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FTAs and Thailand's alcoholic beverage market: Balancing economic opportunities and public health concerns under international trade uncertainty

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Abstract

Free Trade Agreements (FTAs) serve as effective instruments for creating opportunities that promote long-term economic growth across countries. However, international trade uncertainty significantly disrupts trade flows and reduces trade volumes between countries, particularly in the alcoholic beverage market. This study examines the impact of Free Trade Agreements (FTAs) on alcohol regulation in Thailand, with a focus on tax reforms, demand elasticity, trade performance, and import–export trends over the period 2013–2022. This study still uses econometric methodology to find the results of the study. The results of this study confirm that exports of main products in the alcoholic beverage market will rise under FTAs, especially alcohol consumption in Thailand. However, public health policy must focus on measures to prevent both direct and indirect impacts of alcohol consumption in Thailand, which need to be strictly enforced, particularly among younger populations who show an increasing tendency toward alcohol consumption.

Keywords: Alcoholic beverage market, Econometric analysis, Free trade agreements (FTAs), International trade uncertainty, Public health policy.

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1. Introduction

FTAs are crucial instruments in the global trade landscape, driving economic integration, increasing market access, fostering growth, and enhancing cooperation among participating nations. FTAs play a significant role in shaping global trade by creating a framework for the exchange of goods and services between countries with reduced barriers. Typically, FTAs involve the elimination or reduction of tariffs, quotas, and other trade barriers, making it easier and more cost-effective for countries to export and import goods and services. This encourages greater trade volumes between member countries. By promoting trade liberalization, countries benefit from increased competition, which often leads to innovation, better-quality products, and more efficient production methods. Additionally, consumers gain access to a broader range of goods and services at competitive prices. Furthermore, this can enhance a country's attractiveness to foreign investors by providing a stable and predictable trade environment for abroad companies to invest in member countries. In fact, FTAs offer advantages for several categories of goods and services, however they can also pose challenges such as displacement of domestic industries, creating social and economic disruptions, etc. Additionally, it may not be entirely appropriate for the specific category of alcoholic beverages.

The contradiction between FTAs and alcohol regulation in Thailand stems from the tension between trade liberalization and public health objectives. FTAs aim to lower trade barriers, such as tariffs and import restrictions, increasing competition and potentially reducing alcohol prices. However, liberalizing the alcohol market challenges Thailand's goals to control alcohol consumption, mitigate related harms, and protect domestic producers. Key contradictions include Public Health vs. Trade Liberalization: FTAs reduce tariffs and import restrictions, increasing alcohol availability and consumption, conflict with public health policies aimed at controlling alcohol use and its harm. Market Access vs. Regulation: Thailand's strict alcohol sales, advertising, and consumption regulations may face pressure under FTAs to relax, potentially undermining domestic health policies. Domestic Industry Protection vs. Foreign Competition: Tariffs and trade barriers protect Thailand's domestic alcohol industry. FTAs could remove these protections, exposing local businesses to heightened competition from foreign producers, potentially harming local industries.

The questions and uncertainties surrounding these issues served as the impetus for this study, which analyzes the impact of alcohol product liberalization and tax reductions on the alcohol industry in Thailand. The objectives are 1) to analysis of the current tax system structure and the anticipated changes following the implementation of FTAs, 2) to examine elasticity of demand for alcoholic beverages and 3) to investigate Thailand's alcoholic beverage import and export performance, and 4) to forecasting exports and imports under a FTA European zone. This paper is organized as follows: Section 2 informs relevant background. Section 3 details methodology. Section 4 reports results and discussions and Section 5 provides policy recommendations.

2. Relevant Background

Tariff mechanisms impact market balance for imported alcoholic beverages. According to the basic principles of import tariffs and trade Barriers, the variation in natural resources and human expertise across countries results in differing comparative production costs. This disparity is a key driver of international trade. The principle of international trade provides benefits to trading partners and other countries, including increased choices for domestic consumers through a diverse range of imported products, both in terms of quantity and price. Producing countries can leverage their expertise and benefit from the transfer of new technologies through trade, which enhances production and distribution capabilities [1].

However, international trade is complex and multifaceted. Achieving a trade balance between countries with varying economic strengths is crucial. An imbalance may lead to a trade deficit, which can result in a negative balance of payments, potentially destabilizing the currency and harming the country's economy. Additionally, the introduction of new goods and services from abroad may impact local lifestyles and the quality of life in the country [2, 3].

Customs Tax and Its Importance: When importing goods into the Kingdom of Thailand, importers must address customs tariffs, which are considered indirect taxes that can be passed on to consumers, regardless of whether the goods are transported by sea, land, or air. Duty" is commonly used instead of taxation specifically referring to import duty, which is the tax levied on goods entering the Kingdom, and export duty, which applies to goods leaving the Kingdom. Currently, the Customs Department is responsible for collecting customs duties on imports and exports. Additionally, it is tasked with collecting value-added tax (VAT), local development tax, and excise tax on behalf of the Revenue Department and the Excise Department and subsequently transferring these revenues to the respective agencies [4]. Tariffs serve as crucial economic tools with four main roles. First, they generate government revenue to fund national development projects. Second, protection tariffs shield domestic industries by making imported goods more expensive than local products. Third, compensatory tariffs promote domestic industry growth by equalizing tax burdens between imported and domestic goods. Lastly, tariffs regulate consumption by discouraging luxury imports through higher costs and encouraging the use of beneficial products or raw materials by reducing or waiving duties. Overall, tariffs support economic growth, protect local markets, and influence consumer behavior.

Contradictions in FTAs and Alcoholic Beverages: Ricardo [5] states that countries benefit from producing and exporting goods where they have lower opportunity costs than their trading partners while importing goods where opportunity costs are higher. In the context of international trade, alcoholic beverages are often treated as controlled commodities. The World Health Organization (WHO) [6] recommends tax and pricing strategies to reduce alcohol-related harm. These policies influence market dynamics through supply and demand mechanisms, though their effectiveness depends on factors such as market structure, product characteristics, and consumer behavior.

Alcoholic beverages, particularly imported ones, differ from normal goods due to their classification as non-essential luxury items. Typically, priced higher than domestically produced alternatives, their demand is relatively inelastic, showing low sensitivity to price changes but often increasing disproportionately with income. To protect domestic markets, countries may use tariff barriers, such as customs duties, which act as indirect taxes.

These costs are often passed on to consumers, affecting market equilibrium. Understanding how customs tariffs influence this balance is vital when analyzing the trade of imported alcoholic beverages [7, 8].

FTA typically reduces deadweight loss for normal goods, but their broader economic impacts, particularly regarding alcohol, require careful consideration. Alcohol consumption poses significant risks, including health issues, diseases, alcohol-induced fatalities, disabilities from accidents, and other external costs. Addressing these challenges necessitates a thorough and comprehensive assessment. Excise tax policies for alcoholic beverages vary by country and may be based on value (ad valorem taxation) or volume (unitary taxation), depending on the desired consumption control goals. Both approaches raise alcohol prices without affecting income levels, potentially leading to reduced consumption. Thailand employs a mixed taxation system, combining value-based taxes to address luxury consumption and volume-based taxes to target health concerns. This dual approach increases alcohol prices and can help lower consumption levels while reflecting the country's specific needs and context. The choice of taxation method should align with the objectives and circumstances of alcohol regulation [9, 10].

