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Impacts of Tariffs and Trade Agreements on Japanese Wine Imports by Source

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I am submitting herewith a thesis written by Emily Katherine Greear entitled "Impacts of Tariffs and Trade Agreements on Japanese Wine Imports by Source." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural and Resource Economics.

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Impacts of Tariffs and Trade Agreements on Japanese Wine Imports by Source

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ABSTRACT

In recent years, the Japanese bottled wine market (HS classification: 220421) has steadily grown due to an increase in consumption, with the majority of demand being satisfied by imports. Recent trade negotiations with Japan have resulted in the full elimination of tariffs on wine from countries in the European Union (EU) and Chile and the eventual elimination of tariffs on wine from Australia. On October 16, 2018 President Trump announced plans to negotiate the United States-Japan Trade Agreement. The agreement was signed in October of 2019, and a new tariff rate of 8.5 percent on US wine became effective in January of 2020. While the new tariff is lower than the previous 15 percent, the tariff significantly increases the cost of US wine in Japan.

The generalized dynamic Rotterdam model will be used to estimate Japanese wine demand differentiated by exporting source (e.g., France, US, etc.). Expected results include an assessment of habit formation and the derivation of long-run expenditure and price elasticities of demand by source. Price elasticities are used to project the impact of the United States-Japan Trade Agreement as well as the trade agreements between Japan and the EU, Japan and Australia, and Japan and Chile.

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Problem Justification

Japan is of significant importance to global wine trade. In 2017, the United Nations Food and Agriculture Organization (FAO) reported that world wine trade was valued at $70.6 billion and that total world wine trade was nearly 22.3 billion liters. The total amount imported by volume makes Japan the second largest wine import market globally importing 177 million liters of wine in 2019 The total amount imported by value makes Japan the third largest wine import market globally with wine imports valued at over $1.0 billion in 2019 (United Nations Statistics Division, 2019). Specific to US wine in 2019, Japan ranks third in value among countries importing US wine ($125.4 million), behind Canada and China, and ranks second in volume (7.8 million liters), following Canada (United Nations Statistics Division, 2019).

In recent years, the Japanese wine market has steadily grown due to an increase in consumption (Sumio & Negishi, 2019). In 1994, the quantity of wine imported by Japan was 66.2 million liters ($271,565,522), while in 2018, the quantity imported jumped to 167.1 million liters ($978,410,115), a 152 percent increase in volume (260 percent increase in value) (Global Trade Information). Figure 1 depicts the increase over the past twenty-five years of Japanese wine imports in both value and volume. During this time, the spike in imports by value and volume during 1998 is linked to a boom in red wine demand after a series of studies eluded to the health benefits of red wine consumption in moderation (Rod & Beal, 2014; Sumio & Negishi, 2019).

In 2006, Japanese consumption was 1.9 liters of wine per capita, but in 2018, consumption rose to 2.6 liters of wine per capita (Sumio & Negishi, 2019). Even though wine consumption in Japan has increased over the past 50 years, Japan's per capita consumption is relatively low globally. As aforementioned, the Japanese consumed 2.6 liters of wine per capita in 2018 which is minimal compared to Italy, the top consumer per capita, which is 45 liters per capita (United Nations Statistics Division, 2019).

While Japan has the ability to produce wine domestically, the majority of consumption comes from imports. For instance, in 2017, it was reported that 69 percent of wine consumed in Japan came from imported products (Sumio & Negishi, 2019). In 2018, almost 90 percent of total imported wine came from seven importing countries: Australia, Chile, France, Germany, Italy, Spain, and the United States (Global Trade Information); the suppliers are listed in alphabetical order. These countries have consistently been top suppliers of wine to Japan over the past twenty-five years.

In the world of viticulture, Old World wines are defined as wines produced in Austria, Bulgaria, France, Germany, Greece, Hungary, Italy, Portugal, Romania, Spain, and Switzerland and New World wines are defined as wine produced in Argentina, Australia, Brazil, Canada, Chile, Mexico, New Zealand, Peru, South Africa, United Sates, and Uruguay (Aleixandre Benavent, Aleixandre Tudó, Bolaños - Pizarro, & Aleixandre Benavent, 2016). From this, we will be able to conclude Japanese consumer demand of Old World wines versus New World wines based on elasticity estimates.

In this study, Japanese wine imports are defined according to a six-digit harmonized system (HS) classification of 220421. This classification includes wine of fresh grapes in containers holding two liters or less. Figure 2 shows the percentage breakdown of wine imported, by volume, in Japan by supplying country in 1994 and 2018, respectively, where “ROW” is the rest of world which are all other countries not specified. In 1994, France was the leading supplier of wine (by volume) to Japan and accounted for 47 percent (30.8 million liters) of Japanese imports. US wine accounted for 8 percent (5.4 million liters) of Japanese wine imports in 1994, and Chile accounted for 0.3 percent (almost 180,000 liters) of Japanese wine imports. In 2018, Chile was the leading supplier of wine (in volume) to Japan and accounted for 31 percent (51.4 million liters) of Japanese imports. US wine accounted for 4 percent (7.2 million liters) of Japanese imports in 2018, and France accounted for 25 percent (42.2 liters) of Japanese wine imports in 2018. In 1994, France was the top supplier of wine (by value) to Japan and accounted for 59 percent ($162.3 million) of Japanese imports (Global Trade Information). US wine accounted for 6 percent ($15.4 million) and Chile accounted for 0.21 percent (about $570,00) of Japanese imports (by value) in 1994 (Global Trade Information). In 2018, France was the top supplier of wine (by value) to Japan and accounted for 42 percent ($411.5 million) of Japanese imports. US wine accounted for 12 percent ($115.8 million) and Chile accounted for 15 percent ($147.3 million) of Japanese imports in 2018 (Global Trade Information).

Between 1994 and 2018, the leading supplier of Japanese wine imports, by volume, changed from France to Chile. France saw nearly a 37 percent increase in quantity of wine imported by Japan between 1994 and 2018, with imports increasing from 30.8 million liters to 42.2 million liters in 25 years. Chile saw a large increase, 29,000 percent, in the quantity of wine imported by Japan from 1994 to 2018, increasing from 178,538 liters to 51.4 million liters in 25 years. US wine imported by Japan has increased in volume over the past 25 years by 33 percent, increasing from 5.4 million liters to 7.2 million liters. Looking at Japanese wine imports by value varies compared to imports by volume.

Table 1 summarizes the exporter market share and Japanese total wine imports by value and volume from 1994 to 2018. As the data suggests, imports consistently increased over the past twenty-five years (by volume). In terms of value, the data also show an increase over the past twenty-five years, but some years, such as 2012-2014, being greater than those that succeed. Averages show that France consistently dominates the market, 54 percent, followed by Italy. The market share of Italian wine increased over time, reaching $153 million in 2018. The average market share (over a 25 year period) for the all other suppliers is 3.1 percent (Australia), 7.0 percent (Chile), 5.1 percent (Germany), 4.2 percent (Spain), and 7.7 percent (US).

Table 2 summarizes the price per liter of Japanese wine imports, by source, from 1994 to 2018. The volume of wine imports increased over the past twenty-five years, but Japanese consumers are purchasing more expensive imports. For example, the average price of a bottle US wine was $2.84 in 1994 but jumped to $16.14 in 2018. An increase in price over twenty-five years is seen for all major suppliers except for Chile. Also during this time period, the following supplier’s wine became slightly more expensive: Australian wine from $3.73 to $4.17, French wine from $5.26 to $9.75, German wine from $3.15 to $6.00, Italian wine from $2.98 to $5.05, and Spanish wine from $2.83 to $3.05. On average, Chile was responsible for the lowest price per liter ($3.23) while France was responsible for the highest price per liter ($7.91).

Recent trade negotiations have resulted in Japan lowering and eventually eliminating tariffs on wine from specific countries, particularly countries in the European Union (EU), Australia, and Chile. Tariff reductions (or eliminations) are the result of the following: The Japan-EU Economic Partnership Agreement (EPA), the Japan-Australia EPA, and the Japan-Chile EPA were signed as of July 17, 2018, July 8, 2014 and March 27, 2007, respectively (Paulson & Kurai, 2018).

For members of the World Trade Organization (WTO), Japan imposes a 15 percent ad valorem tariff on wine imports, which is the most-favored-nation rate for WTO members. Simply, the most-favored-nation principle means a trading country receives the lowest tariff, the fewest trade barriers, and the highest import quotas. However, due to trade policies and negotiations, countries can agree to trade at a rate that is lower than the most-favored-nation rate. Under the Japan-EU EPA, this 15 percent import duty levied on EU wine was immediately eliminated (Paulson & Kurai, 2018). Prior to the Japan-Australia EPA, Australian wine exports to Japan faced a 15 percent tariff. The tariff rate on wine from Australia will be fully eliminated by 2021 (Zeller & Cole, 2014). The Japan-Chile EPA resulted in an import duty levied on Chilean wine to be lowered from 15 percent to 10 percent in the first year of the agreement (2007). This was followed by equal annual reductions until the tariff was fully eliminated in 2019 (Paulson & Kurai, 2018). All else equal, Japanese consumers will face relatively lower prices for wine from France, Germany, Italy, Spain, and Chile compared to U.S. wine.

During this period, Japan continued to impose a 15 percent tariff on US wine (Paulson & Kurai, 2018). The 15 percent tariff increases the cost of US wine in Japan. In 2018, US exports were valued at $129 million (Sumio & Negishi, 2019). With a 15 percent tariff, along with Japan's 8 percent value added tax, the total cost of importing US wine was $158,670,000.

On October 16, 2018 President Trump announced plans to negotiate the United States-Japan Trade Agreement (Office of the United States Trade Representative, 2019). Japan's role as an important export market for the US is a key factor for the negotiations. Securing market access by reducing or eliminating tariffs on agriculture goods, including wine, was a specific negotiating objective of the United States-Japan Trade Agreement negotiations. The US-Japan Trade Agreement and US-Japan Digital Trade Agreement was signed in October 2019, resulting in a phase-out of tariffs on US wine over a 7-year period. The agreements became effective immediately on January 1, 2020 following the finalization of domestic procedures (Office of the United States Trade Representative, 2019). As of January 1, 2020, the tariff on US wine supplied to Japan was 8.5 percent. According to the Office of the United States Trade Representative report, the tariff will be reduce as follows: 7.1 percent on April 1, 2021, 5.7 percent on April 1, 2022, 4.2 percent on April 1, 2023, 2.8 percent on April 1, 2023, 1.4 percent on April 1, 2024, and duty free effective April 1, 2025 (Office of the United States Trade Representative, 2019).

The purpose of this project is to better understand how tariffs will affect US wine exports to Japan moving forward. This study will address the impacts of the Japan-EU EPA, the Japan-Australia, and the Japan-Chile EPA on US wine exports to Japan as well as the impacts of the new agreement between the US and Japan.

Objectives

The objectives of this study are to:

1) estimate Japanese wine demand differentiated by supplying country;
2) using estimates, derive the elasticities of import demand for Japanese wine imports for each exporting country;
3) using elasticities, simulate the impacts of existing and potential trade agreements on Japanese wine imports.

Literature Review

Analyses of Japanese wine imports and free trade agreements are limited, but several studies have been conducted that describe Japanese wine, beer, and spirit consumption. The Japanese are known to consume alcohol and rank 13th in per capita alcohol consumption in the world (Rod & Beal, 2014). Traditionally, Japanese alcohol consumers have consumed predominately sake, the traditional fermented rice drink of Japan (Holden, 1995). Rod and Beal (2014) state that wine is viewed as an iconic symbol of globalization, representing the growing interdependence of the world's economies, cultures, and populations. Japan is a country where grape wine competes with the traditional alcohol, sake. Imported wine in Japan also competes by source, or where the wine was produced and shipped from. Rod and Beal (2014) state that the Japanese wine market is very competitive, but it is also heavily impacted by trends.

