2022

DEMAND ANALYSIS OF VIETNAMESE COFFEE IN THE U.S.

Leo Kyaw Zin
University of Kentucky, leotripleseven@gmail.com
Author ORCID Identifier:
orcid.org/0000-0001-5673-0625
Digital Object Identifier: https://doi.org/10.13023/etd.2022.249

STUDENT AGREEMENT:

I represent that my thesis or dissertation and abstract are my original work. Proper attribution has been given to all outside sources. I understand that I am solely responsible for obtaining any needed copyright permissions. I have obtained needed written permission statement(s) from the owner(s) of each third-party copyrighted matter to be included in my work, allowing electronic distribution (if such use is not permitted by the fair use doctrine) which will be submitted to UKnowledge as Additional File.

I hereby grant to The University of Kentucky and its agents the irrevocable, non-exclusive, and royalty-free license to archive and make accessible my work in whole or in part in all forms of media, now or hereafter known. I agree that the document mentioned above may be made available immediately for worldwide access unless an embargo applies.

I retain all other ownership rights to the copyright of my work. I also retain the right to use in future works (such as articles or books) all or part of my work. I understand that I am free to register the copyright to my work.

REVIEW, APPROVAL AND ACCEPTANCE

The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student's thesis including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Leo Kyaw Zin, Student

Dr. Yuqing Zheng, Major Professor

Dr. Tyler Mark, Director of Graduate Studies

DEMAND ANALYSIS OF VIETNAMESE COFFEE IN THE U.S.

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

Leo Kyaw Zin

Lexington, Kentucky

Director: Dr. Yuqing Zheng, Professor of Agricultural Economics

Lexington, Kentucky

2022

0000-0001-5673-0625

ABSTRACT OF THESIS

DEMAND ANALYSIS OF VIETNAMESE COFFEE IN THE U.S.

Coffee production in Vietnam has increased almost 100-fold within the past three decades, positioning it to become the second-largest coffee exporter in the world after Brazil. The U.S. is a top market for Vietnamese coffee. In this study, we estimate a conditional demand system of expenditure share equations for coffee from Vietnam, Brazil, Colombia, and an aggregate of seven other countries in the U.S. coffee market using the Linear Approximation Almost Ideal Demand System (LA/AIDS) and based on monthly time-series data from 2000 to 2020 with a total of 252 observations. Compensated and uncompensated own-price, cross-price, and expenditure elasticities were statistically significant at $p < 0.001$. Vietnamese coffee was found to be inelastic. The results suggest that increasing Vietnamese coffee prices could increase its revenue, while Brazilian and Colombian coffee exporters should be more careful in raising their coffee prices.

KEYWORDS: Vietnam, U.S., Coffee, Covid-19, Demand, LA/AIDS

Leo Kyaw Zin

April 15, 2022

DEMAND ANALYSIS OF VIETNAMESE COFFEE IN THE U.S.

By

Leo Kyaw Zin

Dr. Yuqing Zheng
Director of Thesis

Dr. Tyler Mark
Director of Graduate Studies

April 15, 2022

DEDICATION

Dedicated to my mother, son, and wife.

ACKNOWLEDGMENTS

I would like to express my sincere thanks to major professor Dr. Yuqing Zheng for his advice, support, and encouragement during my graduate studies. I also thank Dr. Tyler Mark for being an academic advisor during the past two years. I am also thankful for Dr. Steve Buck and Dr. Shuoli Zhao, who serve on my research committee and provided encouragement during the classes. Your advice and instructive comments have allowed me to complete my graduate program on schedule.

I extend my thanks to faculty members of the Department of Agricultural Economics, University of Kentucky, especially to Dr. Kusunose Yoko and Ms. Karen Pulliam, for their invaluable advice and technical assistance. My thanks also go to my friends, especially Laxmi, Solomon, Seh Meh, Sa Nicholus, Lanan, Ma Wuit Yi, Ma Myat, and Phyu, for their friendship, assistance, and encouragement. And I would like to express sincere gratitude to my sponsor, the IIE and USAID, for their financial and general support. The completion of this study would not have been possible without all of your support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

1.1 Coffee

Many researchers believe that coffee plants were first introduced into Asia, the Americas, and the Caribbean in the early 1800s by expanding European colonial powers (International Trade Centre, 2021). However, most coffee plantations today are located in South America, Southeast Asia, and Africa. Two main coffee varieties are currently produced and traded: Arabica and Robusta. Arabica has higher commercial value because it has a smoother, sweeter taste with less caffeine than Robusta, which is more caffeinated and has a harsher, more bitter flavor.

Arabica coffee can be grown anywhere with a tropical climate and an altitude of 600 meters or above, ideally between 1000-1500 meters, as higher altitudes, generally produce better crop quality. Arabica also thrives with annual rainfall between 1200-2000mm and a minimum temperature of 4°C to 5°C. The best temperature to cultivate Arabica ranges from 18°C to 25°C (Kuit et al, 2004). Robusta coffee, however, can be grown at a lower altitude of 600 meters to sea level. According to the International Coffee Organization (ICO), Robusta is grown successfully in Vietnam on hills and plains where the weather is hot, humid, and little direct sunlight, with temperatures ranging from 24°C to 26° (ICO, 2019). Although Arabica and Robusta thrive in slightly different climates and altitudes, both grow well in shaded areas.

Although coffee is grown in more than 50 countries, some, Brazil, Colombia, and Vietnam, occupy a more significant role in the world coffee market. Brazil has been the world's largest producer and exporter of coffee for the past 150 years, and it currently produces one-third of the world's coffee (Neilson & Pritchard, 2009). Vietnam follows as

the second-largest producer of coffee; its production has increased almost 100-fold, from 18,400 tons in 1986 to 1.76 million tons in 2016. A critical factor for Vietnam's growth in the global coffee market is its focus on Robusta, which is easier to grow but sells for a lower price than its more popular counterpart, Arabica (ICO, 2019).

As one of the most commonly traded agricultural commodities and beverages in the world, coffee plays a vital role in both global and domestic economies. It is grown by 20-25 million coffee producers on 12.5 million farms in more than 50 developing countries. Smallholder farms account for 67-80% of coffee producers, with the majority also located in developing countries (ICO, 2019). Furthermore, the coffee industry employs approximately 125 million people globally who rely on it for their livelihoods (International Trade Centre, 2021). According to 2019-20 ICO data (2020), estimated global coffee consumption has risen to 166.06 million 60kg bags, representing an increase of 0.5% compared to the previous 2018-19 year. This global consumption rate is shown in Figure 1.1.

1.2 Motivation

The first International Coffee Agreement (ICA) was signed in 1962 and counted the world's largest coffee producers and consumers among its signatories. This initial regulation set the price for coffee, with export quotas allocated to each producer. However, due to a number of political reasons, ICA failed to renew in 1989 (Ponte, 2002). The Vietnamese government took the collapse of the ICA as a chance to adopt market-oriented policies that provided Vietnamese coffee producers with the necessary conditions to compete freely and globally (Luong & Tauer, 2006).

Vietnam has since managed to increase its share of the international coffee market drastically. Vietnamese coffee is currently exported to around ninety countries. The U.S. is a top importer of Vietnamese coffee, second only to Germany. Vietnam exported around 12 percent of its total export volume to the U.S. in 2018 (ICO, 2019). This study analyzes how this small Southeast-Asian country claimed such a significant share of the U.S. coffee market. Since Vietnam has grown this share through its exportation of Robusta-type coffee, we also discuss whether Vietnam will see direct competition from other major exporting countries such as Brazil and Colombia. We hypothesize that Vietnamese coffee is not in direct competition with Brazilian and Colombian coffee.

Another factor we consider in our study is COVID-19. As our research was carried out during the COVID-19 global pandemic, we analyze its effects on the U.S. import demand for coffee. Finally, since coffee is one of the most traded agricultural commodities with increasing global demand, we speculate whether another Southeast Asian country, such as Myanmar, which also has a favorable climate in which to grow coffee, could join Vietnam as a major coffee supplier within the next 20 years.