A comprehensive understanding of how FTAs influence alcohol trade can be summarized as follows: Frost, et al. [11] explored how FTAs reduce tariffs and remove regulatory barriers, facilitating smoother trade in the alcohol industry. Williams, et al. [12] focused on the challenges FTAs pose, particularly regarding regulatory harmonization, local production, and the increased competition faced by domestic alcohol producers. Anderson [13] examined how FTAs and policy reforms, along with Brexit, disrupted global alcohol markets by reshaping tariff structures and consumption patterns, especially in Asia. Lee and Jacobs [14] highlighted how FTAs affect tariffs, consumer preferences, and market access, enabling alcohol producers to expand globally. Wittwer and Anderson [13] specifically analyzed the impact of Brexit on the UK alcohol trade, noting how new FTAs with countries like Australia and South Africa could offset Brexit's challenges. Together, these studies illustrate how FTAs reshape the alcohol trade by lowering trade barriers, fostering competition, and opening new markets, while presenting challenges in regulation and market access.

3. Methodology

3.1. Relevant Data

This study analyzes the structure of the current tax system by categorizing alcoholic beverages into three groups: 1) HS 2203 - Beer made from malt (10–15% alcohol content), 2) HS 2204 - Wine (15–20% alcohol content), and 3) HS 2208 - Denatured ethyl alcohol or distilled spirits (30–160% alcohol content). Using data from the United Nations [15] spanning 2013–2022, imports and exports were forecasted through an empirical Polynomial Equation ARIMA Model applied via MATLAB.

Additionally, to examine demand elasticities for imported alcoholic beverages under potential FTA-European scenarios, this study analyzed data from a sample of 320 alcoholic beverage consumers aged 20 and above. A structured questionnaire was used to gather responses to various price reduction scenarios. The research focuses on own-price and cross-price elasticities of demand in reaction to hypothetical price reductions of 5%, 30%, and 60%, following trade liberalization. The analysis covers three major categories: beer, wine, and spirits. Econometric modeling was employed to estimate both own-price and cross-price elasticities across these beverage categories.

3.2. Elasticity of Demand

Elasticity of demand measures how sensitive the quantity demanded of a good or service is to changes in its determinants, such as price, income, or prices of related goods. It provides insight into consumer behavior and helps in pricing strategies, taxation policies, and economic analysis. Types of elasticity of demand and their formulas [16, 17] are as follows:

- Price Elasticity of Demand (PED) measures the responsiveness of quantity demanded to a change in the price of the good.

$$\text{PED} = \frac{\%\ Change\ in\ Quantity\ Demanded}{\%\ Change\ in\ Price} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q},$$

where ΔQ is change in quantity demanded, ΔP is change in price, P is original price, and Q is original quantity demanded.

If elastic demand ($\lceil Elasticity > 1 \rceil$), quantity demanded changes more than proportionally to the determinant such as luxury goods. Otherwise, inelastic demand ($\lceil Elasticity < 1 \rceil$), quantity demand changes less than proportionally such as necessities like food.

- Cross-Price Elasticity of Demand (XED) measures the responsiveness of quantity demanded for one good when the price of another good changes.

$$\text{PED} = \frac{\%\ Change\ in\ Quantity\ Demanded\ of\ Good\ A}{\%\ Change\ in\ Price\ of\ Good\ B} = \frac{\Delta Q_A}{\Delta P_B} \times \frac{P_B}{Q_A},$$

where $\Delta Q_A$is change in quantity demanded for good A, ΔP_B is change in price of good B, P_B is original price of good B, and Q_A is original quantity demanded for Good A.

If positive XED ($\boldsymbol{XED} > 0$), indicating substitutes such as an increase in the price of beer leads to an increase in the demand for wine. Otherwise, negative XED ($XED < 0$), complements such as a decrease in the price of beer lead to an increase in the demand for wine.

3.3. Estimate the ARIMA model via in MATLAB

The ARIMA model equation for ARIMA (p, d, q) can be written as:

$$y_t = c + \theta_1 y_{t-1} + \theta_2 y_{t-2} + \cdots + \theta_p y_{t-p} + \sigma_1 \vartheta_{t-1} + \sigma_2 \vartheta_{t-2} + \cdots + \sigma_q \vartheta_{t-q} + \varepsilon_t$$

where: y_t is the value of the time,
$\theta_1, \ldots \theta_p$ are the coefficients for the AR terms (autoregressive part),
$\vartheta_1, \ldots \vartheta_q$ are the coefficients for the MA terms (moving average part),
ε_t are the residual errors or noise terms.

In MATLAB, Maximum Likelihood Estimation (MLE) is used to estimate the parameters of an Autoregressive Integrated Moving Average: ARIMA model by finding the parameter values that maximize the likelihood of observing the given data, under the assumption that the errors (residuals) of the model follow a normal distribution. The likelihood function represents the probability of observing the given data, given the model parameters. For ARIMA models, the likelihood function assumes that the residuals: ε_t follow a normal distribution, $\varepsilon_t \sim N(0, \sigma^2)$, where σ^2 is the variance of the errors. The likelihood function for an ARIMA model is:

$$L(\theta, \vartheta, \sigma^2) = \prod_{t=1}^{n} f\left(y_t | y_{t-1}, \ldots, y_{t-p}, \varepsilon_{t-1}, \ldots, \varepsilon_{t-q}; \theta, \vartheta, \sigma^2\right)$$

where $f\left(y_t | y_{t-1}, \ldots, y_{t-p}, \varepsilon_{t-1}, \ldots, \varepsilon_{t-q}; \theta, \vartheta, \sigma^2\right)$ is the conditional probability density function of y_t, given its past values and errors, parameterized by $\theta, \vartheta, \sigma^2$. It is more convenient to work with the log-likelihood function because the product of probabilities can become very small. The log-likelihood function is:

$$l(\theta, \vartheta, \sigma^2) = \sum_{t=1}^{n} \log\left(f\left(y_t | y_{t-1}, \ldots, y_{t-p}, \varepsilon_{t-1}, \ldots, \varepsilon_{t-q}; \theta, \vartheta, \sigma^2\right)\right)$$

This transforms the product into a sum and simplifies the optimization process. For maximizing the Log-Likelihood, the goal of MLE is to find the values of $\theta_1, \ldots \theta_p$, $\vartheta_1, \ldots \vartheta_q$, and σ^2 that maximize the log-likelihood function. This is typically done using optimization techniques Newton-Raphson method or BFGS (Broyden–Fletcher–Goldfarb–Shanno) algorithm, among others, are commonly used for this optimization or Gradient-based methods: These methods use the gradient (or derivative) of the log-likelihood function with respect to the parameters to find the values of the parameters that maximize the function.

In MATLAB, the function estimate is used to fit an ARIMA model to the data and find the best-fitting parameters using MLE. The estimate function applies numerical optimization techniques to maximize the log-likelihood function [18-20].