Japanese consumers also consider food quality and safety issues when making purchasing decisions. For example, Kubta, Sawango, and Kono (2017) found that Japanese consumers who are aware of food additive dangers tend to prefer antioxidant-free labeled wine. The authors also found that consumers who have a deeper knowledge and understanding of wine do not prefer the antioxidant-free labeled wine; the additives are perceived as necessary to in the production of quality wine products. In a similar study on organic food preferences in Japan, Sakagami, Sato, and Ueta (2006) found that Japanese consumers concerned about freshness are willing to pay more for organic foods and that the source (origin) is just as important as freshness.

Omura (2016) found that wine consumption is an independent expenditure for Japanese consumers while food-related expenditures, such as bread and vegetables, are a positive impulse for wine consumption. Over time, the diversifying wine market in Japan has occurred simultaneously with the growth and diversification of food-related consumption patterns. The occasion of going out to eat was found to be a promoting factor for wine consumption. Wine was previously regarded primarily as luxury good in Japan but has shifted towards an ordinary good that is consumed both at home and outside of the home regardless of the state of economy in Japan. Although Japan has different dietary habits from that of the Western countries, the results from this study seem to provide proof of the versatility of wine as well as an optimistic outlook of wine consumption in Japan.

Further examining purchasing behavior, Rod and Beal (2014), noted that a Japanese consumer who becomes interested in wine tends to know only of French wine, an Old World wine. This observation can be directly related to France's top spot as the major supplier of Japanese wine imports. Bruwer and Buller (2013) found that brand preferences for Japanese wine consumers was influenced by consumption demographics with statistical significance shown between the following relationships: age, income, region, consumption frequency, and expenditure on wine.

The same association was apparent in Chinese wine consumers and their preference for French wine (Muhammad, Leister, McPhail, & Chen, 2014). As the Japanese consumer's palates expanded and tastes and preferences shifted, so did the choice of alcoholic beverages. Other countries, such as New Zealand, have had a more modest experience. Although alcoholic beverage consumption in Japan has steadily increased, Japan continues to be a very small consumer of wine in per capita terms (Rod & Beal, 2014). Economic growth in Japan has led to an increasing number of consumers that have traveled and studied abroad. These experiences have opened doors to Western cultures and food, specifically wine (Lee, 2009). Applying these studies and conclusions to all Japanese consumers would be an over generalization; however, they do provide some evidence and insight as to why Japan imports their wine products in large amounts from a select few number of countries.

A search of literature, specific to global trade agreements and wine demand, led to four studies. These studies include Mariusz (2012), Heien and Sims (2000), Ma (2006), Anderson and Wittwer (2018), and Rickard, Gergaud, Ho, and Livat (2018). These studies focus on Australia and the European Union, the United States and Canada, China and New Zealand, and the United Kingdom and the European Union, respectively. Mariusz (2012) examined the effects and reasoning of the European Community and Australia agreement on wine trade that was signed in 1994; this agreement eventually led to Australia becoming the top supplier of wine to countries within the European Union by the late 2000s. The concluding statements by Mariusz (2012) proclaimed that global wine trade in the late 1980s and the early 1990s was affected by the negotiation outcomes in the Uruguay Round of the World Trade Organization. During this time, New World wine penetrated an international market that was once dominated by Old World wines.

Heien and Sims (2000) examined the effect of the Canada-United States Free Trade Agreement on US wine exports; this article on focused on tariff removal, the removal of nontariff trade barriers by Canada as well as own-price and exchange rate effects, substitute price and exchange rate effects, and changes in real income in Canada. In this example, the tariff reductions accounted for almost 10% of the increase in imported wine over a 5-year period. The largest amount of increase in quantity was due to the elimination of non-tariff trade barriers (restriction on trade), which is a conclusion found by many trade economists (Heien & Sims, 2000). A competing explanation could be related to the public's increased knowledge of the health benefits associated with moderate wine consumption (Heien & Sims, 2000).

Ma (2006) examined the strategic implications for the New Zealand wine industry's market entry into China following the China-New Zealand free-trade agreement. Through research, Ma (2006), found that wine in New Zealand has a lack of presence in the global wine market. Because of this, successful market penetration will require a long-term strategy. China's views on New Zealand as a country, clean and environmentally conscious, will prove to be beneficial for New Zealand wine trade (Ma, 2006). Ma (2006) identified luxury hotels as well as high quality restaurants as suitable distribution channels for wine from New Zealand.

In doing this, top-end consumers will be targeted and the potential for building the reputation for wine from New Zealand is high. Packaging and labelling were also identified as having an impact on wine choice. In this study, it was found that consumers' preference revealed that high print quality of the product label.

Anderson and Wittwer (2018) examined the effects of Brexit, as well as other UK-EU trade agreements, on world wine markets. This study assumed that no changes were made to alcohol excise duties in any country, even though they are scheduled to progressive increase with inflation in the UK and other countries. Anderson and Wittwer (2018) found that even with no change in relative consumer tax rates of beverages, local beer and spirit consumption is likely to rise compared to wine consumption. Finally, Brexit will prove to be costly to UK wine consumers, and policy outcomes will be followed by uncertainty upon effectuation.

Rickard et al. (2018) analyzed the Transatlantic Trade and Investment Partnership (TTIP), a comprehensive free trade agreement between the US and EU. It was found that tariffs were less important in terms of trade barriers in the negotiations for wine trade between the EU and US. The tariff rate was low for bottled wine products but remained high for bulk wine products. EU domestic regulations limit retail availability of US wine products in Eastern EU states and changes in these types of regulations are difficult to include in trade agreements.

Demand and wine trade among countries has also been studied, exploring how wine exporting countries compete in a global market. These studies include Muhammad et al. (2014), Seale, Marchant, and Basso (2003), Muhammad

(2011), and Carew, Florkowski, and He (2004). Muhammad et al. (2014) uses the absolute price version of the Rotterdam demand system to estimate foreign wine demand in China. They showed that Chinese imports of French wine ranked number one followed by Australia, Spain, Italy, Chile, and the United States (Muhammad et al., 2014). Findings in this study reveal changes in consumer behavior towards foreign wine, specifically Chinese consumers preferring Old World wines, such as wine coming from Italy and France. For example, results confirm that Chinese consumers prefer French wine and that French wine consumption has increased with the foreign wine market (Muhammad et al., 2014). In this study, it was found that wine consumption patterns in China have evolved. This finding shows the significance of a series of estimates over time instead of depending on full-sample results to analyze consumer behavior. The results from Muhammad et al. (2014) indicate that China may be an exception in a global wine trade market that is opening and expanding toward New World wines; Chinse wine imports in the future will likely continue to come from Old World wine-producing countries. The potential for New World wine market penetration stems from wine education and knowledge expansion of the Chinese consumer Muhammad et al. (2014).

Seale et al. (2003) use the first-difference almost ideal demand system (AIDS) to estimate the US red wine market regarding both domestic and imported products. Seale et al. (2003) found that while US wine imports (by volume) have increased over time, the US consumption of domestic red wine is greater than the consumption of imported red wine. As a result, the conditional expenditure elasticities of US imported red wines are inelastic. Conversely, the conditional expenditure of elasticity of demand for US domestic red wines is elastic; if expenditure on red wine were to increase (in the US), the demand for domestic red wine would increase more than the demand for imported red wines(Seale et al., 2003). It was found that an increase in US red wine expenditures stem from nonprice demand factors such as an increase in income, shifting demographics, or shifts in preferences. It is possible that these factors are beyond the influence of the US wine demand (Seale et al., 2003).

Muhammad (2011) analyzed the wine market in the United Kingdom and the relationship between twelve exporting countries. This study focuses on wine demand in a source-differentiated framework, which few prior studies had included; because of this, there is product heterogeneity due to country of origin. The Rotterdam model was used to estimate UK wine demand by exporting country. Elasticity estimates found that demand for French wines was price inelastic. Conversely, the demand for other European wines, such as Italian, Portuguese, and Spanish, were price elastic. The shifts in demand for this study suggest that excess supply in exporting countries has led to a change in wine market structurally, concerns regarding carbons emissions during transport, and excessive drinking in the UK (Muhammad, 2011).

Carew et al. (2004) use a source-differentiated almost ideal demand system (AIDS) model to analyze domestic demand and imported demand for table wine in British Colombia. Results from the analysis suggest substitutability relationships vary between white wines and red wines by country or region of origin for wine consumption in British Colombia. In regards to own-price elasticity, Carew et al. (2004) found that own-price elasticities for most wines are significant and negative; own-price elasticities are less elastic for red wines than for white wines. Also, Carew et al. (2004) found that all expenditure elasticities are positive and statistically significant. It was also found that expenditure elasticities are greater for white wines than red wines. The results perform satisfactorily in terms of obtained own-price and expenditure elasticities (Carew et al., 2004).

Data and methods

Data

The data used in this study was obtained from the Global Trade Atlas®. Two separate datasets, monthly and annual, were downloaded and analyzed. The data begin in January of 1994 and end December of 2018. The following information applies to both datasets downloaded and used. There are two categories of reported data in this study including value (in USD) and volume (in liters). Only wine that falls under the Harmonized System (HS) 220421 classification (bottled wine) was included in the dataset[1]. Japan's total wine imports during the specified timeframe as well as Japan's wine imports by trading partners were downloaded and used in this study. More specifically, Japan's total wine imports, called "World", during the specified timeframe as well as Japan's total wine imports by source were used. Seven countries were used in this study. The seven countries, in alphabetical order, are Australia, Chile, France, Germany, Italy, Spain, and the US. To account for all other countries in the analysis, all remaining countries are aggregated in to the "rest of the world" (ROW). In the past five years of annually reported data (2014-2018), the countries listed above consistently held the top seven import values and volumes. The annual market share and price for each supplier can be found in Table 1 and Table 2, respectively.

[1] The quantity and price of wine are defined according to a six-digit harmonized system (HS) classification of 220421. This classification includes wine of fresh grapes in containers holding two liters or less.

For this analysis, the focus is on imports and will not include domestically produced wine products. There is strong consumer differentiation between domestic and imported wine in Japan (Paulson & Kurai, 2018). It has also been shown that wine demand is differentiated by exporting source in Japan and therefore wine from one country may not be considered a perfect substitute for wine from another country (Muhammad et al., 2014). Therefore, Japanese wine demand will be examined using a source-differentiated framework. Wine is differentiated by exporting source where Australian wine, Chilean wine, French wine, German wine, Italian wine, Spanish wine, US wine, and wine from ROW are separate products that consist of the product group wine. Bulk wine will not be included in the model. This is to help provide focus on origin specific preferences at the final demand level.

The descriptive statistics for the model variables are presented in Table 3. This table presents the monthly averages for each variable over the twenty-five-year period. The average price[2] of wine was highest in France at $7.91/liter which is higher than the average price of wine from other suppliers. However, the average price for wine from the US was almost as high as France at $7.08/liter. The average price of wine was least in Chile at $3.26/liter. Price per liter for the remainder of the suppliers are as follows: Australia ($4.48), Italy ($4.41), Spain ($3.27), and Germany ($4.76). France supplied the largest average volume of wine at 4,294,143 liters. Australia supplied the least amount (volume) of wine on

[2] All values in this study are represented in USD.

average over the specified period at 464,115 liters. The average volume of wine supplied to Japan for the remainder of the suppliers are as follows: Chile (1,753,050 liters), Italy (2,193,420 liters), Germany (592,464 liters), Spain (961,593 liters), and the US (808,431 liters). France supplied the largest amount by value on average over the specified time period at $34,012,229, which is much larger than all other supplies in this study on average. Australia supplied the least amount by value on average over the specified time period at $2,076,340 which is much closer to the average values of other suppliers in this study. Average amounts supplied by value for the remainder of suppliers are as follows: Chile ($5,434,192 million), Germany ($2,448,917), Italy ($9,784,526), Spain ($2,961,364), and the US ($5,287,428).

