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Investigating The Validity of The Marshall-Lerner Principle and J-Curve Theory in Relation to Real Exchange Rates and Trade Imbalances: An Empirical Study of China's Economic Dynamics

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Abstract

According to traditional macroeconomic theory, meeting the Marshall-Lerner condition suggests that currency devaluation could positively impact the long-term trade balance. This implies that despite initial import cost increases, enhanced export competitiveness from a weaker currency eventually leads to trade balance improvements. However, short-term negative effects, known as the J-curve effect, may occur due to trade volume adjustments lagging currency devaluations. This study aims to assess the validity of the Marshall-Lerner condition in China's economy from 1995: Q1 to 2023: Q4 and evaluate the short-term J-curve effect's magnitude. Analyzing economic indicators and exchange rate fluctuations, the research confirms the validity of the Marshall-Lerner condition and supports the existence of the J-curve effect. These findings highlight the importance of nuanced currency policymaking for sustainable economic growth and stability, considering both short-term adjustments and long-term objectives.

Key Words: Marshall-Lerner Condition, J Hypothesis, Foreign Trade.

JEL: B17, O24

1.Introduction

The Marshall-Lerner Condition, named after the eminent economists Alfred Marshall and Abba Lerner, provides a theoretical framework for understanding how changes in exchange rates impact a country's trade balance. Central to this condition is the concept of price elasticity of demand, which measures the responsiveness of quantity demanded to change in price. According to the

Marshall-Lerner Condition, if the combined price elasticities of imports and exports are greater than one, a depreciation of the domestic currency will lead to an improvement in the trade balance. This occurs because the volume effect, resulting from increased export competitiveness and decreased import demand, outweighs the price effect, wherein lower export prices and higher import prices offset each other. Complementing the Marshall-Lerner Condition, the J-Curve Hypothesis provides further insights into the dynamics of exchange rate adjustments and their impact on trade balances over time. The J-Curve effect posits that, following a currency depreciation, the trade balance may initially worsen before improving in the long run. This initial deterioration is attributed to factors such as existing contracts, price stickiness, and lagged adjustments in trade volumes. However, as prices and quantities adjust in response to the new exchange rate, the trade balance eventually rebounds and may even surpass its pre-depreciation level.

These theoretical frameworks have significant implications for policymakers and economists, as they offer valuable guidance in formulating effective monetary and trade policies. By understanding the mechanisms through which exchange rate movements affect trade balances, policymakers can make informed decisions to promote economic stability and growth. Moreover, empirical studies testing the validity of the Marshall-Lerner Condition, and the J-Curve Hypothesis provide valuable insights into the real-world dynamics of exchange rates and trade balances, informing policy debates and strategic interventions. In summary, the theoretical background of the Marshall-Lerner Condition and the J-Curve Hypothesis illuminates the complex interplay between exchange rates and trade balances in international economics. By deepening our understanding of these concepts, economists and policymakers can navigate the challenges of globalization and trade dynamics more effectively, ultimately contributing to sustainable economic development and prosperity.

It is widely acknowledged that conducting a comprehensive analysis encompassing both the Marshall-Lerner condition and the J Curve hypothesis within the same study will significantly enhance the depth and scope of research in this domain. By integrating these two fundamental concepts, the study aims to offer a more holistic understanding of the dynamics governing exchange rates and trade balances. The initial section of the study will meticulously delve into the theoretical underpinnings of the Marshall-Lerner condition and the J Curve hypothesis, elucidating their conceptual frameworks and theoretical implications. Subsequently, a thorough review of national and international literature will be undertaken to provide a comprehensive overview of existing research, theories, and empirical evidence pertaining to these concepts. Moreover, the study will incorporate insights from various scholarly perspectives and empirical studies to enrich the analysis further. Finally, the research will transition to econometric analysis and forecasts, employing sophisticated statistical techniques to investigate the relationship between exchange rate movements and trade balances in the Chinese economy. Through rigorous econometric modeling and empirical analysis, the study aims to generate valuable insights that can inform policymakers, economists, and researchers about the complex interplay between exchange rates and trade dynamics in China.

2.Theoretical Background of the Marshall-Lerner Condition and J-Curve Hypothesis

The validity of the Marshall-Lerner condition and the J Curve hypothesis in the context of real exchange rates and foreign trade balances holds significant importance in the realm of international economics, particularly for emerging markets such as China. These theories serve as foundational pillars in understanding the intricate relationship between currency depreciation, import-export dynamics, and overall trade balance. The Marshall-Lerner condition posits that a country's trade balance will improve following a depreciation of its currency if the combined price elasticities of imports and exports exceed unity (Tomoıaga and Sılaghı,2022: 44). Essentially, this condition suggests that the responsiveness of import and export volumes to changes in prices plays a critical role in determining the impact of currency depreciation on the trade balance. This theoretical framework provides valuable insights into the mechanisms through which exchange rate movements affect trade dynamics. Complementing the Marshall-Lerner condition, the J Curve hypothesis offers additional insights into the short-term versus long-term effects of exchange rate movements on the trade balance. According to this hypothesis, while the trade balance may initially deteriorate following a currency depreciation due to contractual obligations and price stickiness, it is expected to improve over the long term as prices and quantities adjust. Thus, the J Curve hypothesis illuminates the dynamic nature of exchange rate adjustments and their eventual impact on trade balances (Altunöz,2022: 128).

In the context of an econometric analysis of the Turkish economy, it is imperative to discuss the relevance of these theories, drawing parallels from China's recent economic experiences. China's substantial involvement in international trade, coupled with notable fluctuations in its currency, presents an intriguing case study for examining the interplay between real exchange rates and trade balances. By delving into China's economic landscape, trade structure, and past empirical findings related to the Marshall-Lerner condition and the J Curve effect, the introduction sets the stage for a comprehensive analysis of the Turkish economic setting. Moreover, recent economic policies, global trade dynamics, and currency volatility have undoubtedly influenced China's foreign trade balance, making it a pertinent subject for this econometric analysis. By providing this contextual background, the introduction aims to lay the groundwork for investigating whether the theoretical predictions of the Marshall-Lerner condition and the J Curve hypothesis hold true in the Turkish context. Such analysis is not only academically significant but also holds practical relevance for policymakers aiming to devise strategies that enhance the country's trade balance and overall economic stability (Geldner,2024:27).