4. Results and Discussions

4.1. Current Tax System Structure and Impact of FTA Implementation on Alcoholic Beverages

Alcoholic beverages possess distinct characteristics that set them apart from typical goods. They are classified as non-essential, with imported alcoholic beverages often considered premium goods, typically more expensive than domestically produced options. The demand for these products tends to increase disproportionately to rises in income or price changes, with consumers showing relatively low sensitivity to fluctuations in income and price. This study analyzes the expected changes in the tax structure for alcoholic beverages in Thailand resulting FTAs. Initially, it considers the preliminary tax structure for imported alcoholic beverages, which includes four types of taxes and eight specific items: 1) Value Added Tax (VAT) at 7%, 2) Customs Duty (import tax based on price), 3) Excise Tax (imposed based on value and volume), and 4) Maintenance Fund (Local Government 10%, Health Promotion Fund 2%, Public Broadcasting Service of Thailand 1.5%, Sports Development Fund 2%, and Elderly Fund 2%). The study categorizes the changes in the tax structure into three product groups (Figure 1).

as follows:

- For Beer (HS2203) with 5% alcohol content in a 450 ml. can, the tax structure includes: *customs duty* (28% of the retail price), VAT (10%), excise duty (53% from both value and volume), and maintenance fees (9%). Assuming the FTA eliminates customs duty, this can result in 19.3% price drop adjustments relative to the original pricing structure.
- For Wine (HS2204) with 14.50% alcohol content in a 750 ml., the tax structure includes: *customs duty* (40% of the retail price), VAT (12%), excise duty (41% from both value and volume), and maintenance fees (7%). Assuming the FTA eliminates customs duty, this can result in 22.8% price drop adjustments relative to the original pricing structure.
- For ethyl alcohol or distilled Spirits (HS2208) with 40% alcohol content in a 750 ml., the tax structure includes: *customs duty* (56% of the retail price), VAT (13%), excise duty (27% from both value and volume), and

maintenance fees (4%). Assuming the FTA eliminates customs duty, this can result in 35.5% price drop adjustments relative to the original pricing structure.

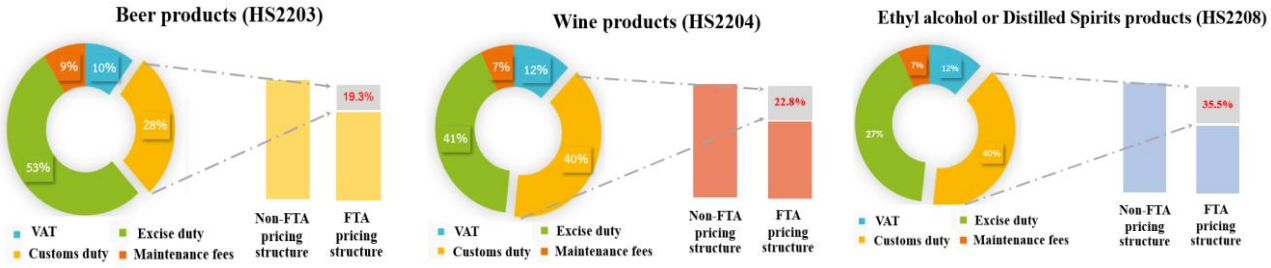


Figure 1.
Effects of price adjustments relative to the original pricing structures.

With the implementation of FTAs, the tax structure will be adjusted to a zero percent customs tariff (Zero Tariff) under the Harmonized System. This adjustment is anticipated to impact the domestic retail price, which will be recalculated based on VAT at 7%, CIF price, zero customs tariff, excise tax, and maintenance fees, while excluding marketing costs due to lack of company-disclosed information on alcohol beverage pricing. This limits insight into the full cost structure, including marketing, distribution, and profit margins. Without this data, it's difficult to predict how zero customs duties will impact final alcohol prices.

Despite lower import prices from the elimination of customs tariffs, undisclosed marketing costs remain a challenge. Industry leaders say adjusting prices under FTAs is difficult as it could damage the premium image of imported alcoholic beverages. Therefore, while the FTA may lower prices compared to pre-FTA domestic prices, actual pricing will still be influenced by factors beyond the FTA tax system. Interviews with alcoholic beverage industry entrepreneurs reveal that adjusting prices due to the FTA is challenging, as it could harm the premium image of imported beverages. While the FTA may lower prices, excluding marketing costs, the final retail price is still influenced by various business factors beyond the FTA tax system. Although the FTA may reduce prices, the impact will depend on specific business conditions.

4.2. Elasticity of Demand for Alcoholic Beverages

The demand elasticity for imported alcoholic beverages (beer, wine, spirits) was analyzed using structured questionnaires, assessing own-price and cross-price elasticity under hypothetical price reductions of 5%, 30%, and 60% due to trade liberalization**.** The Table 1 shows statistically significant inelastic demand elasticity for beer (0.418–0.420), wine (0.662–0.675), and spirits (0.832–0.876), indicating inverse price-consumption relationships. A 1% price change leads to less than a 1% demand change, aligning with Fogarty [21] findings. For example, a 5% drop in imported beer increases consumption by 0.42%. The price elasticity of demand for all alcoholic beverage types is inelastic, indicating that alcoholic beverages have few substitutable alternatives. When alcoholic beverage prices change by 1%, the demand quantity changes by less than 1%, consistent with Fogarty [21]. For example, the imported beer's price decreases 5% due to trade liberalization, its consumption will increase 0.42%.

The analysis reveals statistically significant cross-price elasticity for wine and spirits, indicating they are substitutes for other alcoholic beverages. When substitute prices rise (fall), demand for wine and spirits also rises (falls). Wine's cross-price elasticity is 1.030 (5% significance), while spirits range from 0.318–0.395 (5% and 1% significance). These findings confirm that consumers view wine and spirits as substitutable, consistent with Gallet [22] study. This indicates that consumers view wine and spirits as substitutable with other alcoholic beverages. Therefore, wine, spirits, and other alcoholic beverages are substitute goods, aligning with Gallet [22].

Table 1.
Elasticity of Demand for Imported Alcohol Beverages.

Elasticity of Demand	Alcohol Beverage Price Reduction	Beer	Wine	Spirits
Own-price Elasticity of Demand	0%	0.418***	0.662**	0.832***
	5%	0.420**	0.686**	0.862***
	30%	0.420**	0.675**	0.865***
	60%	0.419**	0.673***	0.876***
Cross-price Elasticity of Demand	5%	0.234	1.030**	0.325***
	30%	0.222	1.030**	0.318***
	60%	0.209	1.030**	0.396**

Note: **, *** indicate statistical significance at 5% and 1% level, respectively.

Analysis of FTA impacts on imported alcohol consumption reveals significant but inelastic demand responses across all beverage categories, with own-price elasticities ranging from 0.418-0.420 for beer, 0.662-0.675 for wine, and 0.832-0.876 for spirits ($p < 0.05$). The inelastic demand indicates that FTA-driven price reductions would result in less than proportional increases in consumption. Cross-price elasticity analysis demonstrates significant substitution effects only between wine (1.030) and spirits (0.318-0.395), suggesting these categories serve as substitute goods, while beer

consumption remains relatively independent. These findings, consistent with previous research, indicate that while trade liberalization would influence consumption patterns through price reductions, the overall impact would be moderate due to the inelastic demand characteristics of alcoholic beverages.

4.3. Thailand's Alcoholic Beverage Import and Export Landscape

The United Nations [15] shows that Thailand's alcoholic beverage imports from 2013 to 2022 are categorized into Beer (HS2203), Wine (HS2204), and Spirits (HS2208). From top five trading partners as detailed in Figures 2, Beer is mainly imported from Vietnam, China, Singapore, Belgium, and Germany. Wine comes from France, Australia, Chile, Italy, and the U.S. Spirits are sourced from England, France, the U.S., Vietnam, and Australia. Belgium, Germany, France, Italy, and the U.K. are key trading partners, particularly in the context of free trade in alcoholic beverages.

