' coffee brand in China. 'New Retail' represents a business model with deeply-integrated online services, offline experiences, and modern logistics based on big data. Luckin Coffee's retail store is located near the Central Business District (CBD), indicating a focus on providing freshly-brewed coffee delivery services for white-collar workers in office buildings. This trend might revolutionize the future coffee industry.

Furthermore, according to the ICO (2018), coffee imports in China, although having sharply increased from 2000 to 2017, experienced fluctuation between 2012 and 2015 (see Figure 7). In fact, imports in 2016 were nearly 10 times higher than in 2000. The ICO (2018) also states that, from 2015 to 2017, although the majority of coffee imported was in the form of green beans (800 thousand 60kg bags per year, on average), the import of roasted coffee is rapidly increasing and reached 621 thousand 60kg bags in 2017. On the other hand, China has also been exporting much more coffee in last 17 years along with its soaring coffee production. We can see from Figure 7 that in 2017 both imports and exports experienced dips, although the decrease of imports was much slighter than the decrease in exports. This can be explained by the global market's downturn and an increase in domestically-produced coffee consumption in 2017. This effect supports the claim that international coffee companies are trying to offer "specifically-targeted blends and products" to the Chinese market by investing to increase coffee production and improve the quality of Arabica produced in Yunnan (ICO, 2015). With this strategy in mind, Nestlé and Starbucks are beginning to grow and sell their own product domestically, which would in turn accelerate the expansion of the domestic market.

China, as a developing country with an existing coffee market, boasts a large unexplored market with thousands of potential consumers. Due to this dual current and potential situation, Chinese coffee consumption was chosen as the focus of this study.

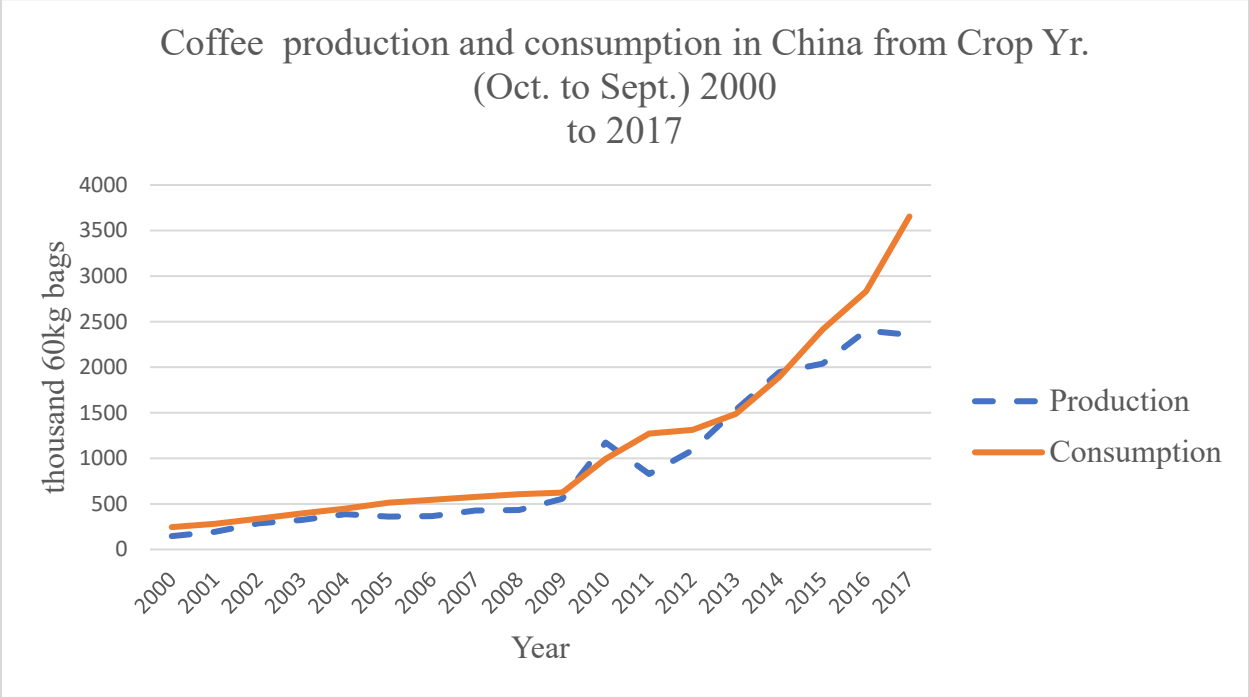

Figure 5: Coffee Production and Consumption in China

Source: 2017 Chinese Coffee Industry Report (ICO, 2018)

