



Faculty of Economics and Business

Factors Affecting China's Tea Exports to Malaysia

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Factors Affecting China's Tea Exports to Malaysia

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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ABSTRACT

This study aims to explore the factors affecting China's tea exports to Malaysia and their long-term and short-term dynamic impacts, so as to deepen China-Malaysia trade relations. Based on demand theory, this study mainly adopts the Autoregressive Distributed Lag (ARDL) approach to conduct an empirical analysis using quarterly data from 2005 to 2024. It focuses on examining the impacts of variables such as the price of China's tea imported by Malaysia, the price of coffee imported by Malaysia, Malaysia's GDP, Malaysia's tea production, and international oil price on the export volume. The empirical results show that an increase in the price of China's tea significantly inhibits export volume in the long-term. As a substitute, coffee price exhibits a significantly negative impact in the long-term, indicating that tea and coffee in Malaysia do not have a conventional substitution relationship. Malaysia's GDP has a significantly positive impact in the long-term, while local tea production and international oil price exert significantly negative long-term impact on China's tea exports. The findings from Granger causality test further indicate that the price of China's tea, the price of coffee, and GDP of Malaysia can Granger cause the China's tea exports to Malaysia in the short-run. This study provides targeted reference suggestions for enterprises and policymakers to promote the development of China-Malaysia tea trade, filling the gap in the literature.

Keywords: China-Malaysia tea trade, export factors, ARDL approach, demand theory.

Faktor Mempengaruhi Eksport Teh China ke Malaysia

ABSTRAK

Kajian ini bertujuan untuk meneroka faktor-faktor yang mempengaruhi eksport teh China ke Malaysia serta impak dinamik jangka panjang dan jangka pendeknya, dengan tujuan untuk memperdalam hubungan perdagangan antara China dan Malaysia. Berdasarkan teori permintaan, kajian ini menggunakan pendekatan Autoregressive Distributed Lag (ARDL) untuk menjalankan analisis empirikal dengan menggunakan data suku tahunan dari tahun 2005 hingga 2024. Fokus kajian ini adalah untuk mengkaji impak pembolehubah seperti harga teh China yang diimport oleh Malaysia, harga kopi yang diimport oleh Malaysia, KDNK Malaysia, pengeluaran teh tempatan Malaysia, dan harga minyak antarabangsa terhadap jumlah eksport. Keputusan empirikal menunjukkan bahawa peningkatan harga teh China secara signifikan menghalang jumlah eksport dalam jangka panjang. Sebagai pengganti, harga kopi menunjukkan impak negatif yang signifikan dalam jangka panjang, menunjukkan bahawa teh dan kopi di Malaysia tidak mempunyai hubungan penggantian konvensional. KDNK Malaysia mempunyai impak positif yang signifikan dalam jangka panjang, manakala pengeluaran teh tempatan dan harga minyak antarabangsa memberi impak negatif yang signifikan terhadap eksport teh China dalam jangka panjang. Penemuan daripada ujian kausaliti Granger juga menunjukkan bahawa harga teh China, harga kopi, dan KDNK Malaysia boleh mempengaruhi eksport teh China ke Malaysia dalam jangka pendek. Kajian ini memberikan cadangan khusus kepada syarikat dan pembuat dasar untuk mempromosikan perdagangan teh China-Malaysia, mengisi jurang dalam literatur.

Kata kunci: *Perdagangan teh China-Malaysia, faktor eksport, pendekatan ARDL, teori permintaan.*

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
ARDL	Autoregressive Distributed Lag
ARCH	Autoregressive Conditional Heteroskedasticity
AIC	Akaike Information Criterion
ADF	Augmented Dickey-Fuller
BNM	Bank Negara Malaysia
BIC	Bayesian Information Criterion
BG	Breusch-Godfrey
BRIT	Belt and Road International Tea Trade Industry Innovation Institute
CTMA	China Tea Marketing Association
CFETS	China Foreign Exchange Trade System
CAPAC	China Association for the Promotion of International Agricultural Cooperation
DOSM	Department of Statistics Malaysia
ECM	Error Correction Model
ECT	error correction term
FRED	Federal Reserve Economic Data
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
HS	Harmonized System
ITC	International Tea Committee
IMF	International Monetary Fund
JB	Jarque-Bera

KPSS	Kwiatkowski-Phillips-Schmidt-Shin
MAFI	Ministry of Agriculture and Food Industries
PNG	Papua New Guinea
RCEP	Regional Comprehensive Economic Partnership
RCA	Revealed Comparative Advantage
SIC	Schwarz Information Criterion
TIC	Tea Industry Committee

CHAPTER 1

INTRODUCTION

1.1 Introduction

This study aims to explore the factors affecting China's tea exports to Malaysia, with the objective of providing insights to facilitate the promotion of bilateral tea trade. In recent years, the performance of China's tea in the Malaysian market has attracted growing attention (Teh et al., 2020). As one of the world's largest producers and exporters of tea, China plays a significant role in shaping the global tea market (Suroso et al., 2024). As an important member of ASEAN, Malaysia has shown a growing demand for China's tea, particularly with the advancement of the Belt and Road Initiative (Kuah, 2021).

This chapter outlines the current status of the tea industry and is structured as follows. Section 1.2 provides the background of the tea industry, including global tea production, consumption, import and export trade, with a focus on the background and status of China's tea exports to Malaysia. Section 1.3 elaborates the problem statement while Section 1.4 introduces the research questions. Section 1.5 provides the objectives of this study. The significance of this study is discussed in Section 1.6 and lastly, Section 1.7 presents the overall structure of this study.

1.2 Background of the Study

1.2.1 Overview of Global Tea Industry

Tea holds broad significance across biological and social domains, with a history dating back 5,000 years. According to legend, in 2737 BC, Shen Nong, revered as the father of medicine and agriculture, observed that a leaf from a tea plant had fallen into his kettle of

boiling water, imparting a delightful aroma. This event marked the origin of tea as a beverage (Hall, 2000). In the 21st century, tea, along with cocoa and coffee, has become widely favored by consumers globally and is renowned as one of the world's three principal beverages (Aboushady et al., 2022). Tea is the world's most popular beverage after water, with approximately 3 billion regular consumers in over 160 countries according to the Food and Agriculture Organization (FAO) of the United Nations (FAO, 2017).

According to the Food and Agriculture Organization (FAO) of the United Nations, the tea industry exerts broad influence and makes significant contributions to rural development, poverty reduction and food security in many developing countries. Tea is a labor-intensive sector that provides employment and income for many of the world's poorest rural communities, including women and their families. A key feature of the tea industry is that smallholders account for 60% of the world's production. The global tea industry employs 13 million people, 9 million of whom are smallholder farmers in developing countries (Bolton, 2022). It serves as the primary income and employment source for countless impoverished families globally. This allows families and communities to meet their food security needs and enhance people's living standards. In 2022, the annual global tea output value exceeded \$17 billion, and the world tea trade value reached approximately \$9.5 billion, making it a crucial export revenue stream. Data from the past decade indicates that the world's per capita tea consumption has increased by 2.5%, with the most significant increase in tea-producing countries. Developing and emerging economies have performed well in tea consumption, with Latin America, Africa, the Caribbean, East Asia and the Near East seeing the most significant growth. In contrast, tea consumption in European markets and other developed countries, tea consumption has been one downward trend (FAO, 2022).

By 2015, the tea industry's value chain had evolved into an extensive global network in which growers, pickers, traders, suppliers, retailers, and consumers interact closely, profoundly influencing the lives and well-being of millions of people worldwide (Khoi et al., 2015).

The tea plant is a subtropical species that thrives in warm, humid, and sunny environments. As a key component of smallholder agriculture and forestry, it is cultivated in more than 60 countries across Africa, Asia, and Latin America, serving as an important economic crop in many developing economies (Yan et al., 2020). According to the International Tea Committee (ITC, 2022), major tea-producing regions span 36 countries across five continents: 14 in Asia, 13 in Africa, 4 in South America, 3 in Europe, and 2 in Oceania. Asia dominates global tea production, accounting for over 90% of total cultivation, followed by Africa (Ahmed et al., 2018). Over the past decade, the global tea cultivation area has expanded by nearly 20%, with particularly significant increases in China, India, Myanmar, Kenya, and Vietnam (Zhao et al., 2023). Tea production carries substantial economic significance for producing countries. The expansion of tea cultivation and related industries has contributed notably to raising farmers' incomes, improving rural livelihoods, advancing agricultural development, and fostering regional economic growth. Furthermore, tea exports constitute a vital source of foreign exchange for many developing nations, particularly Kenya and Sri Lanka (Hanna, 2024).

According to the statistics of the International Tea Committee (ITC), the global tea planting area reached 5.52 million hectares in 2023, a year-on-year increase of 3.8%. From Table 1.1, it can be seen that from 2010 to 2023, the global tea planting area had increased

every year, from 3.68 million hectares to 5.52 million hectares, a total increase of 1.84 million hectares, of which the growth rate was relatively large from 2010 to 2016.

Table 1.1: Global Tea Planting Area from 2010 to 2023

Year	Area (10,000 hectares)	Growth rate (%)
2010	368	3.7
2011	384	4.3
2012	399	3.9
2013	418	4.8
2014	437	4.5
2015	452	3.4
2016	470	4.0
2017	479	1.9
2018	488	1.9
2019	500	2.5
2020	510	2.0
2021	527	3.3
2022	532	0.9
2023	552	3.8

Source: International Tea Committee (2024).

According to the data from the International Tea Committee (ITC), global tea production continued to grow steadily year over year, rising from 5.594 million tons in 2016 to 6.604 million tons in 2023. As shown in Table 1.2, the global tea production increased by 1.01 million tons from 2016 to 2023, representing a growth rate of 18.1%.

Table 1.2: Global Tea Production from 2016 to 2023

Year	Production volume (10000tons)	Growth rate (%)
2016	559.4	5.4
2017	571.8	2.2
2018	596.6	4.3
2019	615	3.1
2020	626.9	1.9
2021	645.1	2.9
2022	647.7	0.4
2023	660.4	1.9

Source: International Tea Committee (2024).

From Table 1.3, it can be seen that the top three countries of the worldwide tea output in 2023 are: China (3.25 million tons, accounting for 49.2%), India (1.368 million tons, accounting for 20.7%) and Kenya (570,000 tons, accounting for 8.6%). The countries ranked fourth to tenth are: Turkey (265,000 tons), Sri Lanka (256,000 tons), Vietnam (170,000 tons), Indonesia (121,000 tons), Bangladesh (103,000 tons), Japan (72,000 tons) and Argentina (68,000 tons).

According to the Annual Statistical Bulletin published by the International Tea Committee (ITC), tea production continued to grow steadily year on year, reaching 6.604 million metric tons in 2023. Among the top ten countries, except for Vietnam, Indonesia and Argentina, where tea production decreased, other countries had different degrees of production growth, especially Bangladesh, which had the most obvious growth, with a year-on-year increase of 9.7%.

Table 1.3: Top Ten Countries in Global Tea Production in 2023

Rank	Country	Production volume (10000tons)	Growth rate (%)
1	China	325.0	2.2
2	India	136.8	0.2
3	Kenya	57.0	6.6
4	Turkey	26.5	7.8
5	Sri Lanka	25.6	1.8
6	Vietnam	17.0	-2.3
7	Indonesia	12.1	-3.4
8	Bangladesh	10.3	9.7
9	Japan	7.2	2.1
10	Argentina	6.8	-4.5
Global Total Production		660.4	1.9

Source: International Tea Committee (2024).

At the same time, consumption continued to lag behind, with consumption in 2023 reaching 6.212 million tons, resulting in a supply-demand gap of 392,000 tons. In 2020, the

total global tea consumption was 5.88 million tons. The top three countries in the world were: China (accounting for 40.81%), India (accounting for 18.06%), and Turkey (accounting for 4.59%). The consumption of the top ten countries accounted for 79.6% of the global consumption (Table 1.4).

Table 1.4: Top Ten Countries in Global Tea Consumption in 2020

Rank	Country	Proportion of Consumption (%)
1	China	40.81
2	India	18.06
3	Turkey	4.59
4	Pakistan	4.28
5	Russia	2.41
6	United Kingdom	1.88
7	America	1.80
8	Indonesia	1.63
9	Egypt	1.60
10	Japan	1.56

Source: International Tea Committee (2024).

Rising domestic tea consumption in producing countries, fueled by population and income growth, has reduced the volume of tea available for export over the past two decades (FAO, 2022). Moreover, the prolonged global economic slowdown and persistent disruptions in international trade and logistics further contributed to a decline in global tea exports in 2023.

The global tea exports volume in 2023 was 1.737 million tons, a decrease of 90,000 tons from 2022, a year-on-year decrease of 4.9%, which is the largest decline in 13 years. From 2011 to 2023, the world's tea exports increased significantly twice in 2012-2013 and 2017-2019, and then suddenly dropped to the level of 2014 in 2020 (Figure 1.1).

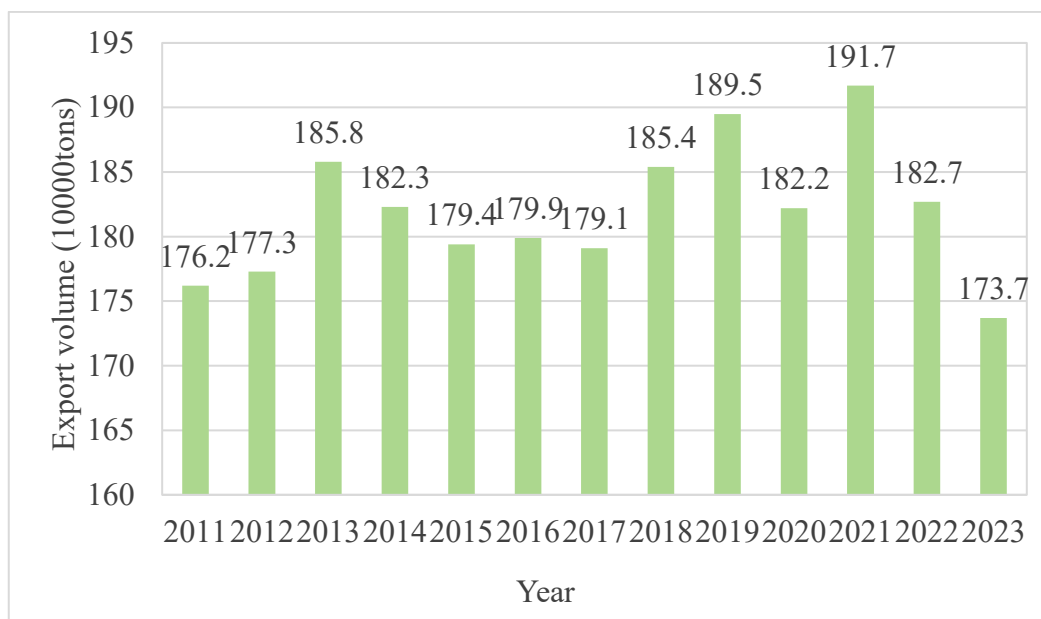


Figure 1.1 Global Tea Export Volume from 2011 to 2023

Source: International Tea Committee (2024).

As shown in Table 1.5, the tea-producing country ranked first in terms of total tea exports in 2023 is Kenya, with an export volume of 523,000 tons, accounting for 30.1% of the world's total tea exports. China followed closely behind (367,000 tons, accounting for 21.1%).

Table 1.5: Global Tea Export Volume in 2023

Rank	Country	Export Volume (10000tons)	Growth rate (%)
1	Kenya	52.3	16.1
2	China	36.7	-2.1
3	Sri Lanka	23.9	-3.2
4	India	22.5	-1.3
5	Vietnam	12.1	-13.6
6	Uganda	6.9	-8.9
7	Argentina	6.6	-7
8	Malawi	4.3	-7.1
9	Rwanda	3.8	4.6
10	Indonesia	3.6	-20
Global Total		173.7	-4.9

Source: International Tea Committee (2024).

The global tea import volume in 2023 stood at 1.655 million tons, marking a decrease of 52,000 tons, from the previous year. From 2011 to 2023, the global tea import volume remained relatively stable compared with the export volume, reaching a peak of 1.812 million tons in 2019, and remained basically stable at around 1.7 million tons (Figure1.2).

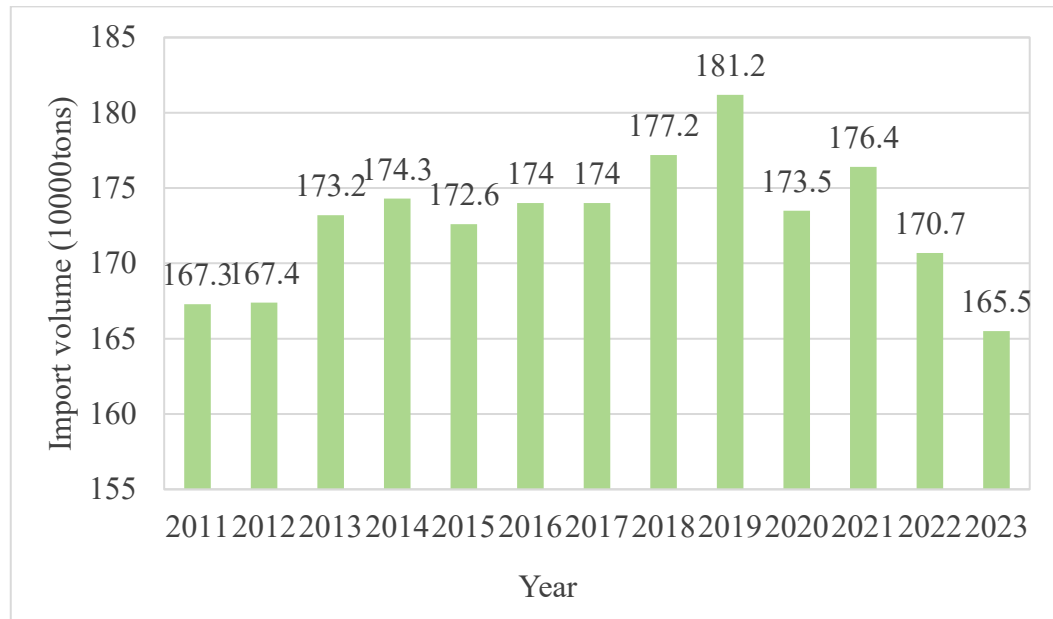


Figure 1.2: Global Tea Import Volume from 2011 to 2023

Source: International Tea Committee (2024).

1.2.2 Background of China's Tea Industry

The tea industry in China enjoys a long history and significant geographical advantages (Jiang, 2019). As the recognized birthplace of tea and the world's largest producer, China's tea culture and tea economy have exerted a profound global influence. China's tea exports can be traced back to the 5th century AD, when tea was traded with Southeast Asia and neighboring regions. By the 10th century, Mongolian caravans had introduced Chinese dark tea to Central Asia through Siberian routes. In the 17th century, tea was first introduced to Europe via the Netherlands, and subsequently popularized in America and Australia by the British. Since then, tea culture has spread worldwide (Nierstraz, 2015).

Before the Opium War, tea had always been China's main export agricultural product, and the world tea trade was almost monopolized by China. At its peak, China's tea exports accounted for about 90% of the global total tea trade and about 60% of China's total merchandise exports (Grigg, 2002). For more than 100 years after the First Opium War, China gradually lost its dominant position in the global tea trade. However, with the establishment of the People's Republic of China, the economic value of tea began to recover, and it returned to the stage of international trade. Today, China's tea planting area is expanding year by year, and its output and export volume are growing steadily, firmly establishing itself as a major tea trading country in the world (Xu, et al., 2021).

According to the China Tea Marketing Association (CTMA), the total output value of China's dry tea reached 329.668 billion yuan in 2023. This represented a year-on-year increase of 11.601 billion yuan, or 3.65%. In 2021, the total economic output of the entire tea industry was close to 800 billion yuan. Tea has played an important role in the economic history of China and even the world (Chen, 2021). It is not only a favorite beverage, but also a driving force for economic and social development. The production, consumption and trade of tea have a significant impact on the economic landscape (Munasinghe, et al., 2017).

Focus on the world economic, the booming tea economy is largely due to the promotion of tea by the Chinese government's The Belt and Road Initiative. Under the advocacy of The Belt and Road Initiative, the world has built a cross-regional, cross-cultural, and all-round international trade and economic corridor for tea. Every year, more than 80% of the world's tea is produced in the Belt and Road Initiative, and it has also expanded the market for China's tea exports. China is the world's largest tea producer and consumer, and the third largest tea exporter (Wu et al., 2020). In 2023, China's tea plantation area accounts

for 62.2% of the world's tea plantation area, tea production accounts for 49.2% of the world's tea production, and tea exports account for 21.1% of the world's total tea exports (ITC, 2023).

Moreover, China's tea occupies an important position in the international tea market. In the field of China's national economy, according to data from the China Tea Marketing Association (CTMA), from the planting and management of tea gardens, tea picking, to subsequent processing, packaging and sales, the tea industry chain provides a large number of employment opportunities for the society and makes a direct contribution to the economy. China's tea industry has provided employment and increased income for more than 70 million people, including tea farmers, tea pickers, processors, and distribution channel practitioners. As one of the important industries in China's poverty alleviation, the tea industry has also driven the employment of rural populations of many poor counties. From 2014 to 2020, China had 832 designated poor counties, of which 372 were tea-producing counties. More than 150 of these counties identified tea as their main industry for poverty alleviation. Their combined output value exceeded 100 billion yuan and helped lift more than 2.6 million people out of poverty. The tea garden area in national-level poor counties is about 1.868 million hectares, with an annual tea output of about 1.5 million tons. The tea industry in poor counties accounts for about two-thirds of the national tea industry, accounting for 67.2% of the area and 62.3% of the annual output. Tea industry is an important part of China's agricultural economy, especially in economically underdeveloped areas.

China is not only the birthplace of tea, but also the world's largest tea producer. A large amount of historical data and modern research results show that tea trees are native to southwest China (Yu et al., 2017). The cultivation, processing and consumption of tea in

other countries in the world are directly or indirectly introduced from China (Chen et al., 2012). China has a vast territory and abundant resources. Nearly half of its land is suitable for tea cultivation. Tea production stretches from the Shandong Peninsula in the north to Hainan Island in the south, and from Taiwan in the east to southeastern Tibet in the west. More than 20 provinces, municipalities, and autonomous regions produce tea. China’s tea planting area ranks first in the world and continues to expand (Wang, 2015). From 2010 to 2023, China’s tea planting area had been growing, from 1.9318 million hectares to 3.4332 million hectares, an increase of 77.7%, with the largest increase around 2013 (Figure1.3). By 2023, China’s tea planting area has reached 62.2% of the world’s total area.