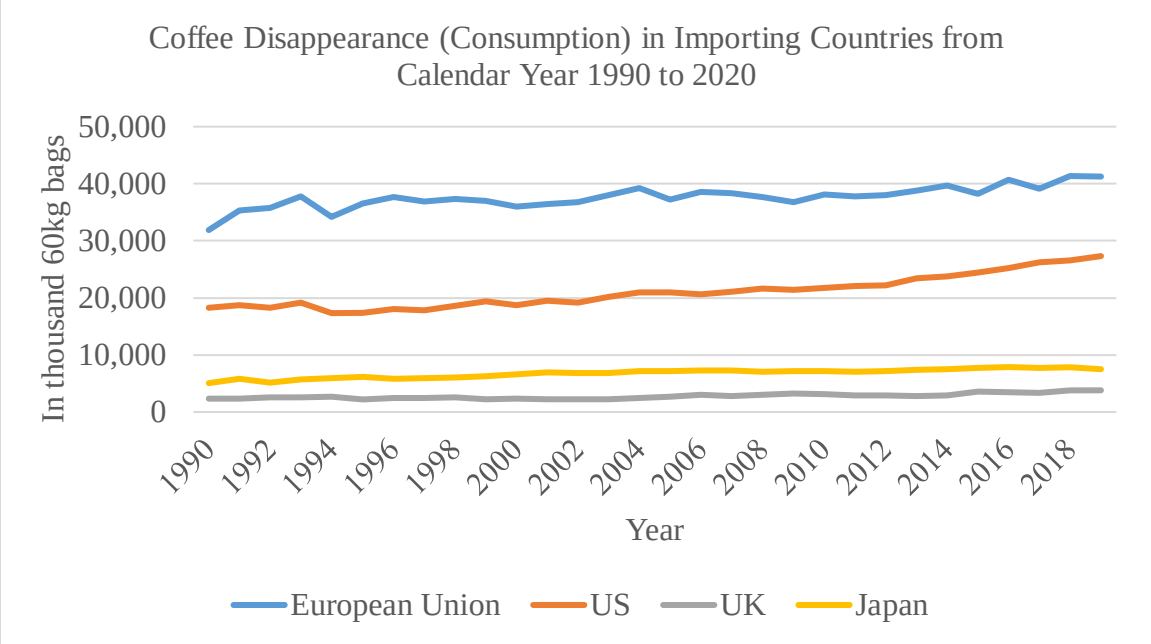


Figure 1.1 Coffee Disappearance (Consumption) in Importing Countries

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

1.3 Objectives and outlines

This study provides unique insight into how Vietnamese coffee competes with other large coffee-exporting countries such as Brazil, Colombia, and an aggregate of seven other important coffee countries (variable *Other-Seven-Countries*) by estimating the demand analysis of Vietnamese coffee in the U.S. coffee market. It also evaluates how the COVID-19 pandemic affects the demand for coffee.

This study focuses on three research questions:

1. What are the price elasticities of imported coffee in the U.S. market by country of origin?
2. What are the impacts of price fluctuations on the market share of Vietnamese coffee?
3. Has the COVID-19 pandemic impacted coffee demand in the U.S.?

The remainder of the paper is structured as follows: Chapter 2 provides background information on the coffee industry in Vietnam and coffee demand in the U.S, compared to

other countries. Chapter 3 reviews literature related to this study, mainly on the import demand analysis of coffee and other commodities in different countries. Chapter 4 describes the data collection and descriptive statistics. Chapter 5 presents the research methodology of the Almost Ideal Demand System (AIDS) model. Finally, Chapter 6 interprets the results from the AIDS model, and Chapter 7 concludes and suggests possible implications and limitations, followed by references.

CHAPTER 2. BACKGROUND

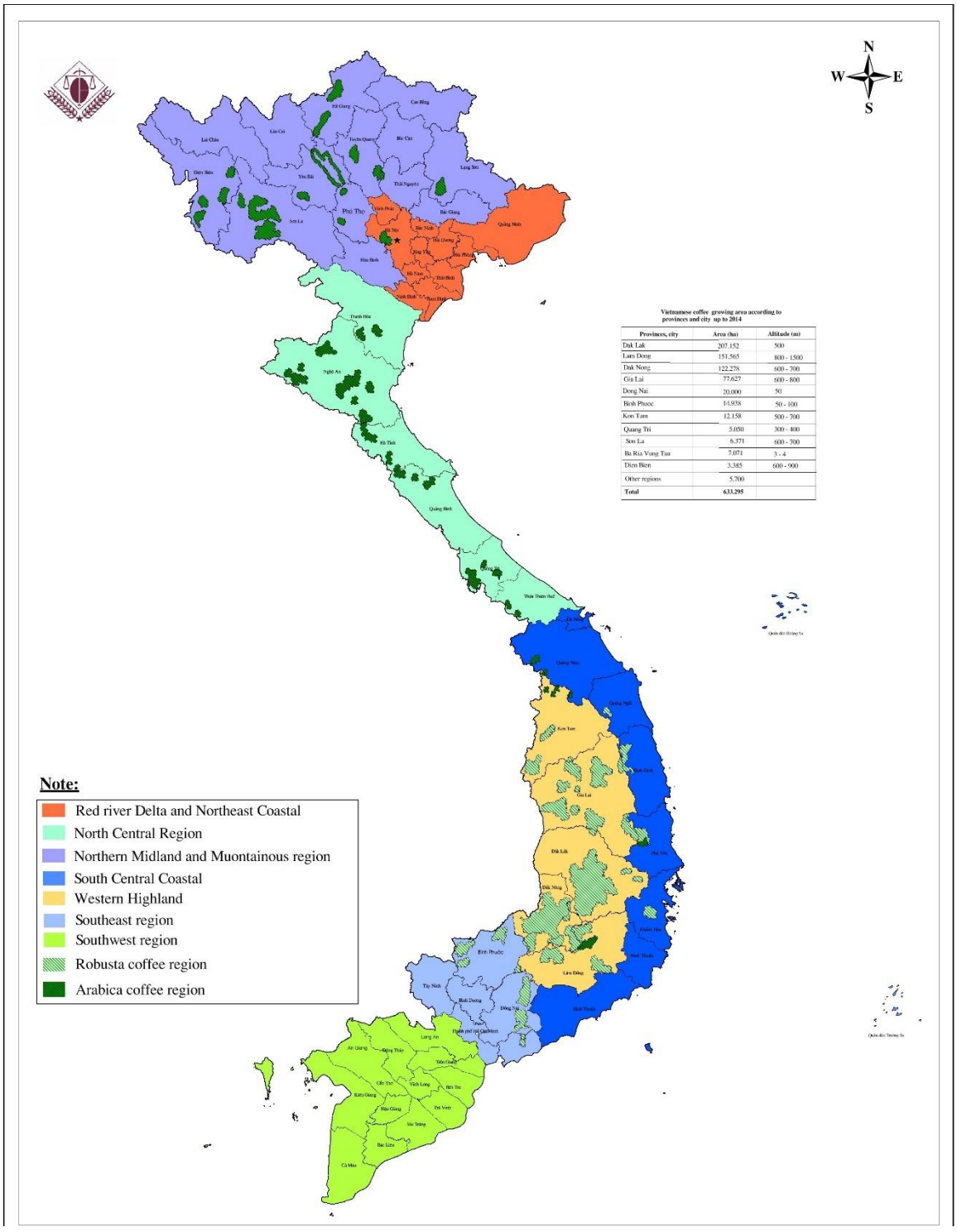
2.1 Vietnam's Coffee Industry

Vietnam is a Southeast-Asian country located on the Indochina Peninsula's eastern border. Its national borders touch China to the North, Laos to the northwest, and Cambodia to the west, with a 3260km coastline along the South China Sea to the south and east. Coffee, first introduced by the French in 1857, thrives in 'Vietnam's favorable tropical and subtropical climate and red basalt soil that is well-suited for coffee growing (ICO, 2019).

Since the end of the war in 1975 and the subsequent reunification of the Democratic Republic of Vietnam (in the North) and the Republic of Vietnam (in the South), the Vietnamese government has intensively focused on expanding coffee production. Although both Robusta and Arabica are being produced in Vietnam, Robusta accounts for 97% of the total output. In the mid-20th century, one hundred years after its initial introduction, coffee plantations occupied only 30,000 hectares. However, with the 'government's intensive support, coffee farming has increased to more than 600,000 hectares, and its production has grown a hundred-fold, from 18,400 tons in 1986 to 1.76 million tons in 2016 (ICO, 2019).

After years of research conducted in collaboration with the Western Highlands Agriculture and Forestry Science Institute (WASI) and other seedling research institutes, Vietnam has produced a new strain of Robusta that is more resistant to pests and diseases and demonstrates increased adaptability to and healthy growth rates in Vietnam's soil and climate. At the same time, only 3 percent of Vietnam's total coffee production is Arabica, which requires higher altitudes, is more susceptible to pests and diseases, and produces less per hectare. As a result of this prioritization of specialized Robusta, Vietnamese coffee

production is higher than any other country globally, with an average output of 2.3 tons per hectare. Many Vietnamese coffee growers harvest over 3.5 tons per hectare (ICO, 2019). The coffee-growing regions of Vietnam are illustrated in Figure 2.1.