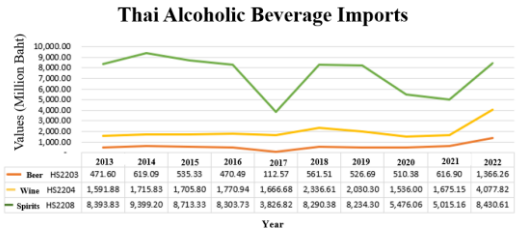
Thailand's alcohol beverage exports to its top five trading partners, categorized by three types. Beer (HS2203) is exported to Myanmar, Cambodia, Japan, the United Arab Emirates, and Singapore. Wine (HS2204) is exported to Myanmar, Cambodia, Laos, Vietnam, and Japan. Spirits (HS2208) are exported to Myanmar, Japan, Cambodia, Vietnam, and Singapore. Notably, none of Thailand's trading partners in this group have agreed to open free trade for all three types of alcoholic beverages.

Types of Beverage	Thailand's Import trading partners
Beer HS2203)	Vietnam, China, Singapore, Belgium, Germany
Wine (HS2204)	France, Australia, Chile, Italy, United States
Spirits (HS2208)	England, France, USA, Vietnam, Australia

2(a) Thailand's Import trading partners

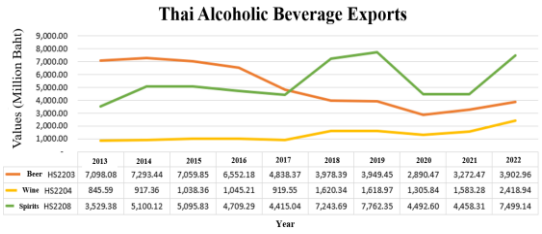
Types of Beverage	Thailand's Export trading partners
Beer HS2203)	Myanmar, Cambodia, Japan, United Arab Emirates and Singapore
Wine (HS2204)	Myanmar, Cambodia, Laos, Vietnam and Japan
Spirits (HS2208)	Myanmar, Japan, Cambodia, Vietnam and Singapore

2(b) Thailand's Export trading partners



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Beer HS2203	471.60	619.09	535.33	470.49	112.57	561.51	526.69	510.38	616.90	1,366.26
Wine HS2204	1,591.88	1,715.83	1,705.80	1,770.94	1,666.68	2,336.61	2,030.30	1,536.00	1,675.15	4,077.82
Spirits HS2208	8,393.83	9,399.20	8,713.33	8,303.73	3,826.82	8,290.38	8,234.30	5,476.06	5,015.16	8,430.61

2(c) Thai Alcoholic Beverage Import Values

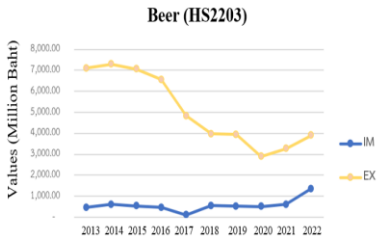


	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Beer HS2203	7,098.08	7,293.44	7,059.85	6,552.18	4,838.37	3,978.39	3,949.45	2,890.47	3,272.47	3,902.96
Wine HS2204	845.59	917.36	1,038.36	1,045.21	919.55	1,620.34	1,618.97	1,305.84	1,583.28	2,418.94
Spirits HS2208	3,529.38	5,100.12	5,095.83	4,709.29	4,415.04	7,243.69	7,762.35	4,492.60	4,458.31	7,499.14

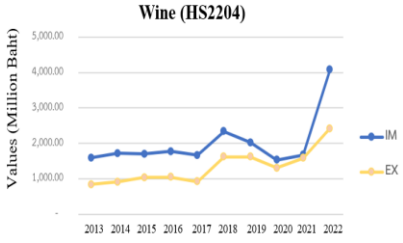
2(d) Thai Alcoholic Beverage Export Values

Figure 2.
Thailand's Alcoholic Beverage Import and Export Landscape.

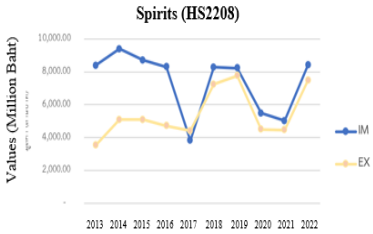
Beer (HS2203) shows a trade surplus, with exports exceeding imports, while Wine (HS2204) and Spirits (HS2208) have trade deficits. The period from 2016 to 2017 saw excise tax adjustments under the Excise Tax Act B.E. 2560, causing pricing volatility in the alcoholic beverage market. From 2021 onward, as the economy recovered from the COVID-19 pandemic, both exports and imports increased. Thailand's alcoholic beverage market is closely linked to the ASEAN Economic Community (AEC), particularly the CLMV countries—Myanmar, Cambodia, Laos, and Vietnam (Figures 3 (a-c)).



3(a) Beer trade balance



3(b) Wine trade balance

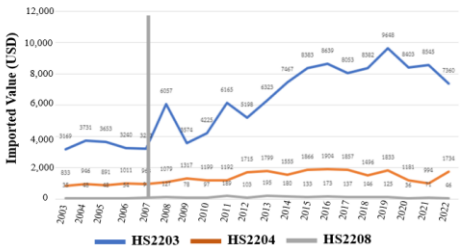


3(c) Spirits trade balance

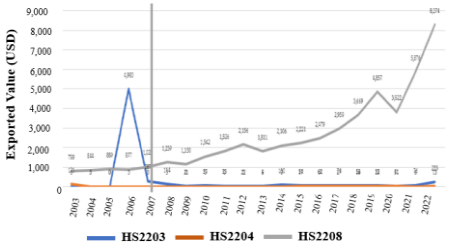
Figure 3.
Comparison of Export and Import Values for Alcoholic Beverages.

4.4. Empirical data on Imports-Exports of Alcoholic Beverages under FTAs of Trading Partners

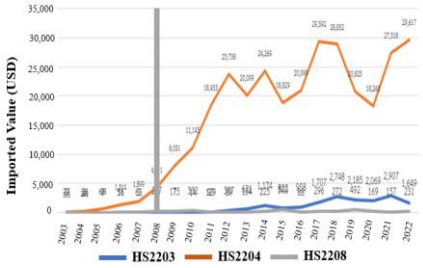
Countries with bilateral or multilateral FTAs generally see increased imports and exports of alcoholic beverages after implementation. However, this trend varies by beverage type and the reputation of the producing country. For example, FTAs such as those between Japan and Thailand (2007), China and New Zealand (2008), and the EU and South Korea (2015) have shown differing effects, as illustrated in Figures 4(a) - 4(h).



