CMIS 567 - 73C, Data Analytics

Spring 1, 2025

Factors Affecting Trade Balance Across Countries 1974 - 2023

Submitted to:  
Prof. Dr. Joseph Vithayathil

Submitted by:  
Baniya, Lipika

**Table of Contents**

[*Executive Summary 3*](#_heading=h.gjdgxs)

[*1. Introduction 3*](#_heading=h.30j0zll)

[*2. Research Background 3*](#_heading=h.1fob9te)

[*3. Data and Methodology 3*](#_heading=h.3znysh7)

[*4. Data Analysis and Findings 3*](#_heading=h.2et92p0)

[*5. Limitations 3*](#_heading=h.tyjcwt)

[6.](#_heading=h.3dy6vkm)Conclusions and Recommendations *4*

# Executive Summary

Import and export are associated with a country's exchange rate, inflation, and interest rates. On the other hand, an increasing trade deficit and rising imports are negatively associated with a country's exchange rate. The Government has an economic function in a market economy when the benefits of a government policy outweigh the costs, such as providing for national defense, addressing environmental problems, protecting property rights, and making markets more competitive. Keeping the economy stable. The data analysis looks at five variables as factors that potentially affect trade balance in countries. The variables analyzed are the Gross value added at basic prices (GVA), Official Exchange Rate, Inflation (consumer price), Foreign direct investment, net inflows (% of GDP), Foreign direct investment, net outflows (% of GDP). To understand and improve trade balance, one must first grasp the relationship between trade (import and export) and other economic factors.

# Introduction

# Research Background

# Data and Methodology This section explains sample data, development of research questions, hypotheses, and methodology.

* 1. Sample Data

For this analysis, I decided to use a World Bank dataset with pre-existing data. A "World Bank dataset" refers to a collection of economic and social data compiled by the World Bank. I decided to download the countries from three categories lower-middle-income countries, upper-middle-income countries, and high-income countries) which have been pre categorized by World Development Indicator. After that, I chose the dependent variables trade balance (import-export), and a few independent variables that are relevant to conducting the analysis. In order to understand the data at minute level I decide to create pivot tables to find countries with the most number of missing values. Countries with missing values that is not enough for data modeling: UAE, Vietnam, Ghana, Lebanon, Nepal,

|  |  |
| --- | --- |
| **Categories** | **Countries** |
| Lower Middle-Income Countries | Bangladesh, India, Pakistan, Vietnam, Philippines, Ghana, Lebanon Nepal |
| Upper Middle-Income Countries | Argentina, Belgium, Costa Rica, Malaysia, Thailand, Indonesia, Brazil, Turkiye, Mexico |
| High-Income Countries | United States, United Kingdom, United Arab Emirates, France, Canada, Australia, Singapore, Japan |

|  |  |
| --- | --- |
| **Variable Name** | **Definition** |
| Exchange Rate (LCU per US$, period average) | The official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar). |
| Imports of goods and services (constant LCU) | Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments. Data are in constant local currency. |
| Exports of goods and services (constant LCU) | Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments. Data are in constant local currency. |
| Inflation, consumer prices (annual %) | Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. |
| Foreign direct investment, net inflows (% of GDP) | FDI, net inflows refer to the total amount of foreign direct investment (FDI) coming into a country from foreign investors |
| Foreign direct investment, net outflows (% of GDP) | "FDI net outflow" represents the total amount of FDI leaving a country, meaning investments made by residents of that country in foreign economies; |
| Trade Balance | The trade balance of a country is the difference between exports and imports of goods and services. It tells us whether a country is making more money from selling to other countries (exports) or spending more on buying from other countries (imports).  Trade Balance=Exports−Imports |

* 1. Hypothesis

1. What is the impact of exchange rate fluctuations on the total imports and exports of lower-income, lower-middle-income, and upper-middle-income countries? – Panel Discussion Regression

*Hypothesis 1 (H1A):* Exchange rate fluctuations positively impact the trade balance (TB) i.e. currency depreciation leads to net exports.

*Hypothesis 2 (H1B):* Exchange rate fluctuations negatively impact the trade balance i.e. currency depreciation leads to a decrease in net exports.  
  
*Null Hypothesis (H0A):* Exchange rate fluctuations have no significant impact on trade balance.  
  
*TBit​ = β0​ + β1​ERit​+β2​INFit ​+ β3​FDIit ​+ β4​GVAit ​+ αi​ + ϵit​  
Where:*

* *TBit = Trade Balance (Exports - Imports) for country iii at time ttt*
* *ERit = Exchange Rate (LCU per USD)*
* *INFit = Inflation (annual %)*
* *FDIit = Foreign Direct Investment (% of GDP)*
* *GVAit = Gross Value Added (proxy for economic activity)*
* *αi ​ = Country fixed effects*
* *ϵit = Error term*

1. Which independent variable ( inflation, FDI) has the most significant impact on trade in lower-income, lower-middle-income, and upper-middle-income countries?   
   *Hypothesis 1 (H2A):* GVA has the most significant impact on trade.  
   *Hypothesis 2 (H2B):* Exchange rate fluctuations have the most significant impact on trade.

*Hypothesis 3 (H2C):* Inflation has the most significant impact on trade.

*Hypothesis 4 (H2D):* Foreign direct investment (FDI) has the most significant impact on trade.

*Null Hypothesis (H0B):* None of these variables have a statistically significant impact on trade.  
  
*TBit​ = β0​ + β1​ERit​+β2​INFit ​+ β3​FDIit ​+ β4​GVAit ​+ αi​ + ϵit​  
Where:*

* *TBit = Trade Balance (Exports - Imports) for country iii at time ttt*
* *ERit = Exchange Rate (LCU per USD)*
* *INFit = Inflation (annual %)*
* *FDIit = Foreign Direct Investment (% of GDP)*
* *GVAit = Gross Value Added (proxy for economic activity)*
* *αi ​ = Country fixed effects*
* *ϵit = Error term*

Noes – remove GVA, assumption – inflation (same worldwide) 1998 inflation different than 2000 inflation year ko basis ma inflataion linu paryo, exchange rate should be country level check yyear bt yeat as well, null value based on past values. FDI country level aggregation. Country by country difference inflation and also check global inflation if vastly different country level. Excisting countries pattern based on that null values are filled. Box plot , histogram (most unlikely),trend through scatter plot or line plot check trend each country.  
Low income – trend – separate avaerage  
middle income -trend – separate average   
  
Specific year data average , average year of other countries, check ouliers if many take median   
Outlier detection mechanism   
  
Data exploration   
Which income group has the most trading?

Which year had the most and the least total trading flows?

Which countries exported more than they imported?  
regarding echange rate, Indonesia has high exchange rate because it is set up that way its not an outlier it just has high numerical exchange rates because of their lower value relative to the US dollar.

* 1. Scatter Plot
  2. Methodology

# Data Analysis and Findings

* 1. Descriptive Statistics
  2. Correlation Results
  3. Regression Results

# Limitations

# Conclusions and Recommendations

# Appendix