In the literature on the conditions necessary for devaluation to positively affect the foreign trade balance, two theoretical approaches can be discussed. The first theoretical approach is the BRM model, which entered the literature because of the works by Bickerdike (1920), Robinson (1947), and Metzler (1948), and the second is the Marshall-Lerner condition (Marshall, 1923; Lerner, 1944). In the Marshall-Lerner condition, it is argued that devaluation will positively affect the trade balance provided that the total of the absolute magnitudes of the import and export demand elasticities exceeds one, by only incorporating the import and export demand elasticity into the calculation, whereas, in the BRM model, both supply and demand import and export elasticities are included in the calculation. Empirical analyses have understood that for some countries, although elasticity is low in the short term, they increase in the long term. Producers and consumers' reactions to price changes that vary in parallel with the exchange rate change are not immediate but occur over time. In the effects used as the J Curve (also referred to as the S Curve in the literature), initially, the trade balance is negatively affected by the devaluation, but over time, this effect will turn positive (Junz and Rhomberg, 1973; Magee, 1973; Meade, 1988). In this context, the level at which increases in the exchange rate will reduce imports and increase exports depends on the demand and supply elasticity of the imported and exported goods (Miles, 1979:611). In the Marshall-Lerner condition, for the devaluation to have a positive effect on foreign trade performance, the total absolute values of the demand elasticities of the imported and exported goods need to be greater than one ($|\mu\_m| + |\mu\_x| > 1$) (Marshall, 1923; Lerner, 1944). In later studies related to the Marshall-Lerner condition, it has been argued that expressing the effects of exchange rate changes on the foreign trade balance by looking only at the changes in the quantity and prices of goods, as advocated by the model defended by Marshall (1923) and Lerner (1944), is insufficient. In these studies, views that argue that the income effect should also be added to the model in addition to the Marshall (1923) and Lerner (1944) model, such as those by Laursen and Metzler (1950); Sen and Turnovsky (1989); Rose and Yellen (1989); Bahmani-Oskooee and Niroomand (1998); and Gomez and Ude (2006), have become popular.

In the framework of the Marshall-Lerner approach, the analysis predominantly revolves around the influence of the nominal exchange rate on imports and exports. However, Laursen and Metzler (1950) have contended that this perspective overlooks the broader context of price levels prevailing across nations. They argue that a more precise assessment can be achieved by incorporating the real exchange rate (RER) into the analysis, which considers the relative price levels between countries. By opting for the real exchange rate, the examination gains depth and comprehensiveness, as it considers not only the nominal exchange rate but also the actual purchasing power of currencies in international trade transactions. This expanded approach offers a more nuanced understanding of the dynamics influencing trade flows and exchange rate movements. The real exchange rate (Real Exchange Rate: RER); is determined with the help of equation (1), considering the relative price levels between countries.

$$REER = \frac{P^d}{P^f * ER} \quad (1)$$

In Equation (1), P^d represents the Consumer Price Index (CPI) for the reference country, while P^f denotes the general price level in the foreign (trade partner) country. Additionally, ER represents the nominal exchange rate. In this context, an appreciation of the domestic currency (a decrease in the nominal exchange rate) will lead to an increase in inflation within the country or a decrease in inflation in the foreign country (reduction in the prices of goods), which will raise the real exchange rate and decrease the foreign trade competitiveness (Uslu, 2018:556). The Marshall-Lerner condition is derived through the export demand model in Equation (2) and the import demand model in Equation (3) (Göçer & Elmas, 2013: 140).

$$X_t = \beta_0 + \beta_1 REXR_t + \beta_2 Y_t^f + \varepsilon_{1t} \quad (2)$$

$$M_t = \alpha_0 + \alpha_1 REXR_t + \alpha_2 Y_t^d + \varepsilon_{2t} \quad (3)$$

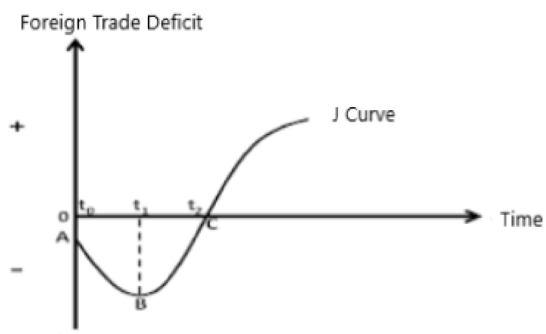
In Equations (2) and (3), X represents exports; M represents imports; REXR represents the real exchange rate; Yd represents the income of residents within the country, and Yf represents the income of residents outside the country. Additionally, the export and import elasticity with respect to the real exchange rate are represented by β_1 and α_1, respectively. $\beta_2$is the income elasticity of exports, while $\alpha_2$is the income elasticity of imports. Based on Equations (2) and (3), for the Marshall-Lerner condition to be satisfied, the condition in Equation (4) must be met.

$$(|\beta_1| + |\beta_2| + |\alpha_1| + |\alpha_2|) > 1 \quad (4)$$

As outlined in Equation (4), the foreign trade balance of countries is determined based on the real exchange rate, domestic income, and global national income levels. Under fixed exchange rate conditions, devaluation differentiates the relative prices of trade goods, leading to a decrease in imports and an increase in exports, thus making positive contributions to the balance of payments. However, the provision of such positive contributions depends on the import and export demand elasticities being greater than one. In other words, the positive effect of devaluation on the foreign trade balance depends on the validity of the Marshall-Lerner condition. However, in countries where these conditions are met within the elasticity-focused Marshall-Lerner perspective, it has been observed that the trade balance begins to deteriorate immediately after devaluation(Shuaibu and Isah,2020:72). The fact that the trade balance incurs more deficits in the short term following devaluation and starts to improve after a certain time period follows a J-shaped path; hence, this situation is termed the J Curve (Bahmani-Oskooee and Rahta, 2001: 1377).

In the context of the Marshall-Lerner condition, if the foreign trade balance shows improvement in the long term despite deteriorating in the short term, it is understood that the J Hypothesis is valid. According to the J Curve hypothesis, consumers and producers cannot react quickly to decreases and increases in exchange rates in the short term; positive effects will be recorded in the foreign trade balance as adjustments are made in the long term.

Figure 1: J Curve



Source: Hepaktan, 2016: 78

According to Figure 1, t_0 represents the year when devaluation occurs, and at this period, there is an external deficit of 0A. The external deficit continues for a certain period after devaluation, reaching its highest level at point B during the $t_1$period, resulting in a foreign trade deficit of $t_1 - B$. The primary reason for this increase in foreign trade in the short term is the increase in foreign demand for exported goods and the inability to limit domestic demand for imported goods (Hepaktan,2016:78). In other words, it is due to the failure to meet the Marshall-Lerner condition. In the long term, however, adaptation to the newly formed prices in the economy occurs, and the existing external deficit begins to decrease. Rose and Yellen (1989) have analyzed the validity of the J Curve hypothesis using Equation (5).

$$BT = \beta_0 + \beta_1 REER + \beta_2 Y^d + \beta_3 Y^f \quad (5)$$

In Equation (5), the foreign trade balance is represented by BT, while the real exchange rate is denoted by REER. Additionally, Y^drepresents national income within the country, and Y^f represents national income in the foreign country. In the Rose and Yellen (1989) model, a prerequisite is stated that the Marshall-Lerner condition must be met, indicating that in the short term $(\beta_1 < 0)$ or β_1 should be statistically insignificant, whereas in the long-term analysis, should be greater than zero $(\beta_1 > 0)$

3. Chinese Economy Overview and Literature

The Chinese economy stands as a colossal force in the global economic landscape, renowned for its remarkable growth trajectory and profound impact on international trade and investment(Altunöz, 2017:30). Over the past few decades, China has undergone a transformative journey from a largely agrarian society to the world's second-largest economy. This economic metamorphosis has been fueled by rapid industrialization, extensive exports, and a surge in foreign investments, positioning China as a key player in shaping the dynamics of the global economy.

