FACTORS AFFECTING FDI IN SINGAPORE

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DECLARATION

We are hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgment has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

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LIST OF ABBREVIATIONS

ADF	Augmented-Dickey Fuller
AFTA	ASEAN Free Trade Area
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
ASEAN	Association of Southeast Asian Nations
BRI	Belt and Road Initiative
CCI	Strategic Connectivity
CSFTA	China-Singapore Free Trade Agreement
CV	Critical Value
DTTs	Double Taxation Treaties
ECT	Error Correction Term
EU	European Union
EXR	Exchange Rate
FDI	Foreign Direct Investment
FGLS	Feasible Generalized Least Squares
FTA	Free Trade Agreement
GDP	Gross Domestic Product
IDP	Investment Development Path

IMF	International Monetary Fund
INF	Inflation
LCU	Local Currency Units
MNC	Multinational Corporation
MPA	Maritime and Port Authority
MTI	Ministry of Trade and Industry Singapore
MYR	Malaysian Ringgit
NIIP	Net International Investment Position
OLI	Eclectic Paradigm
OLS	Ordinary Least Squares
OPEC	Organization of the Petroleum Exporting Countries
PP	Phillips-Perron
PTA	Preferential Trade Agreement
SE	Standard Error
SGD	Singapore Dollar
SIC/SC	Schwarz Information Criterion
TRADE	Trade Openness
US	United States
USA	United States of America
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

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ABSRACT

The aim of the study is to investigate the relationship between the foreign direct investment (FDI) and the inflation rate, trade openness, economic growth and exchange rate. In this research, the secondary data was being collected from World Bank and the period being used was 1985 to 1969. First Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test was carried out to examine the stationarity of the data. Following that, Johansen Methodology is used to determine the cointegration of the model and to examine the long-run equilibrium relationship of the variables. Then, the Vector Error Correction Model (VECM) and Granger Causality test was carried out in this research. The result shown that the all the factors does not granger cause the FDI. However, FDI so show Granger causality to some of the factors such as economic growth and trade. Meanwhile, we use macroeconomics variables in this research and the result shown that FDI does not granger cause the macroeconomic variables.

CHAPTER 1: INTRODUCTION

1.1 Background of studies

Foreign Direct Investment (FDI) refers to a participation of a country in another country in the terms of management, joint-venture, and transfer of technology and expertise. According to International Monetary Fund (IMF), FDI is being explained as "The acquisition of at least ten percent of the ordinary shares or voting power in a public or private enterprise by non-resident investors. Direct investment involves a lasting interest in the management of an enterprise and includes reinvestment of profits". FDI had brought a great effect on globalization in the way of increasing international trade. With the help of FDI, it enhances the interactions among the world. In this circumstance, it has effectively expanded the international flows of portfolio direct investment and international trade. Faster economic growth can be achieved through trade and investment. Since the 1980s, FDI around the world had increased sharply, and at the same time, it enhances the transferring of technologies and the efficiency of production and sales internationally had increased. The significance of FDI had gradually increased after the financial crisis and Singapore had taken an important place in the development of the economies of the world.

Singapore with a small country with only 728.6 square kilometers. Singapore's FDI inflow is very significant. Singapore is one of the countries that has the most stable economy, its economy is supported mainly by the exports of manufacturing and machinery, financial services, tourism, and the world's busiest cargo seaport. The manufacturing sector in Singapore is the largest industry that contributed twenty to twenty-five percent of the country's annual GDP. Apart from that, the financial services

industry grows rapidly in Singapore as well. In Singapore, there are over 200 banks and regional hubs located there and under it is because Singapore has a business-friendly environment together with its stability of politics. Apart from that, Singapore has the strength to attract FDI due to its rapid economic growth. Economic growth in Singapore is considered a great success. In the 1990s Singapore is ranked as the greatest exporter of merchandise and also ranked as the thirteenth in commercial service export. The great success of economic growth in Singapore is mainly due to its large accumulated physical infrastructure and extensive human capital. The strategic location of Singapore as a great port is also one of the reasons that drive the economic growth. According to the world bank, Singapore had promptly grown after the country's independence, which it has developed from a low-income country to a high-income country. In the first 25 years after the country independent, its GDP growth had achieved 9.2%. Following that, Singapore's GDP growth had also reached the world's highest with an average of 7.7%.