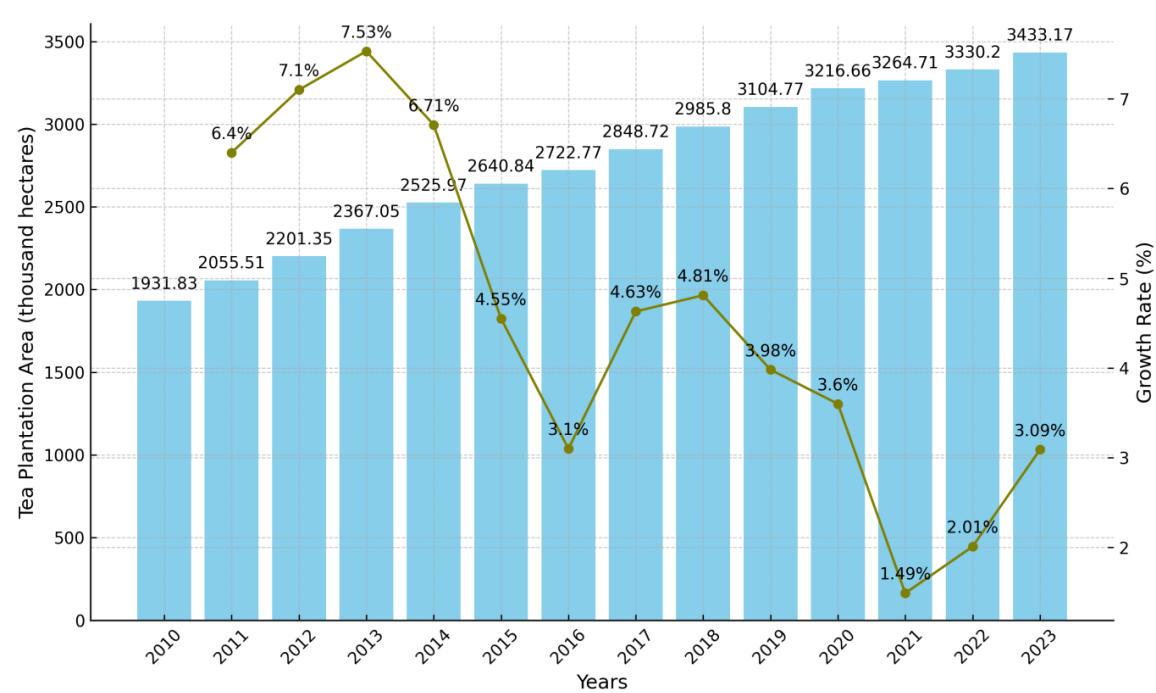


Figure 1.3 Tea Planting Area in China from 2010 to 2023

Source: China Tea Marketing Association (2024).

From the Table 1.6, it can be seen that: in 2023, China’s tea production was 3.54 million tons, an increase of 199,000 tons compared to 2022, representing a year-on-year growth of 6.0%. China’s tea production continued to grow between 2011 and 2023, with a

good upward trend. Yunnan and Fujian are the major tea producing provinces in China. Yunnan is the largest tea-producing province, with a tea output of 557,000 tons in 2023 and an industry chain output value of 150.42 billion yuan. The second province is Fujian, with a tea production of 550,000 tons and an industry chain output value of 150 billion yuan. Guizhou Province ranked third with an output of 469,000 tons (Table 1.7).

Table 1.6: China's Tea Production from 2011 to 2023

Year	Production volume (10000tons)	Growth rate (%)
2011	160.8	9.9
2012	176.2	9.6
2013	188.7	7.1
2014	204.9	8.6
2015	227.7	11.1
2016	231.3	1.6
2017	246.0	6.4
2018	261.0	6.1
2019	277.7	6.4
2020	293.2	5.6
2021	316.4	7.9
2022	334.2	5.6
2023	354.1	6.0

Source: National Bureau of Statistics of China (2024).

Table 1.7: Regional Structure of Tea Production of China in 2023

Province	Area (10,000 hectares)	Production volume (10000tons)	Industrial chain output value (billion RMB)	Agricultural output value (billion RMB)
Yunnan	770	55.7	150.42	30.21
Guizhou	700	46.9	90.81	44.54
Sichuan	598	42.4	120.00	38.67
Hubei	564	44.9	85.50	23.46
Fujian	368	55.0	150.00	36.95
Hunan	330	33.8	106.20	20.37
Anhui	320	14.6	59.08	21.02
Zhejiang	312	20.2	86.00	28.64
Shanxi	251	13.97	90.00	17.71
Henan	215	13.2	68.00	14.63

Source: National Bureau of Statistics of China (2024).

According to the Table 1.8, in terms of tea categories, in 2023, the national green tea output was 1.934 million tons, an increase of 80,000 tons, an increase of 4.3%, accounting for 57.9% of the total output; black tea was 491,000 tons, an increase of 9,000 tons, an increase of 1.9%, accounting for 14.7% of the total output; dark tea was 458,000 tons, an increase of 32,000 tons, an increase of 7.4%, accounting for 13.7% of the total output; oolong tea was 333,000 tons, an increase of 21,500 tons, an increase of 6.9%, accounting for 10.0% of the total output; white tea was 100,000 tons, an increase of 5,600 tons, an increase of 6.0%, accounting for 3.0% of the total output; yellow tea was 23,000 tons, an increase of 10,000 tons, an increase of 78.4%, accounting for 0.7% of the total output. The output structure remains basically stable.

Table 1.8: Production Statistics of Six Major Tea Categories in China, 2022-2023
(Unit: Tons)

Types of tea	2023	2022	Increase quantity	Growth rate%
Green tea	1934000	1853819	80181	4.3
Black tea	491200	482018	9182	1.9
Dark tea	458000	426326	31674	7.4
Oolong tea	332830	311318	21512	6.9
White tea	100200	94522	5678	6.0
Yellow tea	23253	13036	10217	78.4
Total	3339483	3181039	158444	5.0

Source: China Tea Marketing Association (2024).

According to data statistics from China Customs, from 2016 to 2021, China's tea exports showed a good trend, with export volume increasing from US\$1.382 billion to US\$2.299 billion, a total increase of 66.4%, and the average export price increasing from US\$4.25 per kilogram to US\$6.22 per kilogram, a total increase of 46.4%. However, perhaps due to economic fluctuations or epidemic factors, it suddenly began to decline in 2022 and 2023 (Table 1.9). China's tea export value in 2023 dropped by 16.49% year-on-year, which

was the largest decline since 2015. The decline in China's tea export situation in recent years deserves deep reflection from researchers. It is extremely urgent to explore potential trade markets and stimulate the recovery of China's tea export trade.

Table 1.9: The Export Value, Volume, and Average Price of Tea in China, 2015-2023

Year	Export value (hundred million dollars)	Growth rate (%)	Export volume (10,000 tons)	Growth rate (%)	Average price (USD/Kg)	Growth rate (%)
2015	13.82		32.50		4.25	
2016	14.85	7.49	32.87	1.15	4.52	6.27
2017	16.10	8.41	35.53	8.08	4.53	0.31
2018	17.78	10.43	36.47	2.67	4.87	7.56
2019	20.20	13.60	36.66	0.50	5.51	13.03
2020	20.38	0.91	34.88	-4.84	5.84	6.05
2021	22.99	12.81	36.94	5.89	6.22	6.53
2022	20.83	-9.41	37.53	1.60	5.55	-10.84
2023	17.39	-16.49	36.75	-2.06	4.73	-14.74

Source: China Customs (2024).

Although Malaysia is not at the forefront of the world in terms of planting, production, consumption and tea importing in the context of the global tea industry, it occupies a very prominent position in China's tea export market (ITC, 2023). According to data from China Customs, Malaysia has become China's second largest tea export trading partner in 2023, second only to Hong Kong, China. The other top ten trading partners in terms of export value are: Morocco, Ghana, Algeria, Senegal, Mauritania, Vietnam, the United States and Russia (Table 1.10). Malaysia has become the country with the highest tea export value to China, even when both the export value and export volume have declined. In addition, it is also found that the average price of China's tea exported to Malaysia is higher than that of other countries. These obvious contrasts have attracted great attention to the tea trade between Malaysia and China.

Table 1.10: China's Major Export Trading Partners in 2023
(Top Ten of Export Value)

Country or region	Export value (ten thousand dollars)	Growth rate (%)	Export volume (ten thousand tons)	Growth rate (%)	Average price (USD/Kg)
Hong Kong	22023.53	-44.78	0.83	-32.28	26.43
Malaysia	20879.34	-26.66	0.82	-11.41	25.44
Morocco	19007.58	-20.64	5.98	-20.69	3.18
Ghana	14171.08	35.25	3.53	43.98	4.02
Algeria	7085.80	49.47	2.03	76.80	3.50
Senegal	6913.90	0.56	1.67	-2.79	4.15
Mauritania	6716.18	20.04	1.58	25.68	4.24
Vietnam	6456.13	-41.14	0.46	-7.16	14.09
America	5612.56	-18.90	0.86	-33.74	6.51
Russia	5419.56	4.76	1.48	-25.15	3.67

Source: China Customs (2024).

1.2.3 Overview of Tea Market in Malaysia

Malaysia is located in the core area of Southeast Asia. Its average annual temperature is 22-32°C, and it has a tropical climate. Its humidity is 70%-90% and annual rainfall is about 2,500 mm. It mainly produces black tea (Tan & Loh, 2017).

Given the climate conditions that enable year-round production, tea cultivation, as one of Malaysia's oldest industries, has a history of over 500 years in the country. The Cameron Highlands stands as Malaysia's preeminent tea-producing region, home to the nation's most renowned tea estates, namely BOH and Bharat Tea Estate. BOH is the most popular local tea brand in Malaysia, with its products readily available on supermarket shelves and in street-side cafes. In 2016, 70% of Malaysia's domestic tea output came from BOH plantations, of which only a small portion was exported to developed countries, while approximately 90% was sold within Malaysia (Mansur, 2019).

Despite having strong local tea brands, Malaysia faces challenges such as labor shortages and limited planting and processing technologies. As a result, its domestic tea production accounted for only 0.24% of global output in 2023. Malaysia produces about 3.6 million kilograms of black tea each year, with very little tea exported (Peng et al., 2024). According to Table 1.11, Malaysia's tea production has exhibited significant fluctuations in recent years. After experiencing several consecutive years of output decline followed by a slight increase, it saw a substantial surge in 2022. By 2023, Malaysia's tea production had nearly returned to the level recorded in 2011.

Table 1.11: Malaysia's Tea Production from 2011 to 2023

Year	Production volume (tons)	Growth rate (%)
2011	16632	-15.7%
2012	14711	-11.6%
2013	12094	-17.8%
2014	11923	-1.4%
2015	11130	6.7%
2016	11708	5.2%
2017	10385	-11.3%
2018	10808	4.1%
2019	6621	-38.7%
2020	9395	41.9%
2021	7227	-23.1%
2022	15883	119.8%
2023	15868	-0.1%

Source: Food and Agriculture Organization of the United Nations (2024).

Malaysians have a long history of drinking tea. As early as the 15th century, the Chinese navigator Zheng He had brought tea to Malaysia. Since then, the tea drinking culture has appeared in the scenes of Straits immigrants, Baba Nyonya people and other residents of Malacca, and later spread to Penang and the Malay Peninsula and Borneo (Pampus, 2023).

In the 17th century, when some people from Fujian and Guangdong in China migrated south, they also brought the custom of drinking tea. The Chinese ancestors who

had just arrived in Malaysia went through hardships and created their own world. Therefore, the early tea lovers, while drinking tea, were also remembering their ancestors and recalling the struggles reflected behind the tea. Where there are Chinese, there is the fragrance of tea, which refers to the history of tea migrating to Southeast Asia with the Chinese (Cai, 2002). Malaysian culture is diverse, so different people have different tea drinking habits. Malays prefer stronger tea; but Malaysian Chinese prefer lighter tea. Malaysia also has specialty teas, such as teh tarik, bak kut teh, herbal tea, etc (Xu & Guo, 2017).

According to the Malaysian Tea Association (2023), Malaysia is not only a tea producer, but also a tea consumer. It is estimated that more than 80% of the tea consumed in Malaysia today is black tea, while China's and other teas account for less than 20% of the total consumption. In the past, since the great Chinese immigration in the 19th century AD, the types of Chinese tea consumed by the Chinese in Malaysia at that time were consistent with their dialect groups: Hakka people drank green tea, Fujian people drank oolong tea, and Cantonese people drank Liubao black tea. Today, the more adventurous younger generation of Malaysian Chinese consumes various types of China's tea in addition to the Teh Tarik style black tea they like and the fashionable Japanese, Korean and Taiwanese teas that have been popular in recent years. In Malaysia, tea is everywhere, from the cheapest "mamak" (Indian Muslim) stalls to high-end stores and even 24-hour tea stalls throughout Malaysia. Even during the epidemic in 2020 and 2021, tea consumption did not decrease significantly despite travel restrictions and restrictions on gatherings.

In recent years, tea consumption in Malaysia has increased significantly, with annual intake of about 35.9 million kg in 2022, compared to 18 million kg in 2007, and per capita consumption has stabilized at around 910 grams. To make up for the market demand,

Malaysia imports from major tea producing countries such as Indonesia, Vietnam, China, Sri Lanka, India, Papua New Guinea, Kenya, Malawi, Tanzania, Mozambique, Argentina, Ecuador, etc. From August 29, 2008 and January 1, 2010, the import tariff on tea from ASEAN and China was reduced from 20% in 1997 to 0%, while tea from other countries is subject to an import tariff of 5%. Common and popular types of China's tea consumed in Malaysia are jasmine tea, Pu'er black tea, Liubao black tea, oolong tea, etc. Malaysia has great room and potential for importing China's tea. In the past few years, the development of China's tea has echoed China's Belt and Road Initiative, which is encouraging (Malaysian Tea Association, 2023).

Furthermore, alongside tea, coffee has become one of the most important beverages in the Malaysian market (Rahim et al., 2019). In terms of consumption habits, coffee and tea share overlapping drinking scenarios, but coffee demonstrates greater adaptability. The higher frequency and convenience of coffee consumption enhance its potential to substitute for the traditional consumption patterns of tea. At the level of social consumption, kopitiam (traditional coffee shops) serve as key communal spaces where residents gather and interact, performing a role similar to tea restaurants (Ting et al., 2018). From a demographic perspective, variations in preferences across age groups further reinforce coffee's substitutive role. Younger consumers tend to favor coffee due to its stimulating effects and modern cultural associations, whereas tea consumption is more prevalent among middle-aged and older groups. This generational divergence enables coffee to fill the demand gap in the youth market, thereby consolidating its position as a viable substitute for tea (Amin et al., 2016).

1.2.4 Background of China's Tea Exports to Malaysia

Malaysia and China share a history of exchanges spanning more than 2,000 years. The two countries are relatively close and can be directly connected by sea or land. This unique geographical advantage has established a close diplomatic relationship between the two countries (Chen, 2015).

Chinese tea was introduced to Malaysia centuries ago. With the growth of the economy and the increasing convenience of transportation, the presence of Chinese tea in the Malaysian market has steadily expanded. In recent years, China and Malaysia have engaged in in-depth dialogues on bilateral economic cooperation and development, which have not only further promoted the dissemination of Chinese tea culture in Malaysia but also generated notable progress in the local tea industry (Battle, 2017).

At present, Malaysia has responded positively to China's Belt and Road Initiative (BRI). Both countries have advanced cooperation under the framework of the 21st Century Maritime Silk Road, covering a wide spectrum of fields such as economy, culture, and education. Within this context, Chinese tea has gradually integrated into the daily lives of Malaysians, strengthening bilateral cooperation and enhancing cultural exchanges. This development not only consolidates the China-Malaysia partnership but also promotes Chinese tea culture as a medium for political and people-to-people exchanges. Consequently, tea has become a strategic link for advancing the BRI and fostering long-term diplomatic and cultural ties between the two countries (Wu & Wang, 2025).

According to statistics from the Malaysian Tea Association, from 2001 to 2022, Malaysia mainly imported tea from Indonesia, Vietnam, China, Sri Lanka, India, PNG and Australia. Indonesia, China and Vietnam are the main tea importers to Malaysia. Indonesia

has always maintained its position as the largest importer due to its geographical proximity, low transportation costs and high production of black tea (Nursodik et al., 2021).

However, Malaysia had been reducing tea imports from Indonesia in recent years, by 2022, although Indonesia was still the largest importer of tea in Malaysia, but its import proportion had dropped from 72.5% in 2001 to 27.3%, Indonesia had fallen from the absolute import leader to gradually with China and Vietnam tripartita status. Vietnam surpassed China in 2004; 2006; 2009-2013 and 2015-2018 to become the second largest importer. China is the country with the largest increase in import volume among all importing countries. As early as 2001, Malaysia's tea imports from China accounted for only 12.8%, and by 2022 it reached 24.1%, a nearly 2-fold increase. Especially between 2019 and 2021, the growth rate was rapid, China had gradually widened the gap with Vietnam to become the second largest importer. This period spanned more than 20 years, and it can be clearly seen the change in the pattern of Malaysia's tea importing countries (Table 1.12).

Table 1.12: Proportion of Malaysia's Tea Imports by Country, 2001-2022

year	Indonesia	China	Vietnam	Sri Lanka	India	PNG	Australia	Other Asia	Others
2001	72.5%	12.8%	0.7%	1.9%	2.2%	0.2%	1.0%	6.4%	2.3%
2002	72.0%	13.2%	0.4%	2.7%	2.3%	0.4%	0.3%	7.8%	0.9%
2003	67.6%	11.0%	8.1%	3.6%	1.7%	2.1%	1.7%	2.7%	1.4%
2004	73.4%	7.1%	7.5%	3.4%	0.6%	0.1%	2.8%	1.7%	3.3%
2005	63.8%	11.5%	10.8%	3.5%	1.1%	0.6%	2.6%	2.7%	3.5%
2006	55.5%	13.1%	15.1%	4.1%	3.0%	0.8%	1.6%	3.4%	3.4%
2007	54.6%	15.5%	14.5%	4.1%	4.2%	1.3%	1.1%	1.3%	3.4%
2008	56.5%	13.5%	11.2%	4.3%	0.9%	2.5%	1.5%	4.9%	4.7%
2009	46.2%	9.5%	22.0%	6.6%	2.2%	4.1%	0.5%	5.0%	3.7%
2010	46.8%	10.4%	21.0%	5.2%	4.5%	3.6%	8.0%	1.3%	6.4%
2011	53.8%	11.2%	14.3%	3.7%	4.3%	3.5%	7.1%	0.9%	7.6%
2012	44.3%	11.9%	18.6%	5.1%	4.5%	3.7%	0.2%	2.7%	9.7%
2013	43.1%	12.5%	17.2%	3.7%	4.3%	4.0%	0.4%	5.4%	9.5%

Table 1.12: continued

year	Indonesia	China	Vietnam	Sri Lanka	India	PNG	Australia	Other Asia	Others
2014	43.6%	19.8%	13.8%	2.8%	6.1%	2.1%	0.5%	2.0%	9.3%
2015	36.6%	11.7%	13.6%	3.8%	13.2%	1.5%	0.4%	6.0%	13.2%
2016	33.4%	11.0%	16.3%	2.4%	15.0%	1.4%	1.5%	3.6%	15.5%
2017	37.3%	12.0%	14.5%	2.0%	13.5%	1.1%	1.5%	4.0%	14.2%
2018	34.9%	12.5%	15.7%	1.5%	13.8%	0.9%	0.9%	6.3%	13.8%
2019	29.8%	17.8%	13.6%	1.7%	10.5%	0.5%	0.2%	7.0%	18.8%
2020	27.2%	24.9%	14.1%	1.6%	6.9%	0.5%	0.2%	5.3%	19.3%
2021	28.8%	28.1%	13.4%	1.3%	5.2%	0.6%	0.7%	7.4%	14.5%
2022	27.3%	24.1%	16.0%	1.3%	7.7%	0.6%	0.6%	7.6%	14.9%

Source: Department of Statistics Malaysia (2024).

In addition, China's tea export volume to Malaysia in 2023 was 8,208 tons, a year-on-year decrease of 11.41%, and the export value was US\$209 million, a year-on-year decrease of 26.66%, although the export momentum had weakened, the export value still ranked second. From 2016 to 2022, China's tea exports to Malaysia continued to grow, especially reaching a peak in 2019, with exports increasing by 70.43% over the same period. This shows the potential of Malaysia's tea consumption market (Table 1.13).

Table 1.13: China's Tea Export Value, Volume and Average Price to Malaysia, 2016-2023

Year	Export value (hundred million dollars)	Growth rate (%)	Export volume (tons)	Growth rate (%)	Average price (USD/Kg)	Growth rate (%)
2016	0.47	55.06	2377.50	-7.58	19.75	67.77
2017	0.62	32.75	3372.17	41.84	18.48	-6.41
2018	0.77	23.55	3488.20	3.44	22.08	19.44
2019	1.31	70.43	4910.26	40.77	26.73	21.07
2020	1.71	30.53	5634.04	14.74	30.41	13.76
2021	2.57	49.80	7242.63	28.55	35.43	16.53
2022	2.85	10.94	9265.40	27.93	30.73	-13.28
2023	2.09	-26.66	8208.27	-11.41	25.44	-17.22

Source: China Customs (2024).

In 2023, among China's tea export trading partners, Malaysia ranked first in the export value of three tea categories. It ranked first in black tea with an export value of 88.4148 million US dollars, an increase of 17.85%; ranked first in dark tea with an export value of 3.1547 million US dollars, a decrease of 50.84%; ranked first in white tea with an export value of 7.3328 million US dollars. In addition, the export volume of dark tea was 358.78 tons and the export volume of white tea was 161.41 tons, which also ranked first respectively (TIC-APIAC & BRIT, 2023). In summary, Malaysia has become China's most important trading partner for tea exports, and the trade cooperation between the two sides is full of potential and hope.

1.3 Problem Statement

From the above background analysis, it can be seen that driven by the development of global tea trade, China has become an important exporter with its rich tea tradition and huge production capacity (Chaudhry et al., 2017). China's tea exports have long been an important part of China's agricultural trade and a key vehicle for its cultural influence. As an important trading partner in Southeast Asia, Malaysia has always been one of the destinations for China's tea exports. Malaysia is geographically close to China and has a large number of Chinese people. Their living habits are similar to those in China, and their tea drinking habits are also relatively common (Goh, 2023). The demand for tea is strong, making it a very promising market for China's tea exports. In recent years, against the backdrop of the changing global trade environment, evolving consumer preferences, and fluctuating international macroeconomic conditions (Teh et al., 2020). Malaysia has become China's second largest trading partner for tea exports, which makes the factors affecting China's tea exports to Malaysia very valuable for research.