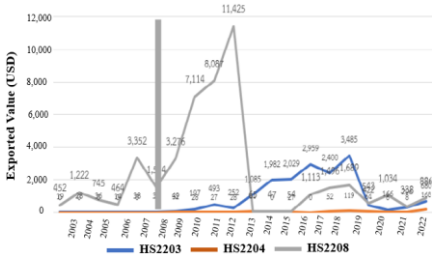
4(a) Imports of Japanese - Thailand (2007)



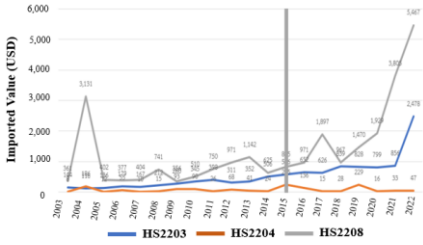
4(b) Exports of Japanese - Thailand (2007)



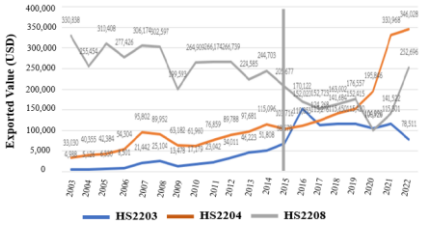
4(c) Imports of China - New Zealand (2008)



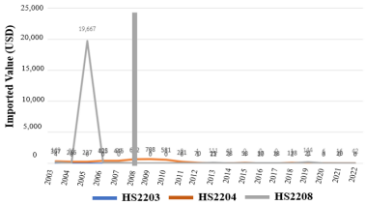
4(d) Exports of China - New Zealand (2008)



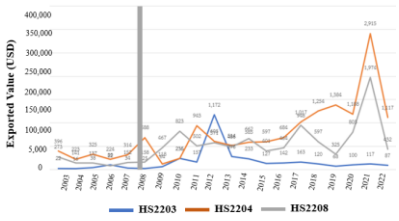
4(e) Imports of EU - South Korea (2015)



4(f) Exports of EU - South Korea (2015)



4(g) Imports of EU - Saudi Arabia (2008)



4(h) Exports of EU - Saudi Arabia (2008)

Figure 4.
Import - Export Value of Alcohol Beverages under FTAs of various trading partners.

Social characteristics, culture, and religion influence trade trends, as seen in the EU-Saudi Arabia trade of alcoholic beverages. Despite low imports of alcohol from Saudi Arabia due to strict regulations based on Islamic law, EU exports to Saudi Arabia have increased following a Free Trade Agreement (FTA). Saudi Arabia's alcohol production remains illegal, limiting its alcohol industry and exports to the EU. In contrast, the EU has a strong, established alcohol industry with global demand. While FTAs can boost economic growth by opening markets, they require careful management to address social and cultural impacts, ensuring benefits without harm to social well-being.

4.5. Forecasting of Alcoholic Beverage imports under the European FTA

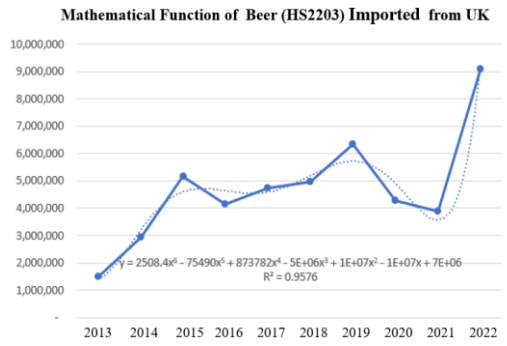
The analysis of Thailand's alcoholic beverage trade highlights the absence of European countries among the top five trading partners. To address this gap, the study incorporates statistical data on alcoholic beverage imports and exports for two key markets: the United Kingdom (UK) and the European Union (EU), offering a comprehensive examination of trade patterns in these regions. The study uses trade data from 2013–2022 and applies regression analysis to select the optimal polynomial function based on R-squared values. For forecasting, the Auto Regressive Integrated Moving Average (ARIMA) model in MatLab is used to predict the next eight years.

In the absence of an FTA, growth rate data from Thailand and Vietnam before and after their FTAs is used for predictive modeling. The analysis includes two scenarios: Scenario 1 (with an FTA) and Scenario 2 (without an FTA). The Information and Communication Technology Center, Ministry of Commerce 2023, provides data on alcohol imports from the UK and EU.

4.5.1. The prediction of Alcohol Beverages Import-Export

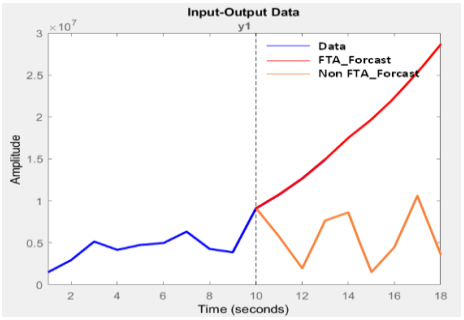
4.5.1.1. The prediction of Beer Imports from the UK and EU to Thailand

This study analyzes Beer import trends from UK to Thailand using a sixth-degree polynomial equation: $y=2508.4x^6-75490x^5+873782x^4-5E+06x^3+1E+07x^2-1E+07x+7E+06$, $R^2 = 0.9576$. It captures 95.76% of the variation, showing a clear upward trend (Figures 5(a)- 5(b)). The ARIMA model forecasts dynamic predictions: Scenario 1 (under an FTA) shows steady growth due to reduced tariffs and increased market access, while Scenario 2 (non-FTA) predicts stability with little change in import levels, reflecting baseline demand without external trade incentives.

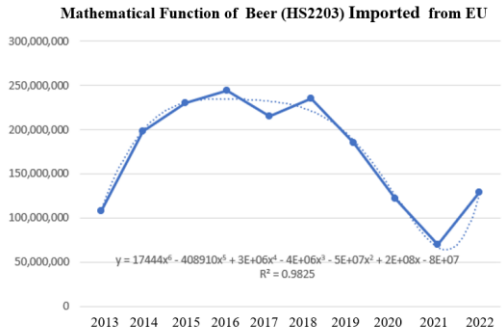


Polynomial Equation: $y = 2508.4x^6 - 75490x^5 + 873782x^4 - 5E+06x^3 + 1E+07x^2 - 1E+07x + 7E+06$, $\mathbf{R^2} = 0.9576$

5(a) Mathematical Function (Beer from UK)

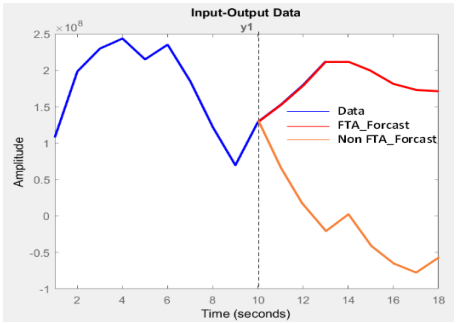


5(b) FTA and Non-FTA of Beer Forecast from UK



Polynomial Equation: $y = 17444x^6 - 408910x^5 + 3E+06x^4 - 4E+06x^3 - 5E+07x^2+2E+08x - 8E+07$, $\mathbf{R^2} = 0.9825$

5(c) Mathematical Function (Beer from EU)



5(d) FTA and Non-FTA of Beer Forecast from EU

Figure 5.
Estimated value of Beer (HS2203) Imports from UK and EU to Thailand.

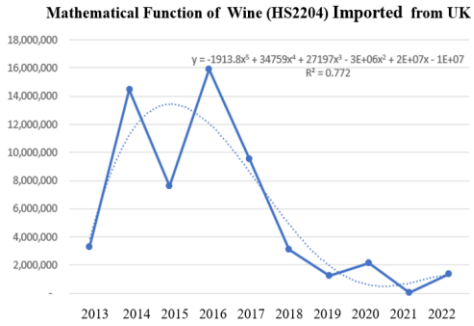
For EU market, the forecasted Beer import from EU using a polynomial equation:

$y= 17444x^6-408910x^5+3E+06x^4-4E+06x^3-5E+07x^2+2E+08x-8E+07$, $R^2 = 0.9825$. The Beer import trend is modeled with 98.25% accuracy (Figures 5(c)- 5(d)). Forecasting with the ARIMA model reveals two distinct scenarios: Scenario 1 (FTA): Beer imports show an increasing trend, driven by the reputation and popularity of EU Beer, though a decline in value may occur in subsequent periods. Scenario 2 (Non-FTA): Beer imports exhibit a consistent downward trend, reflecting reduced market demand without trade incentives.