Empirical Methods

Japanese wine imports may not be fully responsive to changes in external factors in the short-run. Instead, an impactful shift would be noticed over a longer timeframe as a result of habit formation and persistence as well as shifts in export supply (Pollak, 1970). Also, buyers may not adapt immediately to price changes. However, the more time a buyer has for adjustments, the more adjustments they will make. Trade negotiations between exporting countries and Japan do not occur immediately, nor do the implementations. Over the course of several years, import volumes and values will face a shift. To account for these dynamics, the generalized dynamic Rotterdam model will be used to estimate Japanese wine demand and consumption. This study will present a generalization of the absolute price version of the Rotterdam model. This will include dynamic effects due to habit formation, allowing for the derivation of short-run and long-run demand elasticities for Japanese wine consumption.

Let *q* and *p* represent the quantity and price of wine, respectively, *n* represent the number of exporting countries in the study, and *t* represents time. The empirical specification of the dynamic Rotterdam model used in this study is as follows (Bushehri, 2003):

$$\overline{w}_{1t}\Delta q_{1t} = C_1 + C_{11}\Delta q_{1t-1} + C_{12}\Delta q_{2t-1} + C_{13}\Delta q_{3t-1} + \cdots + C_{18}\Delta q_{8t-1} + A_1\Delta Q_t$$
$$+ B_{11}\Delta p_{1t} + B_{12}\Delta p_{2t} + B_{13}\Delta p_{3t} + \cdots + B_{18}\Delta p_{8t} + \mu_{1t}$$
$$\overline{w}_{2t}\Delta q_{2t} = C_2 + C_{21}\Delta q_{1t-1} + C_{22}\Delta q_{2t-1} + C_{23}\Delta q_{3t-1} + \cdots + C_{28}\Delta q_{8t-1} + A_2\Delta Q_t$$
$$+ B_{12}\Delta p_{1t} + B_{22}\Delta p_{2t} + B_{23}\Delta p_{3t} + \cdots + B_{28}\Delta p_{8t} + \mu_{2t}$$

$$\bar{w}_{3t}\Delta q_{3t} = C_3 + C_{31}\Delta q_{1t-1} + C_{32}\Delta q_{2t-1} + C_{33}\Delta q_{3t-1} + \cdots + C_{38}\Delta q_{8t-1} + A_3\Delta Q_t$$
$$+ B_{31}\Delta p_{1t} + B_{23}\Delta p_{2t} + B_{33}\Delta \mathrm{p}_{3\mathrm{t}} + \cdots + B_{38}\Delta p_{8t} + \mu_{3t}$$

$$\vdots$$

$$\bar{w}_{8t}\Delta q_{8t} = C_8 + C_{81}\Delta q_{1t-1} + C_{82}\Delta q_{2t-1} + C_{83}\Delta q_{3t-1} + \cdots + C_{88}\Delta q_{8t-1} + A_8\Delta Q_t \quad (1)$$
$$+ B_{81}\Delta p_{1t} + B_{83}\Delta p_{2t} + B_{83}\Delta \mathrm{p}_{3\mathrm{t}} + \cdots + B_{88}\Delta p_{8t} + \mu_{8t}$$

Δ is the log change operator; for the *i*th exporting country $\Delta q_{it} = \log q_{it} - \log q_{it-12}$ and $\Delta p_{it} = \log p_{it} - \log p_{it-12}$. Following Seale et al. (2003), the 12th-period lag is used in this study to account for the seasonality in monthly data. ΔQ_t is the Divisia index which is a measure of real aggregate expenditures on all imported wine where $\Delta Q_t = \sum_{i=1}^{8} \bar{w}_{it}\Delta q_{it}$. w_{it} is the import share for exporting country *i*, where

$w_{it} = \frac{spending\ on\ wine\ from\ country\ i\ at\ time\ t}{spending\ on\ wine\ from\ all\ countries\ at\ time\ t} = \frac{p_{it}q_{it}}{x_t}$, and

$\bar{w}_{it} = 0.5(w_{it} + w_{it-12})$, which is the two period average. Here, *x* represents total nominal expenditures on wine imports: $x = \sum_{i=1}^{n} p_i q_i$. *A*, *B*, and *C* are parameters that are assume constant for estimation. The first and second subscripts with each parameter is the production source/country of origin and competing country, respectively (e.g., B_{12} measures how wine from exporting country 1 is impacted by the price in exporting country 2). μ_{it} is the error term, which is assumed to be random and normally distributed.

In this study A_i is the ith marginal budget share (real expenditure effect). B_{ij} is the price coefficient which measures the impact of the price of import *j* on the quantity of import *i*. C_{ij} is the dynamic adjustment coefficient which measures the impact of previous period imports from country *j* on present imports from country *i*. Equation (1) states that wine imported from a given source is a function of previous imports from all sources, real aggregate expenditures on imported wine, and the price of wine for each exporting supplier.

The following are parameter restrictions for demand theory properties: (2) adding-up, (3) homogeneity, (4) symmetry, and (5) negativity, respectively:

$$\sum_i C_i = 0\,, \sum_i C_{ij} = 0\,, \sum_i A_i = 1, \sum_i B_{ij} = 0 \tag{2}$$

$$\sum_j B_{ij} = 0 \tag{3}$$

$$B_{ij} = B_{ji} \tag{4}$$

$$B_{ii} \leq 0 \text{ for all } i = 1, 2, \ldots, n. \tag{5}$$

By definition, adding-up requires that expenditures on each source must add up to total expenditures (Snyder & Nicholson, 2008). This is also known as Walrasian equilibrium. Simply, the law states that the value of all quantities demanded must equal the value of all endowments. This holds true for any set of prices (Snyder & Nicholson, 2008). Homogeneity is a demand property that states that changing all prices and income by the same proportion does not change the optimal quantities demanded (Snyder & Nicholson, 2008). This shows that an individual's demand is not affected by pure inflation in which all prices and incomes increase proportionally; the same bundle of goods will be demanded by the individual (Snyder & Nicholson, 2008). By definition, symmetry is a condition where the impact of the price of good *i* on the demand for good *j* equals the impact of the price of good *j* on the demand for good *i* (Stone, 1954). The adding-up property is satisfied by construction. Homogeneity and symmetry are imposed on the model and tested. Negativity means that the matrix of compensated price effects should be negative semi-definite, that is, all own price effects are non-positive (Barten & Geyskens, 1975). The negativity condition is verified by inspection.

Using equation (1), the conditional short-run expenditure elasticity (6), compensated price elasticity (7), and uncompensated price elasticity (8) are respectively defined as the following:

$$\eta_i = \frac{A_i}{\overline{w}_i} \tag{6}$$

$$\eta_{ij}^c = \frac{B_{ij}}{\overline{w}_i} \tag{7}$$

$$\eta_{ij} = \eta_{ij}^c - \eta_i \overline{w}_j \tag{8}$$

The conditional short-run elasticities are calculated at the sample mean (i.e., using mean import shares). The elasticities are conditional on total expenditures for imported wine. The expenditure elasticity indicates the percentage change in the quantity demanded from each of the supplying countries that would result from a 1% increase in total expenditures on imported wine. For normal goods, an increase in expenditures is followed by an increase in demand. For inferior goods, an increase in expenditures is followed by a decrease in demand. The short-run compensated price elasticities represent the percentage change in quantities demanded resulting from a 1% change in price, holding real expenditures on imported wine constant. Equation (7) only accounts for the substitution effect of a price change. The short-run uncompensated price elasticities, equation (8), are calculated by holding real income constant, and reflect substitution and income effect of a price change. Equation (7) and equation (8) measure the impact of percentage changes in the price of wine imports from country *j* on the demand for wine from country *i* (Seale, Sparks, & Buxton, 1992*)*.

The lag terms are used in calculating the long-run elasticities. To derive the long-run elasticities, it is assumed that $\Delta q_{1t} = \Delta q_{1t-1}$. The following are the long-run expenditure elasticities (9), compensated price elasticities (10), and uncompensated price elasticities (11), respectively:

$$\eta_{i(LR)} = \frac{A_i}{\overline{w}_i - C_{ii}} \tag{9}$$

$$\eta_{ij(LR)}^{c} = \frac{B_{ij}}{\overline{w}_i - C_{ii}} \tag{10}$$

$$\eta_{ij(LR)} = \frac{B_{ij}}{\overline{w}_i - C_{ii}} - \frac{A_i}{\overline{w}_i - C_{ii}}\overline{w}_j \tag{11}$$

The conditional long-run expenditure elasticity, equation (9), is calculated at the sample mean by dividing the conditional marginal import shares by the mean of the average import share minus the own-lag estimate. The elasticities are conditional on expenditures for imported wine and indicate the long-run percentage change in quantities demanded from each of the supplying countries that would result from a 1% increase in wine import expenditures. Long-run compensated price elasticities, equation (10), are calculated at the sample mean by dividing the Slutsky parameters by the mean of the average import shares minus the own-lag estimate. The elasticities represent the percentage change in quantities demanded resulting from a 1% change in price, holding real expenditures on imported wine constant (Seale et al., 1992). The long-run uncompensated price elasticities, equation (11), are calculated by allowing real income to change with prices, and reflect both substitution and income effects as a result of price changes (Seale et al., 1992).

Equation (1) will be used in estimating wine import demand in Japan. Using past consumption patterns and behavior, equation (1) can also be used to estimate the effects of past Japanese wine demand on current consumption (habit formation). Using the elasticities, the impacts of the Japan-EU EPA, Japan-Australia EPA, the Japan-Chile EPA, and the potential United States-Japan Trade Agreement on Japanese wine demand by source will be assessed (Kasten & Brester, 1996).

The model and projections are programmed using SAS software packages as well as Microsoft Excel. In SAS, the necessary variables are created from the dataset so that the model can run. The price for each country was found by dividing the spending on wine for country *i* by the quantity of imports for country *i*. The log was taken for each price, quantity, and value of imports variable. The 12th-period difference was applied to each log value of price and quantity to account for seasonality. The budget share (w_{it}) was found by dividing the spending on wine from country *i* by the spending on wine from all countries.

The PROC MODEL statement in SAS is used to analyze models in which the relationships among the variables form a system of one or more nonlinear equations. The PROC MODEL procedure is a regression analysis technique that includes estimation, simulation, and forecasting of nonlinear simultaneous equation models. This is particularly important in this project, as there are eight equations to be estimated. Within SAS, it is possible to test for both homogeneity and symmetry. This is done by using the TEST command. Results are in Table 4. Homogeneity and symmetry were statistically rejected when tested jointly, which is common, but still imposed on the model. Reasoning for this states that the rationalization of theory does not have to hold for aggregate data and that the predictive power of demand systems significantly improves when both are imposed (Kasten & Brester, 1996). With homogeneity and symmetry imposed on the model, 296 parameters are estimated in the model. Imposing parametric restriction, such as homogeneity and symmetry, improves degrees of freedom. The command ISTUR, which also follows the statement PROC MODEL, is used for iterative seemingly unrelated regression. In the initial model, the eight equation (ROW) is dropped due to the adding-up property. Because of this property, the demand system is singular and requires that an equation be deleted for accurate and complete estimation. Because estimates are remain unchanged to the deleted equation, it does not matter which equation is dropped (Barten, 1969). The missing values are found using the ESTIMATE statement in SAS. To check for accuracy, another model is tested, dropping the seventh equation and using ESTIMATE to find the missing variables. When comparing the outputs of the two models, parameter estimates are consistent. Elasticities and their standard errors are found by using the ESTIMATE statement. Excel is used to formulate tables.