However, existing literature shows that there are various researches on China's international tea trade. Existing research mostly focuses on the overall situation of global tea trade or studies China's export performance in developed countries such as Europe, the United States, and Japan (Dong & Zhu, 2015). In addition, countries covered by regional cooperation organizations or policies such as ASEAN and the Belt and Road Initiative are often of the research objects. However, few scholars have analyzed China-Malaysia's tea trade alone, and research on the specific driving factors of China's tea exports to Malaysia is even scarcer.

Actual trade data reveals that China's tea exports to Malaysia exhibit significant volatility and sluggish growth, a phenomenon inconsistent with the strong bilateral relationship and cultural foundation between the two countries. According to China Customs statistics, in 2023, China's tea exports to Malaysia declined by 26.66% in value, 11.41% in volume, and 17.22% in average price (TIC-APIAC & BRIT, 2023). This erratic growth pattern makes it difficult for China's tea exporters to formulate long-term strategies and investments. The reasons behind these fluctuations are multifaceted and intertwined (Yang et al., 2019). In recent years, Malaysia has rapidly emerged as China's second-largest tea export partner, occupying a significant position in China's tea export market; however, a notable decline in exports in 2023 has become the main motivation for this study. This phenomenon raises a key question: what factors determine fluctuations in China's tea exports to Malaysia?

From the perspective of demand theory, the demand for exported products is typically influenced by multiple factors such as price, income levels in importing countries, competition from substitutes, and transportation costs (Kutty, 2001). However, in the

specific market of Malaysia, which is characterized by a highly diversified beverage consumption structure, China's tea faces a more complex competitive landscape: coffee consumption continues to rise, tea supply from local and neighboring countries remains stable, and ready-to-drink products such as milk tea are prevalent (Wen & Aun, 2020). Meanwhile, fluctuations in international oil prices may affect export trade by altering transportation costs, and uncertainties in Malaysia's economic growth rate could also impact overall tea consumption demand. These variables are likely to exhibit long-term and short-term dynamic relationships; yet, current academic research still lacks systematic empirical analysis of such relationships.

Existing literature on bilateral tea trade between China and Malaysia remains extremely limited. At the empirical level, it lacks a combined consideration of price mechanisms, substitution effects, and transportation cost factors. Specifically, regarding coffee as a potential substitute (Grigg, 2002), there is currently no consensus on whether its substitution effect in the Malaysian market holds. Thus, current research still exhibits a significant disconnect between theoretical frameworks and practical applications.

In summary, to promote the development of China-Malaysia tea trade, it is necessary to conduct an in-depth study on the driving mechanisms of China's tea exports to Malaysia. This involves comprehensively considering multiple factors such as price, income, substitutes, local supply, and transportation costs, and analyzing their long-term and short-term impact paths through the ARDL model, which is suitable for dynamic modeling with small samples. This study seeks to address the empirical gaps in existing literature, elucidate the micro-mechanisms underlying China-Malaysia tea trade, and offer a theoretical foundation and decision-making guidance to relevant government departments for

formulating targeted agricultural export policies, as well as to tea enterprises for optimizing their international market strategies.

1.4 Research Questions

Based on the discussion of issues and research gaps in China's tea industry, this study aims to address the following research questions:

- i. How do the prices of tea and its substitute (coffee) impact China's tea exports to Malaysia?
- ii. How does the gross domestic product (GDP) of Malaysia affect China's tea exports to Malaysia?
- iii. How does Malaysia's tea production influence China's tea exports to Malaysia?
- iv. How does the international oil price impact China's tea exports to Malaysia?

1.5 Research Objectives

1.5.1 General Objective

The overall objective of this study is to assess the factors affecting China's tea exports to Malaysia.

1.5.2 Specific Objectives

- i. To analyse the impact of the prices of tea and its substitute (coffee) on the export volume of China's tea to Malaysia.
- ii. To determine the effect of Malaysia's GDP on the export volume of China's tea to Malaysia.

- iii. To examine the influence of Malaysia's tea production on the export volume of China's tea to Malaysia.
- iv. To investigate the impact of the international oil price on the export volume of China's tea to Malaysia.

1.6 Research Significance

From the perspective of national policy, this study provides a key reference for China to formulate tea trade policies with Malaysia. By accurately analyzing the various factors that affect China's tea exports to Malaysia, China can adjust its trade policy according to actual conditions. Under the background of the Belt and Road initiative (Fan & Liu, 2022), the government can use the research results to further strengthen cooperation with Malaysia in the field of tea trade, optimize the trade environment, reduce trade barriers, promote the expansion of bilateral tea trade and the deep integration of China's tea industry with the international market (Zhao et al., 2021).

From the perspective of the industry and tea enterprises, this study provides important guidance. Based on the research results, tea enterprises can gain an in-depth understanding of the market demand and competition situation in Malaysia and formulate more targeted production and sales strategies (Fomani et al., 2019). By paying attention to the prices of China's tea and its competing product, they can optimize cost control, improve product cost performance, and enhance competitiveness in the Malaysian market. Enterprises may further leverage the research findings to enhance brand development: by capitalizing on the cultural legacy and quality strengths of China's tea, they can develop internationally influential brands, thereby further penetrating the Malaysian market,

boosting their market share, and ultimately facilitating the internationalization and industrial upgrading of China's tea industry (Qin & Zhou, 2024).

From the perspective of tea farmers, the growth of China's tea exports to Malaysia is directly related to the vital interests of the majority of tea farmers (Qiao et al., 2016). This study will help promote tea exports, thereby driving an increase in domestic tea demand. When the export value increases and the tea market expands, tea farmers' tea sales channels will be smoother and prices will be better guaranteed, thereby increasing tea farmers' income. In order to meet export demand, tea enterprises will expand their production scale, which will provide more employment opportunities for tea farmers, attract the return of rural labor, and promote the prosperity of the rural economy (Chen & Lu, 2021). The research findings may also inform tea farmers in optimizing their planting structures in response to market demand, thereby enhancing tea quality, fostering sustainable development in tea production, and contributing to the implementation of rural revitalization strategies.

From a theoretical standpoint, through in-depth research on specific bilateral trade relations, this study enriches the application of demand theory in concrete trade scenarios. From an empirical standpoint, this study establishes a multiple linear regression model and primarily employs the ARDL method to conduct an empirical analysis of small-sample quarterly data. By examining the long-term and short-term dynamic impacts of various factors on China's tea exports to Malaysia, it not only advances the application of the ARDL method in international trade but also enriches empirical research in the field of China-Malaysia tea trade.

In summary, this study holds significant importance for advancing the development of China's tea industry, deepening China-Malaysia trade relations, and enriching academic

research outcomes. By conducting an in-depth analysis of the factors influencing China's tea exports to Malaysia, it can provide a valuable basis for decision-making for relevant stakeholders, promote the sustainable development of China's tea export trade, and achieve mutual benefit and win-win outcomes between China and Malaysia in the realm of tea trade.

1.7 Organization of the Study

This study is structured as follows to investigate the factors affecting China's tea exports to Malaysia. Chapter 1 discusses the background of the study, research questions and objectives. Chapter 2 presents the past literature related to the theoretical foundation, conceptual framework, and research methods of this study. Chapter 3 provides the methods used to examine the relationships between the variables and the details of the data employed in this research. Chapter 4 introduces and discusses the empirical research findings. Finally, Chapter 5 summarizes the findings of this study, provides the policy recommendations, and points out the limitations of the study for future research directions.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Previous international trade research covers a wide range of fields and theories, providing valuable insights into exploring the factors affecting China's tea exports to Malaysia. Reviewing relevant research helps identify key factors and relationships, supporting strategies and policies for developing China-Malaysia tea trade. The structure of this chapter is as follows: Section 2.2 introduces the background of related literature review. The theoretical basis is discussed in Section 2.3. Subsequently, Section 2.4 presents the conceptual framework of the study. Section 2.5 puts forward the hypotheses among variables in this study. Then Section 2.6 introduces the research gaps in the literature review. Finally, Section 2.7 summarizes this chapter.

2.2 Background on Related Literature Review

As the world's largest tea producer and exporter, China's tea trade has long attracted significant scholarly attention both domestically and internationally. In recent years, with the advancement of China's "Going Global" strategy and the implementation of the Belt and Road Initiative, China's tea exports have increasingly received policy support at the national level (Zheng et al., 2022). According to FAO, China has long ranked among the world's top tea exporters in terms of export volume. However, in terms of export structure and market distribution, there remain issues of notable regional concentration and high dependence on European and American markets (Liu, 2021). This phenomenon has prompted academic circles to conduct systematic discussions on the export potential of China's tea in non-traditional markets such as Southeast Asian countries, particularly Malaysia.

Currently, studies on China's tea exports mainly focus on such aspects as changes in export scale, the structure of destination markets, and export competitiveness. Qin and Zhou (2024), applying the diamond theory model, systematically examined the high-quality development paths of China's tea export trade in the context of the Belt and Road Initiative, and revealed that policy dividends have a significant facilitating effect on the growth of China's tea exports. Zheng et al. (2022) and Zhang et al. (2019) discussed China's export competitiveness under the Belt and Road Initiative. Fan and Liu (2022) conducted a comparative analysis of 10 member countries and 10 non-member countries of the Belt and Road Initiative, confirming that institutional opening-up plays a facilitating role in promoting the exports of traditional advantageous products. Dong and Zhu (2015) revealed that the limited scale of China's tea exports to developed countries is attributed to the issue of pesticide residues. Dunxue and Holovatska (2025) discussed methods for China to expand tea export volumes to member states in the context of the Regional Comprehensive Economic Partnership (RCEP).

Against the backdrop of global economic integration, Yin et al. (2022), based on network analysis methods, pointed out that China's tea export markets exhibit a distribution pattern characterized by multi-point dispersion and partial agglomeration. Wang et al. (2020) calculated the international market share, intra-industry trade index, and comparative advantage index of China's tea, and found that China has certain comparative advantages in the global tea market, yet showing a declining trend. Suroso et al. (2024) found that China's tea exhibits strong competitive advantages in 39 countries, and that tea trade exerts a positive and significant impact on the economic growth of importing countries both in the long term and short term. From the perspective of supply chains, Lei (2017) compared the compliance

of tea exports between China and Sri Lanka, and put forward the suggestion that China should increase the added value of tea products to enhance competitiveness.

Among the many studies on the factors affecting China's tea exports, it is common to take China's exports to multiple countries or regions as the research object. Liu and Lu (2013), Huo and Lin (2010) and Yi (2010) established a gravity model and analyzed China's tea export trade to multiple countries through panel data. The conclusion is that the GDP of the importing country and China's tea production have a positive impact on the export volume, while the exchange rate of the importing country or region currency to the RMB, green barriers, trade agreements and organizations, the number of pesticide residue standards in the importing country or region, and spatial distance have a negative impact. Zhang et al. (2019) and Zhang (2021) studied 64 countries along the extension line of the Belt and Road and found that trade openness, common borders, language exchanges and similar religious beliefs have a promoting effect on China's tea exports; the currency freedom, financial freedom and geographical distance of the importing country have a significant inhibitory effect on China's tea exports.

There are few studies that focus only on China's exports to a single country. Zhang (2012) established a regression model to study China's tea exports to Japan and found that Japan's tea consumption, China's tea exports to Japan, and export prices were positively correlated with China's tea exports to Japan, and the exchange rate was negatively correlated with the trade volume. Against the backdrop of China-US trade frictions, Xu (2020) empirically analyzed the positive impact of US GDP and population on China's tea exports to the US, based on the classic gravity model. The RMB exchange rate, China's tea export quality level, and Trump's policies are negatively correlated.

Literature specifically studying China's tea exports to Malaysia is very scarce; it is usually mentioned in individual studies that cover multiple countries or involves discussions on segmented products among small regions. Yang et al. (2019) studied the trade exchanges between China and ASEAN countries in the context of RCEP. Malaysia, as one of the ASEAN member states, was mentioned. Data from 2017 shows that Malaysia is the second largest market for China's tea exports to ASEAN, with both policy dividends and consumption potential. Zhao et al. (2023) took the economic and trade cooperation in tea between Guizhou Province of China and Malaysia under the RCEP framework as the research object, focused on the core goal of how Guizhou plateau ecological tea can leverage RCEP rules to explore the Southeast Asian market, and by using the quantitative model of trade competitiveness index, pointed out that Guizhou tea should leverage rule dividends and cross-border e-commerce to enhance its competitiveness. Furthermore, Cao et al. (2023), from the perspective of enhancing the competitiveness of small-packaged green tea, proposed that China should address the two major shortcomings of low logistics efficiency and weak brand awareness.

Besides this, relevant literature related to China-Malaysia agricultural product trade is also very scarce. Wan (2023) explored that the development of cross-border e-commerce can promote the export of Chinese agricultural products to Malaysia. Tao et al. (2023) quantified the comparative advantages of agricultural product trade between the two countries, and found that plant juice extracts are advantageous products exported from China to Malaysia, thus revealing the characteristic of "complementarity amid competition" in China-Malaysia agricultural product trade.

Besides studies on China itself and on trade between China and Malaysia, studies on the agricultural product export mechanisms of some other countries have also provided theoretical insights and comparative references for this study. Literature on agricultural product export trade in representative countries such as the UK, the US, Indonesia, and Thailand (Medineckiene & Kirdaite, 2021; Jordaan, 2014; Warin & Kusona, 2024; Arifin et al., 2022; Hadi & Setyo, 2019; Essien et al., 2011; Sugiharti et al., 2020) has profound reference value for this study.

2.3 Theoretical Framework

With the continuous advancement of globalization and regional economic integration, international trade activities are becoming increasingly frequent. As an important exporter of China's tea, Malaysia's import demand is affected by a variety of economic factors. In order to fully understand the internal mechanism affecting China's tea exports to Malaysia, this study constructs a theoretical framework based on demand theory.

As one of the core theories in microeconomics, demand theory has been the basis for studying consumer behavior and market demand since the late 19th century (Hicks, 1986). Demand theory mainly explores consumer demand behavior for goods or services under different prices, incomes and other related factors. In the classical economics period, scholars such as Smith (1776) had already studied the demand and exchange of goods, but the modern demand theory was formed after the marginal revolution.

Alfred Marshall (1890) first systematically expounded the demand theory. He proposed that the demand function is mainly determined by commodity prices, consumer income and consumer preferences. Marshall believed that, with other conditions unchanged, commodity prices and consumer demand are inversely related, while consumer income and

demand are positively related. From this, the basic characteristics of the demand curve can be deduced, that is, when prices rise, demand decreases; when income increases, demand increases. In addition, elasticity is a core concept in demand theory, which is used to measure the sensitivity of the quantity demanded of a good to changes in its influencing factors (Purwono et al., 2022). Common types of elasticity include: price elasticity, income elasticity, cross-price elasticity, among others.

The price effect refers to the direct impact of changes in the price of a product on the quantity demanded. Generally speaking, rising prices lead to a decrease in demand, while falling prices stimulate demand (Varian, 2003). Rathnayaka et al. (2019) pointed out in his empirical study that when prices change, consumers immediately and fully adapt to the new equilibrium. Most goods have price inelastic demand, and price elasticity is a key input for policy analysis in economic models. Huang et al. (2022) analyzed the impact of price changes on rural households' food demand and discussed the possible reasons for the emergence of different price effects among different food products and different types of households.

In addition, demand theory also takes into account the income effect and substitution effect of consumers. The income effect refers to the impact of changes in consumer income on the demand for goods when the price of the goods remains unchanged; the substitution effect refers to the fact that when the price of a commodity changes, consumers will replace relatively expensive goods with relatively cheaper goods, thereby affecting the demand for the commodity (Israel, 2020).

Mirman and Santugini (2014) found that the impact of risk aversion on consumers' optimal behavior depends on income and substitution effects. Rathnayaka et al. (2019)

confirmed that Sri Lankan consumers spend more than half of their income on food, and that income growth plays an important role in Sri Lanka's consumption patterns. Mustafa (2022) found that the substitution effect exists significantly among vegetables, meats, and fruits, which reflects the strategic adjustments of Pakistani households in response to price fluctuations. Moradi (2021) clearly pointed out that tea and coffee, as substitute goods, may substitute for each other in use or consumption due to changes in the environment, which increases consumers' choices and competition among companies. Therefore, this study selects coffee as the substitute variable for tea.

Demand theory is not only applicable to the analysis of consumer behavior in a single market, but is also widely used in international trade research. Geraci and Prewo (1982) studied the impact of demand factors on the scale of international trade. From a macro perspective, economic growth and income levels in importing countries will increase demand for imported goods, thereby expanding the scale of trade. Tyler (1981) found in empirical studies of multiple countries that as the economy of importing countries grows, their demand for various imported goods will also increase accordingly. According to Sono (1961), demand theory also plays an important role in explaining the price formation mechanism in international trade. According to the law of demand, when other conditions remain unchanged, the price of a commodity and the quantity demanded are inversely related. This means that when the price of a commodity rises in the international market, consumers in the importing country will reduce their purchases due to the increased cost. They may turn to other substitutes.

In the international trade of agricultural products, there is often a significant substitution relationship between the local production capacity of the importing country and

its import demand. When an importing country can produce a certain product at a lower cost, its dependence on similar products from external sources will be significantly reduced. This relationship is called the domestic supply substitution effect, which is also an important theoretical assumption in the study of agricultural product trade. It belongs to the “internal substitution mechanism” on the demand side within the category of demand theory (Clements et al., 2021). Forgenie and Khoiriyah (2023), based on quarterly data from Indonesia, used the ARDL model in their empirical analysis and revealed that when domestic food production increases, the demand for imported food decreases significantly, confirming the practical role of the domestic supply substitution effect. This study takes the same perspective as its theoretical basis to verify whether an increase in Malaysia’s tea production has an inhibitory effect on China’s tea exports.

The transportation cost hypothesis (Wong, 2022) holds that transportation costs are an important non-price factor affecting international trade flows, which is particularly significant in agricultural trade. Since agricultural products are generally large in volume and short in shelf life, transportation efficiency and costs play a crucial role in their international circulation. When transportation costs rise, importing countries may reduce imports from distant countries and turn to neighboring countries or local substitutes, leading to a decline in export volumes. This theory can be traced back to the “iceberg transport model” proposed by Samuelson (1952), who pointed out: If transportation itself consumes resources, then trade gains will not be fully realized (Ding et al., 2022). Since then, numerous studies on trade costs have shown that transportation costs indirectly inhibit trade flows by increasing trade prices. For example, Mulyk and Mulyk (2022) found that the rise in transportation costs has an inhibitory effect on Ukraine’s agricultural exports to ASEAN. Demand theory does not directly analyze how costs affect demand, instead, it treats price

changes resulting from cost pass-through as an exogenous variable to examine their impact on demand. Based above, this study uses international oil price as an indicator of transportation costs to measure their impact on China-Malaysia tea trade.

2.4 Conceptual Framework

In international trade and economics research, export volume is a core indicator for measuring the actual quantity of goods exported by a country or region within a specific period. It is a physical or material indicator that is distinguished from export value and better reflects the true scale of commodity flows (Dudziński & Knap, 2022). There are many factors that affect export volume. From the supply side, factors such as the exporting country's production costs, technological level, and product quality determine the competitiveness of export products. From the demand side, the importing country's economic scale, exchange rate level, imported commodity prices, and consumer preferences directly affect its import demand (Krugman & Obstfeld, 2009). Next, based on empirical literature, this section will discuss the relationship between various influencing factors in this study and export volume.

2.4.1 Relationship between Export Volume and China's Tea Price

According to demand theory, when other conditions remain constant, there is typically a negative relationship between the price of a commodity and its demand; that is, an increase in price tends to reduce demand, whereas a decrease in price tends to raise it (Marshall, 1890). In international trade, changes in export prices directly determine the price competitiveness of products, which in turn affects the import demand of the target market for the product. Dudziński and Knap pointed out that export price is a key factor influencing export performance, and an increase in price usually leads to a decrease in export volume.

At the same time, there is a negative relationship between export price and export volume, which is consistent with traditional demand theory. However, this impact varies depending on a country's level of economic development and the competitiveness of its products (Dudziński & Knap, 2022). Algieri (2015) took the Italian export market as an example and found that changes in export prices significantly affect export demand. The study shows that Italy's export demand has a certain elasticity to price changes.

According to existing literature, the impact of tea prices on export volume varies in its manifestation across different countries and different segmented markets (Gunathilaka & Tularam, 2016). Nursodik et al. (2022), in their study on the competitiveness of Indonesian tea in the Southeast Asian market, revealed a significant negative correlation between tea export prices and export volume. An increase in price leads to an almost proportional decline in export volume, and this result confirms the applicability of the law of demand in tea trade. However, in their study on Indonesia's tea exports to the international market, the impact of export prices on export volume is not significant, suggesting that Indonesian tea may have quality premiums or inelastic demand in the international market (Nursodik et al., 2021). Irina (2020) conducted an empirical analysis on China's tea exports to Russia and found that China's tea prices have a significant negative impact on export volume. In the study on China's tea exports to the U.S. market, Xu (2020) found that tea prices have a positive impact on total tea export volume and black tea exports, but a weak negative impact on green tea exports, indicating that price sensitivity varies by tea category. These studies support the conceptual framework by showing that the price of China's tea imported by Malaysia is a key determinant of import demand. Including this variable allows the study to examine how price changes affect Malaysia's demand for China's tea.

2.4.2 Relationship between Export Volume and Coffee Price

For international agricultural product trade, prices not only affect the demand for a single product, but also change consumer choices through substitution effects (Mas-Colell et al., 1995). Substitution effect refers to the fact that when the price of a commodity rises, consumers may choose relatively low-priced substitutes. Bhandari's study examined the cross-price effects between import and export markets. The research found that import demand is influenced by the prices of substitute goods, which in turn affects the supply and demand in export markets (Bhandari, 2013). In the subfield of agricultural products, Pratama (2023) elaborately demonstrated the price competition and demand shift in export between palm oil and coconut oil as substitutes. Amiruddin et al. (2021) analyzed the factors affecting Indonesia's crude palm oil export trade volume, and took the prices of crude palm oil substitutes, soybean oil and sunflower oil, as independent variables. They found that the prices of substitutes had a significant positive impact on the export volume of the two importing countries, Malaysia and Italy.

This study, based on the research of scholars such as Hodacs (2023), Yeap et al. (2021), Hajra (2021), Grigg (2002), and Aboushady et al. (2022), regards coffee as a substitute for tea. However, in existing literatures, there are relatively few studies that take coffee as a substitute for tea to research tea export demand, and this study has only found references in the following two literatures.