At the heart of China's economic success story lies its prowess in manufacturing, with the nation serving as the undisputed manufacturing powerhouse of the world. From electronics and textiles to toys and automobiles, China's manufacturing prowess spans a vast array of industries, underpinning its status as the leading producer and exporter of goods on the global stage. Moreover, China's economic strategy has evolved over the years, with a growing emphasis on fostering domestic consumption, investing in renewable energy sources, and transitioning towards higher-tech industries. This strategic shift reflects China's commitment to achieving more sustainable and balanced economic growth, in line with global competitiveness standards outlined in The Global Competitiveness Report 2018. (The Global Competitiveness Report 2018). However, alongside its economic achievements, China grapples with a myriad of challenges that underscore the complexity of its economic landscape. Rising debt levels, regional economic disparities, environmental degradation, and an aging population present formidable obstacle to sustained economic progress. Moreover, China's trade policies and foreign investments have occasionally sparked controversies and trade disputes on the international stage, highlighting the delicate balance between economic expansion and global cooperation.

Despite these challenges, China's economic influence extends far beyond its borders, exerting a profound impact on global trade and investment flows. As the world's largest manufacturing economy and exporter of goods, China plays a pivotal role in shaping the contours of international trade. Furthermore, China's emergence as the fastest-growing consumer market and the second-largest importer of goods underscores its growing importance as a destination for global trade. Additionally, China's active engagement in international trade cooperation and agreements further solidifies its position as a key player in shaping the future of global trade dynamics. China is a net importer of services.It is the largest trading nation in the world and plays a significant role in international trade, increasingly engaging in trade cooperation and agreements with many countries. As of 2020, China was the largest recipient of direct foreign investment, receiving $163 billion (Tucker,2021). In the same period, it had the second-largest outward direct foreign investment, following Japan, with $226.65 billion for only the year 2019. As of 2022, China ranks second worldwide in the total number of billionaires. It was second in the number of millionaires in 2018, with 3.5 million.

The Marshall-Lerner Condition and the J-Curve effect have been extensively researched topics in the realm of international economics, with numerous empirical studies shedding light on their applicability and implications. Recent data further attest to China's economic might, with the country emerging as a magnet for foreign direct investment. In 2020, China topped the charts as the largest recipient of foreign direct investment, reflecting its allure as a premier destination for global capital. Moreover, China's outward direct foreign investment has been steadily increasing, positioning the country as a major player in global investment flows. Furthermore, China's economic ascendance is mirrored in its wealth indicators, with the country boasting a burgeoning class of billionaires and millionaires. As of 2022, China ranks second worldwide in the total number of billionaires, underscoring the unprecedented wealth accumulation within the country. Additionally, China ranked second in the number of millionaires in 2018, with approximately 3.5 million individuals enjoying millionaire status. In the realm of international economics, the Marshall-Lerner Condition and the J-Curve effect have emerged as seminal theories, offering valuable insights into the dynamics of exchange rates and trade balances. These theoretical frameworks have been the subject of extensive empirical research, contributing to a deeper understanding of China's economic trajectory and its implications for global economic dynamics. By examining the applicability of these theories within the Chinese context, policymakers and economists can glean valuable insights into the intricacies of China's economic landscape and devise strategies to navigate its evolving dynamics effectively.

One seminal study by Bahmani-Oskooee and Ratha (2004) examined the Marshall-Lerner condition using data from 20 developing countries. Their analysis provided empirical evidence supporting the condition, suggesting that a currency depreciation would improve the trade balance in the long run for these countries. In a related study, Bahmani-Oskooee and Wang (2011) investigated the J-Curve effect in the context of South Korea's trade with 16 major trading partners. Their findings revealed a short-term adverse impact on the trade balance following a currency depreciation, consistent with the predictions of the J-Curve theory.Building on these findings, Tang and Yuen (2009) conducted an empirical analysis focusing on the Marshall-Lerner condition and the J-Curve effect in the case of Japan's trade with 10 Asian countries. Their research confirmed the validity of the Marshall-Lerner condition in the long run, while also observing a short-term deterioration in the trade balance post-devaluation, supporting the existence of the J-Curve effect. Moreover, a study by Zhu and Zhang (2018) explored the applicability of the Marshall-Lerner condition and the J-Curve effect across 30 European Union countries over a period of 25 years. Their analysis demonstrated that exchange rate depreciations led to an improvement in the trade balance in the long run, while the short-term impact exhibited the characteristic J-Curve pattern. Rose (2000) investigates the impact of currency unions on international trade, focusing on the European Union's adoption of the euro as a common currency. Using a gravity model framework and a large dataset covering bilateral trade flows between 186 countries over the period 1948-1992, Rose examines whether the introduction of a common currency enhances trade among member countries. The findings of the study reveal robust empirical evidence supporting the hypothesis that countries sharing a common currency experience significantly higher levels of trade compared to those with separate currencies. Rose estimates that the adoption of a common currency leads to a substantial increase in bilateral trade, with trade volumes between member countries being on average 50% higher than would be expected otherwise. Moreover, the study analyzes the dynamics of trade responsiveness to exchange rate changes before and after the adoption of a common currency. Rose finds evidence of a significant reduction in the sensitivity of trade to exchange rate fluctuations among countries within a currency union. This phenomenon suggests that the elimination of exchange rate uncertainty and transaction costs associated with currency conversions facilitates trade integration among member states. Additionally, Loungani and Razin (2001) conducted a comprehensive meta-analysis of 83 studies on the J-Curve phenomenon, spanning various countries and time periods. Their findings suggested that while the J-Curve effect is observable in the short term, its magnitude and duration vary across different economies and exchange rate regimes. Further contributing to the literature, Choudhry and Bahmani-Oskooee (2001) investigated the J-Curve effect in the context of the U.S. trade with major trading partners. Their study provided empirical evidence supporting the presence of the J-Curve phenomenon, particularly in the short run, following exchange rate depreciations. In their study, Petrovic and Gligoric (2010) tested the validity of the J-curve using monthly data from January 2002 to September 2007 in Serbia. They found that the J-curve was valid in the short term, considering variables such as real effective exchange rate, trade balance, and real GDP Schaling and Kabundi (2014) examined the existence of the J-curve effect in South Africa for the period from 1994 to 2011. Utilizing variables such as real effective exchange rate, trade balance, and real GDP, their study confirmed the validity of the J-curve. Additionally, Amusa and Fadiran (2019) tested the validity of the J-curve across 19 sectors using quarterly data from 1991:Q4 to 2016:Q3 in the United States and South Africa. Their findings supported the existence of the J-curve. Liang and colleagues (2019) utilized the ARDL model to investigate the relationship between the RMB (Renminbi) and China's export performance. Their findings suggest that the failure of RMB devaluation to improve the trade balance can be attributed to the sustained devaluation of the RMB, which consequently reduces the expected prices of China's exported goods. This decline in expected prices triggers a deflationary effect and causes US importers to delay or reduce imports of Chinese products. However, previous studies have overlooked the initial unevenness of China's trade balance, relying instead on country-level data to estimate the price elasticities of demand for exports and imports. Güneş (2021) aimed to examine the validity of the J Curve Hypothesis in the context of Turkey. Utilizing short and long-term causality tests, cointegration analysis, and FMOLS (Fully Modified Ordinary Least Squares) tests on monthly time series data spanning from January 2010 to September 2019, the study explored the dynamics of the relationship. The findings indicate that the real effective exchange rate does not significantly influence exports in the short term, leading to the conclusion that the J Curve hypothesis is not applicable in the Turkish context. However, in the short term, the real effective exchange rate does impact imports. Moreover, in the long run, a causal relationship exists between the real exchange rate and both exports and imports. The J-curve hypothesis is found to be strongly valid.In their study investigating the Marshall-