4.5.1.2. The Prediction of Wine Imports from UK and EU

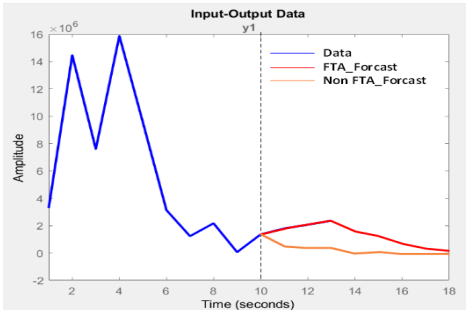
This study analyzes wine import from Thailand to the UK using a polynomial equation: $y=-1913.8x^5+34759x^4+27197x^3-3E+06x^2+2E+07x-1E+07$, $R^2 = 0.7720$.

The Accuracy is at 77.20% (Figures 6(a)- 6(b)). Then, wine import was forecasted by applying ARIMA model. Scenario1: FTA forecast has an increasing import trend but not at a very high jump level while Scenario2: Non - FTA forecast has a stable wine import trend, at the same level as before trade liberalization.

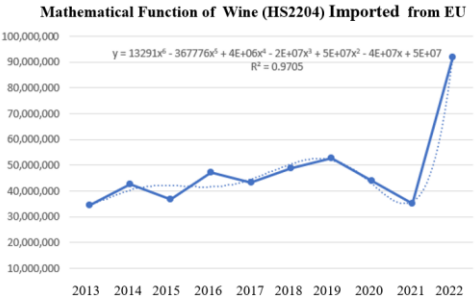


Polynomial Equation: $y = -1913.8x^5 + 34759x^4 + 27197x^3 - 3E+06x^2 + 2E+07x - 1E+07$, $\mathbf{R^2} = 0.7720$

6(a) Mathematical Function (Wine from UK)

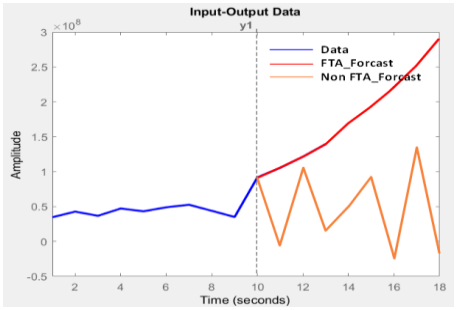


6(b) FTA and Non-FTA of Wine Forecast from UK



Polynomial Equation: $y = 13291x^6 - 367776x^5 + 4E+06x^4 - 2E+07x^3 + 5E+07x^2 - 4E+07x + 5E+07$, $\mathbf{R^2} = 0.9705$

6(c) Mathematical Function (Wine from EU)



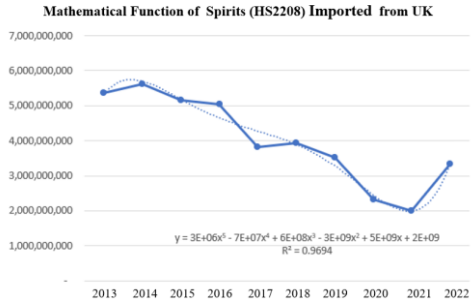
6(d) FTA and Non-FTA of Wine Forecast from EU

Figure 6.
Estimated value of Wine (HS2204) Imports from UK and EU to Thailand.

For EU market, the forecasted Beer import using a polynomial equation: y=13291x6-367776x5+4E+06x4-2E+07x3+5E+07x2-4E+07x+5E+07, $R^2 = 0.9705$. The wine import trend from Thailand to the EU is modeled with 97.05% accuracy (Figures 6(c)- 6(d)). Forecasting with the ARIMA model reveals two distinct scenarios: Scenario 1: the FTA forecast indicates a steady upward trend in wine imports, reflecting the strong reputation and popularity of wines from the EU market. Scenario 2: the non-FTA forecast reveals significant volatility in wine imports t.

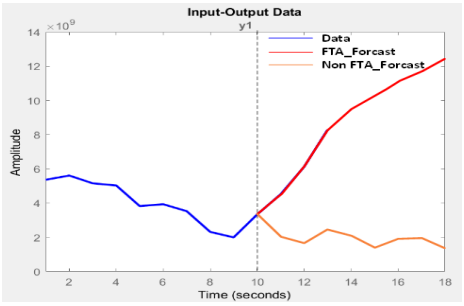
4.5.1.3. The Prediction of Spirits Imports from UK and EU

This study analyzes spirits import from Thailand to UK using a polynomial equation: $y=3E+06x^5-7E+07x^4+6E+08x^3-3E+09x^2+5E+09x+2E+09$, $R^2 = 0.9694$. The accuracy is 96.94% (Figures 7(a)-7(b)). The ARIMA model forecasted spirits imports, with two scenarios: Scenario 1 (under an FTA) shows a continuous increase in imports, driven by the reputation of UK products and reduced trade barriers, enhancing market access and demand. Scenario 2 (non-FTA) projects stable import levels, consistent with pre-liberalization periods, reflecting normal consumer demand without trade incentives.

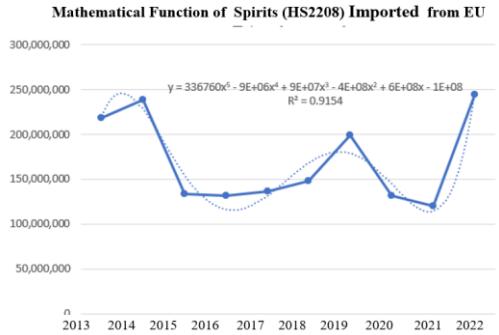


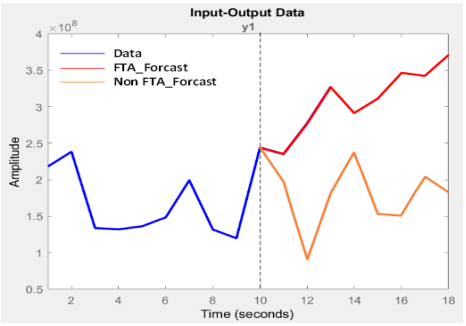
Polynomial Equation: $y=3E+06x^5 - 7E+07x^4 + 6E+08x^3 - 3E+09x^2 + 5E+09x + 2E+09$, $\mathbf{R^2} = 0.9694$

7(a) Mathematical Function (Spirits from UK)



7(b) FTA and Non-FTA of Spirits Forecast from UK





Polynomial Equation: $y = 336760x^5 - 9E+06x^4 + 9E+07x^3 - 4E+08x^2 + 6E+08x - 1E+08$, $\mathbf{R^2} = 0.9154$

7(c) Mathematical Function (Spirits from EU) 7(d) FTA and Non-FTA of Spirits Forecast from EU

Figure 7.
Estimated value of Spirits (HS2208) Imports from UK and EU to Thailand.

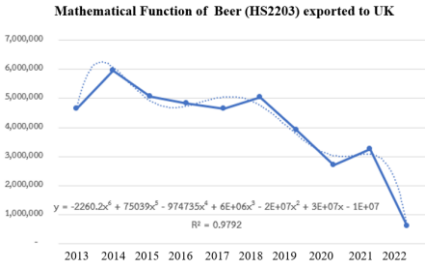
For EU market, the forecasted Beer import using a polynomial equation: $y=336760x^5-9E+06x^4+9E+07x^3-4E+08x^2+6E+08^x-1E+08$, $R^2= 0.9154$. The accuracy is 91.54% (Figures 7(c)-7(d)). Scenario 1: FTA forecast shows a tendency for continuous increase in imports, with the reputation and popularity of liquor from EU market, while Scenario 2: Non-FTA forecast shows fluctuations, with a tendency to remain at the same level as before free trade, reflecting the normal situation in a situation where there are no factors that stimulate consumer drinking.