Kadhim (2022) conducted an empirical analysis by establishing an ARDL model based on Iraq's tea import demand from over 20 countries. The study found that tea prices have a significant negative impact on import volume, while coffee prices exhibit a strong positive substitution effect, indicating that there is a dynamic substitution relationship

between the two in the Iraqi market: when coffee prices rise, consumers will significantly switch to tea consumption; whereas an increase in tea's own price will suppress demand in the short term and trigger a more substantial reduction in import volume in the long term. This reflects that the price sensitivity of tea as a necessity and the consumption switching elasticity of coffee as a substitute jointly shape the structural characteristics of Iraq's import market. In contrast, Irina (2020) took the import price of Brazilian coffee as a substitute for China's tea and concluded that changes in coffee prices lack statistical significance with regard to China's tea exports to Russia. These studies support the conceptual framework by highlighting that the price of coffee imported by Malaysia is a key factor influencing import demand. Including this variable enables the study to analyse how changes in the price of substitute goods affect Malaysia's demand for China's tea.

2.4.3 Relationship between Export Volume and Malaysia's GDP

Gross Domestic Product (GDP), refers to the final result of production activities of all permanent units in a country (or region) over a certain period of time. In international trade research, GDP represents a country's economic strength and purchasing power, which directly determines the scale and growth potential of foreign trade demand (Bleaney & Tian, 2023). The relationship between GDP and export demand is mainly reflected through the income effect. According to demand theory, when a country's GDP grows, its residents' income level and purchasing power also rise, thereby promoting an increase in import demand (Marshall, 1890).

In existing literature, studies using GDP as a proxy variable for national income are relatively common. Vo et al. (2024) used a spatial gravity model and panel data to find that GDP growth and population growth in the importing country have a positive impact on

Vietnam's coffee exports. Bui and Chen (2017) also verified that GDP growth in the importing country has a significant positive impact on Vietnam's rice exports. Sato (2020) examined the impact of importing countries' GDP on Kenya's tea exports and concluded that: GDP of the importing country is positively correlated with the volume of exports. Qin and Zhou (2024) found in their study that China's tea exports show a positive response to GDP growth in target markets of Belt and Road countries: the faster the economic growth of the importing country, the stronger the demand for China's tea, especially in upper-middle-income countries. In Zhang and Liu (2023)'s study based on the gravity model, it was found that in China's tea exports to over 30 countries, for every 1% growth in the importing country's GDP, China's tea export volume increases by approximately 0.68%.

Yeshineh (2016) applied the ARDL method to examine the relationship between trade balance and income. The estimation process included unit root tests, bounds testing, estimation of long-run elasticity coefficients and the short-run error correction model, as well as Granger causality tests. The results indicated a significant long-run relationship between trade balance and income. Gambato et al. (2021) employed the ADF unit root test to examine the stationarity of variables and confirmed that Mongolia's exports to China and Mongolia's GDP were I(1) variables. They also applied the ARDL bounds test and confirmed the existence of a long-run cointegration relationship between Mongolia's exports to China and Mongolia's GDP. Based on the above, this study takes Malaysia's GDP as one of the variables affecting export volume into the conceptual framework.

2.4.4 Relationship between Export Volume and Malaysia's Tea Production

In studies on international agricultural product trade, the domestic agricultural output of importing countries is regarded as one of the important factors affecting their import

behavior. According to the local supply substitution effect, when a country can achieve partial self-sufficiency in agricultural products domestically, the demand for similar imported products usually decreases, thereby exerting an inhibitory effect on exporting countries (Clements et al., 2021).

Forgenie and Khoiriyah (2023) pointed out that Indonesia's food import demand shows high sensitivity to changes in domestic production, and its adjustment speed is significantly faster than that in similar studies. Balié and Valera (2020)'s study shows that under the context of rice trade policy reform in the Philippines, domestic production and imports exhibit a significant relationship: imports surged and caused a short-term decline in domestic output, while in the long run, if productivity improves, imports still serve as an important supplement to domestic supply, with regional heterogeneity in this relationship. Osei-Owusu et al. (2019), using Denmark as a case study, confirmed that growth in domestic production, especially in feed, can effectively suppress import demand. Carew et al. (2009) found in their study that the increase in U.S. domestic wine production significantly reduced the proportion of imported wine. Even when the import price was lower than the domestic price, domestic supply still substituted for import demand, highlighting the domestic production substitution effect. Wu and Liu (2008), using time series data, incorporated domestic production into the gravity model and further verified the negative correlation between the domestic production of importing countries and the export volume of exporting countries. Drawing on these literatures, this study incorporates Malaysia's domestic tea production as an explanatory variable affecting export volume into the conceptual framework.

2.4.5 Relationship between Export Volume and International Oil Price

According to the transportation cost hypothesis, when transportation costs rise, the final price of exported goods in the destination market will increase accordingly, which in turn weakens their relative price advantage, leads to a decline in demand, and reduces export volume. Conversely, a decrease in transportation costs may enhance the price competitiveness of exported goods in the international market, thereby driving an expansion of export scale (Krugman & Obstfeld, 2009).

Transportation costs not only include the freight charges and handling fees incurred in the process of transporting goods from the exporting country to the importing country, but may also be jointly affected by factors such as international oil prices and physical distance. Friedt and Wilson (2018), by analyzing the relationship between actual freight rates and export volume in containerized trade, demonstrated that rising freight rates have an inhibitory effect on export volume. Sato (2020), in his study on Kenya's tea exports, verified from the perspective of physical distance that transportation costs significantly affect Kenya's tea exports through three channels: geographical distance, coastal accessibility, and regional integration.

Limao and Venables (2001) showed in their study that transportation costs are an important factor restricting exports from developing countries. In particular, the trade elasticity of seaborne goods (such as agricultural products) decreases significantly when oil prices rise. This study provided a theoretical basis for incorporating oil prices into transportation cost models. Hummels (2007) systematically analyzed how transportation costs affect international trade and proposed the concept of "transport cost elasticity". The study noted that even as tariffs decline, transportation costs remain a key factor constraining

the export of price-sensitive goods such as agricultural products. Von & Vézina (2016) support the use of international oil prices as a proxy for transportation costs. International oil prices significantly affect imports and exports, and higher oil prices intensify the distance penalty in trade, thereby restraining bilateral trade flows. Zhou and Kang (2021), in their study, systematically examined the influencing factors of Russia's foreign trade and found that Russia's GDP and international oil prices are the main factors affecting its imports and exports. Adi (2018) empirically analyzed the panel data of Indonesia, Malaysia, and Thailand, and found that international oil prices have a significant negative impact on trade flows among the three countries. It can thus be considered that international oil prices serve as an important proxy variable for measuring transportation costs.

According to the literature, since fuel costs account for a high proportion of shipping costs, China's tea is often exported to Malaysia by sea. Oil price fluctuations can significantly affect the transportation costs of China-Malaysia tea trade (Korinek & Sourdin, 2011). In addition, data on freight and logistics costs are difficult to obtain. Therefore, it is reasonable to use international oil price as a representative variable of transportation costs in this study. Incorporating international oil prices into the research framework of this study can effectively capture the impact of transportation costs on China's tea exports to Malaysia.

2.5 Research Hypotheses

Based on the research questions and objectives raised in Chapter 1, combined with the theoretical foundation of demand theory, and through discussions under the conceptual framework, this study proposes the following relevant hypotheses on the influencing factors of China's tea exports to Malaysia. The purpose of proposing hypotheses is to closely connect the theoretical logic of this study with the empirical analysis, thereby enhancing the

scientific nature and logical rigor of the research. The theoretical framework explains the possible relationships between variables, the conceptual framework further concretizes these relationships into variable paths in the research model, and the research hypotheses clearly proposes the expected positive and negative relationships between variables on this basis.

Table 2.1: Research Hypotheses

Hypothesis Summary	
H_1	The price of China's tea imported by Malaysia has a negative impact on the trade volume of China's tea exports to Malaysia.
H_2	The price of coffee imported by Malaysia has a positive on the trade volume of China's tea exports to Malaysia.
H_3	Malaysia's GDP has a positive impact on the trade volume of China's tea exports to Malaysia.
H_4	Malaysia's tea production has a negative impact on the trade volume of China's tea exports to Malaysia.
H_5	International oil price has a negative impact on the trade volume of China's tea exports to Malaysia.

The five research hypotheses proposed in this chapter are all based on the core logic of demand theory. By breaking down the mechanisms of price effect, substitution effect, and income effect, we deduce the impact of each variable on the trade volume of China's tea exports to Malaysia. The following explains the theoretical basis and action path of each hypothesis.

The theoretical basis of H_1 is the price effect. Commodity prices and demand have an inverse relationship. When the price of China's tea imported by Malaysia rises, the purchasing costs of importers and consumers increase, and market demand tends to shrink. Therefore, it is assumed that the price of China's tea imported by Malaysia has a negative impact on the trade volume of China's tea exports to Malaysia.

The theoretical basis of H_2 is the substitution effect. In previous literature, coffee is considered to be a substitute for tea. When the price of imported coffee from Malaysia rises, the relative cost-performance ratio of coffee decreases, and market demand will shift to tea, which has a substitution function. Therefore, it is assumed that the price of imported coffee from Malaysia has a positive impact on the trade volume of China's tea exports to Malaysia.

The theoretical basis of H_3 is the income effect. GDP growth will increase residents' disposable income and consumption capacity. When Malaysia's GDP rises, its market demand for imports of non-essential normal commodities such as tea will expand as consumption upgrades. Therefore, it is assumed that Malaysia's GDP has a positive impact on the trade volume of China's tea exports to Malaysia.

H_4 is also based on the substitution effect, focusing on the substitution relationship between local production and imported goods. When Malaysia's domestic tea production increases, domestic tea will squeeze the demand space for imported China's tea in the market. Therefore, it is assumed that Malaysia's tea production has a negative impact on the trade volume of China's tea exports to Malaysia.

The theoretical basis of H_5 stems from the interaction between cost pass-through and the price effect. International oil prices are fundamental cost factors in global trade. When international oil price rise, costs such as transportation and processing in tea export will increase the price of China's tea imported by Malaysia and suppress demand. Thus, it is hypothesized that international oil price has a negative impact on the trade volume of China's tea exports to Malaysia.

Research hypotheses, as a bridge between theoretical logic and empirical verification, can guide model construction, test variable relationships, clarify research objectives, and enhance the logic and scientificity of the research.

2.6 The Gap in the Literature Review

First, currently, Malaysia is often included in cross-border trade research as a country belonging to both ASEAN and the Belt and Road Initiative; however, studies focusing on China's tea exports to Malaysia are relatively scarce, leaving an evident research gap.

In the study of factors affecting China's tea export trade, previous studies have mostly taken multiple countries or regions as research objects (Oktaviana, 2017), trying to find universal factors from them, but this research method ignores the uniqueness of the markets of each importing country (Li, 2022). China and Malaysia have a deep historical origin, special geographical location and close economic ties in tea trade. The structure of Malaysia's tea market is complex and diverse, as consumers' preferences for tea are affected by the interweaving of multiple cultural factors. Its trade policy is also constantly adjusting to adapt to changes in domestic and foreign economic situations (Pampus, 2023). Therefore, research on tea trade between China and Malaysia, a trading partner with great potential, needs to be supplemented.

Secondly, the existing literature exhibits significant limitations in the methodology of studying tea trade between bilateral countries. Researchers commonly employ gravity models and panel data models to analyze the differential impacts of factors such as economic scale, distance, and policies on export trade flows across different nations or regions (Suroso et al., 2024). The majority of studies focus on the macro-level aspects of international trade, examining export-led growth patterns, trade openness, and the relationships among various

macroeconomic variables (Maity & Ghosh, 2015). Due to the lack of incorporation of representative microeconomic variables, such methodological approaches reveal considerable shortcomings when delving into the specific dynamics of China-Malaysia bilateral trade relations.

Furthermore, in terms of sample selection, prior research has predominantly relied on cross-country panel data or annual time-series datasets (Zhang, 2021). While such data are useful for identifying broad patterns and trends in international trade from a macroeconomic perspective, their coarse temporal resolution makes it difficult to capture short-term market dynamics or accurately evaluate the immediate effects of transient shocks on trade flows and their subsequent adjustment toward long-term equilibrium. As a result, the findings of these studies offer limited practical guidance for shaping China's tea export strategies to Malaysia, particularly in terms of responsiveness to real-time market conditions and policy relevance.

In summary, the current research on China's tea exports to Malaysia has some defects, such as insufficient data timeliness, dominance of macro models, and insufficient application of research methods. These gaps not only limit the in-depth development of academic research, but also hinder the expansion of China's tea enterprises in the Malaysian market and the formulation of relevant government trade policies. Therefore, filling these research gaps has important theoretical and practical significance, which is also the important starting point and mission of this study.

2.7 Chapter Remark

This chapter systematically reviews the theoretical foundation, research hypotheses, conceptual framework, and methodological basis for exploring the factors influencing China's tea exports to Malaysia, while identifying existing research gaps.

In terms of literature background, studies on China's tea exports primarily focus on export scale, market structure, and competitiveness. Qin and Zhou (2024) and Zheng et al. (2022) confirmed that policy dividends (e.g., the Belt and Road Initiative) significantly promote China's tea export growth. Wang et al. (2020) and Suroso et al. (2024) noted that China holds comparative advantages in the global tea market. Regarding influencing factors, Liu and Lu (2013), Huo and Lin (2010), and Yi (2010) found through gravity models that importing countries' GDP and China's tea production positively affect export volume, while exchange rates, geographical distance, and green barriers exert negative impacts. However, literature specifically focusing on China-Malaysia tea trade is scarce, with only Yang et al. (2019), Zhao et al. (2023), and Cao et al. (2023) mentioning Malaysia as an ASEAN market with policy dividends and consumption potential, highlighting a research gap.

The theoretical framework is based on demand theory. Marshall (1890) and Hicks (1986) established that demand is determined by prices, income, and preferences, with price elasticity (Varian, 2003) and income elasticity (Rathnayaka et al., 2019) as core concepts. The substitution effect (Israel, 2020; Mustafa, 2022) and domestic supply substitution effect (Clements et al., 2021; Forgenie & Khoiriyah, 2023) were introduced to explain consumer switching behavior and the inhibitory effect of importing countries' domestic production on imports. The transmission mechanism between transportation costs and prices (Wong, 2022;

Samuelson, 1952) provides a basis for using international oil prices as a factor influencing price effects.

The conceptual framework elaborated on the relationships between variables and export volume. For export volume and tea prices, Algieri (2015) and Nursodik et al. (2022) confirmed a negative correlation, while Xu (2020) noted variations across tea categories. Regarding substitution with coffee, Kadhim (2022) found that coffee prices positively affect tea imports in Iraq, though Irina (2020) found no significant effect in Russia. For GDP, Bleaney and Tian (2023), Sato (2020), and Zhang and Liu (2023) verified a positive impact on import demand through the income effect. For Malaysia's tea production, Forgenie and Khoiriyah (2023) and Carew et al. (2009) demonstrated its negative effect on imports via the domestic supply substitution effect. For international oil price, Limao and Venables (2001), Adi (2018), and Korinek and Sourdin (2011) confirmed their role as a proxy for transportation costs, negatively affecting trade flows. Based on the above, five research hypotheses were proposed, linking tea price, coffee price, Malaysia's GDP, Malaysia's tea production, and international oil prices to China's tea export volume to Malaysia.

Finally, Section 2.6 identified the research gaps: scarcity of studies on China-Malaysia tea trade, overreliance on macro models (e.g., gravity models) that ignore market uniqueness (Li, 2022), and coarse data (annual or panel) failing to capture short-term dynamics (Zhang, 2021). These gaps underscore the necessity of this study, which focuses on bilateral trade, uses quarterly data, and applies ARDL to explore long- and short-term impacts.

Overall, this chapter lays a theoretical and methodological foundation for subsequent empirical analysis, while clarifying the research's originality by addressing identified gaps. In the following chapter, the specific empirical methods of this study will be discussed.

CHAPTER 3

METHODOLOGY

3.1 Overview

This study analyzes the relationship between the export volume of China's tea to Malaysia and five influencing factors, including the price of China's tea imported by Malaysia, the price of coffee imported by Malaysia, Malaysia's GDP, Malaysia's tea production, and international oil price. This chapter presents the research methods of the study. Section 3.1 is the introduction of this chapter. Section 3.2 presents the research design, while the description and sources for the data are explained in Section 3.3. Section 3.4 continues with the empirical model used in the study. In addition, estimation methods such as unit root test, ARDL method and diagnostic tests are detailed in Section 3.5. The last section of this chapter summarizes the above.

3.2 Research Design

This study employs a quantitative approach to explore the causal relationship between the export volume of China's tea to Malaysia and various economic variables. Using time series data and a multiple linear regression model, it empirically analyze the key factors influencing China's tea exports to Malaysia. This section outlines the following steps in the research design process: theoretical framework development, data collection strategy, and empirical methodology. The theoretical foundation of this study is demand theory, which, in the context of international trade, posits that the import demand for a commodity is influenced by price effect, substitution effect, income effect, domestic supply substitution effect, and assumptions regarding transportation costs. By integrating this theoretical framework with existing literature, the study selects export volume as the dependent variable,

and the price of China's tea imported by Malaysia, the price of coffee imported by Malaysia, Malaysia's GDP, Malaysia's tea production, and international oil price as the five independent variables. These variables are transformed into a quantifiable empirical model, with the aim of revealing the long- and short-run mechanisms through which various economic factors influence China's tea exports to Malaysia. Data for this study were obtained from authoritative economic data websites. The empirical methodology involved constructing a multiple linear regression model, then conducting unit root tests for all variables using the ADF and KPSS tests, followed by analysis using the ARDL method. Finally, a series of diagnostic analyses were conducted to ensure the robustness and credibility of the model specification.

3.3 Data Description and Sources

This study focuses on the export volume of China's tea to Malaysia and its influencing factors. The data collected in the study consist of quarterly data from 2005 to 2024, with a total of 80 observations. While the sample size is relatively small, methodologies such as the ARDL approach remain applicable to time-series data with limited observations. To ensure the scientific validity of the research results, the study employs data from authoritative and publicly available sources, with careful attention to reasonable data processing and rigorous methodological application.

There are several variables utilized in the study. The export volume of China's tea to Malaysia is the dependent variable, and the five independent variables include the following: the price of China's tea imported by Malaysia, the price of coffee imported by Malaysia, Malaysia's GDP, Malaysia's tea production, and international oil price. To mitigate heteroscedasticity, compress the scale of extreme values, and make the data closer to a

normal distribution, all variables in this study are transformed into logarithmic form. To facilitate understanding for readers and future research, it is necessary to define the terms involved and introduce the sources of the data.

Table 3.1: Summary of the Variables Involved

Variable	Symbol	Definition	Source
Export Volume	EV	Refers to the total quantity of tea exported from China to Malaysia	China Customs; UN Comtrade
China's Tea Price	CTP	Average price of tea imported from China to Malaysia	UN Comtrade
Coffee Price	CP	Average price of coffee imported into Malaysia from around the world	UN Comtrade
Gross Domestic Product	GDP	The total monetary value of all goods and services produced in Malaysia	BNM; DOSM
Malaysia's Tea Production	MTP	The total amount of tea grown within Malaysia	FAO
International Oil Price	OP	Widely known as the crude oil prices, Brent crude and it acts as a benchmark in the oil market	FRED; IMF

3.3.1 Export Volume

Export volume usually refers to the total quantity of goods and services that a country or region exports to other countries or regions within a certain period of time. It is an important indicator to measure the scale of foreign trade and the degree of economic outward orientation of a country or region (Ebadi & Ebadi 2015). The export volume that this study focuses on is the export trade volume of tea from China to Malaysia. As a dependent variable, it can reflect the results and scale of China's tea export to Malaysia, and is a key indicator to measure the scale of China's tea trade in the Malaysian market. From an empirical point of view, the utilization of trade volume as the dependent variable not only facilitates horizontal

or vertical comparative analysis by leveraging statistical databases but also enables the quantitative assessment of the impact of diverse economic factors on export volume through regression analysis.

Export volume is measured in kilograms, mainly from the statistical data of China Customs. In addition, in order to ensure the reliability and completeness of the data, this study also refers to statistical data from some international organizations and professional databases, such as the United Nations Commodity Trade (UN Comtrade) statistics database.

3.3.2 China's Tea Price

In the study, the China's tea price is intended to measure the average purchase price faced by Malaysia when importing tea from China. This independent variable not only reflects the comprehensive progress of China-Malaysia trade negotiations and international market conditions, but also to a certain extent represents the competitiveness of China's tea in the Malaysian market.

The data of China's tea price comes from the UN Comtrade statistics database. Since the tea varieties involved in China-Malaysia trade are various, with different quality grades and packaging specifications, the prices of these tea products in the database are different. Therefore, this study selects the total category of tea according to the customs code of tea products (HS code 0902) and calculates the average price using the formula "total import value / total import volume". This enables the tea price to be studied at the macro level, making the results more representative. To keep consistent with the other independent variables, this variable is measured in "US dollars/kg".

3.3.3 Coffee Price

The coffee price refers to the average price that Malaysia needs to pay when importing coffee from all over the world. In the empirical model of this study, the core purpose of selecting this independent variable is to measure the possible substitution effect of price changes of imported coffee in Malaysia on the demand for tea.

Consistent with China's tea price in the study, the data for this independent variable comes from the UN Comtrade statistics database too. The data is queried according to the customs code of the coffee category (HS code 0901). The average price of coffee is calculated in the form of "total import value / total import volume". The unit of measurement is "US dollars/kg" to reflect Malaysia's overall import cost level for coffee.

3.3.4 Gross Domestic Product

GDP is the total value of all final products and services produced within a country (or region) over a certain period. In economics, GDP plays an extremely important role and has extensive application significance. It is widely recognized as one of the core indicators for measuring the total economic activity and development level of a country or region. It is also widely used in various fields such as government decisions, economic policy formulation, international comparison, investment evaluation, and social development monitoring (Callen, 2012).

In this study, GDP is one of the core macroeconomic variables used to measure the overall economic development level of Malaysia. GDP growth generally indicates a rise in the income level and consumption capacity of Malaysian residents, which in turn drives the growth of demand for foreign products, including tea exported from China. Malaysia's GDP

is in US dollars, sourced from the Bank Negara Malaysia (BNM) and Department of Statistics Malaysia (DOSM).