Provinces, city	Area (ha)	Altitude (m)
Dak Lak	207.152	500
Lam Dong	151.565	800 - 1500
Dak Nong	122.278	600 - 700
Gia Lai	77.627	600 - 800
Dong Nai	20.000	50
Binh Phuoc	14.938	50 - 100
Kon Tum	12.158	500 - 700
Quang Tri	5.050	300 - 400
Son La	6.371	600 - 700
Ba Ria Vung Tau	7.071	3 - 4
Dien Bien	3.385	600 - 900
Other regions	5.700	
Total	**633.295**	

Figure 2.1 Map of Coffee Production in Vietnam in 2014

Source: ICO, 2019

According to the (ICO, 2019), the average annual growth rate of coffee exports from Vietnam between 2011 and 2017 was 8.2 percent, with a turnover of over 3 billion U.S. dollars per year and accounting for more than 10 percent of the country's total agricultural exports. Figure 2.2 shows Vietnamese coffee production from 2016 to 2021. Since most of Vietnam's coffee is exported as green beans for low prices, the Vietnamese government implemented a policy to increase investments in value-enhancing processing, such as roasted and soluble coffee, with the goal of an additional 6 billion U.S. dollars by the late 2020s.

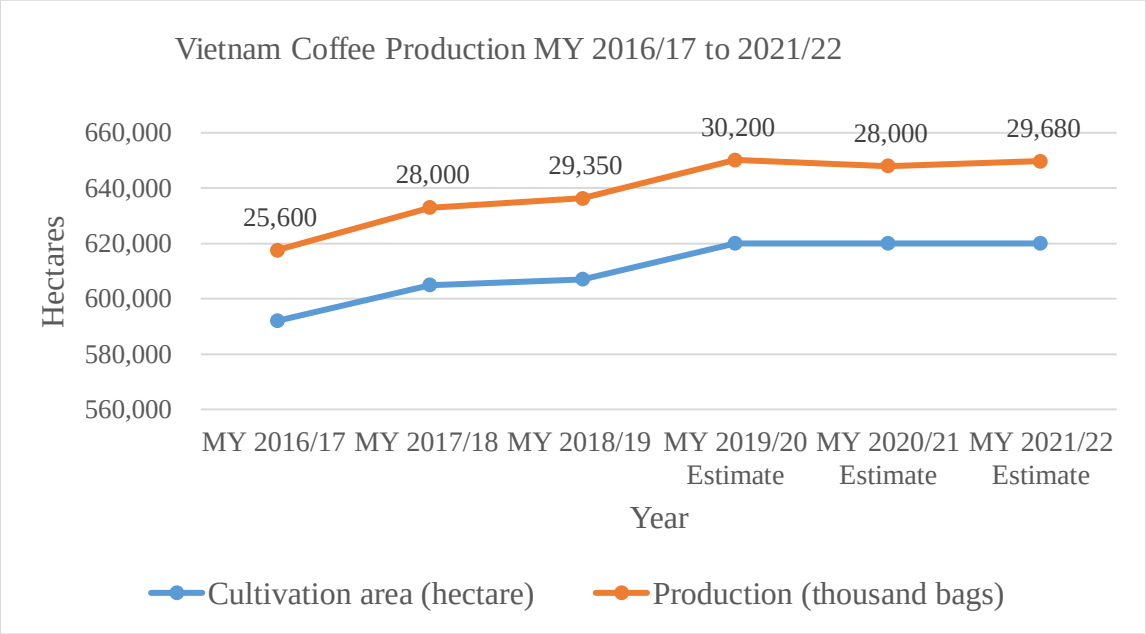


Figure 2.2 Vietnamese Coffee Production

Source: USDA – Vietnam Coffee Annual Report from 2018 to 2021

As shown in Figure 2.3, Vietnam's coffee exports skyrocketed after the ICA failed to renew. Thanks to intensive monoculture planting of coffee and strong government support, Vietnam exceeded Colombian coffee production levels and became the second-largest coffee-producing and -exporting country by the late 1990s. However, Vietnamese coffee exports fell noticeably between 2018 and 2020 due to a number of factors, including

lower rainfall, high temperature, strong competition from Brazilian Conilon (a type of Robusta), and the effects of COVID-19, which disrupted global trade logistics and demand.

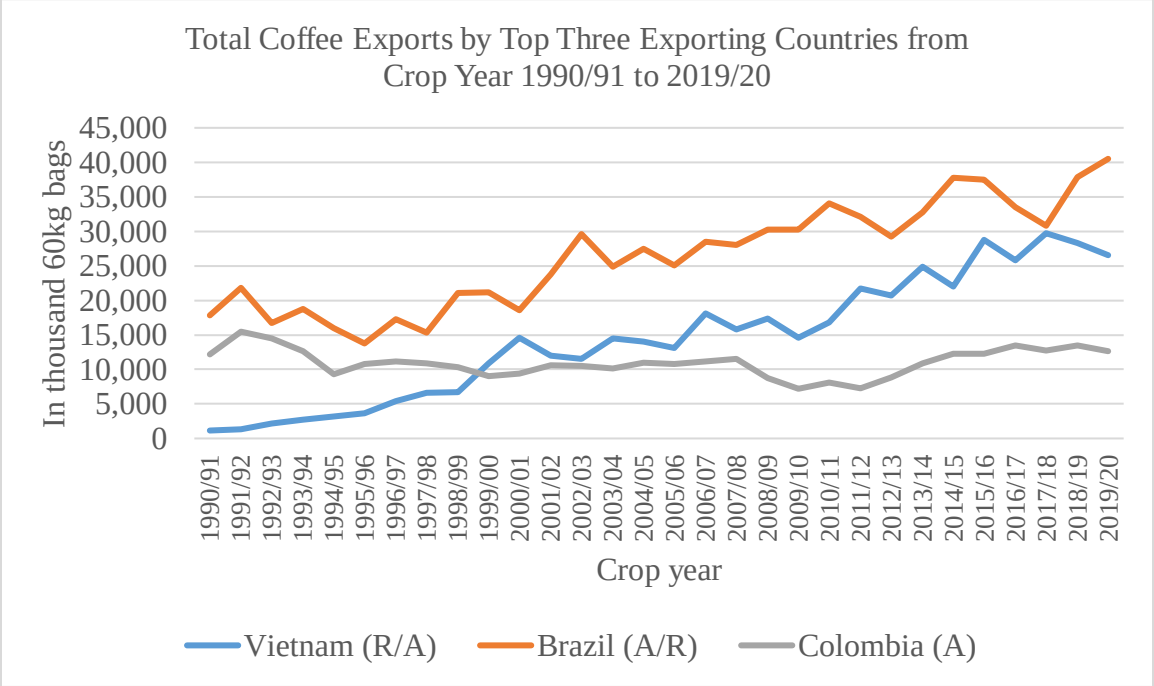


Figure 2.3 Coffee Exports by Top Three Exporting Countries (1990 to 2020)

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

2.2 Coffee Demand in the U.S.

The United States stands as the second-largest importer of coffee with 25 million 60kg bags imported in 2021. Top suppliers include Brazil (30 percent), Colombia (21 percent), Vietnam (11 percent), and Nicaragua (5 percent). Figure 2.4 shows a detailed breakdown of U.S. coffee suppliers (USDA, 2021). The U.S. is a major coffee importer, but it is also a major consumer of global coffee, second only to the European Union. The U.S. and the European Union combined consume more than half of the world's coffee.

According to the National Coffee Association (NCA, 2020), overall coffee consumption in the U.S. has increased by 5 percent since 2015. The average American

coffee drinker consumes more than three cups each day, and seven out of ten Americans drink coffee at least once a week, with 62 percent doing so daily. In addition, there are more than 60,000 coffee and snack shops, which is an increase of 2.4 percent in the U.S. between 2017 and 2022 (IBISWorld, 2021). Starbucks, the world's most recognized coffeehouse chain, saw a steady increase in its number of locations in the last decade and had, in 2021, 8,947 company-operated and 6,497 licensed stores in the U.S. (Statista, 2021). According to Statista's market prediction, the U.S. coffee market is expected to have a Compound Annual Growth Rate of 4.34 percent annually from 2022 to 2025 (Statista, n.d.).