Lerner condition in trade relations between Turkey and the EU, Topçu and Özdemir (2019) concluded that import demand price elasticity and export demand price elasticity were positive by using the Extended Average Group (AMG) estimator for the 2004-2017 period. Mwito et al. (2021) conducted a study using panel data analysis to explore the asymmetric effects of Real Exchange Rate (RER) on trade balance between Kenya and its 30 trading partners over the period of 2006-2018. Their findings revealed that simultaneous bilateral decreases in RER positively influence the long-term trade balance, suggesting that the implementation of devaluation policies could bolster Kenya's competitiveness in international trade in the long run. In a separate study, Ünal (2021) examined the validity of the Marshall-Lerner (M-L) condition and the J-curve hypothesis in the bilateral trade dynamics between Turkey and Russia. Employing the ARDL model for the time span of 2000-2019, the research discovered that the M-L condition holds true and the J-curve hypothesis is confirmed, albeit solely in the long term. Ceyhan and Gürsoy (2021) examine whether the J-curve hypothesis is applicable in Turkey. For this purpose, the Toda-Yamamoto Causality Test, and the Hatemi-J (2012) Asymmetric Causality Test were applied using monthly data for the period 1996-2019. The results of the Toda-Yamamoto Causality Test reveal a one-way causality from the real exchange rate to imports. On the other hand, the results of the Hatemi-J (2012) Test indicate that shocks to the real exchange rate do not affect exports but have a reducing effect on imports. Therefore, it is concluded that the J-curve hypothesis is invalid for Turkey.

In their study, Shuaibu and Isah (2020) analyzed the impact of exchange rate fluctuations on the trade balance across five African nations. Utilizing both linear and nonlinear autoregressive distributed lag models, they examined data spanning from 1980 to 2018. The linear model results indicated the presence of a short-term J-curve effect solely in Uganda, while Algeria exhibited a long-term J-curve effect. Conversely, nonlinear analysis revealed short-term J-curve dynamics in South Africa and Uganda, with long-term effects observed in Algeria and Uganda. These findings suggest that nonlinear models offer better performance in capturing asymmetries. The study underscores the importance of addressing structural economic imbalances to effectively utilize exchange rate and trade policies for enhancing trade outcomes. Ibrahim and Bashir (2020) conducted a study focusing on Sudan's trade balance dynamics over the period of 1978-2017, employing the ARDL bound test approach to analyze the impact of Real Effective Exchange Rate (RER) changes. Surprisingly, their empirical findings suggest that exchange rate devaluations do not significantly influence the trade balance in Sudan, thus indicating the absence of the J-curve effect. Ramzan (2021) delved into the bilateral trade relationship between Turkey and the USA at the industry level, investigating the effects of RER fluctuations. While the linear ARDL results failed to validate the J-curve hypothesis at the aggregate level, interestingly, disaggregated analysis revealed confirmation of the J-curve hypothesis in specific industries such as Transportation, Textiles & Clothing, and Mine & Metal. Güler (2021) explored the nuanced impacts of RER shocks on Turkey's exports (EXPs) and overall trade balance, employing the NARDL test methodology. Contrary to expectations, the study revealed that negative RER shocks led to a gradual improvement in Turkey's trade balance, challenging the conventional understanding of the J-curve effect. Bahmani-Oskooee and Karamelikli (2021) conducted a comprehensive analysis of the symmetrical and asymmetrical effects of devaluation on the trade balance, focusing on Germany and the UK. Through the utilization of both linear and nonlinear ARDL models spanning from 1999 to 2019, their research unearthed the presence of the symmetrical J-curve effect across 12 industries, while also identifying asymmetric J-curve effects in 21 industries. In a similar vein, Bahmani-Oskooee and Nouira (2021) scrutinized the trade dynamics between Italy and the USA, specifically investigating the existence of the asymmetric J-curve effect across various industries. Their econometric examinations revealed compelling evidence, with the J-curve effect confirmed in 12 industries through linear models. Furthermore, nonlinear model estimations unveiled asymmetric effects in 48 industries in the short term and 29 industries in the long term, shedding light on the nuanced dynamics of exchange rate impacts on trade balances. Khan et al. (2022) highlights the contentious nature of currency devaluation as a tool for stimulating economic growth, drawing attention from both developing and developed economies. While policymakers often consider devaluation to enhance competitiveness and address balance of payment issues, its long-term effectiveness in promoting economic growth remains debated. Past studies, employing econometric models like ARDL and Johansen cointegration, have produced mixed findings regarding the impact of devaluation on economic growth, with some suggesting limited or insignificant effects in the long run. Moreover, besides devaluation, factors like interest rates and gross capital formation have been identified as positively influencing long-term economic growth. Challenges such as political instability, macroeconomic volatility, and environmental issues may hinder economic development, potentially outweighing the benefits of devaluation in some cases. Hence, a comprehensive approach to economic policy formulation, considering both macroeconomic and microeconomic indicators, is essential. Additionally, the study suggests that

