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# IMPACT OF EXCHANGE RATE ON FOREIGN TRADE VOLUME

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**Abstract:** This study examines the impact of exchange rates on foreign trade volume for seven well-developed European countries during the period of 2009–2019. To investigate the relationships, regression analyses were conducted using Ordinary Least Squares (OLS) and Autoregressive Distributed Lag (ARDL) methods with STATA-14 software. Empirical evidence from trade between the USA and Germany during 1965–1975 indicates that exchange rate uncertainty significantly impacts prices but does not have a notable effect on trade volume. Usually, logarithmic transformations are utilized to simplify statistical analysis, enhance interpretability, and mitigate potential problems. As international trade continues to grow, regulatory practices that might restrict trade are also increasing. One such obstacle is exchange rate volatility, which directly and indirectly affects trade activities. Exchange rate fluctuations can impact trade relations and a country's trade balance. One finding of this study is that changes in monetary policy can significantly affect trade activities, particularly in the long-term perspective. Typically, the effect on exports appears promptly, while import levels respond over a longer duration. The research also analyzes the relationship with inflation.

**Keywords:** Exchange rate, trade, COVID-19 pandemic, OLS method, Ramsey Reset test, Breusch-Pagan test.

## 1. Introduction.

Exchange rate fluctuations are directly influenced by monetary policy and governmental actions. The recent example is the COVID-19 pandemic, which significantly increased government intervention across economic and social sectors. The higher the number of confirmed cases, the more stringent governmental responses become, which significantly impacts exchange rate volatility. Conversely, economic policies undertaken during the pandemic, such as fiscal measures, income support, and aid packages, tend to mitigate exchange rate volatility (Feng, Yang, Gong, and Chang, 2021)[1].

Currently, many factors affect international trade, including tariffs, various trade policies, and government actions aimed at stimulating national investments and trade. Economic unions such as the European Union seek to enhance international trade by liberalizing capital flows and reducing restrictions and taxes among member states. However, capital exchange rates also considerably impact this issue. The exchange rate is strongly related to competitive financial markets and international trade. This can have both negative and positive effects, but creating conditions that support competitiveness is essential (Toderascu and Firtescu, 2018)[2].

The exchange rate is defined as the price of one country's currency expressed in another country's currency[3]. There are flexible (floating) and fixed types of exchange rates. In currency trading practices, currency is sold at a higher exchange rate (selling rate) and bought at a lower rate (buying rate). The difference between these two rates constitutes the revenue banks generate from currency trading. Officially increasing the exchange rate (revaluation) encourages capital outflows from the country and facilitates imports by making foreign currencies cheaper. Official depreciation (devaluation) typically arises when a country experiences significant deterioration

in its trade and balance of payments and depletion of currency reserves. Uzbekistan's Central Bank regularly publishes foreign currency exchange rates against the Uzbek sum each week, considering money supply and inflation dynamics for accounting and customs duties[4]. As of April 21, 2024, the official exchange rate of 1 USD to Uzbek sum was 12,697 sums[5]. In Uzbekistan, foreign currencies, primarily USD, can currently be bought or sold in 31 banks, except TBC Bank and Apelsin Bank[6].

General wisdom and uncertainty can hinder trade; however, we argue that uncertainty might enhance trade in a simple general equilibrium model with information frictions. Increased uncertainty in equilibrium boosts the average profit differential obtained from foreign trade. This suggests that trade can either increase or decrease due to uncertainty, depending on preferences. Under general conditions, we characterize the significance of these forces using statistical approaches. Trade, in part, generates value by offering mechanisms for risk distribution, with optimal risk sharing achieved when neither party has complete information[7].

Theoretical impacts of exchange rate risk on equilibrium prices and quantities are analyzed using differential models representing risk on both the import demand and export supply sides[8]. Empirical evidence from the trade between the USA and Germany during 1965–1975 shows that exchange rate uncertainty significantly affects prices but not trade volume. This price effect supports previous survey results regarding currency denominations in export contracts, indicating that most trade occurs in the exporter's currency, with some exceptions in U.S. imports.