Once the elasticities are found, it is possible to forecast the impact of the United States-Japan Trade Agreement on wine supplied to Japan from the US. Using a the 3-year average from 2016-2018 as the baseline, the estimated long-run uncompensated own- and cross-price elasticities are used to project the changes in the quantity demanded for each exporting country assuming a price change resulting from tariff elimination. Baseline values (reference points) are in Table 5. It is also possible to forecast the impact of the United States-Japan Trade Agreement on wine supplied from Australia, Chile, France, Germany, Italy, Spain, and ROW to Japan. Using the long-run uncompensated cross-price elasticity between each country and the US, the change in quantity as a result in the tariff change on US wine can be forecasted for Australia, Chile, France, Germany, Italy, Spain, and ROW.

It is also possible to forecast the impact of the Japan-EU EPA, Japan-Australia EPA, and the Japan-Chile EPA on wine supplied to Japan from each country. Using the baseline values for price and quantity for each country and their respective long-run uncompensated own-price elasticity, the change in quantity and the change in price resulting from a tariff change from 15 percent to 0 percent can be forecasted. It is also possible to forecast the impact of the Japan-EU EPA, Japan-Australia EPA, and the Japan-Chile EPA on wine supplied to Japan from the other countries used in this study. Once again, a baseline for price and quantity will be used for each country. Using the long-run uncompensated cross-price elasticity between the country outlined in the agreement and each country analyzed in this study, the change in quantity as a result in the tariff change[3] on wine supplied to Japan can be forecasted.

[3] In this study, each tariff change will be from 15 percent to 0 percent as a result of the agreed upon rate in each of the agreements.

Results and Discussion

The estimated coefficients are shown in Table 6, and estimated lagged coefficients are shown in Table 7. Because there are eight countries analyzed, including ROW, there are 126 coefficients to be estimated. However, the homogeneity and symmetry restrictions decreased the number of estimated coefficients to 98. F-test were used to test for homogeneity and symmetry. Results indicate that homogeneity could not be rejected (P-value=0.06) at the 5% significance level, but symmetry given homogeneity was rejected at the 5% significance level.

Table 6 shows the conditional demand estimates for Japanese wine imports by source. The following are the R_2 values for each equation: Australia (0.38), Chile (0.53), France (0.94), Germany (0.34), Italy (0.78), Spain (0.59), and US (0.53). France and Italy indicate the best fit. In Table 6, the real expenditure effect or marginal expenditure share, A_i, for each country, including ROW, are positive and statistically significant at the 0.01 level. This implies a positive and significant relationship between the Divisia index, the measure of real aggregate expenditure, and wine imports from any source. As Table 6 shows, France has the largest marginal expenditure share estimate (0.58) followed by Italy (0.14). This is expected given France's role as a top supplier of wine to Japan. The marginal expenditure share estimate for the remaining countries are as follows: Australia (0.03), Chile (0.09), Germany (0.04), Spain (0.04), and the US (0.06), each of which represents a much smaller marginal share than France, Italy, and

Spain. A_i indicates how a one dollar increase in aggregate expenditure is allotted across the eight exporting countries. For every one dollar increase in total foreign wine expenditures, on average, $0.58 was spent on French wine and $0.14 on Italian wine, with very little allocated to the remaining suppliers: Australia ($0.02), Chile ($0.09), Germany ($0.04), Spain ($0.04), and the US ($0.06).

Of the conditional own-price effects (B_{ii}) in Table 6[4], all eight countries, including ROW, were negative and statistically significant at the ≤ 0.01 level which is consistent with economic theory. The own-price effect was largest (in absolute value) for France and Chile (-0.103 and -0.071), but relatively smaller for Germany (-0.027). The own-price effect for other suppliers include the following: Australia (-0.044), Italy (-0.061), Spain (-0.046), and the US (-0.058).

Cross-price estimates provide insight on how Japanese consumers substitute wine from one supplier to another supplier. Of the conditional cross-price effects (B_{ij}), four are statistically significant at the ≤ 0.01 level, six at the ≤ 0.05 level, and three at the ≤ 0.10 level. Results show significant competitive relationships (substitutes) between suppliers. Significant price competition is found in relationships with positive and statistically significant values. These relationships include the following: Australia and Italy (0.011), Australia and the US (0.009), Chile and France (0.039), Chile and Spain (0.012), Chile and the US (0.013), Chile and ROW (0.01), France and the US (0.017), France and ROW (0.01), Germany and Spain (0.005), Italy and Spain (0.014), Italy and the US

[4] These estimates are found along the diagonal.

(0.011), Italy and ROW (0.01), and Spain and ROW (0.01). There are no conditional complementary relationships.

Table 7 shows the dynamic adjustment estimates from the model. The significance of the lagged terms (C_{ij}) indicates that the responsiveness of quantity demanded is not instantaneous. The constant term, C_i, and the impact of lags on present imports, C_{ij}, include ten estimates that are statistically significant at the $\leq$ 0.01 level, twelve estimates at the ≤ 0.05 level, and three estimates at the ≤ 0.10 level; this is out of a total of seventy-two estimates. The own-lag estimates (C_{ii})that are statistically significant and positive, Australia, France, and ROW, indicating habit formation (0.005, 0.042, and 0.005). Simply, consumption of these imported wines results in increased consumption in the future, ceteris paribus. The own-lag estimate of Spain is statistically significant and negative (-0.004), which reflects short-run inventory adjustments, or stockpiling behavior (i.e., “opposite” of habit formation).

The sign and magnitude of the cross-lag effects, C_{ij}, depend on the relationship between imports, substitutes versus complements. Given habit formation behavior, if wine from any two countries are substitutes and unrelated to the other countries, their cross-lag effect should be negative. Given habit formation behavior, if wine from any two countries are complements and unrelated to the other countries, their cross-lag effect should be positive.

Table 8 shows the own-price elasticities for Japanese wine demand by source in the short-run and the long-run. The expenditure elasticities, (η_i), measure the responsiveness of wine imports by source to a percentage change in total foreign wine expenditures. All expenditure elasticities are statically significant at the ≤ 0.01 level. Germany has the highest expenditure elasticity in both the short-run and long-run (2.24 and 2.22), meaning that for a 1 percent increase in total wine expenditures, there will be a 2.2 percent increase in imports of German wine in both the short-run and long-run. The demand for French wine in Japan is expenditure elastic in both the short-run and long-run (1.38 and 1.53), where a 1 percent increase in total wine expenditures results in an increase in imports of French wine of about 1.4 percent in the short-run and 1.5 percent in the long-run. The demand for Australian wine in Japan is expenditure inelastic in the short-run (0.98) and expenditure elastic in the long-run (1.22) where a 1 percent increase in total wine expenditures results in an increase in imports of Australian wine of about 1 percent in the short-run and 1.2 percent in the long-run. The demand for Chilean wine in Japan is expenditure inelastic in both the short-run and the long-run (0.64 and 0.66) where a 1 percent increase in total wine expenditures results in an increase in imports of Chilean wine imports of about 0.6 percent in the short-run and 0.68 percent in the long-run. The demand for Italian wine in Japan is expenditure inelastic in both the short-run and the long-run (0.75 and 0.80) where a 1 percent increase in total wine expenditures results in an increase in imports of Italian wine of about 0.8 percent in the short-run and long-run. The demand for Spanish wine in Japan is expenditure inelastic in both the short-run and the long-run (0.61 and 0.58) where a 1 percent increase in total wine expenditures results in an increase in imports of Spanish wine of about 0.6 percent in the short-run and long-run. The smaller expenditure elasticity for Spanish wine in the long-run compared to the short-run is due to the negative own-lag estimate for Spanish wine. The demand for US wine in Japan is expenditure inelastic in both the short-run and the long-run (0.68 and 0.72) where a 1 percent increase in total wine expenditures results in an increase in imports of US wine of about 0.7 percent in the short-run and long-run. For some suppliers, the differences between the short-run and long-run elasticities are small because the own-lag terms (C_{ii}) were relatively small.

Table 8 also shows the compensated own-price elasticities for each supplier. All compensated (η_{ii}^{C}) own-price elasticities are statically significant at the ≤ 0.01 level and negative in the short-run and long-run, as expected. The demand for Australian wine in Japan is elastic in both the short-run and long-run (-1.89 and -2.35), where a 1 percent increase in price results in a decrease in quantity demanded of about 1.9 percent in the short-run and 2.4 percent in the long-run. Of all imports, Japanese consumers are the most sensitive to Australian wine prices. The demand for Chilean wine in Japan is inelastic in both the short-run and long-run (-0.48 and -0.50), where a 1 percent increase in price results in a decrease in quantity demanded of about 0.5 percent in the short-run and long-run. The demand for French wine in Japan is inelastic in both the short-run and long-run (-0.25 and -0.27), where a 1 percent increase in price results in a decrease in demanded of about 0.3 percent in the short-run and long-run. The demand for German wine in Japan is elastic in both the short-run and long-run (-1.67 and -1.66), where a 1 percent increase in price results in a decrease in quantity demanded of about 1.7 percent in the short-run and long-run. The demand for Italian wine in Japan is inelastic in both the short-run and long-run (-0.32 and -0.34), where a 1 percent increase in price results in a decrease in quantity demanded of about 0.3 percent in the short-run and long-run. The demand for Spanish wine in Japan is inelastic in both the short-run and long-run (-0.68 and -0.65), where a 1 percent increase in price results in a decrease in quantity demanded of about 0.7 percent in the short-run and long-run. The demand for US wine in Japan is inelastic in both the short-run and long-run (-0.68 and -0.72), where a 1 percent increase in price results in a decrease in quantity demanded of about 0.7 percent in the short-run and long-run.

Table 8 also shows the uncompensated own-price elasticities for each supplier. All uncompensated (η_{ii}) own-price elasticities are statically significant at the $\leq$ 0.01 level and negative in the short-run and long-run, as expected. Uncompensated own-price elasticities are larger, when compared to the compensated elasticities, in absolute value because the uncompensated own-price elasticities include both the substitution effect and the income effect of a price change, the latter of which is not included in compensated own-price elasticities. Normal goods, such as wine, are reinforced by larger absolute values in uncompensated own-price elasticities. As a result, the uncompensated own-price elasticities indicate an even greater responsiveness to own-price. The demand for Australian wine in Japan is elastic in both the short-run and long-run (-1.91 and -2.38). The demand for Chilean wine in Japan is inelastic in both the short-run and long-run (-0.58 and -0.59). The demand for French wine is own-price inelastic in both the short-run and long-run (-0.82 and -0.91). The demand for German is elastic in both the short-run and long-run (-1.71 and -1.70). The demand for Italian wine in Japan is inelastic in both the short-run and long-run (-0.46 and -0.49). The demand for Spanish wine is own-price inelastic in both the short-run and long-run (-0.73 and -0.69). The demand for US wine in Japan is own-price inelastic in both the short-run and long-run (-0.74 and -0.78).

Table 9 shows the short-run uncompensated cross-price elasticities. The positive and significant estimates indicate that the following imports are substitutes: Australia and the US (0.284) and the US and Australia (0.351). For example, a 1 percent increase in the price of Australian wine will result in a 0.3 percent increase in imports of US wine. The following uncompensated cross-price elasticities are negative and significant, indicating complements: Chile and Italy (-0.170), France and Chile (-0.108), France and Italy (-0.222), France and Spain (-0.083), France and the US (-0.076), France and ROW (-0.051), Italy and Chile (-0.147), Italy and France (-0.232), Spain and France (-0.204), the US and France (-0.244), and the US and Italy (-0.069). For example, a 1 percent increase in the price of Chilean wine will result in a 0.2 percent decrease in imports of Italian wine. The same relationships are found in the long-run. See Table 10.