Pakistan's sustainable economic strategy should prioritize creating a favorable business environment and promoting industrialization. Rather than solely relying on devaluation, policymakers should implement innovative industrial policies to foster industrial sector growth. Encouraging foreign direct investment (FDI) and ensuring a flexible exchange rate regime can further support economic growth objectives. Overall, the literature emphasizes the importance of balanced and proactive economic policymaking in Pakistan, emphasizing structural reforms to stimulate sustainable economic growth. Altunöz (2023) examined whether the Marshall-Lerner condition is met in Turkey during the period of 1993: Q4-2021: Q2 and the validity of the J-curve effect in the short term. According to the findings, it was determined that the Marshall-Lerner condition is valid, suggesting that exchange rate policies can be used as a tool to improve the trade balance in countries. Eroğlu and Olayıwola(2023) aimed to evaluate the impact of exchange rates on Nigeria's economic growth by separating it into positive and negative components using a nonlinear ARDL model. In the short term, when the Naira depreciates against the US dollar, there is a tendency for economic growth to decline, while when it is appreciated, there is a tendency for economic growth to increase. However, in the long term, these effects operate in the opposite direction. In addition, tests conducted for asymmetric effects indicate that the way the appreciation of the Naira affects economic growth is significantly different from its depreciation. Trofimov(2024) investigated the applicability of the J-curve hypothesis across four Southeast Asian nations, namely Indonesia, Malaysia, the Philippines, and Thailand, spanning from 1980 to 2017. The analytical models employed were rigorously evaluated for their diagnostic accuracy, and the variables exhibited cointegration. However, apart from Malaysia, the short- and long-term associations did not demonstrate evidence supporting the existence of the J-curve phenomenon. Notably, Malaysia and the Philippines displayed asymmetric impacts on trade flows, indicating the potential suitability of nonlinear ARDL techniques within these economies.

4.Econometric Analysis

In the analysis section of the study, the validity of the Marshall-Lerner condition for the Turkish economy will first be tested, followed by the examination of the J Curve effect. The period from 1995: Q1 to 2023: Q4 will be included for both analyses. In the first part of the analysis, the Marshall-Lerner analysis, the impact of real exchange rate changes on China's foreign trade performance will be examined. The variables subject to analysis, their abbreviations, and the sources obtained can be followed in Table 2.

Tablo 2: Analyzed Variables, Abbreviations, and Sources

Variable for Marshall-Lerner	**Abbreviation**	**Source**
Real Effective Exchange Rate	REER	The Central Bank of the People's Republic of China
Exports	X	The Central Bank of the People's Republic of China
Imports	M	The Central Bank of the People's Republic of China
Trade Balance	BT	The Central Bank of the People's Republic of China
World National Income	Y^D	World Bank
China's National Income	Y^T	National Bureau of Statistics of China
Variable for J Curve	Abbreviation	Source
Per Capita National Income	GNPper	National Bureau of Statistics of China
Export/Import (export to import ratio for manufacturing industry)	X/M	National Bureau of Statistics of China

In Table 2, China's GDP will be used in the Marshall-Lerner condition analysis, while the per capita national income variable will be used in the J Curve analysis. Since the Gross Domestic Product (GDP) data in China are published quarterly, the entire dataset is organized on a quarterly basis. The world national income consists of GDP data calculated with constant prices of the year 2010. The trade balance has been formed by calculating the percentage value of the ratio of exports to imports. The effects of the real effective exchange rate on foreign trade will be examined using three different models, referring to the works of Eita (2013: 513) and Uslu (2018), and these models can be followed in equations (6), (7), and (8).

Model 1

$$\mathrm{lnX_t} = \emptyset_0 + \emptyset_1 lnREER_t + \emptyset_2 lnY_t^w + \varepsilon_t \quad (6)$$

Model 2

$$\mathrm{lnM_t} = \vartheta_0 + \vartheta_1 lnREER_t + \vartheta_2 lnY_t^d + \vartheta_3 lnY_t^w + \vartheta_t \quad (7)$$

Model 3

$$\mathrm{lnBT_t} = \varphi_0 + \varphi_1 lnREER_t + \varphi_2 lnY_t^d + \varepsilon_t \quad (8)$$

4.1. Unit Root Analyses for Variables

To reduce the standard deviations of all variables included in the model and to stabilize their variances, natural logarithms have been taken and expressed as ln. The seasonal effects of the series have been removed using the Moving Average method, eliminating seasonal impacts. In econometric analyses, the non-stationarity of series can cause the problem of spurious regression. To address this issue, if time series are not stationary, they should be made stationary through unit root analyses. The econometric analysis of this study covers specific dates due to the inclusion of the 2008 global crisis, the currency shock resulting from tensions with the USA in 2018, and the Covid pandemic that started in 2019 and continues to affect; therefore, structural breaks in the time series must be considered. As a result, tests that allow for breaks, such as those by Lumsdaine and Papell (LP, 1998) and Vogelsang and Perron (1998), are added to the analysis alongside the traditional Augmented Dickey Fuller (ADF) unit root test. The model for the ADF unit root test is presented in Equation (9).

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + c \sum \Delta Y_{t-1} + u_t \quad (9)$$

$H_0: \gamma = 0 \;\; ve \;\; \mathrm{H}_1: \gamma \neq 0$

In the ADF (Augmented Dickey-Fuller) unit root test, rejecting the null hypothesis H_0 implies that the series Y does not contain a unit root, meaning it is stationary. If H_0 cannot be rejected, it leads to the conclusion that the series Y contains a unit root, indicating it is non-stationary.

Tablo 3: ADF Unit Root

Variables	**ADF**			
	At Level		**First Difference**	
	constant	**Constant+trend**	**constant**	**Constant+trend**
lnREER	-1,71	-1,87	-4,01*	-4,44*
lnX	4,44*	2,56	-	-
lnM	-1,10	-1,58	-6,19	-6,39*
lnBT	-1,09	-1,51	-7,01*	-7,88*
lnY^D	4,22*	4,81*	-	-
lnY^T	-8,11*	-8,76*	-	-
lnGDP	8,45*	8,77*	-	-

LnX/M	8,40*	8,72*	-	-

Note: *, indicates that the null hypothesis is rejected at the 95% confidence level. The lag lengths have been determined as 1 using the Schwarz information criterion and are indicated in parentheses. The critical values at the 1% and 5% significance levels for the stationary and stationary+trend are (-3.50);(-4.11) and (-2.90);(-3.45) respectively

The results of the ADF unit root test presented in Table 3 indicate that the dependent variable (lnBT), lnREER, and lnM variables contain a unit root at levels, but they are made stationary by taking differences. All other variables, however, are stationary at levels. Traditional unit root tests are criticized for ignoring the structural break dates caused by economic, political, and event-related factors. Therefore, in this study, the structural break based Vogelsang and Perron (1998) test is preferred, and the test statistic can be obtained using two different models. In the Vogelsang and Perron (1998) unit root test, two different models are used: the Additive Outlier (AO) model and the Innovational Outlier (IO) model. The AO model allows for a change in the slope of the trend function, while the IO model only allows for a change in the intercept of the trend function. The AO and IO models are analyzed with equations (10) and (11) (Vogelsang and Perron, 1998: 1080).

$$y_t = \mu + \beta_t + yDT_t^* + y_t \quad (10)$$

$$y_t = \alpha y_{t-1} + \sum_{i=1}^{K} c_i \, \Delta y_{t-i} + e_t \quad (11)$$

The series $\tilde{y}t$ represents the detrended series. Equality is sequentially estimated for all possible values ($T\_b = k + 2, \dots, T - 1$). Here, T represents the total number of observations that minimizes the t-statistics for α = 1. If the absolute value of α's t-statistic exceeds the corresponding critical value, the null hypothesis accepting the presence of a unit root is rejected (Çetin and Saygın, 2019: 323). The attained Vogelsang and Perron unit root test results can be observed in Table 4.