On the other hand, FDI in Singapore has been affected by the Free Trade Agreement implemented by Singapore's government. Singapore's economy is relying on the trading of goods and services and the free trade agreement made trade and investment in Singapore and the partner countries easier. There is strong evidence that showed that the Free Trade Agreement of Singapore brings advantages to the businesses by enhancing market access in terms of the abolishment of customs duties, a better approach to service sectors, and also the limiting technical and on-tariff barriers. The achievement of Singapore's FDI inflows in the 1990s was also partly related to the policy by ASEAN which promoted the establishment of ASEAN as a Free Trade Area and ASEAN Investment Area. Under this circumstance, Singapore together with other ASEAN countries applied trade liberalization and deregulation initiatives had attracted the FDI inflows to their greatest extent. According to the Ministry of Trade and Industry Singapore (MTI), Singapore also implemented the Free Trade Agreement (FTA) with European Union (EU). Singapore was the first country in ASEAN that implemented Free Trade Agreement with European Union. Apart from that, Singapore also applied FTA in several other countries such as China, Korea, Peru, Australia, Turkey, and

United States. In general, FTAs implemented by Singapore have benefitted Singapore and also the partner countries. It can be shown by Singapore had successfully boosted the exports of the goods made in Singapore by enhancing the competitive advantage of Singapore's exported goods and also bringing advantages to the consumer in the partner countries as they pay lesser tariffs.

FDI in Singapore has impacted the national GDP in many ways and one of the many factors is FDI inflow into the country can effectively reduce the unemployment rate of the country and also boost the production of goods and services which will further lead to the upsurge of tax collection, increase in investment and also enhance the exportation. Singapore's economy had once experienced a high level of unemployment due to the country's limited natural resources. Hence, by implementing an open economy with trade openness, it had successfully attracted FDI. In fact, from 1965 to 1973 Singapore has successfully grown its economy and hold inflation of Singapore below the world average by attracting FDI from Japan and USA. Alongside that, Singapore has been received the most FDI in ASEAN and the fifth greatest recipient of FDI in the world. This is because Singapore has propounded incentives exclusively to attract FDI. The FDI that has been attracted to the country has contributed to the in the form of development of human capital by encouraging modern technology and FDI also contributed to technological changes. Singapore also continuously invested in human capital, which has become the most strategic capital in Singapore. Although the human resource strategy has not directly impacted the nation's economy or even GDP, it worked along with the economic and national strategy of Singapore that further impacted the country's economic growth.

Furthermore, China's huge trade surplus and also active engagement in the external economy together with the rapidly growing economy is leading China to the world's largest economy. Hence, the trade relationship between China and Singapore has significantly affected the FDI in Singapore. Singapore and China had applied the two ways of investment and trade which is bilateral trade. The investment from Singapore to China had started in the early 1990s and the investment from China to Singapore

started in the 2000s. In short, the investment from China to Singapore had mainly directed to the service-related industry such as financial intermediations, the commerce sector, the transport sector, and also the communication sector. Besides, the bilateral trading relationship between Singapore and China was enhanced through the implementation of the China and Singapore Free Trade Agreement (CSFTA) on the 28th of October 2008. Economic cooperation had benefitted both nations in terms of the development of bilateral trade. In this case, the free tariff for a total of 97.1% of Singapore's exports to China, whereas China's exports to Singapore experienced a free tariff. Under CSFTA, it improved the market access for Singapore, at some time improved the protection for investors, and also shortened the procedures at the customs.

Besides, a strong exchange rate of the Singapore dollar is important in terms of affecting the FDI in Singapore. When the nation's currency has a relatively strong exchange rate, it will cause the FDI inflow to decline. When the exchange rate depreciates, it will contribute to FDI as it lowers the cost of domestic assets to foreign investors. According to the Monetary Authority of Singapore, the exchange rate of Singapore is being mange in a floating regime which means under a policy band, the currency is allowed to fluctuate, and the band enables the accommodation of short-term fluctuations in the foreign exchange market and also supported the flexibility of management of exchange rate. However, Singapore is having a relatively strong currency which means that the country has low inflation and also a low-interest rate. The exchange rate of the Singapore dollar to the US dollar can be considered stable as it has a predictable pattern. As the inflation rate in Singapore is low in the reason of its strong economic base of Singapore, the exchange rate in Singapore is considered relatively stable.