Import projections based on each trade agreement (US-Japan Trade Agreement, Japan-Chile EPA, and Japan-EU EPA) are based on the uncompensated price elasticities in the short-run[5] and long-run[6]. The results of each trade agreement are presented in Table 11 (short-run) and Table 12 (long-run).

The following are the short-run projections. Given the removal of the 15 percent tariff on US wine, the value of U.S. wine supplied to Japan is projected to increase to $158.4 million, a difference of $53.6 million or 51 percent. The market share for US wine is projected to increase from 9.4 percent to 13.4 percent. Australia, Chile, and ROW are projected to decrease in wine supplied to Japan as a result of the US-Japan Trade Agreement. France, Germany, Italy, and Spain are all projected to increase 7.6 percent, 3.0 percent, 0.4 percent, and 2.9 percent, respectively. Market share is projected to increase for France (from 36.6 percent to 37.1 percent). The supplier that is most impacted by the agreement is Australia which is projected to decrease 28.4 percent in value.

The impact of Japan-Australia EPA on global wine trade in the short-run is found in Table 11. As shown through the own-price elasticity estimates, Japanese consumers are highly sensitive to a change in price for wine from Australia. As a result of the tariff removal outline in Japan-Australia EPA, Australian wine supplied to Japan is projected to increase to $72.8 million, a difference of $44 million or 152.2 percent. Market share for Australian wine supplied to Japan is projected to increase from 2.6 percent to 6.6 percent. All other countries are projected to face a decrease in wine supplied to Japan as a

5 Short-run uncompensated price elasticities are found in Table 9.
6 Long-run uncompensated price elasticities are found in Table 10.

result of the Japan-Australia EPA except for France, which is projected to increase of $1.6 million, or 0.4 percent. Market share is projected to increase for Chile (from 13.6 percent to 13.7 percent) and France (from 36.6 percent to 37.2 percent). The supplier that is most impacted by the agreement the US which is projected to decrease 35 percent in value.

The impact of Japan-Chile EPA on global wine trade in the short-run is found in Table 11. As a result of the tariff removal outline in the economic partnership agreement, Chilean wine supplied to Japan is projected to increase to $206.7 million, a difference of $56.1 million or 37.2 percent. Market share for Chilean wine supplied to Japan is projected to increase from 13.56 percent to 17.0 percent. Only Spain and ROW are projected to decrease in wine supplied to Japan as a result of the Japan-Chile EPA, a decrease in value of 9.7 percent and 9.2 percent, respectively. Market share is projected to decrease for Australia (from 2.6 to 2.4), Spain (from 4.9 percent to 4.0 percent), the US (from 9.4 percent to 8.7 percent), and ROW (from 18.2 to 15.1). The supplier that is most impacted by the agreement is Spain.

The impact of Japan-EU EPA on global wine trade in the short-run can is found in Table 11. As shown through own-price elasticity estimates, Japanese consumers are highly sensitive to a change in price for wine from Germany. As a result of the tariff removal outline in the economic partnership agreement, wine supplied to Japan from countries in the European Union (France, Germany, Italy, and Spain) is projected to increase. French wine is projected to increase to $467 million, a difference of $60.3 million or 14.8 percent. Market share for French wine supplied to Japan is projected to increase from 36.6 percent to 39.2 percent. German wine is projected to increase to $15.2 million, a difference of $1.5 million or 10.6 percent. Market share for German wine supplied to Japan is projected to increase from 1.2 percent to 1.3 percent. Italian wine is projected to increase to $162.8 million, a difference of $12.5 million or 8.3 percent. Market share for Italian wine supplied to Japan is projected to increase from 13.5 percent to 13.7 percent. Spanish wine is projected to increase to $59.3 million, a difference of $5.4 million or 10 percent. Market share for Spanish wine supplied to Japan is projected to increase from 4.9 percent to 5.0 percent. Of the other suppliers, each is projected to face an increase in wine supplied to Japan as a result of the Japan-EU EPA except for Australia, which is projected to decrease $2.1 million, or 7.2 percent. Market share is projected to decrease for Australia (from 2.6 percent to 2.2 percent), Chile (from 13.6 percent to 12.9 percent), the US (from 9.4 percent to 9.0 percent), and ROW (from 18.2 percent to 16.8 percent). The supplier that is most impacted by the agreement is the Australia which is projected to decrease 7.2 percent in value of wine supplied to Japan.

Analysis in the long-run differs from analysis in the short-run. For the US-Japan Free Trade Agreement, the Japan-Australia EPA, and the Japan-Chile EPA, the following is true: a greater percent increase in value of wine supplied to Japan occurs in the long-run and a smaller market share occurs during the long-run (when compared to the market share in the short-run.

What follows is a discussion of the long-run import projections based on each trade agreement. Projections are reported in Table 12. With the removal of the 15 percent tariff on US wine supplied to Japan, the value of U.S. wine supplied to Japan increases to $162.5 million, a difference of $57.7 million or 55 percent. Market share for US wine in Japan increases from 9.4 percent to 13.7 percent. All other countries will face a decrease in wine supplied to Japan as a result of the US-Japan Trade Agreement except for France, Germany, Italy, and Spain which each are projected to increase in value of 8.4 percent, 3.0 percent, 0.5 percent, and 2.9 percent, respectively. The supplier that is most impacted by the U.S. agreement is Australia which is projected to face a 35.3 percent decrease in value.

Recall that Japanese consumers are highly sensitive to a change in Australian wine prices. As a result of the tariff removal outline in Japan-Australia EPA, Australian wine supplied to Japan is projected to increase to $84.5 million, a difference of $55.8 million or 194.1 percent. Market share for Australian wine supplied to Japan is projected to increase from 2.6 percent to 7.4 percent. All other countries are projected to decrease in wine supplied to Japan except for France which is projected to increase in value by 0.5 percent. The supplier that is most impacted by the agreement is Germany which is projected to decrease 35.3 percent in value.

As a result of the tariff removal outline in the Japan-Chile EPA, Chilean wine supplied to Japan is projected to increase to $208.6 million, a difference of $57.9 million or 38.4 percent. Market share for Chilean wine supplied to Japan is projected to increase from 13.6 percent to 17.2 percent. Spain, the US, and ROW are projected to face a decrease wine supplied as a result of the Japan-

Chile EPA. Market share is projected to increase for France (from 36.6 percent to 37.5 percent), Germany (from 1.2 percent to 1.4 percent), and Italy (from 13.5 percent to 14.3 percent). The supplier that is most impacted by the agreement is ROW which is projected to face a 10.0 percent decrease in value.

Japanese consumers are highly sensitive to a change in price for wine from France and Germany. As a result of the tariff removal outline in the Japan-EU EPA, wine supplied to Japan from countries in the European Union (France, Germany, Italy, and Spain) is projected increase. French wine is projected to increase to $473.8 million, a difference of $67.1 million or 16.5 percent. Market share for French wine supplied to Japan is projected to increase from 36.6 percent to 39.9 percent. German wine is projected to increase to $17.3 million, a difference of $3.6 million or 26.3 percent. Market share for German wine is projected to increase from 1.2 percent to 1.5 percent. Italian wine is projected to increase to $163.3 million, a difference of $13.3 million or 8.8 percent. Market share for Italian wine is projected to increase from 13.5 percent to 13.8 percent. Spanish wine is projected to increase to $59.0 million, a difference of $5.1 million or 9.5 percent. Market share for Spanish is projected to increase from 4.9 percent to 5.0 percent. Australia and ROW are the only suppliers projected to face a decrease in Japan as a result of the Japan-EU EPA. Wine supplied by Chile is projected to increase by 1.8 percent and wine supplied by the US is projected to increase by 1.3 percent. Market share is projected to decrease for Australia, Chile, the US, and ROW. The supplier that is most impacted by the agreement is Australia, which is projected to decrease 9.1 percent in value.

Conclusions and Recommendations

This study provided an application of the Rotterdam model on estimating demand for Japanese wine imports by source. The overall objective was to simulate the impacts of existing and potential trade agreements on Japanese wine imports from model estimates and elasticities. The dynamic Rotterdam model performed as expected in this study with estimates and elasticities estimating results as they are anticipated under economic theory. The results of the Rotterdam model illustrate the importance of considering a series of estimates over time to analyze and understand consumer behavior.

Results provided further insight and information on the Japanese consumer and their demands for wine imports by supplier and show persistent changes in consumer behavior towards foreign wine, specifically in how Japanese consumers allotted expenditures to each supplier from 1994 to 2018. Results also suggest a greater preference from Old World wine suppliers, France, Italy, and Spain with growing preference toward one New World wine, Chile. The relationship between quality and French wine is particularly strong in Japan; the relationship between quality and Chilean wine is growing. The shifting preference towards New World wine, specifically Chilean wine, could be attributed to Japan's rising foreign direct investment in Latin American countries (Alvarado, Iñiguez et al. 2017).

Results confirm that Japanese consumers view French wine with great respect. This was shown by the large expenditure share for French wine. The market share increase for Italy also indicates increased consumption of Italian wine in recent years. Looking further at expenditure share, we can conclude that the largest amount of expenditure for Japanese wine imports is attributed to France. This is consistent with average market share values which France has dominated. Wine imports from Italy are a significant portion of the expenditure share and Italian market share percentages have been steadily growing for the past twenty-five years.

Price competition is found in relationships with positive and statistically significant values. The US has significant price competition with Australia, Chile, France, and Italy. This means that the two products are judged by Japanese consumers on their respective pricing, making purchasing decision mostly based on which wine product is cheaper.

For wine from Australia, France, and Germany, Japanese consumers are highly responsive to changes in price, which is shown in the forecasted impacts of the trade agreements between suppliers and Japan. As the impact of Japan-Australia EPA shows, Australia largely benefits from the tariff removal as do France and Germany with the tariff removal under the Japan-EU EPA.

In the both the short-run and the long-run, the Japan-EU EPA is projected to have the smallest impact in terms of percent change in quantity (value) for all other suppliers in this study. Only Australia and ROW are projected to face a decrease in quantity (value) of wine supplied to Japan as a result of the agreement.

The impact of the US-Japan Trade Agreement will likely positively impact US wine exports to Japan. The price of US wine will decrease and become more competitive with fellow top suppliers of wine to Japan. US wine will also become more competitive with suppliers that are viewed as price competitive such as Australia, Chile, France, and Italy. At the same time, US market share may increase with quantity supplied (value) to Japan as the US takes a larger portion of the market share as a result of an increase in quantity of US wine supplied and a decrease in quantity of wine supplied from Australia, Chile, Germany, and Italy. Based on the forecasted values, the 55 percent increase (long-run) in quantity of US wine supplied to Japan outweighs the decrease in quantity of US wine supplied to Japan as a result of the other trade agreements analyzed in this study. Analyzing all trade agreements, the Japan-EU EPA, the Japan-Australia EPA, and the Japan-Chile EPA, the total percent decrease in US wine supplied to Japan is less 40 percent in the long-run, which is less than the amount gained as a result of the US-Japan Trade Agreement. By the end of the 7-year phase out period of tariff reductions on US wine supplied to Japan, the US will likely reap the benefits of the trade agreement and continue to be a top supplier of wine to Japan. However, as literature suggests, tariff reduction and removal can have the smallest impact on quantity supplied when compared to other non-tariff trade barriers.