3.3.5 Malaysia's Tea Production

Malaysia's tea production refers to the total quantity of tea produced within the territorial boundaries of Malaysia during a specific period. This variable reflects the overall output scale of Malaysia's domestic tea industry, covering all tea varieties grown locally, and excluding imported tea or re-exported products. Tea production in Malaysia is geographically concentrated in highland areas (such as the Cameron Highlands in Pahang), and these regions contribute more than 90% of Malaysia's total tea output (Mansur, 2019).

Malaysia's tea production is included as one of the explanatory variables in this study, owing to its substitution effect on China's tea in specific segmented markets. It can more comprehensively reflect the structural constraint effect of local supply capacity on the export volume of China's tea. Consistent with the export volume, the unit of Malaysia's tea production is also kilograms, and the data is sourced from the Food and Agriculture Organization of the United Nations (FAO).

3.3.6 International Oil Price

In this study, the international oil price adopts the Brent crude oil spot price as a representative indicator. The Brent crude oil price is widely utilized in the global energy market and serves as an authoritative indicator for evaluating changes in global energy costs and their impact on international trade flows. Brent crude, produced in the North Sea region of the North Atlantic, is a type of light sweet crude oil. With quality comparable to crude oil from most global producing regions, Brent crude has gained market acceptance across Europe, Africa, the Middle East, and Asia-Pacific. Therefore, its price can well reflect the

supply and demand dynamics of global crude oil trade. Due to its wide coverage and large trade volume, the Brent crude oil price is often regarded as one of the typical representatives of international oil prices (Imsirovic, 2023).

In this study, international oil price (measured by Brent crude in US dollars/barrel) serve as a key independent variable to capture exogenous shocks to international trade transportation costs. The data come from authoritative sources including the Federal Reserve Economic Data (FRED) and the International Monetary Fund (IMF), guaranteeing accuracy and consistency.

3.4 Empirical Model

The multiple linear regression model is the first choice for this study due to its inherent ability to accommodate and analyze the collective impact of multiple independent variables on a single dependent variable (Gan & Ahmad, 2011), which can be applied to the study of trade relations between two countries using time series data. In the context of China's tea exports to Malaysia, a confluence of diverse factors is anticipated to exert influence on the export volume. This model proffers the methodological prowess to concurrently consider and quantitatively assess these relationships.

The generic form of the multiple linear regression model is articulated as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon \quad \text{Equation 3.1}$$

Where Y symbolizes the dependent variable, $X_1, X_2, \dots, X_n$ represent the independent variables, $\beta_0, \beta_1, \beta_2, \dots, \beta_n$ denote the regression coefficients of the independent variables, while ε represents the random error term. The regression coefficient represents the strength

and square of the relationship between the dependent variable and the independent variable, and the random error term indicates the part that cannot be explained by the model.

In order to explore the factors affecting the trade volume of China's tea exports to Malaysia, this study constructs logarithmic linear regression model as follows:

$$LEV_t = \beta_0 + \beta_1 LCTP_t + \beta_2 LCP_t + \beta_3 LGDP_t + \beta_4 LMTP_t + \beta_5 LOP_t + \varepsilon_t \quad \text{Equation 3.2}$$

Where,

- L represents the natural logarithm of the variable,
- EV_t represents the export volume in quarter t,
- CTP_t represents China's tea price in quarter t,
- CP_t represents coffee price in quarter t,
- GDP_t represents GDP of Malaysia in quarter t,
- MTP_t represents Malaysia's tea production in quarter t,
- OP_t represents the international oil price in quarter t,
- β_0 represents the constant term or intercept,
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ represent the coefficients of each independent variable and
- ε_t represents the error term.

Rooted in the theoretical framework of demand theory, which encompasses core principles such as price effects, income effects, and substitution effects, and drawing on a systematic review of existing literature that examines key determinants of export trade, this study first hypothesized the expected signs of the variables before estimating the model.

As shown in Table 3.2, on one hand, increases in the price of imported coffee by Malaysia and Malaysia's GDP will have a positive impact on China's tea exports to Malaysia. On the other hand, increases in the price of China's tea imported by Malaysia, Malaysia's domestic tea production, and international oil price will have a negative impact on China's tea exports to Malaysia.

Table 3.2: Expected Signs for the Cefficients of the Variables

Coefficient	Expected sign	Reference
β_1	Negative	Nursodik et al. (2022), Irina (2020), Xu (2020), Algieri (2015)
β_2	Positive	Kadhim (2022), Pratama (2023), Pradina & Adhitya (2023)
β_3	Positive	Vo et al. (2024), Gil et al. (2008), Qin and Zhou (2024), Zhang and Liu (2023)
β_4 ,	Negative	Forgenie and Khoiriyah (2023), Osei-Owusu et al. (2019), Wu and Liu (2008), Carew et al. (2009)
β_5	Negative	Limao and Venables (2001), Zhou and Kang (2021), Hummels (2007), Adi (2018)

3.5 Estimation Methods

This study mainly constructed a multivariate linear regression model to conduct an empirical analysis of China's tea exports to Malaysia and its influencing factors. In order to ensure that the time series data met the modeling requirements and verify the long-term equilibrium relationship and short-term dynamic adjustment mechanism between the variables, this study introduced a series of econometric methods. It commenced with unit root tests to determine the order of integration of the variables. Subsequently, the bounds test was employed to confirm the existence of a long-run association between the variables. The ARDL model was then used to reinforce the hypothesis regarding the validity of the

long-run relationship between the variables. Additionally, the Wald test was applied to examine Granger causality between variables in the short run. Furthermore, diagnostic tests were conducted to ensure that the estimated model did not suffer from any econometric issues.

3.5.1 Unit Root Test

Time series data often have trend and non-stationary problems. According to Arltová and Fedorová (2016), this study conducted stationarity tests on all variables before regression analysis to avoid spurious regression results. Only when the integration order is $I(0)$ or $I(1)$, the ARDL method and subsequent regression analysis are reasonable. Two common unit root test methods are used: Augmented Dickey-Fuller (ADF) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The ADF test and KPSS test are complementary unit root testing methods: the ADF test takes “the variable has a unit root” as the null hypothesis, while the KPSS test takes “the variable is stationary” as the null hypothesis. Their combined application enables a more comprehensive judgment of the stationarity of time series. (Enders, 2015).

3.5.1.1 Augmented Dickey-Fuller (ADF) Test

The ADF test is an extended method based on the Dickey-Fuller test (Dickey & Fuller, 1979). It controls autocorrelation by adding a lagged difference term to the original regression equation. The general form of constructing a regression model is:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \varepsilon_t \quad \text{Equation 3.3}$$

Where, Y_t is the value of the time series at time t ; ΔY_t is the first-order difference of Y_t , that is, $\Delta Y_t = Y_t - Y_{t-1}$; α is a constant term; βt is a time trend term; γ is the coefficient of

the lag term, which is used to test the unit root; p is the lag order; δ_t is the coefficient of the lag difference term, which is used to eliminate autocorrelation; ε_t is the error term.

According to Cheung and Lai (1995), the null hypothesis (H_0) of the ADF test is that the time series has a unit root ($\gamma = 0$), and the alternative hypothesis (H_1) is that the time series does not have a unit root ($\gamma < 0$). If the test statistic is less than the critical value, the null hypothesis (H_0) is rejected, indicating that the series is stationary; otherwise, the null hypothesis (H_0) is accepted, indicating that the series is non-stationary. In the ADF test, it is very important to choose an appropriate lag order (p). Too few lag orders may lead to residual autocorrelation, and too many lag orders will reduce the effectiveness of the test.

In this study, the selection of the lag order is based on AIC (Akaike Information Criterion) to ensure the goodness of fit and simplicity of the model. According to Liew (2004), for model selection with small samples, Akaike Information Criterion (AIC) is generally preferred over the Bayesian Information Criterion (BIC) or Schwarz Information Criterion (SIC), as AIC is less strict in penalizing model complexity and may be better at avoiding underfitting.

3.5.1.2 Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

The KPSS test, proposed by Kwiatkowski et al. (1992), is an important method for testing the stationarity of time series. The introduction of the KPSS test primarily aims to address the potential bias in conventional ADF test, where the null hypothesis is exclusively based on the presence of a unit root. By adopting a dual-testing mechanism in empirical analysis, the KPSS test enhances the reliability and robustness of unit root determination. Consequently, in practical economic research, the KPSS and ADF tests are often employed

in a complementary manner (Johnson & Umobong, 2015). The model form of the KPSS test is as follows:

$$Y_t = \mu_t + r_t + \varepsilon_t \quad \text{Equation 3.4}$$

The KPSS test decomposes a time series into three components. Where, μ_t is a deterministic component that can include a constant term and a trend term; r_t is a random walk term, whose value determines whether the series has a unit root; and ε_t is the error term.

Unlike the ADF test, “stationarity” is the null hypothesis(H_0) of KPSS test, assuming that the time series is horizontally or trend-stationary ($r_t = 0$). The alternative hypothesis(H_1) is that the series has a unit root and is non-stationary ($r_t > 0$). The statistic calculation of the KPSS test is based on the following formula:

$$KPSS = \frac{1}{T^2} \sum_{t=1}^T \eta_t^2 / \hat{\sigma}^2 \quad \text{Equation 3.5}$$

where, η_t is the cumulative sum of the residuals; $\hat{\sigma}$ is the long-term variance of the error term, typically estimated using the Newey-West method; and T is the sample size. The KPSS statistic must be compared with a critical value (Kwiatkowski et al., 1992).

If the KPSS statistic is greater than the critical value, the null hypothesis(H_0) is rejected, indicating that the series has a unit root and is non-stationary. Otherwise, the null hypothesis(H_0) is accepted, indicating that the series is stationary. As Ting and Ling (2011), Sahu and Sharma (2018), and Musa (2020) note, the KPSS test combined with the ADF test is widely used in unit root testing in economic research.

3.5.2 Autoregressive Distributed Lag (ARDL) Method

The Autoregressive Distributed Lag (ARDL) method was proposed by Pesaran, Shin and Smith (1996). It is an econometric model employed to determine long-run equilibrium relationships and short-run dynamic adjustments between variables, especially in examining time series data integrated at different levels [$I(0)$ or $I(1)$]. In addition, the ARDL method can maintain high test power and estimation accuracy when the sample size is small (Narayan, 2005). After testing the stationarity of the variables through the unit root test, the ARDL bounds test can determine the cointegration relationship between the variables, and then reveal the long-run equilibrium relationship and short-run dynamic changes between the variables. In this study, The ARDL regression model in logarithm form with the assumption of six variables in the model is expressed as follows:

$$\begin{aligned} \Delta LY_t = & \alpha_0 + \sum_{i=1}^j \delta_{1i} \Delta LY_{t-i} + \sum_{i=0}^k \delta_{2i} \Delta LX_{t-i} + \sum_{i=0}^l \delta_{3i} \Delta LW_{t-i} + \sum_{i=0}^m \delta_{4i} \Delta LV_{t-i} \\ & + \sum_{i=0}^n \delta_{5i} \Delta LU_{t-i} + \sum_{i=0}^o \delta_{6i} \Delta LT_{t-i} + \beta_1 LY_{t-1} + \beta_2 LX_{t-1} + \beta_3 LW_{t-1} \\ & + \beta_4 LV_{t-1} + \beta_5 LU_{t-1} + \beta_6 LT_{t-1} + \varepsilon_t \end{aligned} \quad \text{Equation 3.6}$$

Where, L is the logarithm of the variable; Δ is the first difference operator; α_0 is the constant; δ_i represents the lagged difference coefficient, indicating the short-term dynamic impact of the variables; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ represent the coefficient of the lagged level term, indicating the long-term relationship between the variables; j, k, l, m, n, o respectively represent the lag order of each variable; ε_t is the error term. According to Liew (2004), this study used the AIC method to select the lag order. The ARDL model specification for the variables in this study takes the following form:

$$\begin{aligned}
\Delta LEV_t = & \alpha_0 + \sum_{i=1}^{j_1} \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^{k_1} \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^{l_1} \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=0}^{m_1} \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^{n_1} \delta_{5i} \Delta LMTP_{t-i} + \sum_{i=0}^{o_1} \delta_{6i} \Delta LOP_{t-i} \\
& + \beta_1 LEV_{t-1} + \beta_2 LCTP_{t-1} + \beta_3 LCP_{t-1} + \beta_4 LGDP_{t-1} \\
& + \beta_5 LMTP_{t-1} + \beta_6 LOP_{t-1} + \varepsilon_t
\end{aligned}$$

Equation 3.7

$$\begin{aligned}
\Delta LCTP_t = & \alpha_0 + \sum_{i=0}^{j_2} \delta_{1i} \Delta LEV_{t-i} + \sum_{i=1}^{k_2} \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^{l_2} \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=0}^{m_2} \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^{n_2} \delta_{5i} \Delta LMTP_{t-i} + \sum_{i=0}^{o_2} \delta_{6i} \Delta LOP_{t-i} \\
& + \beta_1 LEV_{t-1} + \beta_2 LCTP_{t-1} + \beta_3 LCP_{t-1} + \beta_4 LGDP_{t-1} \\
& + \beta_5 LMTP_{t-1} + \beta_6 LOP_{t-1} + \varepsilon_t
\end{aligned}$$

Equation 3.8

$$\begin{aligned}
\Delta LCP_t = & \alpha_0 + \sum_{i=0}^{j_3} \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^{k_3} \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=1}^{l_3} \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=0}^{m_3} \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^{n_3} \delta_{5i} \Delta LMTP_{t-i} + \sum_{i=0}^{o_3} \delta_{6i} \Delta LOP_{t-i} \\
& + \beta_1 LEV_{t-1} + \beta_2 LCTP_{t-1} + \beta_3 LCP_{t-1} + \beta_4 LGDP_{t-1} \\
& + \beta_5 LMTP_{t-1} + \beta_6 LOP_{t-1} + \varepsilon_t
\end{aligned}$$

Equation 3.9

$$\begin{aligned}
\Delta LGDP_t = & \alpha_0 + \sum_{i=0}^{j_4} \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^{k_4} \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^{l_4} \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=1}^{m_4} \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^{n_4} \delta_{5i} \Delta LMTP_{t-i} + \sum_{i=0}^{o_4} \delta_{6i} \Delta LOP_{t-i} \\
& + \beta_1 LEV_{t-1} + \beta_2 LCTP_{t-1} + \beta_3 LCP_{t-1} + \beta_4 LGDP_{t-1} \\
& + \beta_5 LMTP_{t-1} + \beta_6 LOP_{t-1} + \varepsilon_t
\end{aligned}$$

Equation 3.10

$$\begin{aligned}
\Delta LMP_t = & \alpha_0 + \sum_{i=0}^{j5} \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^{k5} \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^{l5} \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=0}^{m5} \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=1}^{n5} \delta_{5i} \Delta LMP_{t-i} + \sum_{i=0}^{o5} \delta_{6i} \Delta LOP_{t-i} \\
& + \beta_1 LEV_{t-1} + \beta_2 LCTP_{t-1} + \beta_3 LCP_{t-1} + \beta_4 LGDP_{t-1} \\
& + \beta_5 LMP_{t-1} + \beta_6 LOP_{t-1} + \varepsilon_t
\end{aligned} \tag{Equation 3.11}$$

$$\begin{aligned}
\Delta LOP_t = & \alpha_0 + \sum_{i=0}^{j6} \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^{k6} \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^{l6} \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=0}^{m6} \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^{n6} \delta_{5i} \Delta LMP_{t-i} + \sum_{i=1}^{o6} \delta_{6i} \Delta LOP_{t-i} \\
& + \beta_1 LEV_{t-1} + \beta_2 LCTP_{t-1} + \beta_3 LCP_{t-1} + \beta_4 LGDP_{t-1} \\
& + \beta_5 LMP_{t-1} + \beta_6 LOP_{t-1} + \varepsilon_t
\end{aligned} \tag{Equation 3.12}$$

Where the new legend in equations (3.7), (3.8), (3.9), (3.10), (3.11), and (3.12) is as follows: *EV* denotes export volume; *CTP* denotes China's tea price; *CP* denotes coffee price; *GDP* denotes the gross domestic product of Malaysia; *MTP* denotes Malaysia's tea production; *OP* denotes the international oil price.

3.5.2.1 Bounds Test

According to Sam et al. (2019), the bounds test is used to determine whether there is a long-term cointegration relationship between the variables. Narayan (2005) pointed out that the critical value table provided by Pesaran et al. (2001) was derived from large samples ($n > 500$) and may be inaccurate when applied to small samples. He re-estimated a more precise critical value table for the ARDL bounds test based on sample sizes ranging from 30 to 80, and explicitly recommended that studies with small sample sizes ($n < 100$) should adopt this revised table. In this study, the statistic of the bounds test is compared with the critical value (Narayan, 2005): if the statistic is greater than the upper critical value, the null hypothesis (H_0) is rejected, indicating that there is a long-term cointegration relationship; if the statistic is less than the lower critical value, the null hypothesis (H_0) is accepted,

indicating that there is no long-term cointegration relationship; if the statistic is between the upper and lower bounds, the result can be evaluated.

The null hypothesis (H_0) of the bounds test is: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$, that is, there is no long-term cointegration relationship between the variables; the alternative hypothesis (H_1) is: at least one $\beta_i \neq 0$, that is, there is a long-term cointegration relationship between the variables.

If the bounds test indicates the existence of a long-run cointegration relationship, the long-run coefficient can then be estimated. In this study, the long run model is based on the following formula:

$$\begin{aligned} \Delta LEV_t = & \alpha_0 + \sum_{i=1}^j \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^k \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^l \delta_{3i} \Delta LCP_{t-i} \\ & + \sum_{i=0}^m \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^n \delta_{5i} \Delta LMTP_{t-i} + \sum_{i=0}^o \delta_{6i} \Delta LOP_{t-i} + \varepsilon_t \end{aligned} \quad \text{Equation 3.13}$$

When a long-run relationship exists between the variables, an error correction representation is warranted (Shahbaz, 2009). Subsequent to estimating the long-run coefficients, the next empirical step entails formulating the Error Correction Model (ECM).

3.5.2.2 Error Correction Model

The Error Correction Model (ECM) is an important part of the ARDL method and is used to analyze the short-term dynamic relationship between variables. When there is a long-term cointegration relationship between variables, the short-term deviation from the long-term equilibrium will be adjusted through the error correction term to gradually return to the long-term equilibrium state (Shittu et al., 2012). The model form of ECM can be expressed as:

$$\begin{aligned}
\Delta LEV_t = & \alpha_0 + \sum_{i=1}^j \delta_{1i} \Delta LEV_{t-i} + \sum_{i=0}^k \delta_{2i} \Delta LCTP_{t-i} + \sum_{i=0}^l \delta_{3i} \Delta LCP_{t-i} \\
& + \sum_{i=0}^m \delta_{4i} \Delta LGDP_{t-i} + \sum_{i=0}^n \delta_{5i} \Delta LMTP_{t-i} + \sum_{i=0}^o \delta_{6i} \Delta LOP_{t-i} \\
& + \phi ECT_{t-1} + \varepsilon_t
\end{aligned} \tag{Equation 3.14}$$

Where, ECT_{t-1} represents the error correction term, ϕ indicates the error correction coefficient. The ECT_{t-1} is the core of the ECM, which indicates the degree of deviation from the long-term equilibrium in the previous period. Its calculation formula is:

$$\begin{aligned}
ECT_{t-1} = & LEV_t - \alpha_0 - \sum_{i=1}^j \delta_{1i} \Delta LEV_{t-i} - \sum_{i=0}^k \delta_{2i} \Delta LCTP_{t-i} \\
& - \sum_{i=0}^l \delta_{3i} \Delta LCP_{t-i} - \sum_{i=0}^m \delta_{4i} \Delta LGDP_{t-i} - \sum_{i=0}^n \delta_{5i} \Delta LMTP_{t-i} \\
& - \sum_{i=0}^o \delta_{6i} \Delta LOP_{t-i}
\end{aligned} \tag{Equation 3.15}$$

ECT_{t-1} reflects the deviation between the actual value of the previous period and the long-term equilibrium value. The error correction coefficient (ϕ) is a key parameter of the ECM, indicating the speed of short-term adjustment. Several criteria confirm that short-run dynamic adjustments toward long-run equilibrium operate through the ECT_{t-1} . These criteria are as follows: the ECT_{t-1} must be negative, significant, and have a coefficient value ranging between -1 and 0. In addition, long-run causality from the independent variables to the dependent variable can be established when the ECT_{t-1} is statistically significant.

3.5.3 Granger Causality Test

Granger Causality Test is a statistical method used to evaluate whether there is a causal predictive relationship between time series variables. The core point is that if the past values of a variable X can significantly predict the current value of another variable Y , then X is called the Granger cause of Y (Granger, 1969). In this study, the core issue we focus on

is to explore the dynamic causal relationship between the trade volume of China's tea exports to Malaysia and each independent variable. Through the Granger causality test, we can clarify whether each independent variable is predictive in time series, thereby revealing its dynamic transmission mechanism and providing a basis for further policy formulation and corporate strategies.

The Wald test is one of the most widely used statistical tests in regression analysis. It is employed to examine whether model parameters significantly differ from predetermined values. Consequently, the most specific application of the Wald test lies in determining whether one or a set of predictor variables makes a statistically significant contribution to the dependent variable (such as export volume in this study). The Wald test can be used to identify the causal impact between variables by restricting the sum of parameters for the variables and their lagged terms to zero. The model form of Granger causality test is:

$$Y_t = \alpha + \sum_{i=1}^p \delta_i Y_{t-i} + \sum_{j=1}^p \delta_j X_{t-j} + \varepsilon_t \quad \text{Equation 3.16}$$

According to Konya (2004), the null hypothesis (H_0) of the Granger causality test states that X_t is not the Granger cause of Y_t . The alternative hypothesis (H_1) states that X_t is the Granger cause of Y_t . If the F -statistic is greater than the critical value, the null hypothesis (H_0) is rejected, indicating that X_t is the Granger cause of Y_t ; otherwise, the null hypothesis (H_0) is accepted, indicating that X_t is not the Granger cause of Y_t .

3.5.4 Diagnostic Test

Diagnostic tests are mainly used to test whether the regression model meets the basic assumptions of the classical linear regression model. This study uses several specific test methods, including the Jarque-Bera test, Breusch-Godfrey Serial Correlation LM test,

Autoregressive Conditional Heteroskedasticity test, and Ramsey RESET test, while the stability tests are CUSUM and CUSUMSQ. These tests can determine whether the estimated model has problems with normality, autocorrelation of any order, heteroskedasticity, model specification, and stability.