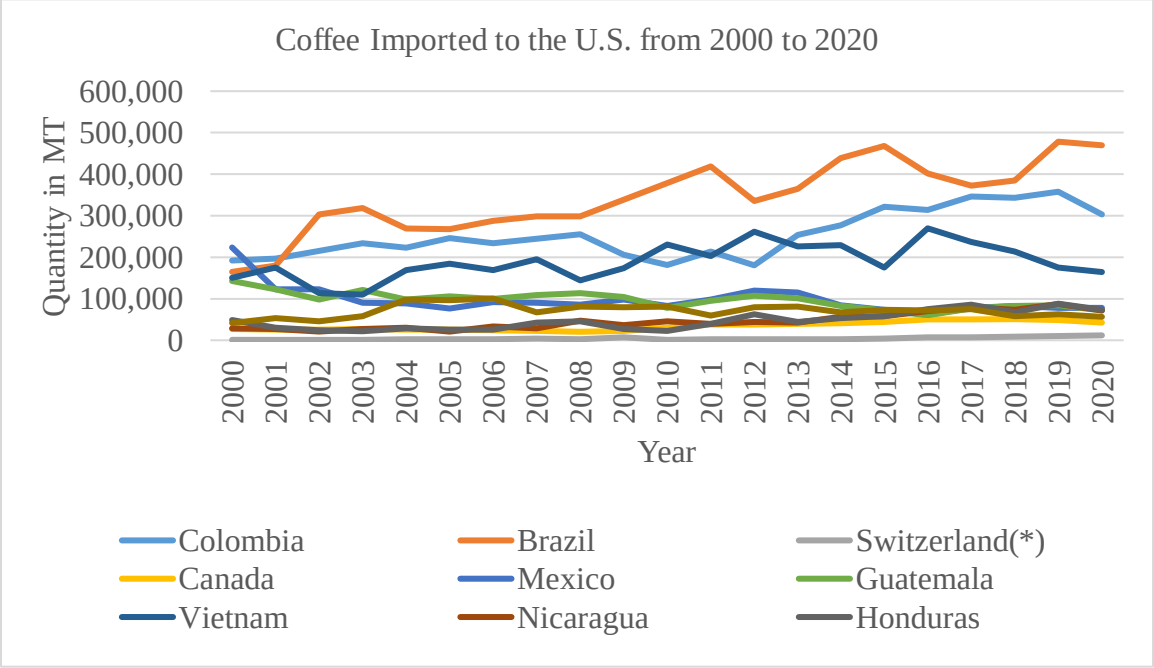


Figure 2.4 Coffee Imported to the U.S.

Source: U.S. Census Bureau Trade Data, FAS, USD

CHAPTER 3. LITERATURE REVIEW

3.1 Coffee Demand

A number of research studies have applied the demand system to analyze coffee demand. (Goddard & Akiyama, 1988) studied U.S. demand for coffee imports by using the AIDS model. In their study, coffee imported to the U.S. was grouped by source and by coffee type, such as Arabica-Other Mild, Arabica-Colombian Mild, Arabica-Unwashed, Robusta, and Robusta (Indonesia). In addition, Houston, Santillan and Marlowe (2003) studied U.S. consumption of three categories of Arabica coffee: Colombian mild, Mexican and other milds, and Brazilian. Moreover, Abaelu & Manderscheid (1968) examined U.S. import demand for green coffee by variety using a nine-equation model. Alsaad et al. (2021) also used the AIDS model to conduct a case study on demand for organic green coffee by using data from 1994 to 2016 to analyze the international market for organic coffee beans and how consumption trends influenced the regular non-organic green coffee market. According to their data, Vietnam had the least import market share compared to Brazil, Colombia, Guatemala, and Mexico coffee imported to the U.S., which contradicted the updated USDA data (2021). Therefore, we are conducting a demand analysis of Vietnamese coffee in the U.S. using the latest data from the USDA.

Gebrehiwot & Daloonpate (2012) found Ethiopian coffee demand to be elastic (-1.051) and determined by its price, the price of substitutes, the contamination dummy variable, and total expenditure in the Japanese market. However, Goddard & Akiyama (1988) studied the demand for coffee imports in the U.S. and found that U.S. coffee demand is price inelastic. Their study grouped five countries' coffee imports into five categories to determine price, expenditure, and substitution elasticities. In their research, Yohannes et

al. (2016) found that elasticity estimates indicate that coffee shops are luxury goods while whole beans, ground coffee, and canned/bottled coffee are necessity goods in Japanese households. The uncompensated own-price elasticities show that coffee shops are own-price elastic, whereas whole beans, ground coffee, and canned/bottled coffee are own-price inelastic.

In contrast, Gebrehiwot & Daloonpate (2012) focus on the import demand analysis of Ethiopian coffee and its major competitors, Brazil, and Colombia, with the remaining 19 countries grouped together into one category, "other." According to the findings, Japanese consumers are more price responsive to Ethiopian coffee than coffee from Brazil or Colombia. Ethiopian coffee complements Brazilian and Colombian coffee due to negative cross-price elasticities of demand for Ethiopian coffee among its main competitors. Because three major nations behave as substitute goods rather than complements, and their cross-price elasticities have a larger positive sign (0.822), all expenditure elasticities imply that coffee imported into Japan is a normal good.

According to Houston et al. (2003) study, U.S. demand for Mexican coffee is responsive to its own price, Colombian coffee prices, and the ICA. Colombian coffee seems to be quite competitive (0.576), with price inelastic demand (-0.773) and income elastic demand (1.401). In contrast, demand for Mexican coffee in the U.S., which uses Brazilian coffee as a close substitute, is affected by its own price, income, ICA, Brazilian coffee prices, and habit formation.

3.2 Impact of COVID-19 on Coffee and Other Foods

The spread of COVID-19 (Novel Coronavirus) emerged as a global public health epidemic within just a few weeks, ultimately affecting more than 180 countries and regions

(ICO, 2020). The crisis has created a supply and demand shock that has impacted global trade flows and production chains. The spread of COVID-19 creates a significant challenge to the global coffee sector, which was already experiencing a prolonged period of low producer prices. According to the ICO (2020) a one-percentage-point drop in GDP growth is related with an 0.95-percentage-point decline in worldwide coffee demand, equivalent to 1.6 million 60-kg bags.

According to Schnepf & Monke (2020), international markets for some major food items, such as rice and wheat, have been disrupted by threats or by the imposition of protectionist policies on staple food exports in certain important producers countries, such as Russia, Kazakhstan, and Vietnam. As a result of the COVID-19 epidemic, 80 countries and customs territories have implemented export prohibitions or limitations World Trade Organization (WTO, 2020). The U.S., China, the European Union, and other WTO members representing over 60% of global agricultural exports have promised not to impose limitations on the free movement of food out of their countries.

Srivastava & Sivaramane (2020) argued that the COVID-19 epidemic has negatively impacted most household incomes, and it is projected to cause economic disequilibrium by downwards shifting demand curves for food non-food items. Furthermore, their projected expenditure elasticities revealed that changes in income would affect consumption differently depending on the commodity and that non-food expenses will change disproportionately.

3.3 Existing Literature on Coffee Demand

There is some existing research analyzing coffee demand. A summary of this literature on the own-price elasticities of coffee is provided in Table 3.1. Goddard &

Akiyama (1988) studied U.S. demand for coffee imports from 53 different countries grouped into five separate categories based on the types of coffee produced. They applied a two-stage estimation problem using annual data from 1962 to 1984. The first stage calculated total expenditure on coffee, and the second stage used the AIDS demand system. They found that the own-price elasticity of Arabica-Colombian Mild was -1.310, and the expenditure elasticity was 0.980. The own-price elasticity of Arabica-Unwashed was -2.04, and the expenditure elasticity was 1.480. Houston et al. (2003) evaluated U.S. demand for mild coffees, especially from Mexico, and estimated the own-price elasticity of Brazilian Milds to be -0.510 and the own-price elasticity of Colombian Milds to be -0.869. With a cross-price elasticity of 1.119, Colombian coffee appeared competitive with Brazilian coffee imports.

In addition, Gebrehiwot & Daloonpate (2012) analyzed the demand for Ethiopian coffee in Japan with quarterly time series data from 1988 to 2009 using the LA/AIDS model. They found that the own-price elasticity of Colombian coffee was -0.940 and of Brazilian coffee was -0.910. Based on the results of cross-price elasticities, they concluded that Brazilian and Colombian coffees are complementary goods. However, Alamo & Malaga (2012) conducted research on coffee demand analysis at the retail level in the U.S. market using scanner data of weekly coffee sales from 2001 to 2006. They applied the AIDS model and categorized coffee into differentiated coffee, regular coffee, and unclassified coffee. The uncompensated own-price elasticities of unclassified coffee and regular coffee were -1.850 and -0.901. However, they concluded that compensated cross-price elasticities of regular coffee and differentiated coffee were complementary and that regular coffee and unclassified coffee were substitutes. Finally, a recent study by Alsaad

et al. (2021) analyzed the demand for organic green coffee using the LA/AIDS model and monthly data from March 1994 to December 2016. Their research addressed the U.S. demand for organic and non-organic green coffee beans. They ran two demand systems separately: export countries classified as Colombia, Brazil, Mexico, Guatemala, Vietnam, and the rest of the world were included in the first system; Arabica non-organic (ARNO), non-Arabica non-organic (NARNO), and organic Arabica with organic non-Arabica (ORGCOF) were determined in the second system. The uncompensated own-price elasticities of Vietnam and Brazil were -8.875 and -0.074, respectively, and both were statistically significant. However, the expenditure elasticity of Vietnam was negative (-7.275), which they concluded was because it represented the lowest share among total imported shares.