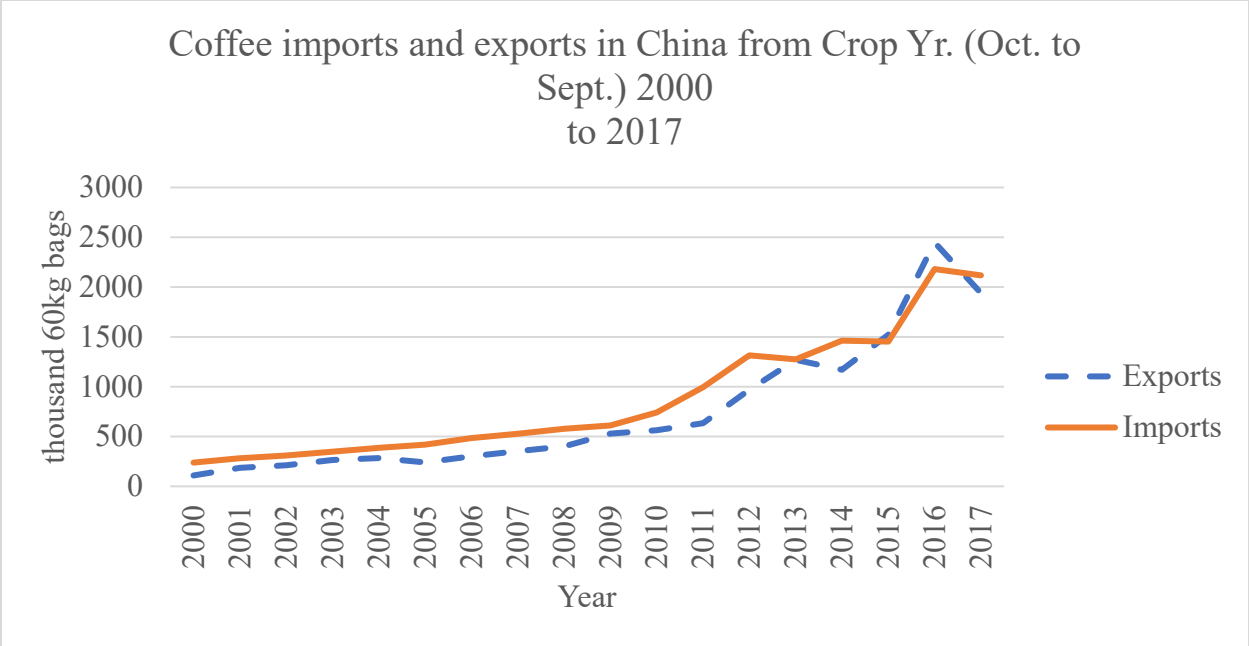

Figure 6: Coffee Exports and Imports in China

Source: 2017 Chinese Coffee Industry Report (ICO, 2018)

CHAPTER 3: LITERATURE REVIEW

3.1 Role of Coffee Production

Existing research is centered around several important issues in the coffee industry. A number of recent studies focus specifically on the welfare of production-side agents. RijsBergen et al. (2016) indicated that farms usually received only 6% to 8% of the retail price on coffee products in Kenya. Moreover, Barham and Weber (2012) found that improved yields seemed to be more important than price premiums for increasing net cash returns for coffee growing households.

Fair Trade coffee is a business model that trades coffee beans directly with local farmers at fair prices to the benefit of coffee growers. The effects of fairly traded coffee vary by region. Fair Trade coffee certification in Honduras helps farmers increase their income and strengthens economic stability by setting a price floor subsidy (Herrell et al., 2017). However, this does not work as well as in Kenya. Compared with an uncertified group, Fair Trade certification did not increase Kenyan farmers' income significantly in the long-term since it is unable to change the overall structure of the coffee value chain (RijsBergen et al., 2016).

Additional studies have looked at price risks and solutions. McCarthy and Sun (2004) indicated that hedging is highly recommended in reducing price risk for Honduran producers, although there is a cost associated to using the required instruments. They also found that coffee producers in Honduras tend to purchase short-term insurance to eliminate price risks due to a fixed income allocation. However, they are not interested in long-term insurance since they can simply adjust their income ratio (i.e. diversifying crops) (McCarthy and Sun, 2004). In general, producers in developing countries are more risk

averse than their counterparts in developed countries since they primarily rely on revenue from coffee for their livelihoods (Mohan et al., 2016). Similarly, Sushil et al. (2016) applied GARCH in estimating the relationship between price risk faced by producers and price volatility. They identified that the solution for volatility elimination is always increasing costs, which may not be preferred by producers.

3.2 Studies on Household Beverage Consumption

Previous literature on household beverage consumption shows us how demand in the beverage market responds to changes in habits, taxes, and income. Reed and Levedahl (2010) used nonlinear aggregation to estimate an Almost Ideal Demand System model and found that the U.S. beverage market demand is significantly affected by the Supplement Nutrition Assistance Program (SNAP).

A number of researchers believe that taxes negatively effect beverage consumption. Some governments levy taxes based on the sugar content of beverages as a means to limit excessive calorie intake. The U.S. sugar tax reduces daily caloric intake via beverages by 34.2 and 40 calories for adults and children respectively. As such, taxation is an effective way to decrease beverage consumption in the U.S. (Lin et al., 2010). However, Silva and Etile (2013) found that market structure should be considered when assessing the impact of sugar taxation since beverage taxes are not immediately and fully transferable to consumer price under market power. Moreover, habits also curb effects on daily beverage consumption. Zhen et al. (2011) supported this claim by showing that U.S. consumers do not switch beverages in the short term when the price of the beverage they are used to drinking increases, specifically because of their habit-based addiction to sugar.

In addition, income plays a role in changes to household beverage habits. Zhen et al. (2014) applied the Censored Exact Affine Stone Index incomplete demand system to estimate the effect of beverage taxes. High-income households had a significantly smaller decrease in caloric intake than low-income households.

3.3 Role of Coffee Consumption

A number of research studies on coffee have focused on price transmission and market scenario. According to research on the Belgian coffee market, coffee prices in a local market are less sensitive to global coffee price decreases than to global coffee price increases (Delille, 2009). Moreover, Houston et al. (2003) estimated a demand equation for Mexican coffee in the U.S. market. They found that the own price of Mexican coffee is inelastic and that the International Coffee Agreement affects it negatively.

Market power has influenced the coffee market noticeably. Kennedy and Kang (2009) dubbed the international coffee market the 'Coffee Paradox' due to the market power existing in exporting countries. Specifically, using statistics of coffee trading between developed countries, price transmission between international trade and retail is dominated by export coffee quota systems (Lee and Gomez, 2013). However, on a local level, buyers have market power and producers must be organized to reduce it (Li and Saghaian, 2015).

Coffee price is also sensitive to changes in natural conditions. Ubilava (2012) found that coffee price is sensitive to uncommon weather conditions such as the El Niño Southern Oscillation. Furthermore, Zheng and Kaiser (2008) showed that advertising is an effective strategy to increase coffee consumption in the U.S. and has a great influence on retail price.

Certifications and their labeling on coffee products play an important role in price determination and consumers' willingness to pay. To estimate the price effect of certifications, Hoehn (2015) applied hedonic price analysis to assess marginal market value in the U.S. retail market. Organic and Estate certifications demonstrated zero and negative value addition respectively. Similarly, both Wang (2016) and Donnet et al. (2008) used hedonic analysis to examine the market effect of Fair Trade labeling and specialty coffee as compared with conventional products. In addition, by evaluating consumers' willingness to pay for coffee in the U.S. and Germany, researchers found that level of understanding of the labeling system has a significant impact on consumer preference (Basu and Hicks, 2008). Therefore, consumption of fairly traded and/or organic coffee can be predicted to increase in the next few years due to increasing public awareness and, subsequently, higher consumer willingness to pay (Catturani et al., 2008).