1.2 Problem Statement

In general, developing countries required a larger source of FDI than developed countries to expand development opportunities such as technology transfer and job creation. However, Singapore, a developed country, has been receiving greater FDI than developing countries in Southeast Asia such as Indonesia and Vietnam. Singapore remains attractive to foreign investors because of its free-trade philosophy, diversified economy, and stable economic condition.

Singapore is a country with no restrictions on foreign ownership of business except for national security reasons and areas. It also highly encourages international trade and FDI in the economy (International Trade Administration, 2020). This shows that Singapore has high trade liberalization. As evidence, Singapore has forged over 26 FTAs including bilateral and regional agreements with 15 countries as of 9 April 2021. Besides, Singapore also diversifies its economy by expanding its network of FTAs to provide the companies with greater market accessibility.

On 23rd October 2008, Singapore and China signed CSFTA that eliminates tariffs of 95% on exports to China (Enterprise Singapore, 2022). The year after CSFTA was established, FDI rebounds to 12.07% of GDP after a sharp drop in 2008. It shows that the free trade philosophy could attract a higher inflow of FDI. Establishing strong trade relations with different countries made Singapore an ideal country for foreign investors to expand their business in Southeast Asia.

However, Singapore is a country highly dependent on the exports sector due to its high trade openness. In other words, the stability of Singapore's economy is dependent on other countries' economies. The main products of its exports are machinery, electronics, and pharmaceuticals. A decrease in export volume has a significant impact on its economic growth as well. For example, US-China Trade War that led to the global electronics sector downturn has significantly affected Singapore's export activity. This is because Singapore has forged FTA with both China and US. The strong trade relationship between countries leads the GDP growth of Singapore to drop further.

Moreover, the Dot-com bubble in 2001 brings Singapore's growth to collapse due to declining global electronics demand and a slowdown in the US economy. Furthermore, the 2008 financial crisis caused a contraction in Singapore's GDP growth, but the country managed to recover its economy in the following years. Unlike the previous contraction, Singapore's economy experiences its slowest rebound in 2019 due to the COVID-19 outbreak that disrupts the global economy. The pandemic pushes Singapore into its lowest GDP growth since 2010 which is only 1.345%. However, Singapore gains a higher FDI inflow in 2019 and peaked at USD120.44 billion (32.17% of GDP).

Other than that, the economic growth of a country affects the flows of FDI as it reflects the economic performance. Singapore has the highest level of GDP per capita among ASEAN countries. The level of GDP per capita measures the prosperity of a nation by economic growth per person. The GDP per capita indicates that citizens in Singapore are having a higher standard of living and purchasing power. Although GDP per capita does not seem to affect FDI directly in Singapore, it is often affecting other factors such as education and workforce capability.

A higher level of GDP per capita leads to higher enrolment and produces a better quality of human capital in a country. A country with well-educated and skilled labor is more attractive as it creates greater chances of achieving the company's goals. Overall, GDP per capita in Singapore is showing an increasing trend, school enrolment at the tertiary level has increased gradually, and the unemployment rate is low and stable from 2010 to 2019. However, the level of FDI fluctuates over the period.

Moreover, the exchange rate of SGD may be a determinant of FDI in Singapore. This is because appreciation in currency may discourage FDI as it cost higher for investing. Singapore has a stronger currency than its neighboring country, Malaysia. A strong currency may not attract FDI directly, but it cost cheaper to bring in more foreign talents to their country. When MYR depreciates, SGD becomes favorable for Malaysian workers.

When a greater number of foreign skilled labor is imported into the nation, foreign investors may be attracted if the currency is stable. This is because when SGD against USD appreciates, it cost higher on-demand for 1SGD. In 2019, SGD depreciates slightly from 1.349 to 1.364 against USD. Whereas the total foreign workforce increased gradually from 2017 until 2019. However, FDI does not show a similar trend but fluctuates during the same period.

Lastly, macroeconomic stability is another determinant of FDI inflow. A low and stable inflation rate, for instance, tends to attract higher FDI inflow as it generates a stable return for investors. In 2019, Singapore's inflation rate falls below zero which is -0.624%. A sudden deflation increases the value of currency and purchasing power. However, continuous price drops may lead the firms to lay off workers to reduce the costs of production and maintain profit. Consequently, the unemployment rate increases and weakens the economic condition. This situation discourages FDI as investments may not be able to generate a favorable return for the investors. Although Singapore is experiencing deflation, the FDI inflows move in an unexpected direction.