3.5.4.1 Jarque-Bera (JB) Test

The Jarque-Bera (JB) test is a widely used statistical method for testing whether regression residuals follow a normal distribution, proposed by Jarque and Bera (1980). This test incorporates two statistics: the skewness and kurtosis of residuals, to measure the difference between the actual distribution and the normal distribution. It is a commonly used normality test tool in time series and econometrics. The null and alternative hypotheses for the Jarque-Bera test are defined as follows:

H₀: *The residuals are normally distributed.*

H₁: *The residuals are not normally distributed.*

The testing process of this method is to first estimate the model and obtain the residuals, then calculate the skewness and kurtosis of the residuals, and finally calculate the statistics and compare them with the critical value. If the p-value is greater than 0.05, the null hypothesis (H_0) of no autocorrelation is rejected.

3.5.4.2 Breusch-Godfrey (BG) Serial Correlation LM Test

The Breusch-Godfrey serial correlation test, proposed by Breusch and Godfrey in 1979 and 1978 respectively (Arunachalam, 2024), is one of the most widely used methods for testing higher-order residual autocorrelation. It falls within the scope of the Lagrange Multiplier (LM) test and is particularly suitable when regression equations contain lagged terms or complex structures. The Breusch-Godfrey serial correlation LM test is mainly used

to verify whether there is autocorrelation in the residuals of the model (Gujarati & Porter, 2009). If there is autocorrelation in the residuals, it indicates that the model fails to fully capture the dynamic relationship in the data, which may lead to inaccurate parameter estimation. The null and alternative hypotheses for the Breusch-Godfrey serial correlation LM test are defined as follows:

H₀: *There is no autocorrelation of any order.*

H₁: *There is autocorrelation of any order.*

The test statistic is calculated as follows:

$$LM = (n - p)R^2 \quad \text{Equation 3.17}$$

Where, n denotes the sample size, p denotes the number of estimated parameters and R^2 is the coefficient of determination of the auxiliary regression. The null hypothesis can be rejected when the calculated statistic exceeds the critical chi-square value for standard significance levels, indicating that the model has sequence correlations and requires further modification of the model structure or the use of robust standard errors.

3.5.4.3 Autoregressive Conditional Heteroskedasticity Test (ARCH)

Engle (1982) proposed the ARCH (Autoregressive Conditional Heteroskedasticity) test, which is designed to detect whether a conditional heteroskedasticity structure exists in the residuals of the regression model. The hypotheses of the ARCH test are shown as follows:

H₀: *There is no heteroskedasticity problem exists.*

H₁: *There is heteroskedasticity problem exists.*

The ARCH test conducts an auxiliary regression of the squared residuals on their own lagged values to detect the presence of autoregressive conditional heteroskedasticity. If the p-value of the test statistic is less than the chosen significance level (usually, 0.05), the null hypothesis is rejected, suggesting that the residuals exhibit conditional heteroskedasticity. This implies that the variance of the errors is not constant over time but changes systematically, which may lead to biased standard errors and unreliable inference (Dufour et al., 2004).

3.5.4.4 Ramsey RESET Test

The Ramsey RESET test is a commonly used test to check whether there are omitted variables, incorrect function form settings, or model misspecification in the regression model (Ramsey, 1969). The hypotheses of the Ramsey RESET test are shown as follow:

H₀: *The model is correctly specified.*

H₁: *The model is misspecified.*

The testing process of this method is to first estimate the model and obtain the predicted value of the dependent variable, then build an auxiliary regression model, and finally calculate the statistic and compare it with the critical value. The Ramsey RESET test rejects the null hypothesis (H_0) when the p-value is smaller than the critical value at 5% significance level, and it may be necessary to review the model specification and consider adding omitted variables or adjusting the functional form of the model to more accurately capture the relationship between the variables.

3.5.4.5 CUSUM Test and CUSUM of Squares Test

The CUSUM test and CUSUM of Squares (CUSUMSQ) test are two commonly used methods for testing model stability, first proposed by Brown et al. (1975) to detect whether

there are structural changes in the parameters of time series regression models over the sample period.

The CUSUM Test, based on the cumulative sum of regression residuals, is primarily used to detect whether regression coefficients exhibit linear drift over the sample period. It constructs a curve formed by the stepwise cumulative sum of standardized residuals and compares this curve with the upper and lower critical bounds determined by the significance level.

The CUSUM of Squares Test involves the cumulative summation of squared residuals and is used to detect whether there are abrupt changes in the variance structure of the model over the sample period, such as sudden volatility shifts or structural breakpoints. For both tests, the consistent hypotheses are shown as follow:

H₀: *The model is stable.*

H₁: *The model is not stable.*

By drawing CUSUM and CUSUMSQ plots, it is determined whether the statistic falls within the preset critical bounds. If the statistic in the plot is always within the confidence interval, it means that the model parameters are stable; if the statistic exceeds the confidence interval, it indicates that there may be structural changes in the model.

3.6 Chapter Remark

In summary, the trade volume of China's tea exports to Malaysia is the dependent variable in this study, while the price of China's tea imported by Malaysia, the price of coffee imported by Malaysia, the GDP of Malaysia, Malaysia's tea production and the international oil price are used as independent variables to establish a multivariate linear regression model.

This study employs quarterly data comprising 80 observations spanning 2005 to 2024 for time series analysis, and adopts the ARDL method, which is suitable for analyzing small-sample time series, as the primary analytical approach.

The first step of empirical research is to conduct unit root tests (ADF test and KPSS test) to determine the stationarity of the variables. When the variables are stationary [$I(0)$ or $I(1)$], this study conducts empirical analysis employing the ARDL method. Firstly, it employs the bounds test to determine whether there exists a long-term cointegration relationship among variables; if cointegration exists, it estimates the long-run coefficients to characterize the long-term equilibrium associations between variables; next, it constructs the Error Correction Model to analyze the short-term dynamic adjustment characteristics of the variables. Then, the Granger causality test is used to analyze whether there is a causal relationship between the dependent variable and the independent variable. Finally, this study employs a series of diagnostic testing methods to ensure the correctness of the model setting, including the Jarque-Bera test for normality, the Breusch-Godfrey serial correlation LM test for autocorrelation, the ARCH test for autoregressive conditional heteroskedasticity, and Ramsey's RESET test for functional form misspecification. Additionally, the stability tests incorporated are the CUSUM and CUSUMSQ tests.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Overview

Chapter 4 presents the empirical findings of this research. Employing the econometric software EViews 13, an estimation analysis was conducted to examine the factors affecting China's tea exports to Malaysia during the period from 2005 to 2024. The relationship between price of China's tea imported by Malaysia, price of coffee imported by Malaysia, Malaysia's GDP, Malaysia's tea production, international oil price and the export volume of China's tea to Malaysia are discussed in this chapter. Chapter 4 is structured as follows. Section 4.1 provides an overview of the chapter's content. Section 4.2 is dedicated to presenting the results of the unit root test, a crucial step in assessing the stationarity of the data employed in this study. In Section 4.3, the estimation results of the ARDL model are discussed. These results encompass bounds test, estimated long-run coefficients, error correction model estimation and Granger causality test. Subsequently, Section 4.4 reports the diagnostic test results. Section 4.5 elaborates on the relationships between each influencing factor and the export volume of China's tea exports to Malaysia. Finally, Section 4.6 comprehensively summarizes the empirical outcomes of this study.

4.2 Unit Root Test Results

In time series econometric analysis, determining the stationarity of variables is a key step before setting up the model. The core of the unit root test is to determine whether a time series has a unit root (Dickey & Fuller, 1979). A sequence containing a unit root is non-stationary, which may give rise to spurious regression – rendering the estimated t -statistics and F -statistics unreliable; In contrast, a series without a unit root is stationary. The purpose

of unit root test is to ensure the correctness of model estimation results. On the one hand, stationarity is one of the basic assumptions of most econometric models (including ARDL model). On the other hand, prior to estimating ARDL model, it is necessary to determine the order of integration of all variables to confirm the appropriateness of the ARDL approach. As specified by Pesaran et al. (2001), the ARDL model is applicable to datasets with variables of mixed integration orders, provided that no variable is integrated of $I(2)$ or higher. Specifically, the variables should consist of a combination of $I(0)$ and $I(1)$ processes.

Therefore, this study employs two commonly used methods, ADF test (Dickey & Fuller, 1979) and KPSS test (Kwiatkowski et al., 1992), to conduct unit root tests on each variable. Both tests were implemented under two specifications: “with intercept” and “with intercept and trend” to ensure the robustness of the test results. The ADF and KPSS tests are complementary unit root tests: the ADF test operates under the null hypothesis that a time series possesses a unit root, implying it is non-stationary, whereas the KPSS test takes the opposite approach, assuming the null hypothesis that the time series is stationary around a deterministic trend. The ADF test is widely applied and straightforward in detecting the presence of a unit root, while the KPSS test provides a more robust assessment of stationarity, making it a valuable complement to the ADF test. Using both tests enhances the robustness of stationarity conclusions, reducing the risk of misleading inferences due to test-specific biases (Enders, 2015).

Tables 4.1 and 4.2 present the results of ADF and KPSS unit root tests for the variables used in this study. Both tests presented consistent results, with most series showing similar stationarity characteristics. According to the definition provided by Musa (2020), combining the results of ADF and KPSS tests: LOP is stationary at level, thus satisfying the

characteristics of an $I(0)$ variable. In contrast, LEV, LCTP, LCP, LGDP and LMTP become stationary only after first differencing, making them typical $I(1)$ variables.

Based on the above analysis, it can be concluded that all variables are either $I(0)$ (specifically LOP) or $I(1)$ (LEV, LCTP, LCP, LGDP and LMTP), with no $I(2)$ variables present. This satisfies the precondition for applying the ARDL model. Consequently, the ARDL approach can be reliably employed to estimate both the long-run equilibrium relationships and the short-run dynamics between the variables. This procedure ensures the validity of subsequent empirical analysis and enhances the robustness of the findings (Pesaran et al., 2001).

Table 4.1: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Augmented Dickey-Fuller					
Series	Level		First Difference		Finding
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	
LEV	-0.8838(3)	-2.3549(2)	-9.0415(2)***	-8.9841(2)***	$I(1)$
LCTP	-1.4589(1)	-2.4538(1)	-14.8985(0)***	-14.8037(0)***	$I(1)$
LCP	-1.6223(0)	-2.3970(0)	-8.1760(0)***	-8.1264(0)***	$I(1)$
LGDP	-2.0992(0)	-2.7094(0)	-8.0914(0)***	-8.1403(0)***	$I(1)$
LMTP	-2.3373(5)	-2.2513(5)	-3.5309(4)***	-3.5934(4)**	$I(1)$
LOP	-3.1645(1)**	-3.1497(1)	-7.2542(0)***	-7.2301(0)***	$I(0)$

Notes: The export volume of China's tea exports to Malaysia is the dependent variable of this study and LEV is its logarithmic form. The price of tea imported from China by Malaysia, the price of coffee imported by Malaysia, the GDP of Malaysia, the tea production of Malaysia and the international oil price are the independent variables of this study, and LCTP, LCP, LGDP, LMTP and LOP are their logarithmic forms. Asterisks (*), (**) and (***) indicate statistically significant at 10, 5 and 1 percent level respectively. Figures in parentheses are the lag lengths. The ADF test's asymptotic and finite-sample critical values are obtained from MacKinnon (1996), and the test examines the null hypothesis of a unit root against the stationary alternative.

Table 4.2: Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Unit Root Test Results

Kwiatkowski-Phillips-Schmidt-Shin					
Series	Level		First Difference		Finding
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	
LEV	1.4650(4)***	0.2379(4)***	0.0578(4)	0.0571(4)	<i>I</i> (1)
LCTP	0.9085(6)***	0.1582(6)**	0.0793(16)	0.0811(16)	<i>I</i> (1)
LCP	0.8900(6)***	0.1298(6)*	0.1464(2)	0.1426(2)*	<i>I</i> (1)
LGDP	1.0905(6)***	0.2283(6)***	0.2342(7)	0.1046(9)	<i>I</i> (1)
LMTP	0.3915(6)*	0.1808(6)**	0.1005(1)	0.0874(0)	<i>I</i> (1)
LOP	0.1214(6)	0.1086(6)	0.0790(4)	0.0597(4)	<i>I</i> (0)

Notes: Contrary to the ADF test, the null hypothesis of the KPSS test is that the series is stationary. Asterisks (*), (**) and (***) indicate statistically significant at 10, 5 and 1 percent level respectively. The figure in the parenthesis is the bandwidth for the KPSS unit root test. Asymptotic critical values for the KPSS test are 0.73900 (1%), 0.46000 (5%), and 0.34700 (10%) without a trend, and 0.21600 (1%), 0.14600 (5%), and 0.11900 (10%) with a trend, as reported by Kwiatkowski et al. (1992).

4.3 ARDL Estimation Results

With China's tea export volume to Malaysia (LEV) as the dependent variable, this model captures both the short-term and long-term impacts of various influencing factors on the trade scale of China's tea exports to Malaysia in terms of quantity. The ARDL model, selected via the Akaike Information Criterion (AIC), effectively incorporates lagged relationships, enabling a more comprehensive assessment of the long-run and short-run associations between variables. The testing procedures in this section follow the sequence below: first, the bounds test for cointegration is conducted to confirm the existence of a long-run relationship; second, the long-run coefficients are estimated; third, the error correction model is estimated to examine ECT; finally, the Granger causality test is applied to identify the short-run causal relationships between variables.

4.3.1 Bounds Test for Cointegration

As the core method for testing the long-run cointegration relationship between variables in the ARDL model framework, the bounds test plays an irreplaceable role in empirical research. Pesaran et al. (2001) pioneered the bounds test and clearly pointed out that the ARDL model has better adaptability to small sample data, laying a theoretical foundation for the small sample application of ARDL. Narayan (2005) defined studies with a sample size of less than 100 as “small samples” and reconstructed the critical value tables for the ARDL bounds test accordingly. The Johansen and Juselius (1990) cointegration test indicated that multiple cointegration relationships might be identified from model estimates. By contrast, Pesaran et al. (2001) assumed that only a single cointegration relationship exists between the dependent and independent variables in the estimated model. Thus, the bounds test results of this study are revealed in Table 4.3.

Table 4.3: Bounds Test for Cointegration Results

Model	Sample size		F -statistic		ARDL Order	
LEV, LCTP, LCP, LGDP, LMTP and LOP	80		4.0619**		(8,2,7,4,9,7)	
Critical values bounds of F-statistic: restricted intercept and no trend ($k = 5, n = 80$)						
Significance	10%		5%		1%	
Sample	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
80	2.303	3.154	2.550	3.606	3.351	4.587
Asymptotic	2.080	3.000	2.390	3.380	3.060	4.150

Notes: Critical values are obtained from (Narayan, 2005), The lag length selection is based on the Akaike Information Criterion (AIC). The asterisk (**) indicates significant at 5% level respectively. $I(0)$ and $I(1)$ are respectively the stationary and non-stationary bounds.

In Table 4.3, “ k ” denotes the number of independent variables employed in this study, while “ n ” represents the number of observations. As previously mentioned, the model includes 5 independent variables and 80 observations. As illustrated in the table, the bounds test showed the F -statistic of 4.0619, which exceeds the 5% significance level upper critical value reported by Narayan (2005). This result confirms the existence of a long-run relationship between the variables in the model. This conclusion positions the interactions between factors such as GDP growth, price fluctuations, and demand-side substitutes with China’s tea export volume as a robust basis for policymakers and trade strategists in China-Malaysia tea trade to adjust their strategies.

The bounds test confirms the existence of a long-run cointegration relationship between the variables. In the following sections, the study will quantify this long-run equilibrium relationship in a specific numerical form by estimating the long-run coefficients, thereby establishing a foundation for the subsequent short-run dynamic analysis.

4.3.2 Estimated Long-run Coefficients

Having confirmed the existence of cointegration relationship between the variables in the model through the bounds test, the long-run equilibrium relationship between them can be further estimated. The long-run coefficient reflects the direction and intensity of the stable and lasting impact of the explanatory variables on the dependent variables after the short-term fluctuations and dynamic adjustment process (Pesaran et al., 2001). Table 4.4 lists the long-run coefficient estimation results of this research model.

Table 4.4: Long-Run ARDL Estimation

Regressor	Coefficient	SE	<i>t</i>-statistics	<i>p</i>-value
LCTP_{t-1}	-0.6722**	0.2931	-2.2934	0.0247
LCP_{t-1}	-2.5698**	1.0774	-2.3851	0.0196
LGDP_{t-1}	6.3409***	1.2224	5.1870	0.0000
LMTP_{t-1}	-0.9011***	0.3092	-2.9138	0.0047
LOP_{t-1}	-1.0995***	0.3772	-2.9151	0.0047
Constant	-124.0755***	29.2713	-4.2388	0.0001

Note: Asterisks *** represents 1 percent significant level while ** represents 5 percent significant level.

The independent variables of this model are LCTP, LCP, LGDP, LMTP and LOP. Based on the analysis of the results, the sign of the LCTP coefficient is consistent with the expected sign and is significant at the 5% significance level ($p < 0.05$). In contrast, the sign of LCP is opposite to expectation and is significant at the 5% significance level ($p < 0.05$). In addition, the coefficient signs of the LGDP, LMTP and LOP variables are correct and significant at the 1% significance level ($p < 0.01$). Therefore, it can be seen that the price of tea imported by Malaysia from China, the price of coffee imported by Malaysia, Malaysia's GDP, Malaysia's tea production and international oil prices can all affect the export volume of China's tea exports to Malaysia in the long run. The long-run estimated coefficient can be summarized in the following equation:

$$LEV = -124.0755 - 0.6722LCTP - 2.5698LCP + 6.3409LGDP - 0.9011LMTP - 1.0995LOP$$

$$(-4.2388)^{***} (-2.2934)^{**} (-2.3851)^{**} (5.1870)^{***} (-2.9138)^{***} (-2.9151)^{***} \quad \text{Equation 4.1}$$

Equation (4.1) provides a clear representation of the estimated coefficient results. In the long run, a 1% increase in the LCTP is associated with a 0.67% decrease in LEV. This result is consistent with the definition of price effect in demand theory by Nicholson and Snyder (2017), which states that higher prices tend to suppress demand. As a normal consumer product, tea demand has a certain elasticity to price, but the absolute value less than 1 indicates that it is an incompletely elastic commodity with a certain rigidity or necessity. A 1% rise in LCP corresponds to a 2.57% decline in LEV. This finding stands in contrast to the substitution hypothesis in demand theory (Deaton & Muellbauer, 1980a). The underlying factors contributing to this divergence will be examined at length in subsequent sections of this study. A 1% growth in LGDP leads to a 6.34% increase in LEV. The findings indicate that China's tea in Malaysia demonstrates the characteristics of a high-quality consumer good, gaining wider acceptance as income levels rise. However, a 1% increase in LMTP is associated with a 0.9% decline in LEV, which aligns with the domestic supply substitution effect within the supply-demand framework (Feenstra, 2015). This suggests that as Malaysia strengthens its capacity to produce tea domestically, its reliance on imports diminishes. Moreover, a 1% rise in LOP leads to a 1.1% reduction in LEV, consistent with the transportation cost hypothesis (Baier & Bergstrand, 2001). Since international oil prices serve as a proxy for global logistics costs, their increase raises the marginal cost of transporting tea exports to Malaysia, thereby reducing long-run trade flows.

The results of the equation (4.1) demonstrate that in the long-run operating mechanism of China's tea exports to Malaysia, variables such as price, substitute price, income level, domestic output and international transportation costs all have significant and quantifiable influence. The elasticity estimates of each variable provide valuable empirical

foundation for policy makers, corporate strategists and researchers in the field of international tea trade.

4.3.3 Error Correction Model Estimation

According to Engle and Granger (1987), the error correction model (ECM) can effectively combine long-run equilibrium and short-run dynamics. It not only reveals the short-run dynamic adjustment path between variables, but also measure the speed and direction of the system's return to the long-run equilibrium state through the error correction term (ECT). The ECT is a better benchmark for identifying cointegration relationships between variables. The coefficient of the ECT must be negative, less than one in absolute value, and statistically significant. This implies that the system adjusts toward equilibrium following short-term deviations from the long-run relationship. This method is particularly well-suited for data structures involving a mix of $I(0)$ and $I(1)$, which have widespread application in field of international trade (Narayan, 2005).

Table 4.5: Error Correction Representation of ARDL Results

Regressor	Coefficient	SE	<i>t</i>-statistics	<i>p</i>-value
ΔLEV_{t-1}	-0.4541***	0.116375	-3.902220	0.0003
ΔLEV_{t-2}	-0.5221***	0.137259	-3.803832	0.0004
ΔLEV_{t-3}	-0.6678***	0.157313	-4.245175	0.0001
ΔLEV_{t-4}	-0.3234**	0.151123	-2.139832	0.0381
ΔLEV_{t-5}	-0.5378***	0.135904	-3.957479	0.0003
ΔLEV_{t-6}	-0.3894***	0.121615	-3.201965	0.0026
ΔLEV_{t-7}	-0.2902**	0.109496	-2.650536	0.0112
$\Delta LCTP_t$	-0.0984	0.114325	-0.860644	0.3942
$\Delta LCTP_{t-1}$	0.3852***	0.116542	3.304826	0.0019
ΔLCP_t	-0.9763***	0.272907	-3.577584	0.0009
ΔLCP_{t-1}	0.7857***	0.288855	2.719927	0.0094

Table 4.5: continued

Regressor	Coefficient	SE	<i>t</i>-statistics	<i>p</i>-value
ΔLCP_{t-2}	0.1447	0.261434	0.553520	0.5828
ΔLCP_{t-3}	0.7598***	0.274233	2.770549	0.0082
ΔLCP_{t-4}	0.6423**	0.264519	2.428236	0.0194
ΔLCP_{t-5}	-0.0721	0.265112	-0.272128	0.7868
ΔLCP_{t-6}	0.8995***	0.271187	3.316941	0.0019
$\Delta LGDP_t$	2.8473***	0.638228	4.461254	0.0001
$\Delta LGDP_{t-1}$	-1.4041**	0.669896	-2.096037	0.0420
$\Delta LGDP_{t-2}$	0.6827	0.696635	0.980035	0.3326
$\Delta LGDP_{t-3}$	-1.2413*	0.669157	-1.854955	0.0705
$\Delta LMTP_t$	0.3308	0.276879	1.194641	0.2388
$\Delta LMTP_{t-1}$	0.2789	0.331218	0.842046	0.4044
$\Delta LMTP_{t-2}$	0.0737	0.324006	0.227504	0.8211
$\Delta LMTP_{t-3}$	0.5867*	0.328204	1.787745	0.0809
$\Delta LMTP_{t-4}$	0.0237	0.383752	0.061851	0.9510
$\Delta LMTP_{t-5}$	0.1152	0.306795	0.375586	0.7091
$\Delta LMTP_{t-6}$	-0.0095	0.315887	-0.030050	0.9762
$\Delta LMTP_{t-7}$	0.5665*	0.318038	1.781101	0.0820
$\Delta LMTP_{t-8}$	-0.5744**	0.279093	-2.058141	0.0457
ΔLOP_t	-0.7199***	0.204951	-3.512366	0.0011
ΔLOP_{t-1}	0.0658	0.216729	0.303661	0.7629
ΔLOP_{t-2}	0.1380	0.213614	0.645897	0.5218
ΔLOP_{t-3}	0.2455	0.212791	1.153537	0.2551
ΔLOP_{t-4}	0.4775***	0.162465	2.939092	0.0053
ΔLOP_{t-5}	0.1105	0.182598	0.605142	0.5483
ΔLOP_{t-6}	0.3444*	0.180792	1.904723	0.0635
ECT	-0.4450***	0.0774	-5.7484	0.0000

Notes: Asterisks *** represents 1 percent significant level while ** represents 5 percent significant level and * represents 10 percent significant level. ECT stands for error correction term.