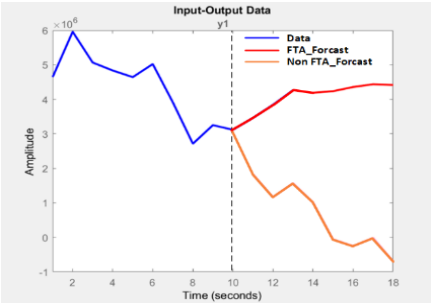
4.5.2. The Prediction of Alcohol Beverages Export from Thai to UK and EU

4.5.2.1. The Prediction of Beer Exports to UK and EU

This study analyzes Thai Beer to UK using a polynomial equation:

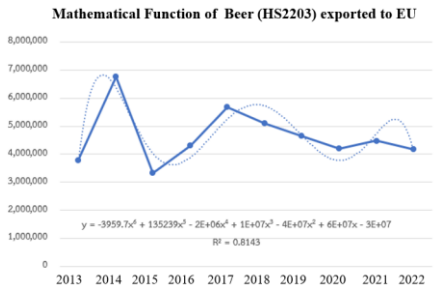
$y=-2260.2x^6+75039x^5-974735x^4+6E+06x^3-2E+07x^2+3E+07x-1E+07$, $R^2 = 0.9792$, indicating 97.92% accuracy (Figures 8(a)-8(b)). The equation highlights a general growth trend in export values. Additionally, the ARIMA model was applied for scenario-based forecasting. Under Scenario 1 (FTA), exports are expected to continuously increase due to reduced trade barriers. In Scenario 2 (Non-FTA), exports show a declining trend, reflecting the adverse effects of higher tariffs and reduced market competitiveness.

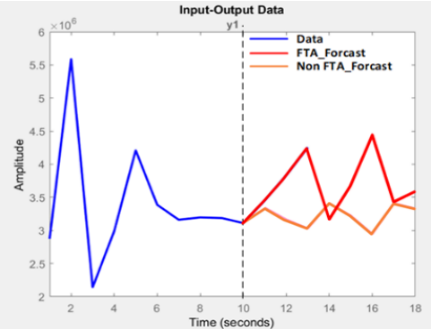




Polynomial Equation: $y=-2260.2x^6 + 75039x^5 - 974735x^4 + 6E+06x^3 - 2E+07x^2 + 3E+07x - 1E+07$, $R^2 = 0.9792$

8(a) Mathematical Function (Beer to UK) 8(b) FTA and Non-FTA of Beer Forecast to UK





Polynomial Equation: y = -3959.7x6 + 135239x5 - 2E+06x4 + 1E+07x3 - 4E+07x2 + 6E+07x - 3E+07, $\mathbf{R^2} = 0.8143$.

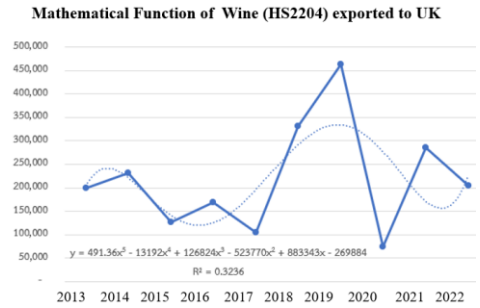
8(c) Mathematical Function (Beer to EU) 8(d) FTA and Non-FTA of Beer Forecast to EU

Figure 8.
Estimated value of Beer (HS2203) Export to UK and EU from Thailand.

For EU market, the forecasted Beer import using a polynomial equation: $y=-3959.7x^6+135239x^5-2E+06x^4+1E+07x^3-4E+07x^2+6E+07x-3E+07$, $R^2 = 0.8143$. The accuracy is 81.43% (Figures 8(c)-8(d)). Scenario 1: FTA forecast: Thai Beer export trends to EU market are volatile but tend to increase, while Scenario 2: Non-FTA forecast: volatile but the level of increase is less than the level of trade liberalization.

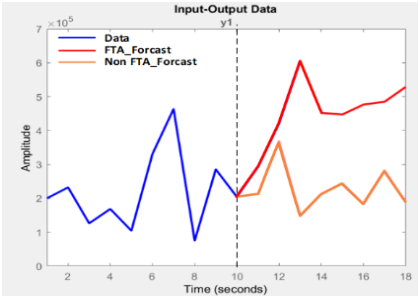
4.5.2.2. The Prediction of Wine Exports to UK and EU Markets

This study analyzes Thai Wine export to the UK using a polynomial equation: $\mathbf{y}=491.36x^5-13192x^4+126824x^3-523770x^2+883343x-269884$**,** $R^2 = 0.7236$, indicating 72.36% accuracy in explaining export trends (Figures 9(a)-9(b)). The equation highlights a general growth trend in export values. Additionally, the ARIMA model was applied for scenario-based forecasting. Scenario 1: FTA forecast trend of Thai Wine exports to UK market is volatile but tends to increase but tends to decrease after some time, while Scenario 2: Non - FTA forecast is highly volatile and at the same level as before the trade liberalization.

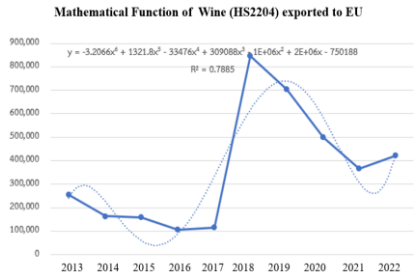


Polynomial Equation: $y=491.36x^5 - 13192x^4 + 126824x^3 - 523770x^2 + 883343x - 269884$**,** $\mathbf{R^2} = 0.723$

9(a) Mathematical Function (Wine to UK)



9(b) FTA and Non-FTA of Wine Forecast to UK



Polynomial Equation: $\mathbf{y=}$ $-3.2066x^6 + 1321.8x^5 - 33476x^4 + 309088x^3 - 1E+06x^2 + 2E+06x - 750188$, $R^2 = 0.7885$

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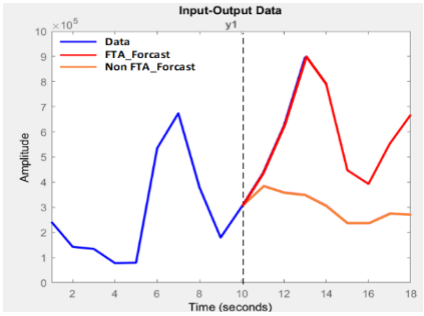


9(c) Mathematical Function (Wine to EU)

9(d) FTA and Non-FTA of Wine Forecast to EU

Figure 9.
Estimated value of Wine (HS2204) Exports to UK and EU from Thailand.