Previous studies have also ventured into the Chinese coffee market. Yang et al. (2014) and Yang et al. (2012) evaluated whether the amount of product information provided affects Chinese consumers' willingness to pay for Fair Trade coffee by using a modified payment card approach. Furthermore, Zhang (2014) evaluated the Chinese coffee market in general and found that Chinese consumers are very price sensitive to new caffeinated beverages and are easily influenced by peers. Mattingly (2016) studied Chinese consumer preferences by investigating the relationship between total coffee consumption and a range of preference indicators such as coffee origin, type of coffee product, and price.

Overall, we note that few articles focus on Chinese coffee consumer preferences directly. Mattingly (2016) worked on Chinese coffee consumption associated with consumer preference, but the data applied was collected in 2008. As the Chinese coffee

market has experienced significant change in the last decade, it is time for an updated Chinese coffee market analysis.

CHAPTER 4: DATA

4.1 Data Collection

Our cross-sectional data are derived from a survey conducted in Zhejiang and Hubei in China in 2016. The representative cities selected are first- and second-tier urban areas with consumer-facing spaces selling coffee products. Trained graduate students from Zhejiang University and Huazhong Agricultural University interviewed coffee drinkers in these cities and gathered a total of 654 responses. Respondents were randomly approached in coffee stores and cafes where Chinese consumers purchase brewed coffee products and were asked to fill out our questionnaire. Surveys were also randomly collected outside of supermarkets to cover consumers of instant coffee. Furthermore, to reduce coverage bias, surveys were conducted at various, predetermined times during both week days and weekends. Also, we coordinated a trial run of our survey to receive feedback and make appropriate revisions to minimize hypothetical bias. The questionnaire used general language, not referring to a specific brand or product-type so that consumers may easily understand the questions and participate in the survey with no bias.

4.2 Survey Design

The questionnaire consists of three sections: the first section targets consumers' coffee consumption behavior, including how long they have been a regular coffee drinker, where they usually purchase coffee, from which part of the world the coffee they consume originates, their taste preferences in coffee, why they drink coffee, etc. The second section asks consumers about their average weekly coffee consumption as well their budget for coffee and beverage expenditures. The third section collects basic demographic information.

4.3 Descriptive Statistics

Descriptive statistics can provide useful information about consumers' purchasing behavior in the Chinese coffee market. The descriptive data gathered in our study provides an interesting overview of current patterns of coffee consumption in China. Regarding consumer purchasing behavior, 28% of the coffee drinkers in our sample have been consuming coffee regularly for 1-5 years, while 39% are irregular consumers. Participants in our survey were asked to estimate their level of understanding of coffee from 1 to 7, with the higher the number representing a better understanding. According to our sample, Chinese consumers were, on average, at a medium level of coffee knowledge (3.39). This implies that coffee is still new to Chinese consumers and that retailers therefore have opportunities for market promotion.

A third (30%) of the individuals in our study drink coffee produced in China. With regard to foreign coffee, consumers surveyed liked coffee from South America (23%) and Europe (15%). Producers and retailers in these areas should be made aware that their products are popular in the Chinese coffee market.

In terms of flavor, 38% of respondents prefer brewed coffee with sugar and milk. This indicates that black (no milk, no sugar) coffee may be too bitter for current Chinese coffee drinkers. Half of the consumers in our survey (50%) drink coffee for refreshment purposes. Chinese people tend to treat coffee as an energy drink to keep from being tired. Furthermore, 65% of respondents usually purchase brewed coffee at a coffee store or cafe, which indicates that Chinese coffee consumers prefer to drink prepared coffee.

As for the demographics of consumers sampled in this survey, most of our respondents are female (58%). The mean age in the sample is around 27 with low variation,

which supports the assumption that a majority of Chinese coffee consumers are relatively young. Also related to consumer age, 72% of our respondents are unmarried. Mean income per month is 14,660 CNY, higher than the average salary in Beijing (8500 CNY) and definitely enough to purchase coffee daily, holding purchasing behavior constant. Survey participants' mean number of years of schooling is about 16 years, roughly equivalent in China to completion of a Bachelor's Degree. Although education is not the only determinant of occupation, we could expect that most of our respondents occupy white-collar professions. The mean household size is 3.79. We assume that most of our unmarried respondents might still live with their parents and that most of our married respondents have 2 children at home.

To simplify the calculation, quantity consumed is standardized to number of medium (35ml) cup. Participants' average weekly coffee consumption is 2.83 medium cups (35ml) and average spending on coffee per week is 50.78 CNY. Therefore, the price of coffee per medium cup (35ml) is about 18 CNY.

Table 1: Data Descriptive of Variables

Variable	Variable Description	Mean	Standard Deviation	Minimum	Maximum
Female	female	0.58	0.49	0	1
Age	age of consumers (# of years)	27.28	9.34	18	91
Income	Household income/month (1000 CNY)	14.66	13.07	1	65
Married	Marital status	0.28	0.45	0	1
Edulevel	Years of schooling	15.35	2.77	6	22

Table 1: Data Descriptive of Variables

Employ	Job status	0.55	0.50	0	1
Household	household size (# heads)	3.79	1.35	1	10
Knowlevel	knowledge level of coffee	3.39	1.24	1	7
Lessone	been drinking coffee regularly for less than 1 years	0.19	0.39	0	1
Onetofive	been drinking coffee regularly for 1 to 5 years	0.28	0.45	0	1
Fivetoten	been drinking coffee regularly for 5 to 10 years	0.10	0.30	0	1
Overten	been drinking coffee regularly for over 10 years	0.04	0.20	0	1
Irregular	drink coffee irregularly	0.39	0.49	0	1
Coffeeshop	most often buy brewed coffee at coffee shop	0.65	0.48	0	1
Restaurant	most often buy brewed coffee at restaurant	0.22	0.41	0	1
Office	normally don't buy brewed coffee but work provides	0.13	0.33	0	1