Table 3. 1 Summary of Previous Studies on the Demand for Coffee

Authors	Coffee	Data period	Own-price elasticity
Goddard and Akiyama (1989)	Arabica-Colombia Mild	1962 to 1984	-1.310
	Arabica-Unwashed		-2.040
Houston et al (2003)	Brazil Mild		-0.510
	Colombia Mild		-0.869
Gebrehiwot and Daloonpate (2012)	Colombia	1988 to 2009	-0.940
	Brazil		-0.910
Alamo and Malaga (2012)	Unclassified	2001 to 2006	-1.850
	Regular		-0.901
A. Alsaad et al (2021)	Vietnam	1994:03 to 2016:12	-8.875
	Brazil		-1.619

3.4 Conceptual Framework

This study aims to determine the demand elasticities of imported coffee by source of origin and the impact of the COVID-19 pandemic on demand for Vietnamese coffee in the U.S. coffee market. Deaton & Muellbauer (1980) proposed the AIDS model, which has been widely employed in demand analyses. The AIDS model was later modified and renamed the Linear Approximate Almost Ideal Demand System (LA/AIDS) due to its non-linearity.

Nzaku et al. (2012) applied the AIDS model for fresh tropical fruit imports to the U.S., including bananas, pineapples, avocadoes, papayas, mangoes/guavas, grapes, and other fruits. It is common to see empirical models such as the Armington model (Armington, 1969) and the AIDS model (Deaton & Muellbauer, 1980) thusly applied to analyses of consumer import demands. The AIDS model is particularly applicable since

importing fresh fruits and vegetables is easier to forecast as import demand. Additionally, own-price, cross-price and expenditure elasticity have been employed in many other studies (Asche et al., 1998; Gebrehiwot & Daloonpate, 2012; Lee et al., n.d.; Seale et al., 2003; Wan et al., 2010; Zheng & Kaiser, 2008).

Although similar studies (see Alsaad et al., 2021; Goddard & Akiyama, 1989; Gebrehiwot & Daloonpate, 2012; Houston et al., 2003) have used the AIDS and other models**,** we assume that the present study is the first to apply the demand system approach to Vietnamese coffee as compared to Brazilian and Colombian coffee, the two primary exporting countries to the U.S. coffee market during the pandemic. With the assumption that COVID-19 impacted coffee imports, and including this variable as a potentially significant factor, we investigate Vietnamese coffee in the demand analysis of the current U.S. coffee market using the LA/AIDS model.

CHAPTER 4. DATA

4.1 Data Collection

Our panel data are derived from the United States Department of Agriculture's (USDA) Foreign Agricultural Service's Global Agricultural Trade System (GATS), which compiles 21 years of monthly time series data from 2000 to 2020, totaling 252 observations. The collected data are from three major countries–Vietnam, Brazil, and Colombia–and from an aggregate of Seven-Other-Countries: Canada, Guatemala, Honduras, Indonesia, Mexico, Nicaragua, and Switzerland (variable Seven-Other-Countries).

The price is per metric ton in U.S. dollars. The total expenditure in the demand system was calculated using the total value of coffee imported into the U.S. coffee market. Monthly expenditures were estimated using quantities and prices, and the total expenditure was computed by adding the expenditures of each of the three primary countries plus the Other-Seven-Countries. COVID-19 is a dummy variable that can be interpreted as 0 on or before March 11, 2020–when the World Health Organization (WHO, 2020) proclaimed COVID-19 a global pandemic– and as 1 after this date.

4.2 Descriptive Statistics

The descriptive statistics for this dataset provide useful information about the U.S. import demand for coffee from Vietnam, Brazil, Colombia, and the Other-Seven-Countries. Table 1.2 summarizes descriptive statistics for U.S. coffee market share, price, and expenditure. The monthly import demand of coffee in metric ton (M.T.) per U.S. dollar is used to construct the variables of import shares, import prices, total expenditures, and

the aggregate price index for the AIDS model. The aggregate mean of U.S. demand for coffee from the top 10 countries was 70,349.07 MT. Although the metric tonnage of Colombian export coffee is less than that of Brazil, 'Colombia's mean market share is higher than Brazil's with an expenditure share of 36 percent. Colombia's average price of 3484.35 USD per ton is also 27.5 percent higher than Brazil's. Vietnam follows Colombia and Brazil in coffee exports with a lower average budget share of 12 percent and a lower average price of 1566.78 USD per ton. The Other-Seven-Countries' aggregated budget share was only 17 percent. Detailed information on monthly coffee import quantity and value is illustrated in Figures 1.5 and 1.6.

Table 4. 1 Descriptive statistics of coffee in the U.S market

Variable	Definition	Mean	Minimum	Maximum	s.d.
p1	Price of Vietnamese coffee $/ton	1,566.78	373.38	2,658.88	663.07
p2	Price of Brazilian coffee $/ton	2,527.11	663.56	5,686.50	1,029.08
p3	Price of Colombian coffee $/ton	3,484.35	1413.04	7,571.86	1,360.18
p4	Price of Other-Seven-Countries coffee $/ton	6,741.56	2174.72	12,755.44	2,411.34
q1	Quantity of Vietnamese coffee in MT	15,728.31	4803.10	29,993.60	5,353.52
q2	Quantity of Brazilian coffee in MT	28,728.91	6420.50	51,870.60	9,385.06
q3	Quantity of Colombian coffee in MT	21,177.09	8749.50	39,646.60	6,225.23
q4	Quantity of Other-Seven-Countries coffee in Mt	4,714.77	2174.93	9,813.23	1,519.73
w1	Budget share of Vietnamese coffee in the U.S. market	0.12	0.04	0.24	0.04
w2	Budget share of Brazilian coffee in the U.S. market	0.35	0.16	0.57	0.08
w3	Budget share of Colombian coffee in the U.S. market	0.36	0.21	0.52	0.06
w4	Budget share of Other-Seven-Countries in the U.S. market	0.17	0.06	0.39	0.07
COVID-19	Dummy variable based on WHO announcement of COVID-19 as a global pandemic	0.04	0.00	1.00	0.19

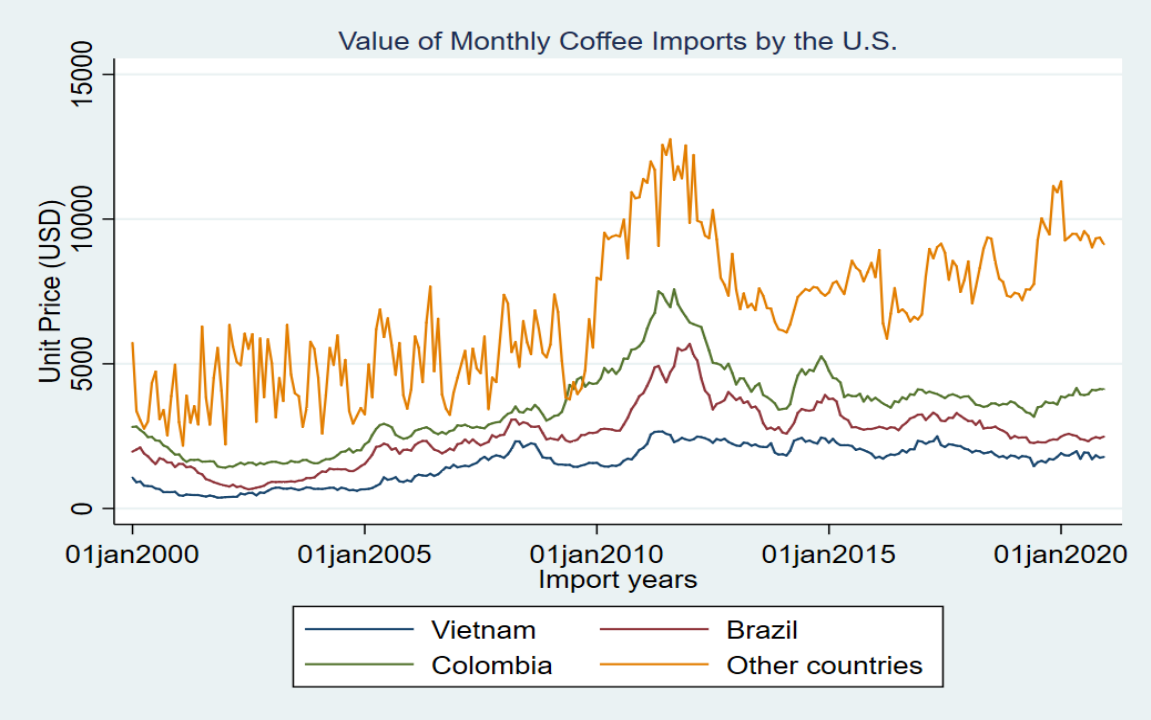


Figure 4.1 Value of Monthly Coffee Imports by the U.S. (USD)