As shown in Table 4.5, the ECT of the model exhibits a negative sign, has a coefficient value less than 1, and is statistically significant at the 1% level. Consequently,

since all ECT criteria are satisfied, this model is confirmed to capture a long-run relationship between the variables. The ECT in the ECM of this study estimates at -0.445, indicating that when the system deviates from its long-run equilibrium in the short run, the export volume (LEV) adjusts back toward the long-run equilibrium value at a rate of 44.5% in one quarter. This implies that it takes approximately 2.25 quarters to achieve long-run equilibrium.

This section further examines the short-run dynamic adjustment path between China's tea export to Malaysia and various explanatory variables on the basis of long-run equilibrium by constructing and estimating the error correction model. The ECT displays the correct sign and high statistical significance, indicating that the system has a good equilibrium repair ability, which provides strong support for the overall robustness and empirical value of the model.

4.3.4 Granger Causality Test

After the cointegration test and error correction model established the long-term relationships between variables, this study conducted Granger causality test between each explanatory variable and China's tea export volume to Malaysia (LEV). This step further verifies the short-term causal relationships between the variables. The Granger causality test (Granger, 1969) enables the determination of whether one variable statistically "precedes" changes in another, thereby exploring the temporal sequence and dynamic causal pathways between variables. In this model, all variable time series have passed the unit root test, meeting the criteria of stationary variables $I(0)$ or $I(1)$ variable sequences after differencing to achieve stationarity, thus enabling the performance of Granger causality test (Wooldridge, 2016). The Granger causality test provides supplementary evidence from a "dynamic

prediction” perspective, thereby enhancing the robustness of the model’s conclusions. The results of the Granger causality test are listed in Table 4.6.

Table 4.6: Granger Causality Test Results

Null Hypothesis	
LCTP does not Granger causes LEV	12.2438[0.0066]***
LCP does not Granger causes LEV	24.1058[0.0022]***
LGDP does not Granger causes LEV	32.5043[0.0000]***
LMTP does not Granger causes LEV	15.7677[0.1065]
LOP does not Granger causes LEV	13.2824[0.1025]

Notes: Asterisks (*), (**) and (***) indicate the null hypothesis is rejected at 10, 5 and 1 percent significance level respectively. The figure in parentheses [...] represents the probabilities.

Drawing on the Granger causality test results presented in Table 4.6, the null hypothesis that LCTP does not Granger-cause LEV was rejected at the 1% significance level. This indicates a short-run causal relationship running from LCTP to LEV. This result demonstrates that fluctuations in tea prices have predictive power for export volume over time. It supports the price effect in demand theory, which states that price changes exert a direct impact on demand (Nicholson & Snyder, 2017). Similarly, the null hypothesis that LCP does not Granger-cause LEV was also rejected at the 1% significance level. It indicates that as a potential substitute, fluctuations in coffee price can statistically predict the export demand for China’s tea. Although its long-run coefficient is negative and contrary to theoretical expectations, this result implies a dynamic influence of coffee price on the tea market. Furthermore, LGDP Granger-causes LEV in the short run, indicating that economic growth in Malaysia exerts a significant leading effect on China’s tea export volume. This finding aligns with the result in the long-term model results, where the coefficient of LGDP is significantly positive.

On the other hand, the results of the Granger causality tests for LMTP and LOP with respect to LEV are insignificant, implying that their past values have limited predictive power for export volume under the current model specification. This implies that changes in Malaysia's tea production do not immediately affect its imports of China's tea in the short term, and that international oil price lack statistically significant predictive power for the volume of China's tea exports to Malaysia over the same period.

4.4 Diagnostic Test Results

Following the estimation of the ARDL model, it is essential to conduct a comprehensive evaluation of the model's robustness to ensure the statistical validity and reliability. This study employs a series of diagnostic testing methods, including the Jarque-Bera test for normality, the Breusch-Godfrey serial correlation LM test for autocorrelation, the ARCH test for autoregressive conditional heteroskedasticity, and Ramsey's RESET test for functional form misspecification. Additionally, the stability tests incorporated are the CUSUM and CUSUMSQ tests. The results of diagnostic tests are summarized in Table 4.7.

Table 4.7: Diagonostic Test Results

Diagnostic Tests	
Normality	0.4322[0.8056]
Serial Correlation	0.6881[0.7089]
Heteroskedasticity	2.4828[0.1151]
Ramsey RESET	3.5874[0.0663]
CUSUM	Stable
CUSUM ²	Stable

Notes: The figure in parentheses [...] represents the probabilities.

The Jarque-Bera test evaluates whether the residual term follows a normal distribution, based on whether the skewness and kurtosis deviate significantly from the

normal value. The p-value of 0.8056 indicates that the residuals are normally distributed, as it exceeds the conventional significance level of 5%. The Breusch-Godfrey serial correlation LM test checks for the presence of serial correlation in the residuals over time. With a p-value of 0.7089, there is no evidence of serial correlation, indicating that the residuals are independent and satisfy the assumption of uncorrelated errors. The ARCH test examines heteroskedasticity by regressing squared residuals on squared fitted values. A p-value of 0.1151 indicates the absence of heteroskedasticity, suggesting that the variance of residuals remains consistent across all observations, thereby supporting the assumption of homoskedasticity. Finally, the Ramsey RESET test assesses the correct functional form of the regression model by including higher-order terms of the fitted dependent variable. A p-value of 0.0663 indicates that the model specification is generally reasonable.

The CUSUM test examines systematic parameter drift in the model, while the CUSUM of Squares test detects structural breaks. As shown in Figures 4.1 and 4.2, both tests indicate that the statistical curves lie within the 5% significance critical bounds, leading to the conclusion that the null hypothesis of parameter stability cannot be rejected. This demonstrates that the model parameters remain stable throughout the entire sample period, with no evidence of structural changes, thereby reinforcing the model's predictive reliability (Brown et al., 1975). These findings carry significant implications: although China's tea exports to Malaysia have been disrupted by numerous external factors over the past two decades (financial crises, changes in consumer preferences, etc.), the mechanism governing China's tea exports to Malaysia has remained stable.

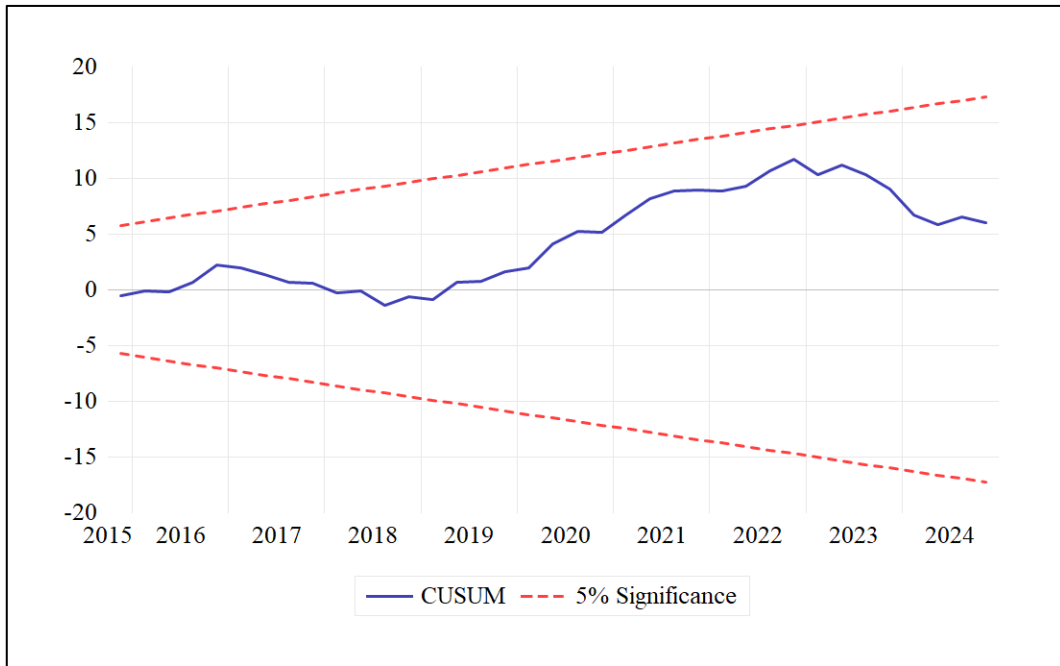


Figure 4.1: CUSUM Test Result

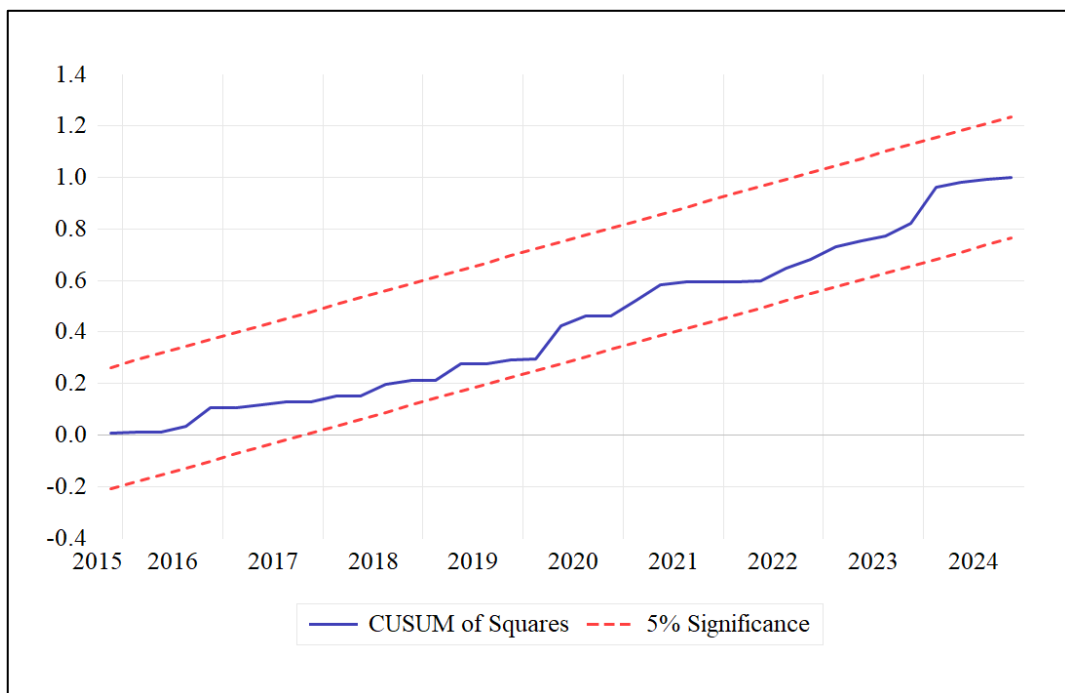


Figure 4.2: CUSUM of Squares Test Result

4.5 Discussion

To ensure a stable foundation for model specification, this study employs two widely recognized methods, ADF (Dickey & Fuller, 1979) and KPSS (Kwiatkowski et al., 1992), to conduct unit root tests on the variables. This approach which has been widely adopted by scholars including Ting and Ling (2011), Sarker and Khan (2020), and Musa (2020), is regarded as a standard procedure in time series modeling. Consistent with the view of Nkoro and Uko (2016), this study first confirms that all variables must be $I(0)$ or $I(1)$ with no presence of $I(2)$, and identifies the sample size as small, thereby meeting the prerequisites for ARDL model specification proposed by Narayan (2005). Scholars including Durmaz and Lee (2015), Vacu and Odhiambo (2022), Ismail et al. (2022), and Sultan (2014) have likewise employed the ARDL approach to conduct empirical analyses on import and export demand functions, revealing that factors such as price, income, and competitor product prices exert significant impacts on import and export volumes. Subsequently, this section will discuss the relationships between each independent variable and the dependent variable in the study based on the empirical results.

Firstly, the relationship between the price of China's tea imported by Malaysia and the export volume of China's tea exported to Malaysia is consistent with expectations. According to the price effect principle in demand theory (Nicholson & Snyder, 2017), *ceteris paribus*, an increase in the price of China's tea imported by Malaysia should lead to a decrease in China's tea export volume to Malaysia. To examine this relationship, this study employed the ARDL approach to perform the bounds test and estimate the Error Correction Model (ECM), confirming the presence of a long-run equilibrium relationship between the variables and deriving the long-run estimated coefficients. The results are consistent with the previous studies by Senhadji and Montenegro (1999), Zhu (2023), and Forgenie et al.

(2024), which have also identified a significant negative long-run relationship between import prices and export volumes in similar contexts.

Specifically, a 1% increase in the price of China's tea is associated with a decrease in tea export volume by approximately 0.67%. Due to the logarithmic form of the model, the long-run coefficient can be interpreted as the long-run price elasticity, which has an absolute value less than 1, indicating that Malaysia's demand for China's tea is price inelastic in the long run. This reflects that China's tea has certain advantages in terms of quality, brand recognition, and cultural acceptance (Wang et al., 2024), which still sustains stable demand even in the face of price increases.

Although the negative impact of China's price increases is relatively small, it remains statistically significant. This phenomenon can be attributed to the combined effect of several economic mechanisms, including cross-border product substitutability of tea (Deaton & Muellbauer, 1980b), cost sensitivity in the Malaysian market, and price responsiveness of consumers. Furthermore, from the perspective of short-run causal relationships, the results of the Granger causality test confirm that the price of China's tea has predictive power for tea export volume in the short run at the 1% significance level. This finding is of great significance for policymakers and China's tea export enterprises, suggesting that price changes are not only serve as a tool for long-term strategic adjustments but may also induce short-term fluctuations in demand.

Secondly, there is a significant negative correlation between the price of coffee imported by Malaysia and the export volume of China's tea to Malaysia, with the direction contradicting expectations. According to the principle of substitution effect in demand theory (Varian, 2003), tea and coffee are to some extent substitutable goods for most

consumers, as they share similar consumption scenarios in beverage consumption, such as breakfast, office, and social occasions (Grigg, 2002). Therefore, an increase in the import price of coffee should, in theory, lead to an increase in the demand for China's tea. However, as Bonfrer et al. (2006) found in their research, common fast-moving consumer goods often exhibit negative cross-price elasticities among substitutes. The empirical results of this study, which also run counter to the expectation, warrant in-depth discussion.

The empirical results of the ARDL model show that the price of coffee imported by Malaysia is significant at the 5% significance level: a 1% increase in coffee prices is associated with a decrease of approximately 2.57% in China's tea exports. Furthermore, the results of the Granger causality test confirm that coffee prices have predictive power for China's tea export volumes in the short term at the 1% significance level. The reasons for this discrepancy between the results and theoretical expectations may involve the following economic considerations.

From the perspective of consumer preferences and substitution elasticity, although tea and coffee are theoretically substitutes, in Malaysian consumption culture, coffee (especially instant coffee and traditional "kopi") carries strong cultural associations (Omar et al., 2022). According to Rahman (2010), Amin et al. (2016), Zamri and Albattat (2022), and Rahim et al. (2019), some high-end consumers exhibit rigid preferences for coffee and demonstrate high levels of brand loyalty. When coffee prices rise, the total consumption volume does not decrease significantly, and no clear substitution effect toward tea emerges. On the contrary, the increase of coffee prices may be accompanied by overall consumer goods inflation, which indirectly tightens consumers' budgets, thereby reducing the demand for other beverages including China's tea. This empirical finding is consistent with the

conclusions by Meyimdjui and Combes (2021), Muhammad et al. (2011), and Durevall et al. (2013): when total consumer spending decreases, people tend to cut back on spending on non-essential items. Therefore, it is reasonable that the export volume of China's tea decreases as coffee prices rise.

From the perspective of import structure complementarity, in Malaysia's food and beverage industry, tea and coffee are often procured uniformly by the same importers or wholesalers. Consequently, when the import price of coffee rises, leading to an increase in overall import costs, enterprises may be prompted to reduce their total procurement scale. This results in a decrease not only in coffee imports but also in tea import orders by extension. What emerges here is a complementary reaction driven by supply chain cost linkage, rather than a substitution effect at the level of consumer demand, which explains the negative coefficient (Hassan et al., 2024).

From the perspective of the price transmission mechanism, an increase in international coffee prices is transmitted sequentially through channel operators, terminal retailers, and consumers, gradually forming overall cost pressure. These pressures may ultimately compress the market scale of the entire beverage category, including China's tea. The "price transmission suppression effect" is evident in the empirical results, which is consistent with the research conclusions of Meyer and Von (2004), Von and Goodwin (2021), and Luo (2021).

The empirical results indicate that the relationship between tea and coffee in the Malaysian market may deviate from the conventional substitute structure, potentially influenced by factors such as consumption culture, import structure, and price transmission. This finding highlights the importance of taking into account the cultural context,

consumption habits, and substitution characteristics of the target market when formulating export strategies and pricing decisions, rather than relying solely on the theoretically predicted direction of price elasticity.

Thirdly, the relationship between Malaysia's GDP and the export volume of China's tea exported to Malaysia is consistent with expectations. According to the income effect in demand theory (Varian, 2014), the expansion of an importing country's economic scale significantly boosts its demand for foreign products. China's tea, as a consumer good with cultural and health attributes, should experience a corresponding increase in export volume to the target country alongside the growth of the target country's GDP (Nicholson & Snyder, 2017). This study confirms a statistically significant positive correlation between Malaysia's GDP and the export volume of China's tea to Malaysia at the 1% significance level in the long-run. Specifically, a 1% increase in Malaysia's GDP leads to an approximate 6.34% rise in China's tea exports. The results of the Granger causality test validate that Malaysia's GDP has predictive power over tea export volume in the short term at the 1% significance level. This empirical finding is consistent with the discoveries of Khan and Hussain (2011), Yee et al. (2016), Khan et al. (2016), Tellaeche and Aliphath (2023), Gaalya et al. (2017), and Dhungel (2018).

The study empirically demonstrates that Malaysia's GDP growth exerts a significant, stable, and substantial positive impact on the export volume of China's tea. This indicates that China's tea possesses the characteristics of a normal good in the Malaysian market, with economic growth and consumption upgrading serving as the key drivers of demand. These findings offer important implications for future export strategy formulation: continuously

monitoring the economic trends of the target market, while enhancing brand awareness and promoting cultural value, can further expand the potential for export growth.

Next, the relationship between Malaysia's tea production and the export volume of China's tea exported to Malaysia is consistent with expectations. According to the analytical framework of substitutes in demand theory, changes in the domestic supply of a commodity in the domestic market will generate a substitution effect on its import demand (Nicholson & Snyder, 2017). Although Malaysia's total domestic tea production is relatively limited, it exerts a certain degree of substitution effect in specific market segments or regional markets (Krishnan, 2000).

The empirical results show that there is a negative correlation at the 1% significance level between Malaysia's tea production and the export volume of China's tea. Specifically, a 1% increase in Malaysia's tea production leads to an approximate 0.9% decrease in China's tea exports. Consistent with the empirical findings of Muhammed and Iliyasu (2021), Mukhoti (1983), and Bathla (2009), in the long run, the improvement of domestic production has important impacts on price competitiveness, trade policies, and the layout of procurement channels, which is further reflected in the overall reduction of import demand. Furthermore, Malaysia's tea production has no predictive effect on tea export volume in the short term. This may be due to the fact that domestic tea in Malaysia accounts for a limited proportion of the overall tea consumption and differs from China's tea in terms of segmented markets, which hinder effective short-term market substitution.

Finally, the relationship between international oil price and the export volume of China's tea exported to Malaysia is consistent with expectations. According to demand theory, oil prices can indirectly affect the volume of international trade by influencing

transportation costs. Within the analytical framework of export demand, international oil prices represent a crucial cost factor. This is particularly true for agricultural products (such as tea) that rely on long-distance transportation. Fluctuations in oil prices can alter trade volumes through the price transmission mechanism (Krugman & Obstfeld, 2003). Taghizadeh et al. (2019) and Ogbonna and Ichoku (2023) identified the inhibitory effect of oil prices on the import demand for commodities in their research. The empirical results of this study further confirm a statistically significant negative correlation between international oil prices and the export volume of China's tea at the 1% significance level. Specifically, a 1% increase in international oil prices is associated with an approximate 1.1% decrease in China's tea exports.

In addition, international oil prices have no predictive power for the export volume of China's tea in the short term. This is in line with the view of Feenstra (2015) that the export of bulk commodities is slow to respond to changes in transportation costs in the short term, as prices and supply chain coordination usually depend on long-term agreements and trading relationships.

4.6 Chapter Remark

Focusing on the factors influencing China's tea exports to Malaysia, this chapter constructs a model based on demand theory, taking tea export volume as the dependent variable, introducing price, income, substitute price, domestic production, and transportation costs as independent variables, and conducting an empirical analysis on quarterly data from 2005 to 2024 using the ARDL method.

First, the order of integration of each variable was confirmed through ADF and KPSS unit root tests, revealing a mix of variables with integration orders $I(1)$ and $I(0)$, which

satisfies the prerequisite for the ARDL model (Pesaran et al., 2001). Second, the sample size of this study consists of 80 observations, and such a relatively small sample size also meets the modeling requirements of ARDL (Narayan, 2005). Subsequently, the bounds test was used to confirm the existence of a cointegrating relationship between the dependent variable and each explanatory variable, indicating a long-run equilibrium relationship between the variables. The long-run coefficients derived from this foundation show that the price of China's tea has a significant negative impact on tea export volume, while Malaysia's GDP has a significant positive impact on export volume, verifying the price effect and income effect in demand theory (Hicks, 1940). However, the price of coffee, as a substitute, exhibits a significant negative impact, which contradicts theoretical expectations and leads to discussions on the potential particularities of Malaysian consumers' behavior or market structure. In addition, Malaysia's domestic tea output and international oil prices have significant negative impacts on export volume. These findings are consistent with the expectations of the substitution effect (Goldstein & Khan, 1985) and the transportation cost hypothesis (Nanovsky, 2019), highlighting the important roles these factors play in shaping the export dynamics of China's tea to Malaysia.