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Appendix

Tables

Table 1. Japanese wine imports and market share by exporting country

Year	Volume (liters in millions)	Value ($US million)	Australia	Chile	France	Germany	Italy	Spain	US	ROW
			Market Share %							
1994	66.2	273.5	2.2	0.2	59.4	18.2	8.0	2.6	5.6	3.9
1995	74.7	339.4	1.8	0.4	58.9	16.8	10.1	2.3	6.1	3.7
1996	74.0	381.5	2.1	1.6	52.7	15.1	16.0	2.8	6.1	3.6
1997	101.4	504.9	1.9	3.5	56.5	10.9	14.5	2.6	5.7	4.4
1998	243.5	1,099.4	1.8	8.2	54.3	5.7	15.4	3.1	6.5	4.9
1999	126.1	669.4	2.5	3.6	56.7	7.8	13.3	3.0	9.4	3.7
2000	124.5	617.9	2.9	4.6	57.9	5.8	13.5	2.8	8.8	3.7
2001	131.6	612.7	2.3	4.9	58.3	4.8	15.3	2.7	8.1	3.5
2002	130.5	628.0	2.5	4.1	59.4	4.5	15.9	2.8	7.5	3.2
2003	124.0	694.3	3.0	3.7	60.0	4.0	15.9	3.2	7.1	3.2
2004	127.0	779.8	3.9	3.4	62.6	3.5	13.6	3.1	6.4	3.5
2005	119.0	744.9	4.8	3.5	61.1	3.5	13.9	3.5	6.4	3.4
2006	120.2	789.4	3.6	3.5	61.8	3.3	13.8	3.4	6.9	3.5
2007	119.9	844.4	4.2	4.2	60.7	2.4	14.3	3.8	7.1	3.2
2008	119.7	890.9	4.1	5.2	58.4	2.4	15.0	4.2	6.9	3.8
2009	128.5	773.4	4.3	7.2	54.8	2.3	14.9	5.2	6.7	4.4
2010	134.3	778.6	4.6	8.7	51.3	2.3	15.0	5.3	7.8	5.2
2011	145.1	884.7	4.0	8.7	51.5	2.2	16.0	5.6	7.5	4.6
2012	182.0	1,046.2	3.7	9.8	49.7	1.9	15.7	6.6	7.7	5.0
2013	181.0	1,055.8	3.1	11.0	47.6	1.8	16.3	6.7	8.6	4.8
2014	181.7	1,059.9	2.9	12.9	45.3	1.6	16.7	6.6	7.7	5.3
2015	186.4	949.1	2.9	16.1	43.2	1.5	15.7	5.8	9.5	5.1
2016	173.2	921.7	3.1	15.8	42.7	1.4	15.6	5.6	10.4	5.4
2017	180.0	978.6	3.0	16.2	42.2	1.4	15.7	5.7	10.6	5.2
2018	167.1	978.4	2.9	15.1	42.1	1.5	15.6	5.5	11.8	5.5
Average	**138.5**	**771.9**	**3.1**	**7.0**	**54.0**	**5.1**	**14.6**	**4.2**	**7.7**	**4.2**

Note: Japanese foreign wine import prices are defined according to HS 2204.21: *wine of fresh grapes (other than sparkling wine), containers not over 2 liters.* ROW is rest of world.
Source: Global Trade Atlas®, HIS Markit Inc.

Table 2. Japanese foreign wine import price by source

Year	Australia	Chile	France	Germany	Italy	Spain	US	ROW
				Price ($US/Liter)				
1994	3.73	3.19	5.26	3.15	2.98	2.83	2.84	4.20
1995	3.98	2.96	5.80	3.83	3.17	2.85	3.02	4.09
1996	4.91	3.12	6.94	4.01	4.24	4.11	3.45	4.16
1997	5.10	3.19	6.55	3.81	3.83	3.55	3.85	3.93
1998	4.42	3.26	5.77	3.66	3.72	3.22	3.91	3.32
1999	4.52	3.79	7.07	3.57	3.92	3.40	4.79	4.14
2000	4.07	3.33	6.87	3.15	3.31	3.45	4.33	4.37
2001	3.92	3.31	6.14	3.05	3.19	3.11	4.39	4.34
2002	3.82	3.33	6.12	3.28	3.60	2.85	4.61	4.25
2003	4.17	3.42	7.45	4.11	4.32	3.24	4.07	4.90
2004	4.52	3.39	8.23	4.79	4.65	3.35	4.07	5.26
2005	4.30	3.44	8.47	5.08	4.75	3.50	4.44	5.71
2006	4.58	3.49	8.84	5.24	4.79	3.66	4.89	6.32
2007	4.92	3.35	9.74	5.72	5.31	3.75	6.03	5.89
2008	4.94	3.47	10.41	6.30	5.83	4.17	7.96	5.63
2009	4.00	3.21	8.71	6.00	4.87	3.22	6.41	5.10
2010	4.78	3.16	8.47	6.04	4.67	2.95	6.94	5.17
2011	5.50	3.17	9.02	5.52	4.99	3.10	7.12	5.94
2012	5.38	3.24	8.65	5.44	4.73	2.76	7.59	5.70
2013	4.79	3.19	8.86	5.85	5.17	3.01	7.83	5.59
2014	4.54	3.13	9.06	5.86	5.20	3.28	9.55	5.42
2015	4.00	2.97	7.96	4.97	4.30	2.68	9.74	5.43
2016	4.09	2.88	8.61	4.79	4.47	2.65	14.53	5.60
2017	4.10	2.86	9.07	5.34	4.56	2.77	15.07	5.82
2018	4.17	2.87	9.75	6.00	5.05	3.05	16.14	5.94
Average	**4.45**	**3.23**	**7.91**	**4.74**	**4.38**	**3.22**	**6.70**	**5.05**

Note: Japanese foreign wine import prices are defined according to HS 2204.21: *wine of fresh grapes (other than sparkling wine), containers not over 2 liters.* ROW is rest of world.
Source: Global Trade Atlas®, HIS Markit Inc.

Table 3. Summary of variables

Variable	Definition	Mean	Std Deviation
Q_0	Quantity of World Wine	11,626,4230 (Liters)	4,225,7723
Q_1	Quantity of Wine from Australia	464,115	210,559
Q_2	Quantity of Wine from Chile	1,753,050	1,615,930
Q_3	Quantity of Wine from France	4,294,143	2,144,590
Q_4	Quantity of Wine for Germany	592,464	445,920
Q_5	Quantity of Wine from Italy	2,193,420	833,986
Q_6	Quantity of Wine from Spain	961,593	641,363
Q_7	Quantity of Wine from US	808,431	324,770
Q_8	Quantity of Wine from ROW	559,213	293,984
X_0	Value of World Wine	64,856,324 ($US)	26,659,104
X_1	Value of Wine from Australia	2,076,340	961,736
X_2	Value of Wine from Chile	5,434,192	4,715,934
X_3	Value of Wine from France	34,012,229	18,835,872
X_4	Value of Wine from Germany	2,448,917	1,449,403
X_5	Value of Wine from Italy	9,784,526	4,016,181
X_6	Value of Wine from Spain	2,961,364	1,758,650
X_7	Value of Wine from US	5,287,428	2,648,624
X_8	Value of Wine from ROW	2,851,328	1,376,210
P_1	Price of Wine from Australia	4.49 ($US/Liter)	0.65
P_2	Price of Wine from Chile	3.26	0.35
P_3	Price of Wine from France	7.91	1.58
P_4	Price of Wine from Germany	4.76	1.19
P_5	Price of Wine from Italy	4.41	0.81
P_6	Price of Wine from Spain	3.27	0.60
P_7	Price of Wine from US	7.08	4.33
P_8	Price of Wine from ROW	5.13	0.93

Note: Japanese foreign wine import prices are defined according to HS 2204.21: *wine of fresh grapes (other than sparkling wine), containers not over 2 liters.* ROW is rest of world.

Table 4. Homogeneity and symmetry test

Test	Statistic	P-value
Homogeneity	10.44	0.0638
Homogeneity and Symmetry	67.18	<.0001

Table 5. Baseline values for elasticity forecasts

	Price	Quantity
Australia	$4.12	6,974,431
Chile	$2.87	52,489,958
France	$9.14	44,498,688
Germany	$5.38	2,553,768
Italy	$4.69	32,053,409
Spain	$2.82	19,116,377
US	$15.25	6,874,333
ROW	$3.29	61,377,852

Note: Baseline values are a 3-year average from 2016-2018. ROW is rest of world.

Table 6. Conditional demand estimates for Japanese wine imports by source

	Price Coefficient B_{ij}								
Country	Australia	Chile	France	Germany	Italy	Spain	US	ROW	A_i
Australia	-0.044 (0.004)***	0.003 (0.005)	0.011 (0.006)	0.004 (0.002)	0.011 (0.005)**	0.003 (0.003)***	0.009 (0.003)***	0.004 (0.003)	0.023 (0.005)***
Chile		-0.071 (0.012)***	0.039 (0.012)***	0.001 (0.005)	-0.007 (0.008)	0.012 (0.004)***	0.013 (0.006)**	0.010 (0.004)**	0.094 (0.016)***
France			-0.103 (0.022)***	0.005 (0.007)	0.015 (0.012)	0.004 (0.006)	0.017 (0.008)**	0.011 (0.006)(	0.577 (0.016)***
Germany				-0.027 (0.005)***	0.009 (0.005)	0.005 (0.003)*	0.003 (0.005)	0.000 (0.003)	0.036 (0.005)***
Italy					-0.006 (0.012)***	0.014 (0.005)***	0.011 (0.005)**	0.008 (0.005)*	0.141 (0.009)***
Spain						-0.046 (0.004)***	0.002 (0.003)	0.007 (0.003)***	0.041 (0.004)***
US							-0.058 (0.005)***	0.003 (0.026)	0.058 (0.008)***
ROW								-0.042 (0.004)***	0.031 (0.004)***
R_2	0.38	0.53	0.94	0.34	0.78	0.59	0.53	0.72	

Note: Standard errors are in parenthesis.
***, **, * Significance level = 0.01, 0.05, and 0.10 respectively. ROW is rest of world.

Table 7. Dynamic adjustment estimates of lagged coefficients

		Lag Coefficients C_{ij} (one-period lag effects)							
Country	Constant C_i	Australia	Chile	France	Germany	Italy	Spain	US	ROW
Australia	-0.001 (0.001)	0.005 (0.002)**	0.001 (0.001)	-0.012 (0.004)***	-0.006 (0.003)**	0.000 (0.004)	0.002 (0.002)	0.003 (0.002)	0.007 (0.005)
Chile	0.003 (0.002)	0.001 (0.004)	0.003 (0.004)***	0.042 (0.016)***	0.009 (0.006)	0.004 (0.009)	-0.000 (0.004)**	-0.000 (0.005)	0.094 (0.011)***
France	-0.0042 (0.003)	0.001 (0.004)	0.003 (0.003)	0.0423 (0.016) ***	-0.014 (0.008)*	-0.019 (0.013)	0.017 (0.008)**	-0.000 (0.001)	-0.501 (0.008)***
Germany	-0.003 (0.009) ***	0.003 (0.002)	-0.006 (0.001)***	-0.011 (0.005)**	-0.000 (0.003)	-0.001 (0.004)	0.002 (0.002)	-0.001 (0.002)	0.003 (0.005)
Italy	0.001 (0.002)	-0.005 (0.004)	-0.011 (0.030)***	-0.019 (0.091)**	0.000 (0.005)	0.011 (0.007)	-0.000 (0.004)	0.001 (0.004)	0.003 (0.004)
Spain	0.002 (0.001) ***	0.000 (0.002)	-0.000 (0.001)	-0.011 (0.004)***	0.005 (0.002)**	0.005 (0.003)	-0.004 (0.002)*	0.002 (0.209)	0.008 (0.002)
US	0.003 (0.001) **	-0.002 (0.003)	0.001 (0.002)	-0.000 (0.008)	0.014 (0.005)**	0.001 (0.007)	-0.001 (0.004)	0.005 (0.004)	-0.007 (0.004)*
ROW	0.000 (0.007)	0.002 (0.002)	0.001 (0.001)	0.009 (0.004)**	0.000 (0.023)	-0.000 (0.004)	0.002 (0.002)	-0.000 (0.002)	0.005 (0.002)**

Note: Standard errors are in parenthesis.
***, **, * Significance level = 0.01, 0.05, and 0.10 respectively. ROW is rest of world.