## 2. **Methodology.**

Generally, logarithmic transformations are utilized in statistical analyses to simplify, streamline, and prevent potential issues. An advantage of analyzing logarithmic values is that changes can be easily interpreted as percentages. Therefore, using logarithmic values from World Bank statistical data is considered appropriate.

$$trade_{it} = \beta_0 + \beta_1 \times exchange_{it} + u_{it}$$

Variables introduced into the model include trade volume, representing business activity. This indicator is presented in the World Bank database for each country during the observed years. The variable's STATA command name is "lnt" (log of trade), chosen for ease of use and clarity in STATA results. Trade is the main dependent variable in the model.

Exchange rate ("lne") is considered as an explanatory variable influencing business activity. Exchange rates from the World Bank database are used.

Descriptive statistics of these variables are provided in Table 1.

Table 1. Descriptive statistics of variables

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| savdo | 77 | 4.258 | .489 | 3.194 | 5.091 |
| kurs | 44 | 4.532 | .103 | 4.24 | 4.668 |

To assess normality and distribution characteristics of data sets, histograms were generated and compared with normal distribution curves.

Tashqi savdo uchun sarflangan mablag`lar o`rtacha qiymati 4.258, standart deviasiya esa 0.103ni tashkil qiladi.

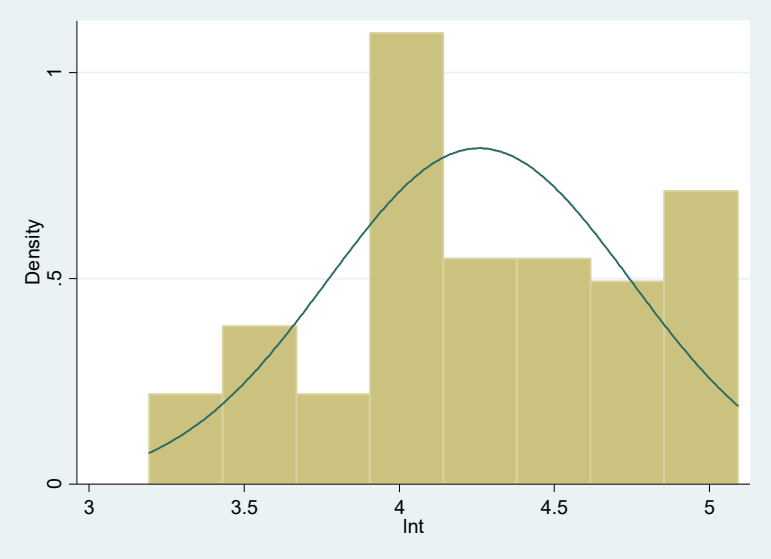

Diagram 1. Normality of trade indicators

Scatter plots demonstrate initial assumptions about economic relationships between primary indicators.

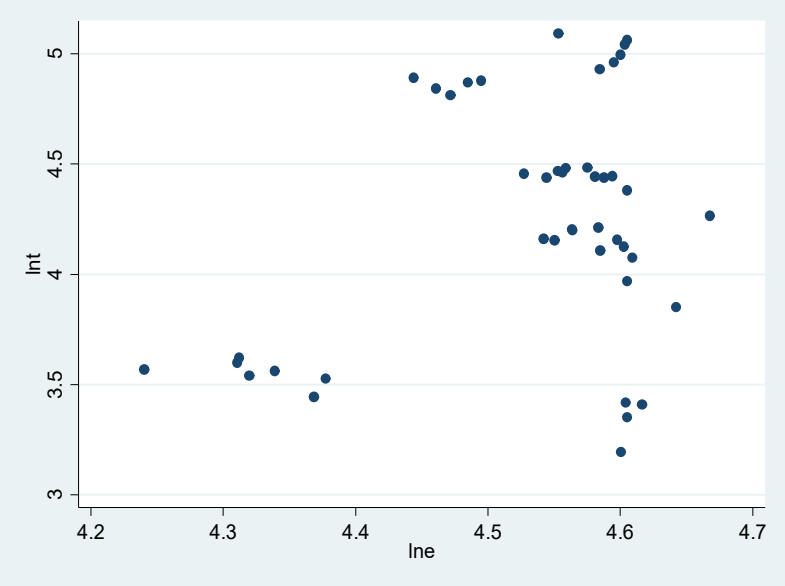

Diagram 2. Impact of Exchange Rate on Foreign Trade Volume.