Table 4: Unit Root Test Results by Vogelsang and Perron (1998)

Variable	Test Statistic	Critical Value			Break Date	Result
		1%	5%	10%		
lnREER	-1,15	-5,66	-5,09	-4,87	2008	-
lnX	-7,89*	-5,66	-5,09	-4,87	2008	I(0)
lnM	-2,90	-5,66	-5,09	-4,87	2008	-
lnBT	-1,05	-5,66	-5,09	-4,89	2008	-
lnY^D	-4,08***	-4,81	-4,23	-4,04	2020	I(0)
lnY^T	-4,004*	-4,81	-4,23	-4,04	2020	I(0)
lnGDP	-4,67**	-4,81	-4,23	-4,04	2020	I(0)
LnX/M	-4,50	-4,81	-4,23	-4,04	2020	I(0)
ΔlnREER	-6,717*	-4,81	-4,23	-4,04	2008	I(1)
ΔlnM	-5,056*	-4,81	-4,23	-4,04	2008	I(1)
ΔlnBT	-7,009*	-4,81	-4,23	-4,04	2020	I(1)

Note: Akaike Information Criterion has been used to determine the optimal lag lengths. Models with stationary at levels and trends, and first differences with a constant have been preferred. ***; %1, **; %5, *; %10 indicate stationarity at significance levels. The maximum lag length is set to 5. Unit root tests for first differences have not been conducted for series that are stationary at the level.

According to the results in Table 4, variables lnBT, lnREER, and lnM are not stationary at levels but become stationary when first differences are taken. The break dates are significant for the Turkish economy. Engle and Granger (1987) claim that analyses conducted on series with unit roots will encounter the problem of spurious regression. To address this issue, the Bound Test approach developed by Pesaran, Shin, and Smith (2001), allowing for cointegration analysis at different levels of stationarity, will be preferred. In this context, it is necessary to determine the appropriate lag length. The most suitable lag length in the information criteria to be considered is the lag length where the critical value is minimized. However, if autocorrelation issues are encountered at the determined lag length, the lag length with the second smallest value is chosen. If autocorrelation persists, the process continues until autocorrelation ceases. The appropriate lag length is presented in Table 5. The presence of autocorrelation is analyzed with the BREUSCH-GODFREY test.

Table 5: Determination of Suitable Delay Length

M	AIC	Schwarz	X^2 BREUSCH-GODFREY
1*	2,100	4,213	7,008**(0,124)
2	3,109	6,100	7,344(0,200)
3	3,200	6,900	6,186**(0,300)
4	3,111	6,308	4,008*(0,595)
5	3,107	8,089	3,654*(0,321)
6	3,114	8,067	4,886*(0,220)
7	3,803	7,113	2,222**(0,178)
8	3,008	4,000	1189**(0,010)
9	4,270	7,221	3,400**(0,316)

Note: *, **, and *** denote the suitable delay length chosen at the 1%, 5%, and 10% levels, respectively. Values in parentheses indicate the probability value. Akaike and Schwarz information criteria have been utilized.

When considering a maximum length of 9, it has been concluded that the most suitable lag length is 1. A Wald test will be applied to test the cointegration relationship between the variables. In this context, the hypotheses in equations (12) and (13) should be tested.

$$H_{0:}: \beta_3 = \beta_4 = 0 \tag{12}$$

$$H_{1}: \beta_3 \neq \beta_4 \neq 0 \tag{13}$$

The F-statistic values obtained through the Wald test should be compared with the critical lower and upper bounds recommended by Pesaran, Smith, and Shin (2001). If the obtained F-statistic values are below the lower threshold level, it indicates that there is no cointegration relationship. If the value falls between the lower and upper bounds, no conclusion can be drawn. However, if the F-statistic value exceeds the upper bound, it suggests the presence of a cointegration relationship.

Table 6: Boundary Test Results

	f stat.	**k**	**Critical Values**					
			Lower Bound			**Upper Bound**		
			10%	**5%**	**1%**	**10%**	**5%**	**1%**
Model 1	1,198	2	2,63	2,79	3,2	3,35	3,67	5
Model 2	7,887	3	2,63	2,79	3,2	3,35	3,67	5
Model 3	6,186 ***	2	2,63	2,79	3,2	3,35	3,67	5
J Modeli	9,178***	2	2,63	2,79	3,2	3,35	3,87	5

Note: ***, denotes significance at the 1% level.

According to the boundary test results presented in Table 6, the presence of a cointegrating relationship has been detected in all models except Model 1. Therefore, no long- or short-term forecasts will be made for Model 1. This is because attempting long-term analysis with series where cointegration cannot be detected may lead to the problem of spurious regression. The breakpoints obtained from the breakpoint unit root test analysis, with the 2008 crisis date and the year 2020 representing the pandemic period, are significant. In this context, these dates will be added to the analysis as dummy variables.

4.2. Analysis of the Marshall-Lerner Condition

In this section of the analysis, the Marshall-Lerner condition will be analyzed using Model 2 and Model 3, where the presence of cointegration has been established. In this context, the model equations (14) and (15) can be followed for the long term. Since negative values cannot be used in the analysis of manufacturing industry foreign trade data, the export/import (X/M) ratios are taken into account.

Model 2

$$\mathrm{lnBT_t} = \varphi_0 + \sum_{r=1}^{m} \varphi_{1k} lnBT_{t-k} + \sum_{r=0}^{n} \varphi_{2k} lnREER_{t-k} + \sum_{k=0}^{p} \varphi_{3k} lnY_{t-k}^{D} + \sum_{k=0}^{q} \varphi_{4k} lnY_{t-k}^{T} + \varphi_1 lnBT_{t-1} + \varphi_2 lnREER_{t-1} + \varphi_3 lnY_{t-1}^{D} + \varphi_4 lnY_{t-1}^{T} + \varepsilon_t$$

(14)

Model 3

$$\mathrm{lnM_t} = \vartheta_0 + \sum_{r=1}^{m} \vartheta_{1k} lnM_{t-k} + \sum_{r=0}^{n} \vartheta_{2k} lnREER_{t-k} + \sum_{k=0}^{p} \vartheta_{3k} lnY_{t-k}^{D} + \sum_{k=0}^{q} \vartheta_{4k} lnY_{t-k}^{T} + \vartheta_1 lnM_{t-1} + \vartheta_2 lnREER_{t-1} + \vartheta_3 lnY_{t-1}^{D} + \vartheta_4 lnY_{t-1}^{T} + \varepsilon_t$$

(15)

The theoretical expectation from the models is that an increase in the real effective exchange rate (a decrease in the nominal exchange rate) is expected to increase imports and hinder exports. While an increase in foreign national income is expected to boost exports and positively contribute to the trade balance, an increase in domestic national income is expected to increase imports and deteriorate the trade balance. In the short-term analysis, a decrease in the real effective exchange rate due to a drop in the national currency's foreign purchasing power is expected to positively affect countries' trade balances, indicating that the Marshall-Lerner condition is met. For the J Curve to be applicable, the Marshall-Lerner condition must hold in the long term, and in the short-term analysis, the decrease in the real effective exchange rate due to a decline in the national currency's foreign purchasing power should negatively affect countries' trade balances in the short term, during the process of price, supply, and demand readjustment.