Table 1: Data Descriptive of Variables

Southamerica	for coffee consumed most often, produced in S.America	0.23	0.42	0	1
Europe	for coffee consumed most often, produced in Europe	0.15	0.35	0	1
Centralamerica	for coffee consumed most often, produced in Central America	0.10	0.30	0	1
Eastafrica	for coffee consumed most often, produced in East Africa	0.05	0.22	0	1
China	for coffee consumed most often, produced in China	0.30	0.46	0	1
Noidea	don't care where the coffee is produced	0.18	0.38	0	1
Regular	for coffee consumed most often, is reg black w/sugar only flavor	0.29	0.45	0	1
Milk	for coffee consumed most often, is reg w/creamer or milk & sugar flavor	0.38	0.49	0	1
Vary	for coffee consumed most often, is specialty (e.g.Latte, Cappuccino) flavor	0.33	0.47	0	1

Table 1: Data Descriptive of Variables

Refreshing	consume coffee for refresh themselves	0.50	0.50	0	1
Taste	consume coffee for taste	0.25	0.43	0	1
Health	consume coffee for health concern	0.13	0.34	0	1
Sentiment	consume coffee for sentiment	0.08	0.28	0	1
Business	consume coffee for business	0.04	0.20	0	1
Quantity	total quantity consumed on beverage/week (# of 35ml medium cup)	2.83	2.16	0	21
Expenditure	total expenditure on coffee/week (CNY)	50.78	54.03	0	555

CHAPTER 5: METHODOLOGY

5.1 OLS Model

In statistics, ordinary least squares (OLS) is a widely used method to analyze demand. It identifies coefficients by minimizing the square of the error (the difference between the observed responses in a given dataset and those predicted by a linear function of a set of explanatory variables and coefficients).

For a linear model, suppose the data consists of n observations $\{y_i, x_i\}_{i=1}^{n}$. Each observation i includes a scalar response y_i and a column vector x_i of values of p predictors (regressors) x_{ij} for $j = 1, ..., p$. In a linear regression model, the response variable, y_i, is a linear function of the regressors:

$$y_i = \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_p x_{ip} + \varepsilon_i \qquad (1)$$

or in vector form,

$$y_i = \beta x_i^T + \varepsilon_i \qquad (2)$$

where β is a $p \times 1$ vector of unknown parameters; the ε_i's are unobserved scalar random variables (errors) which account for influences on the responses y_i from sources other than the explanatory variables x_i; and x_i is a column vector of the ith observations of all explanatory variables. This model can also be written in matrix notation as

$$\mathrm{y} = \beta X + \varepsilon \qquad (3)$$

where y and ε are $n \times 1$ vectors of the values of the response variable and the errors for the various observations, and X is an $n \times p$ matrix of regressors, also sometimes called the design matrix, whose row i is x_i^T and contains the ith observations on all explanatory variables.

As a rule, the constant term is always included in the set of regressors X, by, for example, taking $x_{i1} = 1$ for all $i = 1, \ldots, n$. The β_1 coefficient corresponding to this regressor is called the intercept.

There may be a relationship between regressors. For instance, the third regressor may be the square of the second regressor. In this case (assuming that the first regressor is constant) we have a quadratic model in the second regressor. This is however still considered a linear model because it is linear in the βs.

For estimation purposes, suppose b is a "candidate" value for the parameter vector β. The quantity $y_i - x_i^{\mathrm{T}} b$, called the residual for the ith observation, measures the vertical distance between the data point $(x_i\ y_i)$ and the hyperplane $y = x^{\mathrm{T}} b$, and thus assesses the degree of fit between the actual data and the model. The sum of squared residuals (SSR) (also known as the error sum of squares (ESS) or residual sum of squares (RSS))[2] is a measure of the overall model fit:

$$S(b) = \sum_{i=1}^{n} (y_i - x_i^T b)^2 = (y - Xb)^T (y - Xb) \qquad (4)$$

where T denotes the matrix transpose, and the rows of X, denoting the values of all independent variables associated with a particular value of the dependent variable, are $X_i = x_i^{\mathrm{T}}$. The value of b that minimizes this sum is called the OLS estimator for β. The function $S(b)$ is quadratic in b with positive-definite Hessian, meaning that this function possesses a unique global minimum at $\mathrm{b} = \hat{\beta}$.

5.2 Missing Data and Tobit Model

As shown in the descriptive data, the independent variables have less than 10% missing observations. Given the severity of missing data for each variable, it is reasonable

to simply replace the missing values with the mean/median or mode for continuous/dummy variables (Hu, 2014).

On the other hand, our data set of dependent "total expenditure" and "total quantity consumed" variables have many 'zero consumption' responses, meaning that there are individuals who do not consume coffee. In other words, the distribution of the dependent variable is truncated at '0'. In this case, general OLS model coefficient estimates are biased because the dependent variable is not normally distributed. Hence, the application of a Tobit model is an effective way to deal with both zero and non-zero values for the dependent variable (Van Phuong et al., 2014).

Tobit models have been widely used to analyze consumption with censored data, as it is assumed that the dependent variable has a number of its values clustered at a limiting value, usually zero (McDonald et al., 1980). McCracken and Brandt (1987) used a Tobit model to account for cases involving 'zero consumption' when they were looking at consumption as the dependent variable. For our study, total expenditure and total quantity consumed have values clustered at zero. Van Phuong et al. (2014) proposed the following Tobit model with a lower limit of zero:

$$\boldsymbol{y}_i^* = \boldsymbol{x}_i'\boldsymbol{\beta} + \boldsymbol{v}_i, \quad i = 1, \ldots, n \tag{5}$$

$$\begin{aligned} \mathbf{y}_i &= \boldsymbol{y}_i^* \quad \text{if } \boldsymbol{y}_i^* > 0 \\ &= 0 \quad \text{if } \boldsymbol{y}_i^* \leq 0 \end{aligned} \tag{6}$$

where y_i represents the dependent variable, x_i represents a vector of independent variables, β represents a vector of unknown coefficients, and v_i is a vector of independent and identically-distributed normal random variables assumed to have a mean of zero and constant variance, σ^2. As stated in the above equation, y_i is observed only when it is