Table 8. Own-price elasticities for Japanese wine demand by source

	Short-run elasticities			Long-run elasticities		
	Expenditure ηi	Compensated Own-Price η^{C}_{ii}	Uncompensated Own-Price η_{ii}	Expenditure ηi	Compensated Own-Price η^{C}_{ii}	Uncompensated Own-Price η_{ii}
Australia	0.978 (0.195)	-1.889 (0.190)	-1.912 (0.191)	1.219 (0.263)	-2.353 (0.310)	-2.382 (0.312)
Chile	0.643 (0.077)	-0.484 (0.080)	-0.578 (0.083)	0.658 (0.079)	-0.496 (0.081)	-0.592 (0.084)
France	1.375 (0.038)	-0.245 (0.051)	-0.822 (0.050)	1.529 (0.061)	-0.273 (0.058)	-0.914 (0.061)
Germany	2.236 (0.316)	-1.673 (0.306)	-1.709 (0.306)	2.224 (0.519)	-1.664 (0.409)	-1.699 (0.413)
Italy	0.750 (0.049)	-0.323 (0.061)	-0.464 (0.062)	0.795 (0.057)	-0.343 (0.067)	-0.492 (0.070)
Spain	0.614 (0.065)	-0.688 (0.053)	-0.464 (0.062)	0.580 (0.061)	-0.651 (0.051)	-0.690 (0.051)
US	0.680 (0.097)	-0.680 (0.063)	-0.729 (0.053)	0.722 (0.106)	-0.722 (0.070)	-0.783 (0.072)
ROW	0.559 (0.077)	-0.767 (0.074)	-0.738 (0.064)	0.610 (0.084)	-0.837 (0.083)	-0.870 (0.083)

Note: Standard errors are in parenthesis. All estimates are significant at the 0.01 level. ROW is rest of world.

Table 9. Short-run uncompensated cross-price elasticities

Country	Australia	Chile	France	Germany	Italy	Spain	US	ROW
Australia	-1.912 (0.191)***	-0.034 (0.203)	0.091 (0.251)	0.145 (0.141)	0.276 (0.216)	0.043 (0.120)	0.284 (0.121)**	0.122 (0.130)
Chile	0.002 (0.031)	-0.578 (0.083)***	0.003 (0.812)	-0.002 (0.034)	-0.170 (0.057)***	0.042 (0.029)	0.036 (0.040)	0.030 (0.030)
France	-0.004 (0.014)	-0.108 (0.030)***	-0.822 (0.050)***	-0.009 (0.018)	-0.222 (0.030)***	-0.083 (0.014)***	-0.076 (0.019)***	-0.051 (0.013) ***
Germany	0.192 (0.206)	-0.253 (0.318)	0.606 (0.404)	-1.709 (0.306)***	0.118 (0.344)	0.174 (0.185)	-0.030 (0.193)	-0.121 (0.196)
Italy	0.039 (0.026)	-0.147 (0.044)***	-0.232 (0.061)***	0.034 (0.028)	-0.464 (0.062)***	0.025 (0.024)	-0.004 (0.028)	0.001 (0.025)
Spain	0.023 (0.042)	0.097 (0.065)	-0.204 (0.085)**	0.068 (0.044)	0.096 (0.069)	-0.729 (0.053)***	-0.029 (0.040)	0.141 (0.088)
US	0.351 (0.119)***	-0.009 (0.043)	-0.244 (0.042)***	0.149 (0.190)	-0.069 (0.034)**	-0.022 (0.040)	-0.738 (0.064)***	0.025 (0.048)
ROW	0.062 (0.057)	0.092 (0.082)	-0.042 (0.100)	-0.009 (0.057)	0.038 (0.086)	0.084 (0.049)*	0.015 (0.048)	-0.798 (0.074) ***

Note: Standard errors are in parenthesis.
***, **, * Significance level = 0.01, 0.05, and 0.10 respectively. ROW is rest of world.

Table 10. Long-run uncompensated cross-price elasticities

Country	Australia	Chile	France	Germany	Italy	Spain	US	ROW
Australia	-2.382 (0.312) ***	-0.043 (0.253)	0.113 (0.312)	0.190 (0.176)	0.344 (0.273)	0.053 (0.150)	0.353 (0.154) **	0.152 (0.163)
Chile	0.002 (0.032)	-0.592 (0.084) ***	-0.003 (0.084)	-0.002 (0.035)	-0.174 (0.059) ***	0.043 (0.030)	0.037 (0.041)	0.030 (0.031)
France	-0.005 0.016)	-0.120 (0.034) ***	-0.914 (0.061) ***	-0.010 (0.017)	-0.247 (0.034) ***	-0.093 (0.016) ***	-0.084 (0.021) ***	-0.056 (0.015) ***
Germany	0.191 (0.206)	-0.251 (0.321)	-0.603 (0.416)	-1.700 (0.413) ***	0.117 (0.343)	0.173 (0.184)	-0.030 (0.192)	-0.310 (0.295)
Italy	0.042 (0.028)	-0.156 (0.047) ***	-0.247 (0.065) ***	0.036 (0.030)	-0.492 (0.070) ***	0.026 (0.025)	-0.005 (0.030)	0.001 (0.026)
Spain	0.022 (0.040)	0.091 (0.062)	-0.193 (0.081) **	0.064 (0.042)	0.090 (0.065)	-0.690 (0.051) ***	-0.028 (0.037)	0.063 (0.038)
US	0.090 (0.035) **	0.060 (0.075)	-0.086 (0.099)	0.020 (0.038)	-0.004 0.068)	-0.029 (0.033)	-0.783 (0.072) ***	0.003 (0.033)
ROW	0.067 (0.061)	0.100 (0.089)	-0.046 (0.109)	0.443 (0.073)	0.041 (0.094)	0.091 (0.054) *	0.016 (0.052)	-0.870 (0.083) ***

Note: Standard errors are in parenthesis.
***, **, * Significance level = 0.01, 0.05, and 0.10 respectively. ROW is rest of world.

Table 11. Forecasted short-run Japanese wine imports

Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Impact of United States-Japan Trade Agreement						
Australia	$ 28,734,656	2.6%	$ 20,574,013	$ (8,160,642)	-28.4%	1.7%
Chile	$ 150,646,179	13.6%	$ 145,222,917	$ (5,423,262)	-3.6%	12.3%
France	$ 406,718,008	36.6%	$ 437,628,577	$ 30,910,569	7.6%	37.5%
Germany	$ 13,739,272	1.2%	$ 14,151,450	$ 412,178	3.0%	1.2%
Italy	$ 150,330,488	13.5%	$ 150,931,810	$ 601,322	0.40%	12.8%
Spain	$ 53,908,183	4.9%	$ 55,471,520	$ 1,563,337	2.9%	4.7%
US	$ 104,833,578	9.4%	$ 158,435,443	$ 53,601,864	51.1%	13.4%
ROW	$ 201,933,133	18.2%	$ 198,904,136	$ (3,028,997)	-1.5%	16.8%
Impact of Japan-Australia EPA						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 72,761,146	$ 44,026,490	153.2%	6.6%
Chile	$ 150,646,179	13.6%	$ 150,344,887	$ (301,292)	-0.2%	13.7%
France	$ 406,718,008	36.6%	$ 408,344,880	$ 1,626,872	0.4%	37.22%
Germany	$ 13,739,272	1.2%	$ 11,101,332	$ (2,637,940)	-14.2%	1.0%
Italy	$ 150,330,488	13.5%	$ 144,467,599	$ (5,862,889)	-3.9%	13.2%
Spain	$ 53,908,183	4.9%	$ 52,668,295	$ (1,239,888)	-2.3%	4.8%
US	$ 104,833,578	9.4%	$ 68,036,992	$ (36,796,586)	-35.1%	6.2%
ROW	$ 201,933,133	18.2%	$ 189,413,279	$ (12,519,854)	-6.2%	17.3%
Impact of Japan-Chile EPA						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 29,711,634	$ 976,978	3.4%	2.4%
Chile	$ 150,646,179	13.6%	$206,712,758	$ 56,066,578	37.2%	16.5%
France	$ 406,718,008	36.6%	$ 450,643,553	$ 43,925,545	10.8%	36.0%
Germany	$ 13,739,272	1.2%	$ 17,215,308	$ 3,476,036	25.3%	1.4%
Italy	$ 150,330,488	13.5%	$ 172,429,070	$ 22,098,582	14.7%	13.9%
Spain	$ 53,908,183	4.9%	$ 48,679,089	$ (5,229,094)	-9.7%	3.9%
US	$ 104,833,578	9.4%	$ 105,777,080	$ 943,502	0.9%	8.5%
ROW	$ 201,933,133	18.2%	$ 183,355,285	$ (18,577,848)	-9.2%	15.1%
Impact of Japan-EU EPA						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 26,654,517	$ (2,080,139)	-7.2%	2.2%
Chile	$ 150,646,179	13.6%	$ 153,141,666	$ 2,495,487	1.7%	12.9%
France	$ 406,718,008	36.6%	$ 466,983,007	$ 60,264,999	14.8%	39.2%
Germany	$ 13,739,272	1.2%	$ 15,192,648	$ 1,453,376	10.6%	1.3%
Italy	$ 150,330,488	13.5%	$ 162,820,991	$ 12,490,503	8.3%	13.7%
Spain	$ 53,908,183	4.9%	$ 59,315,408	$ 5,407,225	10.0%	5.0%
US	$ 104,833,578	9.4%	$ 107,376,932	$ 2,543,354	2.4%	9.0%
ROW	$ 201,933,133	18.2%	$ 200,063,057	$ (1,870,076)	-0.9%	16.8%

Table 12. Forecasted long-run Japanese wine imports

Impact of United States-Japan Trade Agreement						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 20,574,013	$ (8,160,642)	-28.4%	1.7%
Chile	$ 150,646,179	13.6%	$ 145,222,917	$ (5,423,262)	-3.6%	12.3%
France	$ 406,718,008	36.6%	$ 437,628,577	$ 30,910,569	7.6%	37.0%
Germany	$ 13,739,272	1.2%	$ 14,151,450	$ 412,178	3.0%	1.2%
Italy	$ 150,330,488	13.5%	$ 150,931,810	$ 601,322	0.4%	12.8%
Spain	$ 53,908,183	4.9%	$ 55,471,520	$ 1,563,337	2.9%	4.7%
US	$ 104,833,578	9.4%	$ 158,435,443	$ 53,601,864	51.1%	13.4%
ROW	$ 201,933,133	18.2%	$ 198,904,136	$ (3,028,997)	-1.5%	16.8%
Impact of Japan-Australia EPA						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 72,761,146	$ 44,026,490	153.2%	6.6%
Chile	$ 150,646,179	13.6%	$ 150,344,887	$ (301,292)	-0.2%	13.7%
France	$ 406,718,008	36.6%	$ 408,344,880	$ 1,626,872	0.4%	37.2%
Germany	$ 13,739,272	1.2%	$ 11,101,332	$ (2,637,940)	-19.2%	1.0%
Italy	$ 150,330,488	13.5%	$ 144,467,599	$ (5,862,889)	-3.9%	13.2%
Spain	$ 53,908,183	4.9%	$ 52,668,295	$ (1,239,888)	-2.3%	4.8%
US	$ 104,833,578	9.4%	$ 68,036,992	$(36,796,586)	-35.1%	6.2%
ROW	$ 201,933,133	18.2%	$ 189,413,279	$ (12,519,854)	-6.2%	17.3%
Impact of Japan-Chile EPA						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 29,711,634	$ 976,978	3.4%	2.4%
Chile	$ 150,646,179	13.6%	$ 206,712,758	$ 56,066,578	37.2%	16.5%
France	$ 406,718,008	36.6%	$ 450,643,553	$ 43,925,545	10.8%	36.0%
Germany	$ 13,739,272	1.2%	$ 17,215,308	$ 3,476,036	25.3%	1.4%
Italy	$ 150,330,488	13.5%	$ 172,429,070	$ 22,098,582	14.7%	13.8%
Spain	$ 53,908,183	4.9%	$ 48,679,089	$ (5,229,094)	-9.7%	3.9%
US	$ 104,833,578	9.4%	$ 105,777,080	$ 943,502	0.9%	8.5%
ROW	$ 201,933,133	18.2%	$ 181,739,820	$ (20,193,313)	-10.0%	15.0%
Impact of Japan-EU EPA						
Country	Baseline	Market Share	New Value	Δ Value	% Value	New Market Share
Australia	$ 28,734,656	2.6%	$ 26,654,517	$ (2,080,139)	-7.2%	2.2%
Chile	$ 150,646,179	13.6%	$ 153,141,666	$ 2,495,487	1.7%	12.9%
France	$ 406,718,008	36.6%	$ 466,983,007	$ 60,264,999	14.8%	39.9%
Germany	$ 13,739,272	1.2%	$ 15,192,648	$ 1,453,376	10.6%	1.5%
Italy	$ 150,330,488	13.5%	$ 162,820,991	$ 12,490,503	8.3%	13.8%
Spain	$ 53,908,183	4.9%	$ 59,315,408	$ 5,407,225	10.0%	5.0%
US	$ 104,833,578	9.4%	$ 107,376,932	$ 2,543,354	2.4%	9.0%
ROW	$ 201,933,133	18.2%	$ 187,999,747	$ (13,933,386)	-6.90%	15.8%