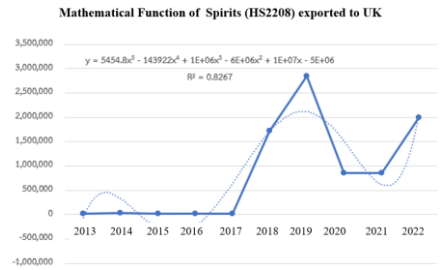
For EU market, the forecasted Wine export using a polynomial equation:

$y=-3.2066x^6+1321.8x^5-33476x^4+309088x^3- E+06x^2+2E+06x-750188$, $R^2 = 0.7885$. The accuracy is 78.85% (Figures 9(c)-9(d)). Scenario 1: FTA forecast Thai Wine exports to EU market are highly volatile, with an upward trend but a downward trend over time, while Scenario 2: Non - FTA forecast shows a downward trend but not much different from pre-free trade levels.

- *The prediction of Spirits exports to the UK and EU*

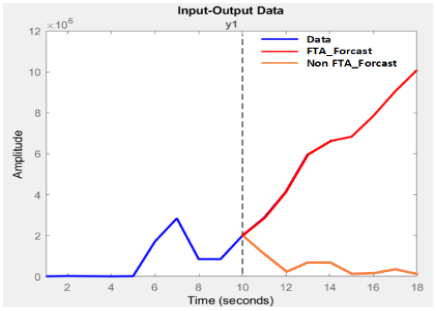
This study analyzes Thai Spirits export to the UK using a polynomial equation:

$y = 5454.8x^5-143922x^4+1E+06x^3-6E+06x^2+1E+07x-5E+06$, $R^2 = 0.8267$, indicating 82.67% accuracy in explaining export trends (Figures 10(a)-10(b)). Scenario 1: FTA forecast Thai liquor exports to the UK market tend to increase continuously, while Scenario 2: Non-FTA forecast tends to decrease but not much different from the pre-free trade level.

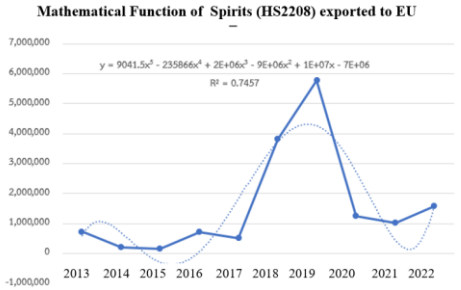


Polynomial Equation: $y = 5454.8x^5 - 143922x^4 + 1E+06x^3 - 6E+06x^2 + 1E+07x - 5E+06$, $\mathbf{R^2} = 0.8267$

10(a) Mathematical Function (Spirits to UK)

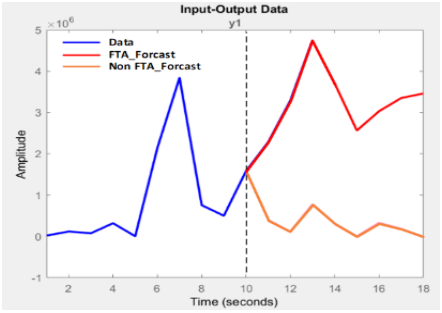


10(b) FTA and Non-FTA of Spirits Forecast to UK



Polynomial Equation: $y = 9041.5x^5 - 35866x^4 + 2E+06x^3 - 9E+06x^2 + 1E+07x - 7E+06$, $\mathbf{R^2} = 0.7457$

10(c) Mathematical Function (Spirits to EU)



10(d) FTA and Non-FTA of Spirits Forecast to EU

Figure 10.
Estimated value of Spirits (HS2208) Exports to UK and EU from Thailand.

For EU market, the forecasted Thai Spirits export using a polynomial equation:
$y=9041.5x^5-235866x^4+2E+06x^3-9E+06x^2+1E+07x-7E+06$, $R^2 = 0.7457$. The accuracy is 74.57% (Figures 10(c)-10(d)). Scenario 1: FTA forecast liquor exports to the UK are expected to increase but are highly volatile, with a downward trend over time. Meanwhile, Scenario 2: Non-FTA forecast shows a downward trend but not very different from pre-free trade levels.

5. Policy Recommendations

- Customs tariffs play a critical role in shaping the market for imported alcoholic beverages in small countries like Thailand. As price takers, these countries lack the bargaining power to influence world prices. When tariffs are imposed, the cost of imported alcohol increases by the full tariff rate, directly affecting its domestic price. The supply curve for imported goods is perfectly elastic, indicating a fixed global price irrespective of local policies. This dynamic creates a price gap between imported and domestically produced alcohol, making local beverages more affordable and competitive. As a result, consumers may shift preferences toward domestic products. While tariffs support local industries, they also limit the market share of imported goods. The policy highlights the balance between protecting domestic producers and influencing market equilibrium in small economies.
- Customs tariffs significantly impact on the alcoholic beverage market. Before international trade, domestic supply and demand were balanced. However, opening trade introduced imported alcoholic beverages, altering market dynamics. Tariffs imposed on imports raised domestic prices for imported beverages, reducing their consumption and increasing domestic production. While this benefits local industries, it decreases consumer surplus-the satisfaction from paying less than the maximum consumers is willing to pay. The higher prices caused by tariffs reduce CS and result in economic inefficiencies, known as Dead-Weight Loss. These losses occur as consumers buy less, and the economic value cannot be recovered. Thus, while tariffs protect domestic producers, they impose costs on consumers and reduce market efficiency.
- The tax structure changes following Trading partner's FTA entry reveal that alcoholic beverages differ significantly from regular goods. Classified as luxury and non-essential, imported alcoholic beverages are typically more expensive than domestically produced ones. Their demand responds minimally to changes in income or price, as consumers are less sensitive to these factors and lack access to detailed business information. Although FTA-related tax reductions might lower expected prices (excluding marketing costs) compared to pre-FTA domestic retail prices, the actual retail prices in the alcoholic beverage market remain influenced by broader business factors. These include marketing strategies and other operational considerations, beyond the direct impact of FTA tax adjustments.

- Empirical data on the imports and exports of alcoholic beverages under FTAs reveal an upward trend following the implementation of bilateral or multilateral agreements. However, the extent of this increase varies depending on the type of beverage and the reputation or popularity of the producing country.
- Predicting the impact of FTAs on alcoholic beverage consumption using elasticity shows that the demand for beer, wine, and liquor is statistically significant. This indicates that price changes in alcoholic beverages inversely affect consumption. When prices rise (or fall), demand decreases (or increases) accordingly. However, the demand for all types of alcoholic beverages is inelastic, meaning these products have few substitutes. Even with a 1% price change, the corresponding change in demand is less than 1%, reflecting the limited sensitivity of consumers to price variations for alcoholic beverages.
- FTAs play a crucial role in driving an open economy within the global market. By reducing or eliminating import taxes on goods, FTAs make products more affordable and competitive internationally while creating opportunities for increased trade and investment. They also reduce barriers and taxes on foreign investments, stimulating economic growth by boosting national income, especially for normal goods. However, alcoholic beverages differ significantly from normal goods. Considered luxury and non-essential items, particularly imported alcoholic beverages, their demand is relatively unaffected by changes in income or price. Despite their economic role, alcohol consumption poses significant health risks, impacting both households and national populations. These risks burden public health systems, requiring substantial budget allocation to address alcohol-related health issues and accidents, which contribute to broader social and public health challenges.
- Stimulating the economy through the alcoholic beverage industry, whether via trade or investment, can generate significant income for the country. However, the international trade and investment market must consider the trade balance, whether it results in a surplus or a deficit.
- In cases of a deficit, government policies may need to be reassessed. Balancing economic stimulus with public health considerations is a complex challenge. It requires thorough study and analysis of stakeholders' interests to ensure that promoting trade and investment in the global market is both effective and sustainable.

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