Source: USDA from Import Years January 2000 to December 2020

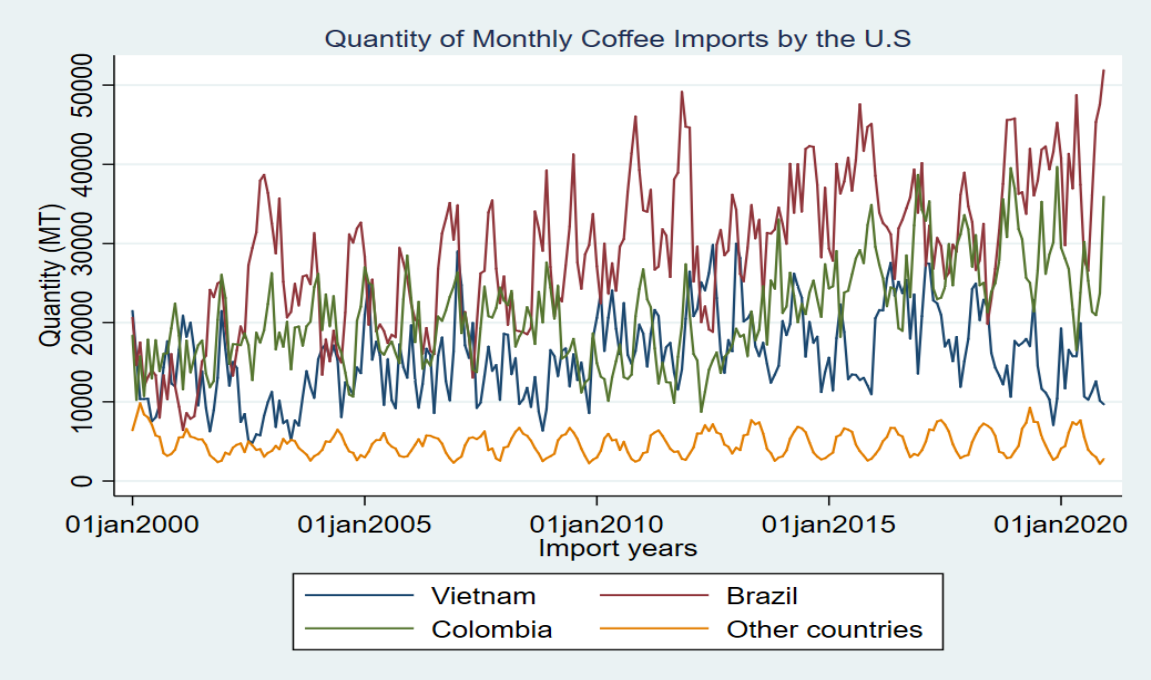


Figure 4.2 Quantity of Monthly Coffee Imports by the U.S. (Metric Ton)

Source: USDA from Import Years January 2000 to December 2020

CHAPTER 5. METHODOLOGY

The Almost Ideal Demand System (AIDS), developed by Deaton & Muellbauer, (1980), is used to calculate the demand equations in this study. The AIDS model was chosen for several reasons: it gives an arbitrary first-order approximation to any demand system; it satisfies the axioms of choice exactly; it is consistent with consumer theory, so theoretical properties of homogeneity and symmetry can be tested and imposed through linear restrictions on the parameters, and it simplifies estimation.

The fundamental AIDS model is based on a specific cost (expenditure) function from the Price-Independent, Generalized-Logarithmic (PIGLOG) cost function class. The AIDS model applies Shephard's Lemma through an expenditure function, in which a product category's expenditure is a function of price. The linked product expenditure can be proven with Equation 1,

$$w_{it} = \alpha_i + \Sigma_{j=1}^{n}\gamma_{ij}\ln P_{it} + \beta_i(\ln X_t - \ln P_t) + \lambda \ln COVID\_19_t + \sigma_m + \sigma_y + \varepsilon_{it}\ , \qquad (1)$$

where i = (1,2,3,4) represents the three major coffee export countries of Vietnam, Brazil, and Colombia, with the Other-Seven-Countries aggregated into 4. The current study examines the import demand for Vietnamese coffee compared to that of its major competitors, Brazil and Colombia. w_i denotes the coffee expenditure share of country i in the U.S. coffee market. t indexes time in months. Pj denotes the price of coffee from each of the four sources. The parameters α_i, γ_{ij}, β_i, and λ must be estimated. X is the total cost of coffee imports into the U.S. during each period, and ln P is the translog price index. COVID-19 is a dummy variable that refers to the WHO (2020) announcement of COVID-19 as a global pandemic on March 11, 2020. Before and on that date is referred to as

COVID-before = 0, and after is referred to as COVID-after = 1. σ_m, month and σ_y, year are fixed effects and ε_{it} is the error term for country *i* in year *t*.

P is a price index defined by:

$$\ln P = \alpha_0 + \Sigma_{i=1}^{4} lnP_i + \frac{1}{2} \Sigma_{i=1}^{4}\Sigma_{j=1}^{4}\gamma_{ij} \ln P_i \ln P_j \ . \quad (2)$$

Because the translog price index is nonlinear, Deaton and Muellbauer (1980) proposed replacing an approximately specified price index that can be defined outside of the AIDS system for the nonlinear AIDS price index in Equation 2, resulting in a purely linear system of share equations. They recommend Stone's share-weighted geometric mean price index, which is as follows:

$$ln\ P^* = \Sigma_{i=1}^{4}\ w_i lnP_i \quad (3)$$

$w_i = \frac{p_i q_i}{X}$, i = 1,…,n and P ,

where w_i = ($p_i q_i$/X) is the budget share of good *i*'s country, X = $\sum_i p_i\ q_i$ is a nominal expenditure, p_i is the price of good *i*, q_i is the quantity of good *i*, and *n* is the number of goods. The following equation became known as the "Linear-Approximate" AIDS model (LA/AIDS), on which Equation 4 is based:

$$w_{it} = \alpha_i + \Sigma_{j=1}^{4}\gamma_{ij}\ln P_{it} + \beta_i(\ln X_t - \ln P^*_t) + \lambda \ln COVID\_19_t + \sigma_m + \sigma_y + \varepsilon_{it} \quad (4)$$

The LA/AIDS model was estimated with imposed adding up, homogeneity, and symmetry restrictions. One equation was dropped from the system to avoid the singularity error of a covariance matrix. The following conditions must be met to be consistent with consumer demand theory:

Adding up: $\Sigma_{i=1}^{4}\alpha_i = 1, \Sigma_{i=1}^{4}\beta_i = 0 \; and \; \Sigma_{i=1}^{4}\gamma_{ij} = 0$ (5)

Homogeneity: $\Sigma_{j=1}^{4}\gamma_{ij} = 0 \quad \forall_i$ (6)

Symmetry: $\gamma_{ij} = \gamma_{ji} \quad \forall \quad i \neq j$ (7)

Based on the results from Table 1.2, we calculated the expenditure, own-price, and cross-price elasticities as follow:

Expenditure elasticities: $E_i = 1 + \beta_i / w_i$ (8)

Compensated Own-Price elasticities: $E_{ii} = -1 + \gamma_{ii} / w_i + w_i$ (9)

Compensated Cross-Price elasticities: $E_{ij} = \gamma_{ij} / w_i + w_j$ (10)

Uncompensated Own-Price elasticities: $E_{ii} = -1 + \gamma_{ii} / w_i - \beta_i$ (11)

Uncompensated Cross-Price elasticities: $E_{ij} = \gamma_{ij} / w_i - \beta_j$ (12)

where E_i, E_{ii}, and E_{ij} represent expenditure, compensated own and cross-price elasticities, and uncompensated own-price elasticities, respectively. Our model in this study is a conditional demand system and these equations are adapted from the Gebrehiwot & Daloonpate (2012) and Zheng & Kaiser (2008) studies.

CHAPTER 6. RESULTS

6.1 Parameter Estimates

We estimated our model using the Linear Approximation Almost Ideal Demand System (LA/AIDS) and the aidsills command, as developed by Blundell & Robin (1999), on Stata 15.0 software. The estimated parameters from the LA/AIDS model are reported in 6.1. The coefficient values for own-price of Vietnam and Other-Seven-Countries were statistically significant at the 10 percent and 1 percent levels, respectively. On the other hand, five out of twenty-five cross-price coefficients were statistically significant at least p value < 0.05. The dummy variable of COVID-19 was not statistically significant.

Table 6. 1 Parameter Estimate from the LA/AIDS Model

	Price Coefficients				
	p1	p2	p3	p4	Covid_19
Vietnam (1)	0.040* (0.019)	-0.003 (.024)	-0.025 (0.026)	-0.012 (0.009)	0.007 (0.017)
Brazil (2)	-0.003 (0.029)	-0.045 (0.037)	0.087* (0.041)	-0.039** (0.014)	0.001 (0.025)
Colombian (3)	-0.025 (0.030)	0.087* (0.039)	-0.015 (0.042)	-0.047** (0.014)	0.003 (0.027)
Other-Seven-Countries (4)	-0.012 (0.017)	-0.039 (0.022)	-0.047* (0.024)	0.098*** (0.009)	-0.011 (0.014)

* p<0.05, ** p<0.01, *** p<0.001. Standard errors are in parentheses.