Figures

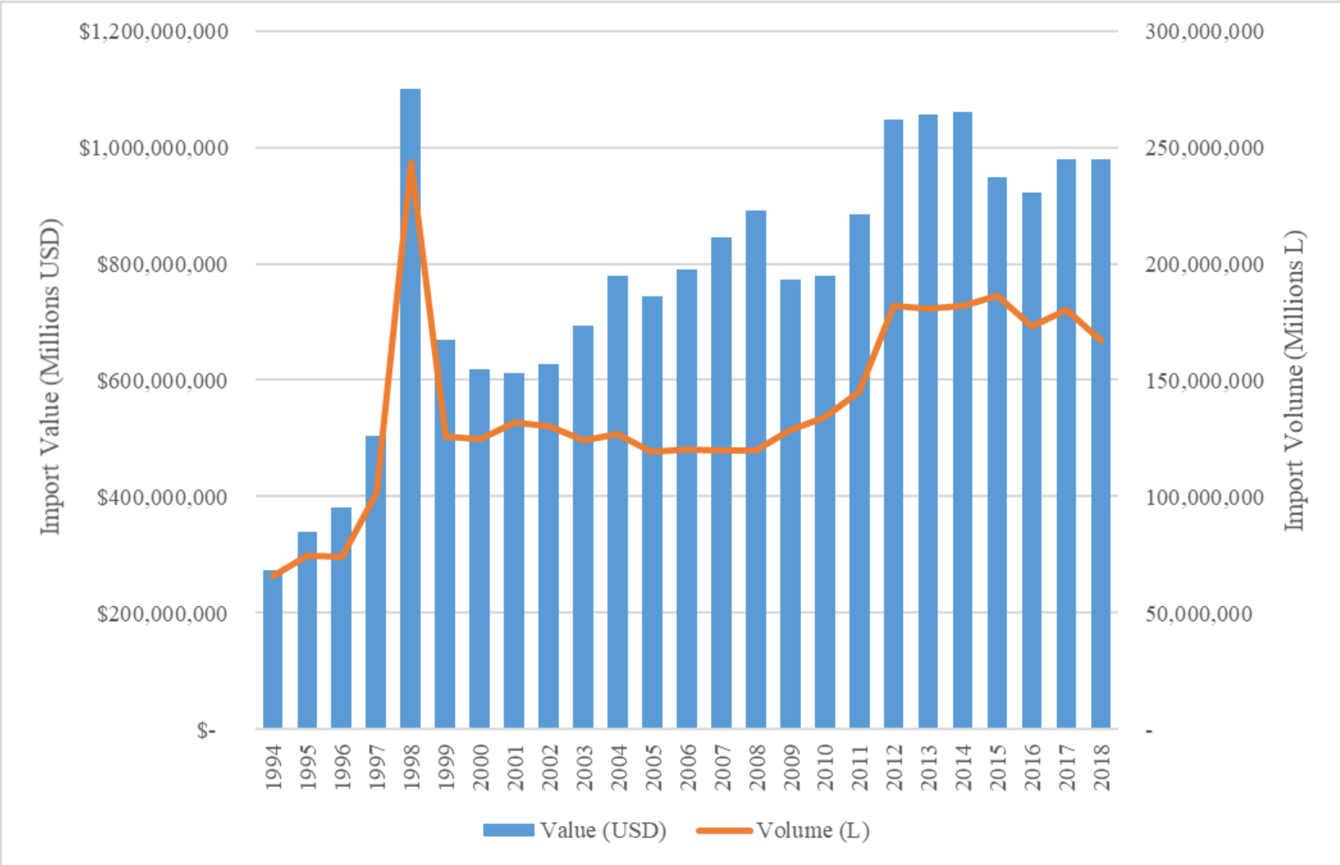

Figure 1. Japanese wine imports by value and volume from 1994-2018

Note: Imports include wine products that fall under the HS Code 220421
Source: Global Trade Atlas 2019

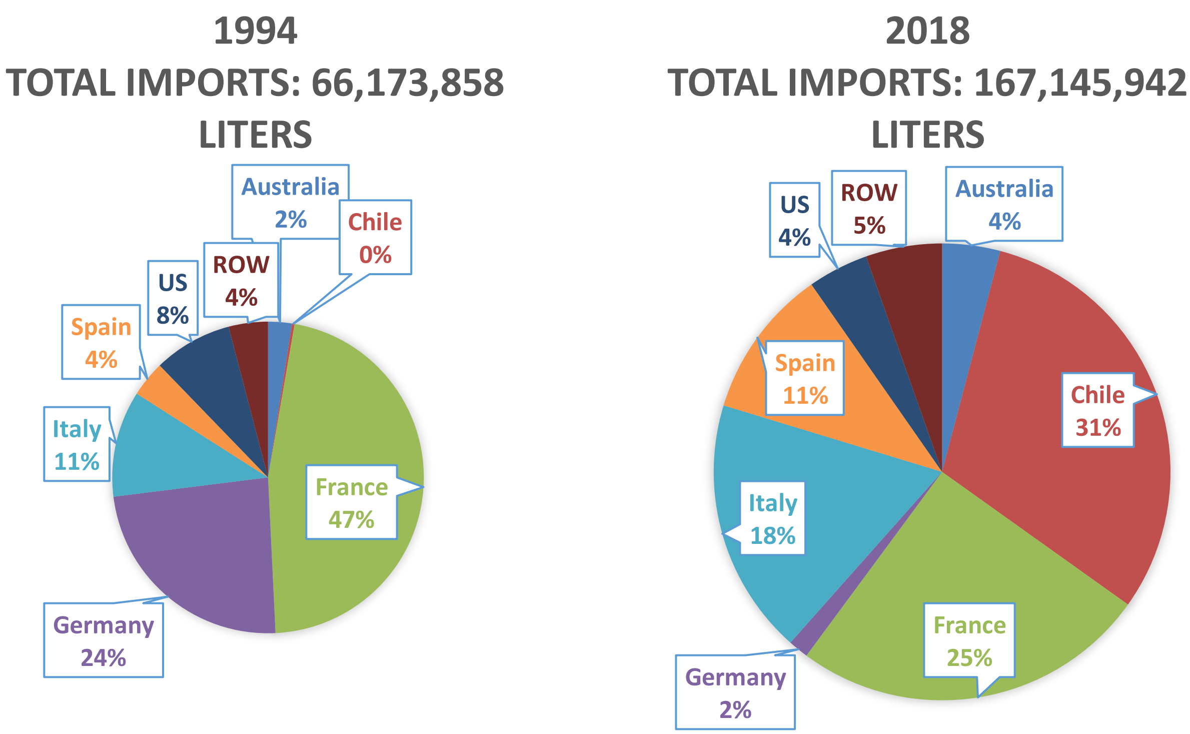

Figure 2. Japanese wine imports by source in 1994 and 2018

Imports include wine products that fall under the HS Code 220421
Source: Global Trade Atlas 2019

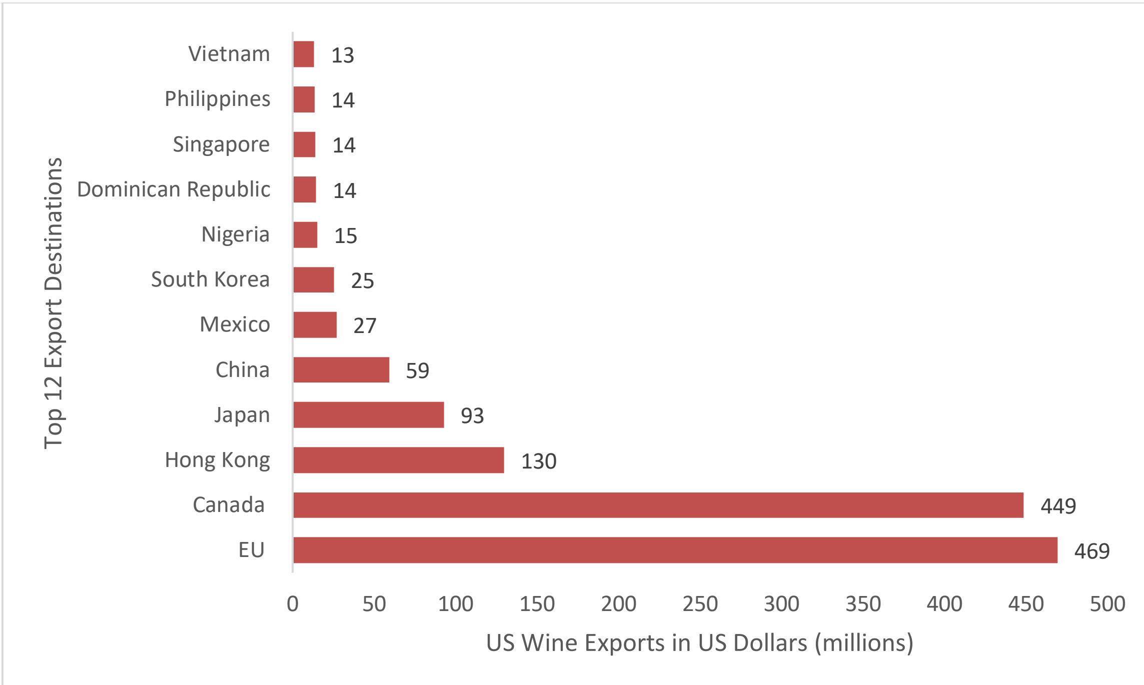

Figure 3. Top 12 destinations for US wine exports by volume in 2018

Vita

Emily Greear was born and raised in Abingdon, Virginia. Before attending the University of Tennessee, Knoxville, she attended Virginia Polytechnic Institute and State University where she earned her Bachelor of Science in Applied Economic Management, with honors, in 2018.

While at the University of Tennessee, Knoxville, Emily was a member of the Agricultural and Resource Economics department scholarship committee, a teaching assistant for the National Agri-Marketing Association club, and a finalist for the Herbert College of Agriculture 3 Minute Thesis Competition in 2020.