positive; if y* is less than zero, it is not observed. Thus, y_i is censored at zero. The following equations describe the conditional and unconditional marginal effects:

$$E(\boldsymbol{y}_i) = \boldsymbol{x}_i\boldsymbol{\beta}F(z) - \sigma f(z) \quad (7)$$

$$E(\boldsymbol{y}_i^*) = \boldsymbol{x}_i\boldsymbol{\beta} - \sigma f(z)/F(z) \quad (8)$$

$$\partial E(\boldsymbol{y}_i)/\partial \boldsymbol{x}_i = F(z)(\partial E(\boldsymbol{y}_i^*)/\partial \boldsymbol{x}_i) - E(\boldsymbol{y}_i^*)(\partial F(z)/\partial \boldsymbol{x}_i) = F(z)\boldsymbol{\beta} \quad (9)$$

$$\partial E(\boldsymbol{y}_i^*)/\partial \boldsymbol{x}_i = \boldsymbol{\beta}(1 - zf(z)/F(z) - f(z)^2/F(z)^2) \quad (10)$$

$$\partial F(z)/\partial \boldsymbol{x}_i = f(z)\boldsymbol{\beta}/\sigma \quad (11)$$

Where $z = {x_i\beta}/{\sigma}$, is the normalized index, f(z) is the standard normal density function, and F(z) is the cumulative standard normal distribution function.

5.3 Empirical Model

This study looks at Chinese coffee consumers to identify and understand the factors that drive coffee consumption in China. Since we are focusing on Chinese consumer purchasing behavior with regard to coffee, both *Quantity Consumed (per week) of coffee* and *Total Expenditure (per week) on coffee* are applied in our analysis as dependent variables in different models. Demographics and level of consumer knowledge of coffee are treated as 'core factors' and are first put through a regression model. Below is our *Quantity* Tobit model and *Expenditure* Tobit model with core factors.

Quantity:

$$\text{Total Quantity Consumed} = \beta_0 + \beta_1 * female + \beta_2 * age + \beta_3 * income + \beta_4 * married + \beta_5 * edulevel + \beta_6 * employ + \beta_{10} * household + \beta_{11} * knowlevel + \varepsilon_1 \quad (12)$$

Expenditure:

$$\text{Total Expenditure} = \beta_{12} + \beta_{13} * female + \beta_{14} * age + \beta_{15} * income + \beta_{16} * married + \beta_{17} * edulevel + \beta_{18} * employ + \beta_{19} * household + \beta_{20} * knowlevel + \varepsilon_2 \quad (13)$$

To investigate the relationship between consumption preference and total consumption of coffee, the consumer purchasing behavior variables are included in the following models:

Quantity Consumed:

$$\text{Total Quantity Consumed} = \beta_{21} + \beta_{22} * female + \beta_{23} * age + \beta_{24} * income + \beta_{25} * married + \beta_{26} * edulevel + \beta_{27} * employ + \beta_{28} * household + \beta_{29} * knowlevel + \beta_{30} * lessone + \beta_{31} * onetofive + \beta_{32} * fivetoten + \beta_{33} * overten + \beta_{34} * southamerica + \beta_{35} * europe + \beta_{36} * centralamerica + \beta_{37} * eastafrica + \beta_{38} * noidea + \beta_{39} * milk + \beta_{40} * vary + \beta_{41} * coffeeshop + \beta_{42} * restaurant + \beta_{43} * refreshing + \beta_{44} * taste + \beta_{45} * health + \beta_{46} * sentiment + \varepsilon_3 \quad (14)$$

Total Expenditure:

$$\text{Total Expenditure} = \beta_{47} + \beta_{48} * female + \beta_{49} * age + \beta_{50} * income + \beta_{51} * married + \beta_{52} * edulevel + \beta_{53} * employ + \beta_{54} * household + \beta_{55} * knowlevel + \beta_{56} * lessone + \beta_{57} * onetofive + \beta_{58} * fivetoten + \beta_{59} * overten + \beta_{60} * southamerica + \beta_{61} * europe + \beta_{62} * centralamerica + \beta_{63} * eastafrica + \beta_{64} * noidea + \beta_{65} * milk + \beta_{66} * vary + \beta_{67} * coffeeshop + \beta_{68} * restaurant + \beta_{69} * refreshing + \beta_{70} * taste + \beta_{71} * health + \beta_{72} * sentiment + \varepsilon_4 \quad (15)$$

Apparently, the models with all variable are models with core factors continued with consumer purchasing variables. Therefore, the quantity model with core variables and the quantity with all variables are nested as well, the expenditure model with core variables and the expenditure model with all variables are nested. Adjusted R-Square is introduced to explain the goodness of fit of each pair of models.

CHAPTER 6: RESULTS

6.1 Results and Interpretations

Table 2 gives the estimation of marginal effects in the *Quantity* and *Expenditure* models with core variables. Table 3 gives the estimation of marginal effects in the *Quantity* and *Expenditure* models with all variables. Below is an explanation of the results and statistically significant interpretations with an analysis of each variable in Table 2.

The *Female* variable is the dummy for consumer gender; *Female* represents respondents who identify as female. The marginal effect for this variable is 10% statistically significant in the *Quantity* model but is 1% statistically significant in the *Expenditure* model. Ceteris paribus, males drink 0.3 medium cups of coffee more and spend 11.85 CNY more on coffee per week than females. A reason for this might be that there are more males in advanced business conferences where the coffee offered is high grade and expensive. This may also cause males to have higher requirements for coffee quality and willingness to pay for it.

The variable *Age* is a continuous variable representing the age of respondents. The marginal effect for this variable is 10% statistically significant in the *Quantity* model but is 1% statistically significant in the *Expenditure* model. Ceteris paribus, an increase of 1 year in age entails a 0.02 medium cup of coffee increase in consumption and a 0.77 CNY increase in total expenditure on coffee per week. Admittedly, most of our respondents are young adults, meaning that the mean age for our sample is young and there is insufficient variation. However, older individuals have more experience with coffee and tend to have higher WTP for coffee products.