6.2 Uncompensated Own-Price and Cross-Price Elasticities

Estimated results for uncompensated own-price, uncompensated cross-price, and expenditure elasticities are presented in Table 6.2. The diagonal entries represent the own-price elasticities corresponding to changes in import quantities produced by a change in the

price of the same commodity, whereas the non-diagonal values reflect the cross-price elasticities. Our results align with the law of demand, which states that the own-price elasticity of demand is always negative. The compensated and uncompensated price elasticities display the theoretically expected negative sign.

The uncompensated own-price elasticities indicate that Brazilian coffee was above unitary elasticity (-1.207) at a value greater than 1, while Colombian coffee was close to unitary elasticity (-1.023). The uncompensated own-price elasticities for Vietnam (-0.649) and the Other-Seven-Countries (-0.272) were inelastic but significant at $p<0.001$. Therefore, a 1 percent increase in the price of Vietnamese coffee will decrease its demand by 0.649 percent, holding other demand factors constant. Likewise, a 1 percent increase in the price of Other-Seven-Countries' coffee will decrease their demand for coffee by 0.272 percent, holding other demand factors constant. This finding contradicts Alsaad et al. (2021), who found that the uncompensated own-price elasticity of Vietnamese coffee was elastic (-8.875). Therefore, their results implied that U.S. consumers are more responsive to Brazilian and Colombian coffee than to Vietnamese and Other-Seven-Countries coffee.

The uncompensated cross-price elasticity of demand for Brazilian and Other-Seven-Countries coffee had negative value in our study, implying that Brazilian coffee behaves as a complement to Other-Seven-Countries coffee. If the price of Other-Seven-Countries coffee increases by 1 percent, then the quantity demand for Brazilian coffee will decrease by 0.206 percent. The very small value of -0.206 indicates a weak complement relationship. Colombia and Other-Seven-Countries are also weak complements with a very small value (-0.119). However, the uncompensated cross-price elasticities of demand for Colombian coffee on the price of Brazilian coffee is 0.251. This means that if the price of

Brazilian coffee increases by 1 percent, then demand Colombian coffee increases by 0.251 percent, holding other demand factors constant.

Table 6. 2 Uncompensated Own-Price, Cross-Price, and Expenditure Elasticities

	P1	P2	P3	P4	Expenditure Elasticity
Vietnam (1)	**- 0.649*** **	0.003	-0.161	-0.063	0.870***
	(0.161)	(0.200)	(0.225)	(0.072)	(0.137)
Brazil (2)	- 0.057	**-1.207*** **	0.114	-0.206***	1.356***
	(0.086)	**(0.106)**	(0.120)	(0.039)	(0.072)
Colombia (3)	- 0.063	0.251*	**-1.023*** **	-0.119**	0.954***
	(0.086)	(0.107)	**(0.120)**	(0.038)	(0.073)
Other-Seven-Countries (4)	0.005	-0.110	-0.072	**-0.272*** **	0.449***
	(0.108)	(0.134)	(0.151)	**(0.049)**	(0.093)

* p<0.05, ** p<0.01, *** p<0.001. Standard errors are in parentheses.

6.3 Expenditure Elasticities

According to the theory, the positive signs of all expenditure elasticities were consistent with what was expected. The expenditure elasticities show that only the Brazilian coffee was expenditure elastic (1.356), implying that Brazilian coffee is a luxury good. However, Colombian coffee was slightly expenditure inelastic (0.954), closely followed by Vietnamese coffee (0.870). These results echo those of Gebrehiwot & Daloonpate (2012), who found that the expenditure elasticity of demand for Colombian coffee was inelastic (0.877), indicating that coffee from Colombia is a necessary good in the Japanese market.

The expenditure elasticities of demand for Vietnamese, Colombian, and Other-Seven-Countries coffee were inelastic, indicating that coffees from those countries are

necessary goods in the U.S. market. The results from estimating expenditure indicated that, in general, Brazilian coffee is more of a luxury good than Vietnamese, Colombian, or Other-Seven-Countries coffee in the U.S. market. If U.S. coffee import expenditures increase by 1 percent, Brazilian coffee will increase by 1.356 percent. In contrast, demand for Vietnamese, Colombian, and Other-Seven-Countries coffee will increase by less than 1 percent.

6.4 Compensated Own-Price and Cross-Price Elasticities

The compensated own and cross-price elasticities are presented in Table 6.3. The compensated own-price elasticities are below 1, with Vietnam at -0.545, Brazil at -0.732, Colombia at -0.678, and Other-Seven-Countries at -0.196, indicating that all import coffee is price inelastic. Vietnamese, Brazilian, Colombian, and Other-Seven-Countries coffee also appear to be responsive to changes in their own prices because they are all statistically significant. The magnitude of elasticities for the top three countries differed slightly.

The compensated cross-price elasticity of Brazilian coffee on the price of Colombian coffee was positive, showing that Colombian coffee acts as a substitute for Brazilian coffee. Furthermore, the estimate revealed that U.S. customers regard Colombian coffee as a substitute, implying that an increase in the price of Brazilian coffee will drive U.S. consumers to purchase more Colombian coffee, provided all other coffees remain equal. This means that a 1 percent increase in the price of Colombian coffee increases demand for Brazilian coffee by 0.605 percent. This result is in line with the analysis by Houston et al. (2003), as Colombian coffee appears to be competitive to imports of Brazilian coffee with a cross-price elasticity of 1.119.

Likewise, the cross-price elasticities of compensated demand for Colombian coffee on the prices of Brazilian coffee were positive, showing that Brazilian coffee acts as a substitute for Colombian coffee. In other words, a 1 percent increase in the price of Brazilian coffee increases the demand for Colombian coffee by 0.585 percent. However, our study does not find any complementing relationship among coffee of different country origins.

Table 6. 3 Compensated Own-Price and Cross-Price Elasticities

	p1	p2	p3	p4
Vietnam (1)	**-0.545*** **	0.307	0.154	0.083
	(0.158)	(0.201)	(0.219)	(0.070)
Brazil (2)	0.105	**-0.732*** **	0.605***	0.023
	(0.084)	**(0.107)**	(0.117)	(0.037)
Colombia (3)	0.051	0.585***	**- 0.678*** **	0.042
	(0.084)	(0.107)	**(0.117)**	(0.037)
Other-Seven-Countries (4)	0.059	0.047	0.090	**-0.196*** **
	(0.106)	(0.135)	(0.146)	**(0.047)**

* p<0.05, ** p<0.01, *** p<0.001. Standard errors are in parentheses.

CHAPTER 7. CONCLUSION

7.1 Implication

This study contributes to bridging the gap in knowledge of Vietnamese coffee as considered alongside its Brazilian, Colombian, and Other-Seven-Countries counterparts by estimating the U.S. demand for imported coffee. Our research applied the Linear Approximate Almost Ideal Demand System (LA/AIDS) to estimate the demand relations of the top coffee-exporting countries. We analyzed the demand systems of coffee from Vietnam, Brazil, Colombia, and Other-Seven-Countries in the U.S. coffee market, paying particular attention to the impact of prices and expenditure shares of Vietnam, Brazil, and Colombia. The monthly time series data from 2000 to 2020 was pulled from the United States Department of Agriculture's (USDA) Foreign Agricultural Service's Global Agricultural Trade System (GATS), with 252 observations.

Our results show that the uncompensated own-price elasticities of Brazilian and Colombian coffee are -1.207 and -1.023, respectively, and that the uncompensated own-price elasticities of Brazilian and Colombian coffee are elastic. Whereas Baroh et al. (2014) found that Mexican coffee is a partner of Indonesian coffee in the U.S. market, we discovered that Brazilian, Columbian, and Vietnamese coffees had no statistically significant result. Abaelu & Manderscheid (1968) found negative income elasticity for Brazilian coffee, meaning that Brazilian coffee behaves as an inferior good.

The present study showed that the uncompensated own-price elasticity of Vietnamese coffee is inelastic (-0.649). Given this finding, Vietnam could raise the price of its coffee to increase its revenue. The U.S. consumption of Brazilian and Colombian coffee, on the other hand, showed that their demands were price elastic. Therefore, it will

be difficult for Brazilian and Colombian producers to raise their prices while expanding their market shares.

Although we included COVID-19 as a dummy variable, it does not significantly affect coffee imports to the U.S. from any exporting county. This is likely due to the fact that the expected COVID-19 impact on coffeeshops was offset by increased demand for at-home coffee consumption, and that COVID-19 did not affect U.S. consumers' preference for coffee by county of origin. This effect in our study could also be due to the limited number of observations during COVID-19 as our data only extends to March 2020. We, however, conclude that COVID-19 did not change import budget allocations between coffee exporting countries.