1.3 Research Questions

There are several questions in this research. Besides, the questions are classified into two categories which are the main research questions and specific research questions. The questions were developed based on the variable of research on the theoretical framework.

1.3.1 Main Research Question

1. What are the factors that affect the FDI in Singapore?

1.3.2 Specific Research Questions

1. How does the inflation impact the FDI in Singapore?
2. How does the trade openness affect FDI in Singapore?
3. How does the economic growth influence the FDI in Singapore?
4. How does the exchange rate affect the FDI in Singapore?

1.4 Research Objectives

According to Tejvan Pettinger (2019), Foreign Direct Investment (FDI) illustrate that companies purchase capital and invest in a foreign country. For instance, Nike as a US multinational company built a factory for making trainers in China, it can be described as a foreign direct investment. In this research, we examine factors including exchange rate, inflation, economic growth as well as trade openness that affect FDI in Singapore. The objectives were developed based on the research questions above. This is due to the reason that, both research questions and research objectives must be in line to get the final result of this research. The research objectives are classified into two categories which include main research objectives and specific research objectives.

1.4.1 Main Research Objectives

1. To identify the factors that affect the FDI in Singapore.

1.4.2 Specific Research Objectives

1. To examine whether there is a positive relationship between exchange rate and FDI in Singapore.
2. To determine whether there is a positive relationship between inflation and FDI in Singapore.
3. To examine whether there is a positive relationship between economic growth and FDI in Singapore.
4. To determine whether there is a positive relationship between trade openness and FDI in Singapore.

1.5 Significance of Study

In this study, we are focusing on finding the driving factors that affect the Foreign Direct Investment (FDI) of Singapore. Therefore, we have listed a few factors that might affect the FDI of Singapore and determined their relationship with FDI as our dependent variable. These factors include exchange rate, inflation rate, economic growth, and trade openness. The main reason for this study is due to the FDI of the country does help in economic growth and improving their GDP which assists a country to develop itself. The significance of this study will help individuals to understand the significance of these factors in affecting the FDI of a country. Moreover, the foreigners might be interested in the studies on Singapore as it could boost the economic growth of both countries. Hence, it might help in creating an opportunity to build a new trading relationship between countries. Furthermore, the investors might have a better understanding of the economic condition of Singapore after the studies. It helps them in making better decisions to maximize their profits.

In our research, we mainly focus on Singapore because we realized that most of the studies are focused on other Asian countries, or they focus on ASEAN countries. For

instance, in this study factors influencing ASEAN FDI and the policy implications. They analyzed the characteristics of ASEAN FDI by using the knowledge capital model and eclectic theory (Jeong, H. G., Lee, B., Pek, J.P., 2018). Other than that, factors affecting foreign direct investment in 10 ASEAN countries 2015-2018 with a fixed-effect model approach on panel data regression (Ramdan, M., Purwanto, A., Saifuddin, M. P., 2020) They used a panel data regression model to model the effect of explanatory variables on dependant variable by adopting the fixed effect model approach. We found a study that focuses on Singapore, the determinants of foreign direct investment (FDI) in Singapore. In this study, they use the OLS method (Pondicherry, H., Tan, P. H.P., 2017). However, our variables are not fully aligned with theirs as they have the interest rate, trade liberalization, and ARDL time series which does not include in our studies. Hence, we will adopt the Granger Causality test to distinguish the causal relationship between the FDI of Singapore with the four independent variables. Moreover, we also adopted Johansen methodology to explain the long run cointegrated relationship between the four independent variables and the dependent variable.

1.6 Structure of the Study

Chapter 1: Introduction

The first chapter is introductory, it provides an overview of the selected topic which is the factors that affect FDI in Singapore. Besides, it briefly explains the relationship between the independent variables which include exchange rate, inflation, economic growth, and trade openness, and dependent variables which is FDI in Singapore. It also provides the research background, the explanation of the problem statement, the designed research question, the research objectives to be achieved as well as the significance of the study.