The *Income* variable is a continuous variable representing the monthly income of every coffee consumer in the survey. The marginal effect for this variable is 1% statistically significant in the *Quantity* model but is 5% statistically significant in the *Expenditure* model. Ceteris paribus, a 1,000 CNY increase in income entails a 0.02 medium cup of coffee increase in consumption and a 0.28 CNY increase in total expenditure on coffee per week. This makes sense since the price of coffee products at Starbucks is still high for many Chinese people and, therefore, consumers with higher incomes such as white-collar workers would buy higher-quality coffee products at higher price points.

The *Married* variable is the dummy representing consumer relationship status. *Married* denotes consumers who are married. The marginal effect for this variable is not statistically significant in both the *Quantity* and *Expenditure* models. This might imply that marital status does not impact coffee purchasing behavior in China.

The *Edulevel* variable is the continuous variable representing a respondent's years of education. The marginal effect for this variable is 1% statistically significant in the *Quantity* model. Ceteris paribus, every additional year of schooling entails a 0.09 medium cup of coffee increase in consumption and a 1.86 CNY increase in total expenditure on coffee per week. This result supports our hypothesis that people with higher education levels are more likely to spend more money on coffee products, likely due to the fact that they have greater access to the beverage and a better understanding of coffee in general.

The *Employ* variable is the dummy variable representing consumer employment status, with *Employ* representing those who are employed. The marginal effect for this variable is not statistically significant in the *Expenditure* model but is statistically significant in the *Quantity* model at a 1% level. Ceteris paribus, consumers who are

employed drink 0.5 medium cup of coffee per week more than those who are unemployed. An explanation for this is that employees is usually offered free coffee in their office.

The *Household* variable is a continuous variable representing the number of family members in respondent households. The marginal effect for this variable is 10% statistically significant in the *Quantity* model and 5% significant in the *Expenditure* model. Ceteris paribus, every additional family member entails a 0.11 medium cup of coffee increase in consumption and a 3.03 CNY decrease in total expenditure on coffee per week. This result suggests that drinking coffee may be influenced by family size in China.

The *Knowlevel* variable is a continuous variable for respondents' self-assessed level of knowledge about coffee. The marginal effect for this variable is statistically significant at a 1% level in both the *Quantity* and *Expenditure* models. The marginal effect for the *Knowlevel* variable is statistically significant at a 1% level in the *Quantity* model while its quadratic form is statistically significant at a 5% level. Ceteris paribus, a one-level increase in coffee knowledge leads to a 0.27 medium cup of coffee increase in consumption and a 6.75 CNY increase in total expenditure on coffee per week. This result supports the hypothesis that people are likely to consume more coffee as they learn more about the beverage.

Table 3 illustrates the models with all variables have higher Adjusted R-Square, compared to their counterpart in model with core variables respectively. Hence, the model including demographics, consumers' understanding level of coffee and purchasing behavior could explain our hypothesis better.

In Table 4, however, the *Age*, *Female*, and *Household* variables are not statistically significant in the *Quantity* model and the *Income* variable is not statistically significant in

the *Expenditure* model after variables reflecting consumer drinking habits are incorporated. As such, there could be correlations between variables. For instance, the question "For how long have you been a regular coffee drinker?" might be associated with consumer age.

The *Lessone*, *Onetofive*, *Fivetoten*, *Overten* variable group are dummies representing the question of how long consumers have been regularly drinking coffee (e.g. every day or week). Omitted are consumers who have not been consuming coffee regularly, including consumers that may be just beginning to drink coffee.

The *Lessone* variable is the response of consumers who have been consuming coffee regularly for less than one year. The marginal effect for this variable is statistically significant at a 1% level in the *Quantity* model but is not statistically significant in the *Expenditure* model. Ceteris paribus, consumers who have been consuming coffee regularly for less than a year drink 0.68 medium cup of coffee per week more than those who do not drink coffee regularly. Consumers in this stage have been drinking coffee for a short time and are still trying new types and flavors. Hence, there is no difference in quantity consumed and expenditure compared with irregular drinkers.

The *Onetofive* variable represents consumers who have been consuming coffee regularly for 1-5 years. The marginal effect for this variable is statistically significant at a 1% level in the *Quantity* model and is significant at a 5% level in the *Expenditure* model. Ceteris paribus, consumers who have been consuming coffee regularly for 1-5 years drink 0.66 medium cup of coffee more and spend 10.34 CNY more on coffee per week than those who do not drink coffee regularly. At this level of maturity, consumers prefer certain types of coffee and will invest more money in these preferences.

The *Fivetoten* variable represents consumers who have been consuming coffee regularly for 5-10 years. The marginal effect for this variable is statistically significant at a 1% level both in the *Quantity* and *Expenditure* models. Ceteris paribus, consumers who have been consuming coffee regularly for 5-10 years drink 1.13 medium cups of coffee more and spend 28.56 CNY more on coffee per week than those who do not drink coffee regularly. More experienced consumers would drink more coffee and spend more money doing so.

The *Overten* variable represents consumers who have been consuming coffee regularly for over 10 years. The marginal effect for this variable is statistically significant at a 1% level both in the *Quantity* and *Expenditure* models. Ceteris paribus, consumers who have been consuming coffee regularly for over 10 years drink 2.32 more medium cups of coffee and spend 43.39 CNY more on coffee per week than those who do not regularly drink coffee. Along with the findings described in the 3 paragraphs above, the consistency of estimation for this variable group supports our hypothesis that consumption of coffee will increase as a coffee consumer matures.

The *Southamerica*, *Europe*, *Centralamerica*, *Eastafrica*, and *Noidea* variables are dummies representing where the coffee that consumers most often consume is produced. *Southamerica*, *Europe*, *Centralamerica*, and *Eastafrica* represent the responses of consumers who most often consume coffee produced in South America, Europe, Central America, and East Africa, respectively. *Noidea* represents consumers who do not care or do not know where the coffee they consume is produced. The omitted group consists of consumers who most often consume coffee produced in China. The marginal effect for *Southamerica* is statistically significant at a 5% level both in the *Quantity* and *Expenditure*

models, while the other four variables are not statistically significant in either the *Quantity* or *Expenditure* models. Ceteris paribus, consumers who most often drink coffee produced in South America drink 0.5 more medium cups of coffee and spend 9.38 CNY more on coffee per week than those who most often drink coffee produced domestically.