Table 7: Long-Term Forecast Results for Model 2

Variable	Coefficient	t stat.	probability
$lnREER$	-017*	-0,55	0,01
lnY^D	0,49**	0,76	0,03
lnY^T	-0,20**	-0,23	0,04
$DUMMY_{2008}$	0,15**	0,69	0,00
$DUMMY_{2020}$	0,16**	0,80	0,03
c	0,80	0,39	0,67
R^2:0,89	$\overline{R^2}$:0,80	F:11,00(0,00)	DW:2,12

According to Table 7, R^2 represents the explanatory power of the model, where the value of 0.85 is close to 1, indicating a strong explanatory power of the model. The presence of autocorrelation in the model has been investigated using the Durbin-Watson test, and no autocorrelation issue has been detected. Additionally, the probability value of 0.01 (less than 0.05) from the F-test result indicates that the dependent variable is collectively explained at a significant level.

Based on the results in Table 7, an increase in the real effective exchange rate (a decrease in the nominal exchange rate) in China is expected to have a negative impact on foreign trade. In this context, the obtained results are in line with theoretical expectations, where a one-unit increase in the real effective exchange rate will decrease foreign trade by 0.17 units. An increase of one unit in world GDP is expected to increase China's foreign trade by 0.49 units, which is also consistent with theoretical expectations. However, the negative impact of domestic income growth on the trade balance is consistent with the thesis of growing economies running current account deficits.

Looking at the dummy variables, it is understood that foreign trade was positively affected during the recovery following the 2008 global crisis and the 2019 pandemic period. Based on the long-term results obtained, the Marshall-Lerner condition is satisfied due to the detrimental effect of an increase in the real effective exchange rate (a decrease in the nominal exchange rate) on the trade balance.

Table 7: Long-Term Forecast Results for Model 2

Variable	Coefficient	t stat.	probability
$lnREER$	-018**	-1,21	0,01
lnY^D	0,36**	0,51	0,01
lnY^T	-0,16*	-0,32	0,02
$DUMMY_{2008}$	0,17*	0,76	0,00
$DUMMY_{2020}$	0,21*	0,70	0,00
ECT_{t-1}	-0,40*	-2,22	0,01
R^2:0,85	$\overline{R^2}$:0,81	F:19,134(0,01)	DW:1,96

The short-term results in Table 8 exhibit parallelism with the long-term results. It is expected that the error correction coefficient (ECT), which indicates how quickly short-term imbalances will reach long-term equilibrium, takes a negative value between 0 and 1. The attained value of 0.33 suggests that long-term equilibrium will be reached with a lag of 3 periods.

While increases in the real effective exchange rate negatively and significantly affect the trade balance in the short term, increases in GDP in other countries have a negative impact, whereas increases in domestic GDP have a positive impact. No issues were encountered in diagnostic tests of the model. Due to the fulfillment of the Marshall-Lerner condition in Model 2, there is no need for the analysis of Model 3. Therefore, the analysis proceeds to the J Hypothesis in this context.

4.3. J Curve Hypothesis Analysis

In this section of the study, due to the varying degrees of stationarity of the variables involved in the J Curve Hypothesis, ARDL analysis will be employed following the justifications outlined in the Marshall-Lerner analysis. The model equation (16) can be observed.

$$(\frac{X}{M})_t = \beta_0 + \sum_{i=1}^{m} \beta_{1i} (\frac{x}{m})_{t-1} + \sum_{i=0}^{p} \beta_{2i} REER_{t-1} + \sum_{i=0}^{q} \beta_{3i} GDP_{t-1} + \alpha_1 \left(\frac{X}{M}\right)_{t-1} + \alpha_2 REER_{t-1} + \alpha_3 REER_{t-1} + \varepsilon_i$$

(16)

For determining the lag lengths m, p, and q followed in equation (16) for the boundary test analysis, Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Hannan Quinn Information Criterion (HQ), and Final Prediction Error (FPE) will be utilized. Since the boundary test results in Table 5 indicate the presence of a co-integrating relationship, long-term forecasting will be carried out with equation (17).

$$\Delta(\frac{X}{M})_t = \beta_0 + \sum_{i=1}^{m} \beta_{1i} (\frac{x}{m})_{t-1} + \sum_{i=0}^{p} \beta_{2i} \Delta REER_{t-1} + \sum_{i=0}^{q} \beta_{3i} \Delta GDP_{t-1} + \varepsilon_i \quad (17)$$

The long-term forecast results estimated with equation (17) can be observed in Table 9.

Table 9: Long-Term Forecast Results for the J Curve Hypothesis (Dependent Variable X/M)

Variable	**Coefficient**	**t stat.**	**probability**
$lnREER$	-0,17*	-1,06	0,00
GDP	-0,36**	0,66	0,00
C	1,16	0,21	0,46

Based on the long-term ARDL forecast results presented in Table 9, it is evident that even slight fluctuations in the real effective exchange rate (representing a decrease in the nominal exchange rate) can exert a notable impact on the manufacturing industry's net exports (X/M). Specifically, a mere 1% change in the real effective exchange rate is associated with a reduction of manufacturing industry net exports by 0.17%. Notably, this effect is statistically significant, underscoring the importance of exchange rate dynamics in shaping trade outcomes over the long term. Furthermore, the analysis reveals that variations in GDP per capita values also play a significant role in influencing manufacturing industry net exports. A 1% change in GDP per capita values is associated with a decrease of 0.36% in manufacturing industry net exports over the long term, highlighting the intricate interplay between economic growth and trade dynamics. It is noteworthy that these findings underscore the multifaceted nature of factors influencing trade outcomes, necessitating a nuanced approach to policy formulation and economic management. Additionally, equation (18) provides insights into the short-term dynamics captured by the model, offering valuable guidance for policymakers and stakeholders seeking to understand the immediate implications of economic variables on manufacturing industry net exports.

$$\Delta(\tfrac{X}{M})_t = \beta_0 + \textstyle\sum_{i=1}^{m} \beta_{1i} (\tfrac{x}{m})_{t-1} + \sum_{i=0}^{p} \beta_{2i} REER_{t-1} + \sum_{i=0}^{q} \beta_{3i} GDP_{t-1} + ECT_{t-1} + \varepsilon_i \quad (18)$$

Equation (18) determined short-term coefficients can be observed in Table 10.