According to correlation analysis, a positive economic relationship exists between trade and exchange rates, with a correlation coefficient of 0.322.
Table 2. Correlation matrix of variables

| Variables | (1) | (2) |
|---|---|---|
| (1) lnt | 1.000 | |
| (2) lne | 0.322 | 1.000 |

3. **Results:**
In the regression model, there is a single independent variable (random variable), and attention is given to its indicators. Regression analysis results are:

- F-value of the model is 14.719, significant at Prob>F = 0.000, indicating a statistically significant relationship.
- Exchange rate ("lne") coefficient is 1.279, significant (p=0.047).
- Constant value (cons) is not significant (p=0.361).

Table 3. OLS linear regression results

| lnt | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| lne | 1.279 | .624 | 2.05 | .047 | .018 | 2.54 | ** |
| L | -1.136 | .241 | -4.71 | 0 | -1.624 | -.648 | *** |
| Constant | 2.864 | 3.097 | 0.92 | .361 | -3.395 | 9.123 | |

| | | | |
|---|---|---|---|
| Mean dependent var | 4.221 | SD dependent var | 0.538 |
| R-squared | 0.424 | Number of obs | 43 |
| F-test | 14.719 | Prob > F | 0.000 |
| Akaike crit. (AIC) | 49.944 | Bayesian crit. (BIC) | 55.227 |

*** *p*<.01, ** *p*<.05, * *p*<.1

These results indicate that a one-unit increase in the exchange rate brings about a benefit of 1.279 units for foreign trade. Ensuring the absence of heteroscedasticity issues in the model is critically important; therefore, the Breusch-Pagan heteroscedasticity tests were conducted.

Table 4. Breusch-Godfrey Autocorrelation Test

| Number of gaps in sample: 21<br>Breusch-Godfrey LM test for autocorrelation<br>chi2 | df | Prob>Chi2 |
|---|---|---|
| 1.697 | 1 | 0.193 |

Breusch-Godfrey test indicates autocorrelation in the case of p-value of the test being smaller than 0.05. The p-value of our case, which is 0.193, indicates no autocorrelation. This implies that the model goes to having BLUE coefficients.

Table 5. Ramsey's RESET Test

Ramsey RESET test using powers of the fitted values of lnt
Ho: model has no omitted variables
F(3, 37) = 2.40
Prob > F = 0.0834

The Ramsey's RESET test was conducted to assess the presence of omitted variables in the model. According to the test results, no omitted variables were detected in our model. The results were shown in Table 5, indicating that the probability value exceeded 0.05.

Table 6. Breusch-Pagan Test for Heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
Variables: fitted values of lnt
chi2(1) = 0.69
Prob > chi2 = 0.4046

To verify the abscence of heteroscedasticity issues in the model, the Breusch-Pagan test was performed. According to the results obtained, the model is free from heteroscedasticity problems (Table 6).

## 4. Xulosa.

This research investigates the impact of the exchange rate on foreign trade volume for well-developed countries such as Malaysia, Thailand, Turkey, Spain, Germany, French Polynesia, and Japan over the period of 2009–2019. To examine these relationships, regression analysis was conducted using the Ordinary Least Squares (OLS) method in the STATA-14 software.

Over the past decades, numerous empirical studies have been conducted on various theoretical bases. These studies have shown that exchange rate volatility can have positive, negative, or no effect at all on international trade volume. Furthermore, studies typically analyze the influence of both the level and volatility of the exchange rate on trade using either a single equation or a set of equations. Results differ significantly depending on various factors, including the period under consideration, the measurement of volatility, and whether the effects were examined over the short-term or long-term, as well as whether the analysis was conducted at the aggregate, sectoral, or product level.

Additionally, research focusing on various sectors indicates that trade in certain products responds positively to exchange rate fluctuations, while others show negative responses, highlighting that the specific impact is highly dependent on the composition of exported and imported goods. In summary, the literature on this topic reveals that many studies find negative impacts of exchange rate fluctuations on trade, while others find no significant impact at all. It has also been observed that, in the long term, specific sectors such as agricultural exports are negatively impacted by exchange rate volatility. Furthermore, short-term studies have found that exchange rate fluctuations significantly affect both exports and imports.

Overall, the impact of exchange rate volatility can vary across different industrial and business sectors, as these sectors differ substantially in terms of their trade policies and levels of market concentration.

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