Most Arabica coffee on the market comes from South America. Although 95% of total Chinese coffee output is Arabica, the quality is inferior to its South-American counterpart. We can conclude that Chinese consumers are becoming more knowledgeable about coffee and, as such, bean quality is increasingly important. Coffee produced in the other 3 geographic areas is rarely imported into China and so Chinese consumers are less familiar with it.

The *Milk* and *Vary* variables are dummies representing consumer preference for type of coffee product. *Milk* represents the responses of consumers who most often consume regular coffee with milk and sugar, while *Vary* are consumers who consume specialty products (such as lattes or cappuccinos). The omitted group consists of consumers who most often drink brewed, black coffee.

The marginal effects for the *Vary* variable are not statistically significant in either the *Quantity* or *Expenditure* models. The marginal effects for the *Milk* variable is however statistically significant in the *Quantity* model at a 10% level and in the *Expenditure* models at a 5% level. Ceteris paribus, consumers who most often drink coffee with milk and sugar consume 0.3 medium cups of coffee more and spend 11.65 CNY more per week than consumers who prefer regular coffee. This supports the assumption that Chinese consumers prefer beverages with milk and sugar over black coffee and are willing to pay higher prices for them.

The *Coffeeshop* and *Restaurant* variables are dummies for the question asking consumers where they most often buy brewed coffee. *Coffeeshop* respondents most often buy brewed coffee at a coffee shop, while *Restaurant* respondents do so at a restaurant. The omitted group consists of consumers who most often drink brewed coffee offered for free in their office. The marginal effects for these 2 variables are not statistically significant in either the *Quantity* or *Expenditure* models. Since instant coffee still dominates the Chinese coffee market, brewed coffee purchasing behavior does not currently affect total quantity consumed/expenditure on an individual level.

The *Refreshing*, *Taste*, *Health*, and *Sentiment* variables are dummies representing consumers' reasons for drinking coffee, specifically for refreshment, taste, health, and sentimental reasons, respectively. The omitted group consists of consumers who drink coffee for business reasons. Only the marginal effect for the *Health* variable is statistically significant in the *Expenditure* model at a 1% level, although it is not statistically significant in the *Quantity* model. The marginal effects for the other 3 variables are not statistically significant in either the *Quantity* or *Expenditure* models. We can conclude that Chinese consumers' quantity consumed/expenditure on coffee is currently weakly related to their reason for drinking coffee. This implies that coffee brands in China can pay less attention to market segmentation by reason for purchasing when they are creating their marketing strategies.

Table 2: The marginal effects from the *Quantity* and *Expenditure* Models with core variables

Variable	Variable Description	Quantity Model Coefficient (Std. Error)	Quantity Model Marginal Effect	Expenditure Model Coefficient (Std. Error)	Expenditure Model Marginal Effect
Intercept	Intercept	-1.0831 (0.6640)		-27.0323 (17.0483)	
Female	Female	-0.3323 (0.1702)	-0.3018*	-14.5190 (4.3657)	-11.8454***
Age	Age of consumers	0.0210 (0.0123)	0.0198*	0.9416 (0.3165)	0.7682***
Income	Household income/month	0.0190 (0.0066)	0.0173***	0.3438 (0.1711)	0.2806**
Married	Married	-0.2082 (0.2512)	-0.1891	1.6310 (6.4391)	1.3313
Edulevel	Years schooling	0.0982 (0.0306)	0.0892***	2.2817 (0.7861)	1.8615***
Employ	At least part-time employed	0.5514 (0.197)	0.5007***	6.1114 (5.0608)	4.9860
Household	household size	0.1159 (0.0622)	0.1052*	-3.7194 (1.5993)	-3.0345**
Knowlevel	Square of household size	0.2934 (0.0685)	0.2664***	8.2779 (1.7574)	6.7536***

***, ** and * indicates significance at the 1%, 5% and 10% significance levels, respectively

Table 3: *Adjusted R-Square*

Name of Model	Adjusted R-Square
Quantity Model with core variables	0.1088
Quantity Model with all variables	0.1780
Expenditure Model with core variables	0.1316
Expenditure Model with all variables	0.2001

Table 4: The marginal effects from the *Quantity* and *Expenditure* Models with all variables

Variable	Variable Description	Quantity Model Coefficient (Std. Error)	Quantity Model Marginal Effect	Expenditure Model Coefficient (Std. Error)	Expenditure Model Marginal Effect
Intercept	Intercept	-0.4317 (0.7191)		-19.7988 (18.4858)	
Female	Female	-0.2636 (0.1669)	-0.2425	-14.2957 (4.2827)	-11.8569***
Age	Age of consumers	0.0091 (0.0120)	0.0084	0.5739 (0.3088)	0.4760*
Income	Household income/month	0.0205 (0.0064)	0.0189***	0.2705 (0.1658)	0.2244
Married	Married	-0.3615 (0.2418)	-0.3325	-0.0370 (6.1952)	-0.0307
Edulevel	Years schooling	0.0720 (0.0298)	0.0662**	1.8604 (0.7641)	1.5430**
Employ	At least part-time employed	0.5333 (0.1954)	0.4905***	7.6244 (5.0116)	6.3237
Household	household size	0.0620 (0.061)	0.0570	-3.4740 (1.5861)	-2.8814**

Table 4: The marginal effects from the *Quantity* and *Expenditure* Models with all variables