Table 10: Short-Term Forecast Results for the J Curve Hypothesis (Dependent Variable X/M)

Variable	**Coefficient**	**t stat.**	**probability**
$lnREER$	-0,21*	-1,00	0,02
GDP	-0,49**	0,56	0,01
ECT(-1)	1,21	0,20	0,36

If an increase in the nominal exchange rate, leading to a decrease in the country's currency value (a decrease in the real effective exchange rate), adversely affects the balance of trade in the short term, then it will be decided that the J Curve Theory is applicable. The short-term results obtained are supportive of the long-term results, and the noteworthy point is that the short-term impact of

GDP per capita and an increase in the real effective exchange rate is stronger in the short term. This result indicates the existence of the J Curve. Diagnostic tests for the models used can be observed in Table 11.

Table 11: Diagnostic Tests for Each Model

Diagnostic Tests	**M-L Conditions (Model 2)**	**J Hypothesis**
R^2	0.824	0.866
Adjustes R^2	0.887	0.891
F stat.	361.819(0.000)	531,333(0.000)
Breusch-Godfrey	1.432 (0.238)	1.568(0.208)
ARCH LM Test	0.155 (0.666)	0.199 (0.133)
Jarque – Bera	1.421(0.156)	1.412(0.281)
Ramsey Reset	2.120 (0.311)	2.217(0.121)

The diagnostic tests conducted for Model 2 (M-L Conditions) and J Hypothesis provide valuable insights into the reliability and effectiveness of the regression analysis. Firstly, the R-squared (R^2) values indicate that approximately 82.4% and 86.6% of the variation in the dependent variable is explained by the independent variables for Model 2 and J Hypothesis, respectively. Additionally, the adjusted R-squared (Adjusted R^2) values, which consider the number of predictors in the model, are 0.887 for Model 2 and 0.891 for J Hypothesis, suggesting a good fit. Both models also exhibit statistically significant F-statistics (361.819 with p-value of 0.000 for Model 2 and 531.333 with p-value of 0.000 for J Hypothesis), indicating that the overall regression models are robust. Moreover, tests for autocorrelation (Breusch-Godfrey Test), ARCH effects, normality of residuals (Jarque-Bera Test), and misspecification (Ramsey Reset Test) all yield non-significant results, further supporting the reliability of the models. Overall, the diagnostic tests confirm the soundness of both Model 2 and J Hypothesis in capturing the relationship between the variables under study.

Conclusion

The devaluation of a national currency against foreign currencies traditionally implies a decrease in the value of domestically produced goods for foreign markets, rendering exports more competitively priced, while simultaneously raising the cost of imported goods. However, empirical evidence suggests that this theoretical expectation does not universally hold true. In economies where the J Curve hypothesis applies, an initial currency depreciation tends to have a negative impact on exports and a positive impact on imports in the short term.

Despite the overarching goal of achieving higher income and bolstering welfare levels through the liberalization of foreign trade to foster economic growth, it is important to acknowledge that the benefits of free trade are not always guaranteed. Persistent trade deficits and current account deficits can arise when a country's imports surpass its exports, posing significant macroeconomic challenges. Therefore, regular analysis of the determinants and sustainability of countries' foreign trade balances is crucial, accompanied by the formulation of appropriate policy recommendations when necessary. In the context of China, the econometric analysis of this study underscores the significance of meeting the Marshall-Lerner condition, suggesting that exchange rate adjustments can serve as vital policy instruments for regulating trade balance dynamics. Furthermore, the validity of the J Curve Hypothesis indicates the presence of a enduring relationship between trade balance and exchange rates, particularly in addressing the chronic issue of the current account deficit within the Chinese economy. This implies that a national currency depreciation could enhance China's competitiveness and positively contribute to financing the current account deficit over the long term. While short-term effects of currency depreciation may initially impact the trade balance negatively, the overall trajectory is expected to shift to a positive outlook in the long run.

It is anticipated that the findings of this study can provide valuable insights into the analysis of the effects of exchange rate policies on countries' foreign trade competitiveness, offering guidance for nations seeking viable solutions to economic challenges.

Considering the findings from this study, it is recommended that policymakers carefully consider the implications of exchange rate policies on trade dynamics, especially in economies facing persistent current account deficits. Here are some suggestions to enhance the effectiveness of policy interventions: To effectively address trade imbalances and promote sustainable economic growth, it is crucial to implement comprehensive strategies that encompass various aspects of exchange rate management and trade policy. Below are expanded and elaborated versions of the policy recommendations provided:

• Continuous Monitoring of Exchange Rate Movements: It is imperative to maintain vigilant oversight of exchange rate fluctuations and their implications for trade balances. By conducting regular and thorough assessments of exchange rate dynamics, policymakers can proactively identify potential imbalances and take corrective actions in a timely manner. This involves not only tracking the nominal exchange rates but also considering the real effective exchange rates to capture the broader impact on competitiveness.

• Implementation of Targeted Exchange Rate Policies: Policymakers should explore the adoption of targeted exchange rate policies tailored to address specific trade balance challenges. This could involve the implementation of managed exchange rate regimes, where authorities actively intervene in currency markets to stabilize exchange rates and mitigate undue fluctuations that could adversely affect trade balances. Additionally, deploying currency interventions or imposing capital controls may be considered as part of a broader toolkit to manage exchange rate volatility.

• Promotion of Export Diversification: Encouraging export diversification is essential to reduce reliance on a narrow range of export products or trading partners. Policymakers should facilitate initiatives aimed at expanding export markets and product offerings, thereby enhancing resilience to exchange rate fluctuations. This could involve providing incentives for exporters to explore new markets, facilitating access to trade finance, and investing in trade promotion activities.

• Enhancement of Trade Competitiveness: Investing in initiatives to enhance trade competitiveness is paramount for sustaining export growth and improving trade balances. This encompasses a multifaceted approach, including infrastructure development, trade facilitation measures, and investments in education and skills development. By bolstering the competitiveness of domestic industries, policymakers can mitigate the adverse effects of currency depreciation on export performance and promote a more resilient export sector.

• Promotion of Domestic Production: Policymakers should prioritize policies that support domestic production and innovation to reduce reliance on imported goods and enhance import substitution. This involves fostering an enabling environment for domestic industries through targeted incentives, research and development support, and infrastructure investments. By promoting import substitution industries, policymakers can strengthen domestic value chains, reduce import dependency, and improve the trade balance over the long term.

• Coordination of Policy Responses: Given the interconnected nature of global trade, fostering international cooperation and coordination is essential for addressing systemic trade imbalances. Policymakers should engage in multilateral forums and bilateral dialogues to foster collaboration on trade-related issues, including exchange rate management and trade policy coordination. By working together, countries can mitigate the risks of trade conflicts, promote open and fair-trade practices, and contribute to sustainable economic growth and development on a global scale. By implementing these suggestions, policymakers can better navigate the complex interplay between exchange rates and trade balances, ultimately contributing to more stable and resilient economies.

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