Based on the above conclusions and the fact that elasticities are essential factors to consider when creating models for policy implications, the findings of this study can be beneficial for policy decisions regarding coffee imports and exports. Moreover, as we applied conditional demand elasticities, we can conduct policy simulations on the import demand of coffee to the U.S. coffee market. Therefore, both Brazil and Colombia should carefully consider their pricing policy for their coffee products as they risk losing market share by increasing their coffee prices. As for Vietnamese coffee, it is price inelastic but significant at $p<0.001$. Vietnamese exporters can utilize these opportunities to engage in price enhancing strategies since the U.S. does not levy on the green, roasted, and soluble coffee. As a result, exporting value-added products can increase their prices while maintaining their product quality, and the export revenue will increase. In addition, based on calculated result, the mean price of Vietnamese coffee was 1566.78 per ton, and we assume that Vietnam was exporting Robusta and it was not in direct competition with

Brazilian, Colombian and Other-Seven-Countries' coffee. Vietnamese Robusta coffee was less responsive with the change in its price. However, Brazilian and Colombian Arabica coffee were highly responsive with change in their prices. Therefore, if Vietnamese coffee producers or coffee retailers in the U.S. increase the price of Vietnamese coffee, they will increase the revenue for Vietnamese coffee.

7.2 Limitations and Future Research

We may consider that this demand analysis of Vietnamese coffee in the U.S. is one of the first demand analyses conducted after the WHO (2020) pronounced COVID-19 a global pandemic. However, there were some limitations while conducting this research, as finding instrumental variables challenging and we could not perform an endogeneity test in this study. For a more precise estimation of the U.S. import demand for coffee, a disaggregated demand analysis for coffees imported from a range of countries of origin would be necessary. Moreover, as the data for Vietnamese coffee represent only for Robusta coffee, conducting future research with specific data for each type of coffee would provide more insights for the U.S. coffee market.

REFERENCES

Abaelu, J. N., & Manderscheid, L. V. (1968a). U.S. Import Demand for Green Coffee by Variety. *American Journal of Agricultural Economics*, *50*(2), 232–242. https://doi.org/10.2307/1237539

Alamo, C., & Malaga, J. (2012). *Coffee Differentiation: Demand Analysis at Retail Level in the US Market*. 19.

Alsaad, A. A., Moon, W., & Rendleman, C. M. (2021). *International Trade in Specialty Agricultural Products: Demand for Organic Green Coffee—A Case Study*. 6.

Armington, P. S. (1969). A Theory of Demand for Products Distinguished by Place of Production (Une theorie de la demande de produits differencies d'apres leur origine) (Una teoria de la demanda de productos distinguiendolos segun el lugar de produccion). *Staff Papers - International Monetary Fund*, *16*(1), 159. https://doi.org/10.2307/3866403

Asche, F., Bjorndal, T., & Salvanes, K. G. (1998). The Demand for Salmon in the European Union: The Importance of Product Form and Origin. *Canadian Journal of Agricultural Economics/Revue Canadienne D'Agroeconomie*, *46*(1), 69–81. https://doi.org/10.1111/j.1744-7976.1998.tb00082.x

Baroh, I., Hanani, N., Setiawan, B., & Koestiono, D. (2014). Indonesian Coffee Competitiveness in the International Market: Armington Model Application. *American Journal of Economics*, 12.

Blundell & Robin. (1999). ESTIMATION IN LARGE AND DISAGGREGATED DEMAND SYSTEMS: AN ESTIMATOR FOR CONDITIONALLY LINEAR SYSTEMS. *J. Appl. Econ.*, 24.

Deaton, A., & Muellbauer, J. (1980). An Almost Ideal Demand System. *The American Economic Review*, *70*(3), 312–326.

Gebrehiwot, W., & Daloonpate, A. (2012). *Demand Analysis of Ethiopian Coffee in Japan*. 10.

Goddard, E. W., & Akiyama, T. (1988). *United States Demand for Coffee Imports*. 14.

Houston, J. E., Santillan, M., & Marlowe, J. (Eds.). (2003). U.S. DEMAND FOR MILD COFFEES: IMPLICATIONS FOR MEXICAN COFFEE. *Journal of Food Distribution Research*. https://doi.org/10.22004/ag.econ.27956

IBISWorld. (2021). *IBISWorld—Industry Market Research, Reports, and Statistics*. https://www.ibisworld.com/default.aspx

International Coffee Organization (ICO). (2019 March 25-29). *Country coffee profile Vietnam. International Coffee Council 124th Session. http://www.ico.org/documents/cy2018-19/icc-124-9e-profile-vietnam.pdf*

International Coffee Organization (ICO). (2020 April). *Impact of COVID-19 on the Global Coffee Sector- The Demand Side.* Coffee-break-series-No.1. https://www.ico.org/documents/cy2019-20/coffee-break-series-1e.pdf

International Trade Centre. (2021). *The coffee guide* (Fourth Edition). International Trade Centre.

Kuit et al, M. (2004). *Manual for Arabica Cultivation*. 219.

Lee, Y., Kennedy, P. L., & Hilbun, B. (n.d.). *IMPORT DEMAND SYSTEM ANALYSIS OF THE SOUTH KOREAN WINE MARKET WITH THE SOURCE DIFFERENTATED AIDS MODEL*. 26.

Luong & Tauer. (2006). A real options analysis of coffee planting in Vietnam. *Agricultural Economics*, *35*(1), 49–57. https://doi.org/10.1111/j.1574-0862.2006.00138.x

NCA. (2020). *NCA releases 2020 National Coffee Data Trends, the ""Atlas of American Coffee"."* https://www.ncausa.org/Newsroom/NCA-releases-Atlas-of-American-Coffee

Neilson, J., & Pritchard, B. (2009). *Value Chain Struggles*. Wiley-Blackwell. https://doi.org/10.1002/9781444308723

Nzaku et al. (2012). *A Dynamic Application of the AIDS Model to Import Demand for Tropical Fresh Fruits in the USA*. 25.

Ponte, S. (2002). The `Latte 'Revolution'? Regulation, Markets and Consumption in the Global Coffee Chain. *World Development*, *30*(7), 1099–1122. https://doi.org/10.1016/S0305-750X(02)00032-3

Schnepf, R., & Monke, J. (2020). *COVID-19, U.S. Agriculture, and USDA's Coronavirus Food Assistance Program (CFAP).* 33.

Seale, J. L., Marchant, M. A., & Basso, A. (2003). Imports versus Domestic Production: A Demand System Analysis of the U.S. Red Wine Market. *Review of Agricultural Economics*, *25*(1), 187–202. https://doi.org/10.1111/1467-9353.00053

Srivastava, S. K., & Sivaramane, N. (2020). Income-induced effects of COVID-19 on the food consumption pattern of Indian households. *AGRICULTURAL ECONOMICS*

RESEARCH REVIEW, *33*(confspl), 15–24. https://doi.org/10.5958/0974-0279.2020.00014.2

Statista. (n.d.). *Coffee—United States | Statista Market Forecast*. Statista. Retrieved April 14, 2022, from https://www.statista.com/outlook/cmo/hot-drinks/coffee/united-states

Statista. (2021). *Number of Starbucks stores in the U.S.* Statista. https://www.statista.com/statistics/218360/number-of-starbucks-stores-in-the-us/

United States Department of Agriculture (USDA). (2021 December). *Coffee: World Markets and Trade. https://apps.fas.usda.gov/psdonline/circulars/coffee.pdf*

Wan, Y., Sun, C., & Grebner, D. L. (2010). Analysis of Import Demand for Wooden Beds in the U.S. *Journal of Agricultural and Applied Economics*, 16.

World Health Organization (WHO). (2020 March 11).Director-General'*s opening remarks at the media briefing on COVID-19* April 18, 2022, from https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

WTO. (2020). *WTO report finds growing number of export restrictions in response to COVID-19 crisis*. https://www.wto.org/english/news_e/news20_e/rese_23apr20_e.htm

Yohannes, M. F., Matsuda, T., & Sato, N. (2016). Substitution in Consumer Demand for Coffee Product Categories in Japan. *Journal of Agricultural Science*, *8*(4), 50. https://doi.org/10.5539/jas.v8n4p50

Zheng, Y., & Kaiser, H. M. (2008). Advertising and U. S. Nonalcoholic Beverage Demand. *Agricultural and Resource Economics Review*, *37*(2), 147–159. https://doi.org/10.1017/S1068280500002963

VITA

Leo Kyaw Zin

Place of birth:

Wakema, Myanmar

Education:

Bachelor of Business Administration

Martin Luther Christian University, Shillong, Meghalaya, India (2012-2015)

Work Experience:

Program Manager

Livelihood and Training Program, and Emergency Relief Assistance Program

Karenni Social Welfare and Development Center, Myanmar (October 2016 – Present)