Knowlevel	knowledge level of coffee	0.1771 (0.0707)	0.1629**	4.9050 (1.8122)	4.0682***
Lessone	been drinking coffee regularly for less than 1 years	0.7439 (0.2267)	0.6842***	-0.3857 (5.8584)	-0.3199
Onetofive	been drinking coffee regularly for 1 to 5 years	0.7191 (0.2059)	0.6613***	12.4678 (5.2678)	10.3407**
Fivetoten	been drinking coffee regularly for 5 to 10 years	1.2371 (0.2975)	1.1378***	34.4397 (7.5883)	28.5642***
Overten	been drinking coffee regularly for over 10 years	2.5209 (0.4449)	2.3184***	52.3091 (11.3446)	43.3850***
Southamerica	for coffee consumed most often, produced in South America	0.5434 (0.2266)	0.4998**	11.3062 (5.8077)	9.3773**
Europe	for coffee consumed most often, produced in Europe	0.0812 (0.2566)	0.0747	2.9398 (6.6090)	2.4383
Centralamerica	for coffee consumed most often, produced in Central America	-0.2919 (0.2928)	-0.2685	8.9006 (7.4936)	7.3822
Eastafrica	for coffee consumed most often, produced in East Africa	-0.4098 (0.3902)	-0.3769	-0.2427 (10.0121)	-0.2013

Table 4: The marginal effects from the *Quantity* and *Expenditure* Models with all variables

Noidea	don't care where the coffee is produced	-0.0624 (0.2379)	-0.0574	9.4986 (6.0942)	7.8781
Milk	for coffee consumed most often, is reg w/creamer or milk & sugar flavor	0.3266 (0.1984)	0.3004*	12.5560 (5.1013)	10.4139**
Vary	for coffee consumed most often, is specialty (e.g. Latte, Cappuccino) flavor	-0.0203 (0.2081)	-0.0187	5.7380 (5.3492)	4.7591
Coffeeshop	most often buy brewed coffee at coffee shop and Café	-0.1513 (0.2508)	-0.1392	9.9481 (6.4347)	8.2510
Restaurant	most often buy brewed coffee at restaurant	-0.3908 (0.2823)	-0.3594	-3.2381 (7.2447)	-2.6857
Refreshing	consume coffee for refreshing	0.2670 (0.2530)	0.2456	-5.8491 (6.5093)	-4.8512
Taste	consume coffee for taste	0.0700 (0.2738)	0.0645	-5.1618 (7.0301)	-4.2812
Health	consume coffee for health	-0.1877 (0.2955)	-0.1727	-23.3973 (7.6118)	-19.4056***
Sentiment	consume coffee for sentiment	-0.0389 (0.3575)	-0.0358	5.3746 (9.1450)	4.4577

***, ** and * indicates significance at the 1%, 5% and 10% significance levels, respectively

Source: This table was manually re-created in Word via SAS output

CHAPTER 7: CONCLUSION

7.1 Implications

With increasing investment and growth in disposable income per capita, the Chinese coffee market will continue to rapidly expand. It is therefore important for producers and retailers alike to understand Chinese consumer preferences with regard to coffee. Our study uses data collected from pilot cities in China to analyze Chinese coffee consumption. We focus on the drivers behind the number of medium cups of coffee consumed per week by Chinese consumers and how much they pay for coffee on a weekly basis to then provide market information for Chinese farmers who are growing or plan to grow coffee and to help coffee retailers with their marketing strategies in China. We examine the relationships between consumer purchasing behavior, demographic data, and total consumption of coffee per week (quantity and expenditure) using Tobit models. The analysis demonstrates that factors such as how long a consumer has been a regular coffee drinker, how much they know about coffee, their individual preference, educational background, and occupation affect to varying degrees the quantity of coffee consumed/expenditure on coffee. We summarize the main findings of our results below.

Consumers who have been drinking coffee regularly for a longer time like to consume more coffee and spend more money on coffee. Moreover, if we classify coffee consumers into three groups – beginner, intermediate, and proficient, based on their level of coffee knowledge – the intermediate group tends to consume the largest quantity of coffee and spend the most on coffee. This implies that it is important for coffee brands to maintain regular customers since their expenditures will increase over time. Hence, attractiveness and quality of coffee products are key factors on which retailers should focus

to survive long-term in the coffee market. Furthermore, sales and discounts for regular customers are important to ensure that they continue returning.

With regard to domestically-produced Arabica coffee, Chinese consumers are willing to pay more to drink higher-quality Arabica coffee imported from South America. This demonstrates that Chinese consumers are beginning to develop the ability to differentiate between different qualities of coffee. In other words, the coffee market's profit model is shifting from profit by sales volume to profit by price premium. Therefore, high coffee bean quality is an essential element in the long term.

Individuals with higher education levels and business-related careers tend to drink more coffee. Therefore, building specialized business cafes might be an innovation in the coffee industry. Furthermore, since lattes (espresso with milk) are a best seller among all brewed coffee products, the addition of milk seems to be a key factor for the consumption of coffee products in China.

In addition to the findings discussed above, we suggest that coffee retailers emphasize market segmentation based on individual reasons for drinking coffee. As Chinese coffee consumers learn more about coffee, their budgets and WTP when they are buying coffee also changes. As such, retailers could attain price premiums in the long term with accurate product-positioning strategies.

Overall, coffee is a new beverage for Chinese consumers and the coffee culture will take time to develop in China. As and when it does, Chinese coffee consumers will be exigent with regard to coffee quality. There is currently a small but growing population of regular coffee drinkers in China. Based on our sampling of this population, we believe that, if retailers were to propose innovative products and promotional strategies, there would be

an increase in the number of regular coffee consumers in China and an expansion of the Chinese coffee market in general. Moreover, we suggest that Chinese producers and retailers concentrate on improving the quality of their coffee, since higher profits from higher-quality coffee will be a successful strategy for the long run.

7.2 Limitations and Future Research

The data applied in our study was collected in 2016. Although this is only two years ago, the Chinese coffee market has been developing rapidly. For instance, the "New Retail" business model, which incorporates factors highlighted in this study, has been a hot topic in the coffee industry since 2017. Future research could assess customer preference with regard to this new business model which, when considered alongside this study conducted in 2016, could show changes in Chinese coffee consumer behavior. In addition, it would be interesting to add panel data to our analysis since panel data is better able to explain consumer changes over time.

Unlike scanner data collected from sale terminals, our survey data may suffer from data selection biases. For instance, most of our respondents are young, resulting in a deficiency of variation in the *Age* variable.

Although our sample cities are strong representations of average urban populations in China, future research could widen data collection to more areas throughout the country.

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