Second, to further reveal the long-run relationship between variables, this study constructed an error correction model. Since the ECT of the model has a negative sign, with a coefficient value less than 1 and statistical significance at the 1% level, the model confirms the existence of a long-run relationship between variables. In addition, the Granger causality test indicates that the price of China's tea imported by Malaysia, Malaysia's GDP, and the price of coffee imported by Malaysia have a significant short-term causal impact on China's tea export volume to Malaysia. This result reveals the dynamic interactions among variables

and enhances the understanding of how price, income, and substitutes jointly affect changes in export demand.

Finally, the model's statistical robustness was verified through a series of diagnostic tests. The Jarque-Bera test indicated that the residuals follow a normal distribution; the Breusch-Godfrey serial correlation LM test and ARCH tests revealed no issues of serial correlation or heteroscedasticity; the Ramsey RESET test did not suggest severe misspecification of the model; and the CUSUM and CUSUM of Squares tests confirmed that the model maintains structural stability over the sample period. Overall, the model constructed in this study exhibits strong explanatory and predictive power, capable of reflecting the long-run economic mechanism underlying China's tea exports to Malaysia. It provides quantitative support for policymakers and export enterprises in terms of price regulation, market judgment, and competition from substitute products.

CHAPTER 5

CONCLUSION

5.1 Overview

This chapter presents the conclusions drawn from the overall findings of the study, structured into four sections: a synthesis of key conclusions, policy recommendations, research limitations, and suggestions for future research. Section 5.1 briefly introduces the contents of this chapter. Section 5.2 provides a review of the overall study. In Section 5.3, the policy recommendations are addressed. Section 5.4 describes the study's limitations, and lastly Section 5.5 gives suggestions for future research.

5.2 Conclusion

With the in-depth advancement of the Belt and Road Initiative, trade in agricultural products between China and ASEAN countries has become increasingly close. As an important trading partner of China in Southeast Asia, Malaysia has long imported large quantities of tea products from China. In 2023, Malaysia became the country with the largest import value of tea from China. However, against the backdrop of changes in the global agricultural trade environment, the upgrading of tea consumption structures in Malaysia, and fluctuations in logistics costs, the trend of China's tea exports to Malaysia has become more complex. Currently, there is a lack of systematic empirical studies on the factors influencing China-Malaysia tea trade.

Against the backdrop, this study focuses on the factors affecting China's tea exports to Malaysia. Based on the demand theory and combined with empirical analysis methods, it systematically explores the relationship between the export volume of China's tea to

Malaysia and four categories of variables: price, income, supply and cost. The main findings of this research address the existing gap in the understanding of micro-mechanisms underlying China-Malaysia tea trade.

This study employs the ARDL model as the primary empirical method. The selection of this model is primarily based on three considerations. First, the research data consists of quarterly time series data covering from 2005 to 2024, with a total sample size of 80, which categorizes the study as a small-sample study. Second, following the ADF and KPSS unit root tests, the variables in this study exhibit the characteristic of mixed integration orders of $I(0)$ and $I(1)$, with no $I(2)$ variables, thus complying with the prerequisites for the application of the ARDL model. Third, compared to traditional methods such as the Johansen cointegration approach, the ARDL model possesses significant advantages in analyzing both long-run and short-run relationships among variables.

In the implementation of the model, the study first conducted unit root tests to ensure all variables meet the ARDL specification requirements, and then selected the optimal lag combination using the AIC. Through the bounds test, a cointegrating relationship between the dependent variable and explanatory variables was confirmed, laying the foundation for estimating long-run coefficients and constructing an Error Correction Model. Long-run estimation results indicate that China's tea price, coffee price, Malaysia's tea production, and international oil prices exert significant negative effects on export volume, while GDP demonstrates a significant positive effect. The significance and negative sign of the ECT further confirm the system's tendency to converge toward long-run equilibrium. Additionally, the Granger causality test reveals the predictive role of GDP and price factors on export volume in the short run. To ensure model reliability, the robustness of the

specification was validated through a series of diagnostic tests, including the Jarque-Bera test for normality, the Breusch-Godfrey serial correlation LM test for autocorrelation, the ARCH test for heteroskedasticity, the Ramsey's RESET test for functional form misspecification, the CUSUM and CUSUMSQ tests for stability. Overall, the application of the ARDL method in this study not only demonstrates its adaptability in export demand analysis but also provides operational empirical support for similar research in this field.

Following this, the empirical findings are summarized in accordance with the four research objectives outlined in this study (Table 5.1), followed by a discussion of the theoretical significance and practical implications.

Table 5.1: Summary of Empirical Findings

Variable	Long-run Effect (Coefficient)	Short-run Effect
The price of China's tea imported by Malaysia	Negatively significant (-0.67)	Significant predictability
The price of coffee imported by Malaysia	Negatively significant (-2.57)	Significant predictability
Malaysia's GDP	Positively significant (6.34)	Significant predictability
Malaysia's tea production	Negatively significant (-0.9)	No significant predictability
The international oil price	Negatively significant (-1.1)	No significant predictability

First, the impact of the prices of tea and its substitute (coffee) on the export volume of China's tea to Malaysia. The study begins with price-related factors, and the empirical results align with the expectations derived from the classical demand theory. The empirical findings reveal a significant long-run negative relationship between the price of China's tea imported by Malaysia and the volume of China's tea exports to Malaysia: a 1% increase in

the price of China's tea is associated with a decrease in export volume by approximately 0.67%. China's tea price demonstrates predictive power over export volume in the short term, reinforcing the sensitivity of Malaysian importers to price fluctuations. However, coffee price, as a substitute variable, exhibits a significant predictive effect on China's tea exports in the short term but shows a negative impact in the long-run relationship: a 1% increase in coffee price corresponds a decrease of approximately 2.57% in China's tea exports. Although this outcome deviates from the conventional expectation of a positive substitution effect, it can be reasonably interpreted within the specific structural context of Malaysia's consumer market from three perspectives: consumer preferences and substitution elasticity, the complementarity of import structures, and price transmission mechanisms. This finding contributes novel empirical insights into the understanding of hot beverage consumption patterns in developing countries. The empirical results of this study contrast with the evidence from the Iraqi market, where empirical research suggests a substitution effect between tea and coffee (Kadhim, 2022), highlighting the importance of different country contexts. Moreover, Malaysia has implemented concrete policies and programmes that support the coffee industry, such as sustainable agriculture incentives for coffee growers in Sarawak (The Borneo Post, 2024) and the expansion of the NESCAFÉ Grown Respectfully programme with local cultivation (Chew, 2023); these measures may attenuate the expected substitution effect and reshape demand dynamics for China's tea.

Secondly, the effect of Malaysia's GDP on the export volume of China's tea to Malaysia. As a representative indicator of income levels, GDP plays a critical role in influencing export volume. The study identifies a significant positive long-run relationship between Malaysia's GDP and the export volume of China's tea: a 1% increase in Malaysia's GDP leads to an approximate 6.34% rise in China's tea exports. This suggests that sustained

economic growth in Malaysia enhances the country's consumption capacity, thereby driving demand for imported tea. This finding suggests that consumption upgrading driven by economic growth will generate continuous external market pull for China's high-quality tea. Furthermore, Malaysia's GDP exhibits a short-run causal relationship with China's tea export volume, which further strengthens the explanatory power of this variable as an exogenous driving factor. Therefore, the empirical findings of this study provide strong support for the significance of the income effect in the export demand. Moreover, the positive and strong impact of GDP growth on China's tea exports in this study can be partly explained by a series of macroeconomic policies recently implemented in Malaysia. For instance, the government set an annual economic growth target of 5.0-5.5% for 2021-2025 and explicitly identified private sector expenditure, improvements in the labor market, and productivity enhancements as the main drivers of GDP growth (Ministry of Economy Malaysia, 2023). The economic policies have created a favorable external environment for China's tea exports to Malaysia.

Thirdly, the influence of Malaysia's tea production on the export volume of China's tea to Malaysia. This study incorporates Malaysia's tea production into the model to assess whether it exhibits a significant substitution effect. The estimation results reveal that Malaysia's tea production exerts a significant negative impact on the volume of China's tea exports to Malaysia: a 1% increase in Malaysia's tea production leads to an approximate 0.9% decrease in China's tea exports. However, no short-run causal relationship is found between Malaysia's tea production and China's tea export volume, indicating that although domestic tea production in Malaysia exerts a significant long-term impact on China's tea exports, it does not serve as a direct predictive factor for export volume in the short run. This finding is consistent with agricultural economics literature, where local supply expansion often

substitutes for imports in crops such as soybeans (Cabezas et al., 2019). It also reflects Malaysia's long-standing agricultural diversification policies, which prioritize strengthening domestic plantation crops (Mansur, 2019). Consequently, China's tea exporters may face structural competition in Malaysia's market whenever domestic tea output expands, a risk that trade policymakers should acknowledge when designing long-term export strategies.

Lastly, the impact of the international oil price on the export volume of China's tea to Malaysia. Transportation costs represent a key determinant influencing the cross-border circulation of agricultural products. Therefore, this study incorporates international Brent crude oil prices as a proxy variable into the model. Within the framework of demand theory, transportation costs fall under the category of implicit prices. The empirical results are consistent with the theory of price elasticity: rising international oil prices lead to increased total costs, which in turn result in a negative response in demand. Specifically, a 1% increase in international oil prices is associated with an approximate 1.1% decrease in the export volume of China's tea. However, no significant short-run predictive relationship is observed between international oil prices and export volume. This finding indicates that the influence of oil prices on exports is a long-term, gradually accumulating process involving structural adjustments, rather than through a direct causal mechanism. From a policy perspective, the result underscores the vulnerability of China-Malaysia tea trade to global energy price volatility, highlighting the importance of infrastructure projects under the Belt and Road Initiative that aim to reduce shipping costs and stabilize supply chains (De-Soyres et al., 2019).

Beyond the bilateral context, these findings also carry broader implications for regional and global agricultural trade. The observed income effect, whereby Malaysia's GDP

growth significantly drives import demand, echoes similar dynamics in other ASEAN economies and highlights the pivotal role of rising middle-class consumption in shaping trade flows. The substitution and complementarity patterns between tea and coffee demonstrate that beverage consumption in emerging markets may deviate from conventional expectations, suggesting that global hot beverage industries should account for heterogeneous consumer preferences. Moreover, the long-run sensitivity of tea exports to oil prices underscores the structural importance of transportation costs in global value chains, particularly for agricultural goods. Finally, the negative impact of domestic supply on imports reflects a generalizable trend observed across agricultural goods, where local production expansion often reduces reliance on foreign suppliers. Thus, this study contributes not only to a deeper understanding of China-Malaysia tea trade but also to the comparative analysis of agricultural trade mechanisms in developing regions and global markets.

5.3 Policy Recommendation

This study reveals the key variables that affect export fluctuations and fills the empirical gap in the micro-mechanism of China's tea exports to Malaysia. Subsequently, to support China in further optimizing its tea export strategy to Malaysia, with the dual objectives of increasing export volume and enhancing the overall structure and quality of exports, this study proposes actionable recommendations across five key dimensions: trade policies, income levels, price mechanisms, substitute competition, and transportation costs.

5.3.1 Improve the China-Malaysia Cooperative Trade Systems

At the national level, China and Malaysia have established close economic cooperative relations in recent years under the framework of the Belt and Road Initiative and

the Regional Comprehensive Economic Partnership (RCEP). Existing studies indicate that following the implementation of RCEP, China's agricultural exports to ASEAN countries have seen significant improvements in terms of tariffs, quarantine procedures, and certificates of origin (Cong & Chin, 2023). However, tea, as a high-value-added consumer good, still encounters challenges in Malaysia market, such as "customs clearance delays", and "non-tariff technical standards". For small and medium-sized tea enterprises, export costs have increased significantly (Manaf & Ahamat, 2022). In this regard, it is suggested that national-level policy support for China-Malaysia tea trade be strengthened through the following measures.

First, institutional development of China-Malaysia agricultural trade cooperation mechanisms should be strengthened. Government departments could promote the signing of a China-Malaysia agreement on rapid customs clearance for agricultural products under the RCEP framework. This agreement may include measures such as establishing green channels, implementing electronic certificates of origin, and simplifying product ingredient filing procedures to improve the efficiency of tea export clearance.

Second, it is necessary to promote the establishment of a coordination mechanism for bilateral tea standards. It is suggested that a China-Malaysia cooperative certification platform for "halal tea" be built. The China's agricultural authorities and Malaysian halal certification bodies could collaborate to set up official certification centers in key tea-exporting provinces such as Guangxi, Fujian, and Zhejiang, offering policy guidance and financial subsidies for export enterprises to enhance the adaptability of China's tea to Malaysia's Muslim market. However, this proposal needs to be critically examined against Malaysia's existing halal certification system, which is governed by the Department of

Islamic Development Malaysia under strict national standards. While Malaysia's current policies emphasize centralized control and uniformity of halal certification, a bilateral cooperative platform would need to align with these established regulations to avoid duplications or conflicts.

Third, on the basis of trade facilitation policies, it is essential to enhance information services and market guidance for China's export enterprises. To address the issue of "information lag" among export enterprises regarding consumer preferences and channel structures in the Malaysian market, it is proposed that the Ministry of Commerce and the Ministry of Agriculture and Rural Affairs could jointly develop a Belt and Road agricultural product market database (Malaysia Station). The database should include tea consumption data across Malaysian states, country-specific import statistics, price trends of competing products, and updates on customs clearance policies, with regular reports released to provide data support for enterprises.

Finally, from a diplomatic strategic perspective, China-Malaysia relations have strengthened significantly in recent years. As 2025 marks the 51th anniversary of the establishment of diplomatic ties between the two countries, a series of cooperation memorandums have been signed in key areas such as the digital economy, high technology, and green agriculture. This milestone presents an opportunity to include China's tea industry within the priority scope of agricultural export support to Malaysia. For instance, a "Tea Culture Cooperation Group" could be established during high-level talks, consisting of tea industry associations, cultural promotion institutions, and universities. Activities such as the "China's Tea Art Culture Week" could be held in Malaysia to enhance the national image of China's tea, thereby promoting market expansion through integrated policy and cultural

promotion strategies. However, it should be noted that Malaysia's existing cultural diplomacy and agricultural promotion policies, such as the National Agrofood Policy 2.0 (2021–2030), issued by the Ministry of Agriculture and Food Industries (MAFI, 2021), prioritized strengthening domestic plantation crops and promoting local food culture. This means that while cultural events can create soft power synergies, policy alignment will require balancing China's efforts to promote its tea industry with Malaysia's emphasis on safeguarding its own agricultural identity.

5.3.2 Formulate a Targeted Marketing Strategy

From the enterprise perspective, first, efforts should focus on more accurately target middle-to-high-end consumer groups and enhancing product value-added attributes. As urban middle-class income and purchasing power continue to rise, consumer attention to quality, health, and culture in tea has been steadily increasing. Statista data indicate that demand for healthy tea, such as functional tea, and sugar-free organic tea, is growing rapidly in Malaysia (Statista, 2024). Export enterprises should adjust their product mix by moving away from the single sales of low-cost green tea or oolong tea. Instead, they should launch innovative products adapted to Southeast Asian tastes, such as “low-caffeine black tea” and “health-preserving tea”, in order to better meet the growing demand for healthy and functional consumption. In addition, brand development plays a critical role. Compared with Indian and Sri Lankan brands, which have deeply cultivated the market for a long time, China's tea brands currently exhibit relatively low visibility. Therefore, enterprises should focus on building exclusive high-end China's tea brands, crafting compelling narratives around China's tea culture, and engaging in collaborative promotions with local tea culture festivals, food festivals, and other events. For example, establishing “tea culture experience

centers” in Malaysia, combining composite marketing of tea tasting, tea art, tea utensil sales, can effectively enhance brand loyalty and consumer engagement.

Second, it is necessary to implement differentiated pricing and packaging strategies based on the characteristics of consumer groups. Export enterprises should avoid blindly raising prices or competing solely on high prices; instead, a tiered pricing strategy should be adopted based on specific market segments. For instance, middle-to-high-end organic packaged products can be placed in urban supermarkets, while simple-packaged economical tea bag products are more suitable for sale in small convenience stores and e-commerce platforms. This strategy enables differentiated price elasticity management and improves overall market adaptability.

5.3.3 Effectively Prevent the Risks of Price Fluctuations

For tea export enterprises or practitioners, first, efforts should be made to enhance research on cost transmission mechanisms to avoid excessive price fluctuations. Premarathne (2020) demonstrates that tea export prices are shaped by a wide range of supply chain costs. These include raw material procurement, processing, packaging and logistics, sea freight rates, and exchange rate fluctuations. It is suggested that enterprises establish a “hierarchical price transmission mechanism” by breaking down export costs into sub-items such as raw materials, labor, logistics, and exchange rates. Through sensitivity analysis, the degree of their impact on the final price can be evaluated, and a “cost fluctuation buffer clause” can be included in contracts to allow price adjustments within a certain range, thereby reducing the risk of order instability caused by sharp price changes.

Second, a dynamic pricing strategy based on market intervals should be introduced. To avoid the disadvantage of high prices, it is recommended that export enterprises adopt a

“Price Band Strategy”, which involves setting prices according to the price ranges of substitute products in the Malaysian market, such as teas from Indonesia, Sri Lanka, and India, to ensure that the price of China’s tea remain within the market-acceptable range.

Third, digital tools should be used for price forecasting and risk early warning. Enterprises are encouraged to actively leverage big data and AI tools to predict price fluctuation trends.

5.3.4 Enhance Product Competitiveness

Policymakers and enterprises should pay increased attention to non-traditional substitution effects and potential competitive effects within the complex market structure. First, promote the cultural integration of “tea + coffee” categories between China and Malaysia by fostering the perception of tea and coffee as complementary in consumption scenarios during sales activities. Chinese enterprises could collaborate with local coffee brands to launch “morning tea + coffee combination packages”, positioning the two as daily beverage pairings rather than mere substitutes.

Second, establish a multilateral monitoring mechanism. By integrating the price trends of major substitutes such as coffee, Malaysian local tea, Indonesian black tea, and Sri Lankan tea, a “cross-product price index” should be constructed to developed to simulate the fluctuations in substitution pressures over time. This index would serve as an early warning mechanism, providing China’s exporters and policymakers with real-time signals of potential demand shifts caused by changes in the prices of substitutes.

5.3.5 Establish Long-term and Stable Export Channels

For policymakers, first, support should be provided for tea export enterprises in their layout of “origin + transit warehouse”. Enterprises should be encouraged to establish bonded warehouses or port-side transit warehouses in Malaysia, improving cost control. When international transportation costs, such as oil prices are excessively high, enterprises can prioritize selling local inventories to reduce transportation expenses.

Second, efforts should be made to expand regional alternative channels to avoid high transportation pressure. Tea enterprises should be encouraged to establish diversified regional export routes with ASEAN ports, so as to avoid over-reliance on the single route of the Strait of Malacca and reduce the concentration of transportation risks.

Finally, when transportation costs, such as international oil prices rise, in addition to tea enterprises’ own price adjustments, the government can also offer economic support such as green logistics subsidies and freight reductions on cross-border e-commerce platforms.

5.4 Limitation of the Study

The study encountered two limitations in its implementation. The first limitation is the constraint of data and resources. Although this study systematically conducted modeling and analysis on quarterly time series data from 2005 to 2024 using EViews 13, limitations in data availability still impacted the depth and breadth of the research. The specific manifestations are as follows:

The lack of data on tea export prices of subcategories. Statistical data on Malaysia’s imports of China’s tea in official sources are mostly aggregated under the general category of “tea”. Except for green tea and black tea, monthly import and export data for subcategories,

such as oolong tea, Pu'er tea, and Liubao tea are difficult to obtain, which may mask differences in the sensitivity of different tea categories to factors such as price and income. Given Malaysia's ethnically diverse population, there is also a scarcity of detailed data on tea consumption habits across different ethnic groups.

The second limitation is the inadequacy of literature. Existing literature contains relatively few studies on Malaysia's tea import and export trade, and systematic empirical research on "tea substitutes" is also scarce, resulting in limited literature support. This gap has presented certain challenges for the integration of theoretical frameworks and literature in this study.

5.5 Suggestion for Future Research

One of the potential suggestions is to conduct analysis at the level of market segments and products. With the trend of diversification in the international tea consumption market and the continuous evolution of consumer preferences, significant differences exist in the market behaviors exhibited by different types of tea (such as green tea, black tea, oolong tea, Pu'er tea, and Liubao tea) in the export structure. Therefore, future research should focus on segmented analysis at the tea product level to explore the trade logic and driving mechanisms of specific categories.

On one hand, there are obvious differences in market acceptance, price elasticity, and brand influence among different tea types in the Malaysian market. For instance, Pu'er tea and Liubao tea have gradually gained popularity among middle-aged and elderly Chinese communities in Malaysia due to their maturation processes and health-preserving functions, while green tea is more appealing to young consumers. Thus, modeling export products by

category can help identify the differential impacts of variables on the exports of different tea types more accurately.

On the other hand, future studies could also introduce the dimension of competing countries for comparative analysis, such as the substitution and complementary relationships between China's tea and tea from Sri Lanka (black tea), India (Assam tea), and Indonesia (low-priced tea) in the Malaysian market. For example, a model of the evolutionary trend of transnational export shares could be developed by integrating the Revealed Comparative Advantage (RCA) index and consumer preference index, enabling a more comprehensive analysis of China's tea competitive positioning in both high-end and mid-to-low-end markets.

The next potential suggestion is to quantify non-economic factors in research. While economic variables form the basis of export demand research, non-economic factors also significantly influence tea consumption preferences and trade decisions. For instance, survey-based indicators such as brand awareness and category-specific consumption preferences can be analyzed through questionnaire data or social media text mining. This research direction has the potential to reveal the underlying motivations behind consumer preferences for certain tea types or brands, even under comparable price conditions. Meanwhile, the discontinuity of the policy environment also merits in-depth exploration. For example, policy changes such as tariff concessions, fluctuations in tax policies, and reforms to import licensing systems may pose sudden shocks to China's tea exports. Future research could quantify the short-term and long-term impacts of trade policy changes on export flows, thereby providing a robust quantitative basis for policy formulation and adjustment.

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