Chapter 2: Literature Review

The second chapter is about the literature review which is the basis for those hypotheses based on the journals and articles done by researchers. It provides a comprehensive overview of the relationship between the independent variables which are exchange rate, inflation, economic growth, and trade openness, and dependent variables on FDI in Singapore. Therefore, a clear and logical statement will be made in this literature review. The literature review will include some supporting information resources which will cover related theories and models, past studies, theoretical frameworks, hypothesis developments, and gaps in the literature review.

Chapter 3: Methodology

The third chapter is about the research methodology that describes how the research is conducted and the specific procedures or techniques used to analyze information about the relationship between the independent variables which are exchange rate, inflation, economic growth and trade openness, and dependent variables of FDI in Singapore. The main purpose is to choose the best approach that suits the research objectives. This chapter will introduce research design, data collection methods, sampling design, research instrument, and data collection techniques.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, we will construct a literature review on Foreign Direct Investment with the exchange rate, economic growth, inflation, and trade openness. The relevant theories will be listed to study the variables. All the undergoes empirical studies are to explain the relationship between the FDI with the variables. Besides, the data collection method applied is secondary data. Other than that, a hypothesis test will be carried out to examine the relationship between the dependant and independent variables. Then, the gap in this literature review will be mentioned at the end of chapter 2.

2.1 Relevant Theory

2.1.1 Investment Development Path (IDP) theory

This theory is introduced by John H. Dunning in 1981 which act as the proactive stance for his Eclectic paradigm (OLI) model in 1958. He developed the IDP concept to examine the relationship between the FDI and the economic development of a country. In his framework, a country will undergo five investment evolution stages. These stages are correlated with the stock of inward and outward FDI in a country. Then, the net international investment position (NIIP) of a country is developed based on the varies of value in the FDI of the country.

For the information, the inward FDI is defined as the inflow of investment capital by a foreign entity or country on the investment of the local economy. Outward FDI is the opposite meaning of inward FDI which referring the outflow of investment capital by a local entity or country on the investment of a foreign economy (Chen, 2021). Thus, NIIP can be understood as the difference between inward FDI and outward FDI. It shows the disparity between foreign assets owned by a local country and local assets owned by a foreign country (Ganti, 2021).

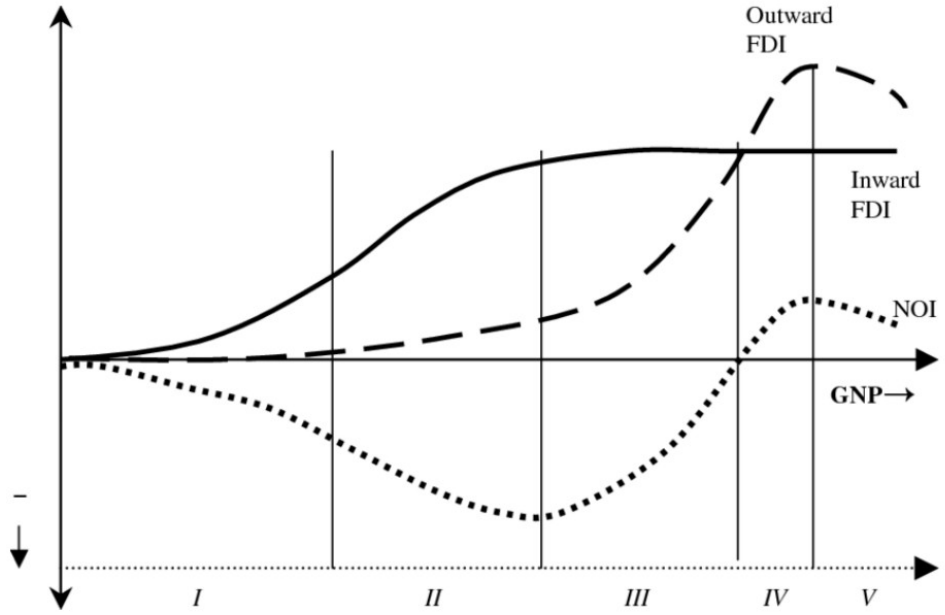

Figure 2.1. Five stages of investment development of a country (Only for illustrative purpose). Adapted from Narula, R. and Dunning, J. H. (2010). *Multinational enterprises, development and globalization, some clarifications, and a research agenda*. Oxford Development Studies, 38(3), p. 265.

Dunning explained that the variation in the volume of FDI in a country is driven by the ownership advantage of local firms in the country. However, economic growth is

associated with the ownership advantage of domestic firms. The locational advantage is not obvious in a low economic development country, ceteris paribus (Narula & Dunning, 2010). On the other hand, more firms are likely to develop and have a larger ownership advantage when their country started the economic development growth. This can be explained by factors such as the technology has improved, the market size increased and the labor force is more well-trained.

Hence, as the economic growth increase (GDP increases), local firms are more like to have a larger ownership advantage to increase their productivity. Investors are now attracted and increase the investment capital in the local firm causing the investment increase. When the FDI inflows increases, domestic firms have more assets resulting from the FDI inflows will increase their investment in a foreign country. This will lead to the FDI outflow to rise as well, vice versa. Hence, the FDI (inward FDI & Outward FDI) will increase throughout of investment development stages, and the result in the NIIP will follow to increase as well.

2.1.2 Imperfect Capital Market Approach

This approach is adopted to distinguish the relationship between exchange rate and FDI when the capital market is restricted by imperfect information. This occurrence of imperfect information in the market will lead to external financing being more costly compared to internal financing. Then, the wealth turns into the main factor that drives the dynamics of the demand for FDI. This is due to the decline in the exchange rate of

a country will cause their currency to weaken and the cost is now relatively lower for the foreign investor.

The mechanism between exchange rate and FDI is when a currency started to weaken, its value will depreciate. Foreign investors will increase their capital outflow on the FDI of the country. This is because the currency is now relatively cheaper and thus, they will invest more and leading to the FDI of the country with a weak currency increasing. Now, they showed a diagram to prove the correlation between exchange rates and the FDI of a country.

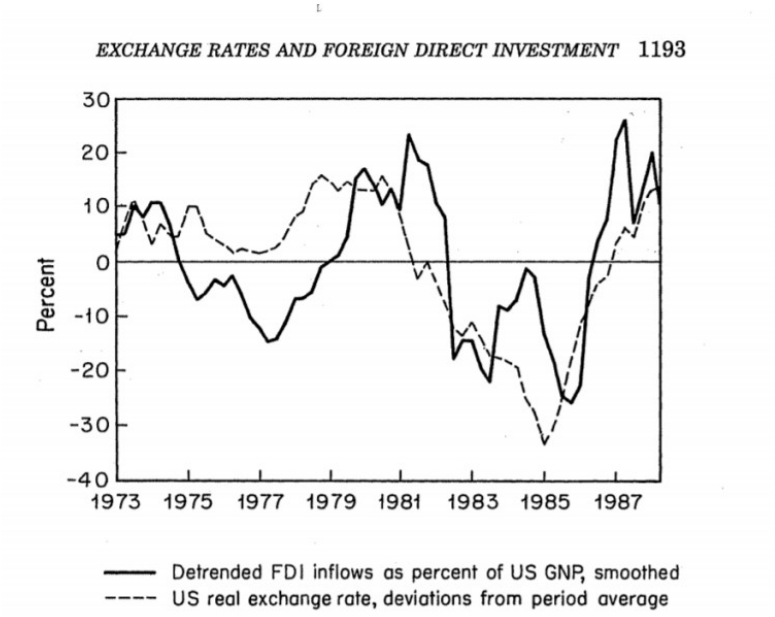

Figure 2.2. US FDI Inflow and the Real Exchange rate. Adapted from Froot, Kenneth, A., and Jeremy, C. S. (1991). *Exchange Rates and Foreign Direct Investment: An Imperfect Capital Market Approach*. Quarterly Journal of Economics 106 (Nov.): 1191-1217.

The diagram shown indicates the real exchange rates and FDI of the US from 1973 to 1987. It shows the negative relationship between the real exchange rate and FDI as the real exchange rate decrease, the FDI of the US increase, vice versa. Then, they did a simple statistical test to justify their observation and they concluded that the imperfect information is the factor that driving the result. However, they mentioned that there is an exception where a passive investment portfolio is not that "information-intensive" compare to normal stocks and bonds. Hence, they are less likely to be affected by the exchange rate. On the other hand, asymmetric information is highly significant with those direct investments.

Then, more evidence was searched to support the theory. They found out that the wealth positions of investors caused by the effect of the exchange rate are more notable compared to the other shocks. Supposed the past studies mentioned that profits of firms are vital as they act as investment fund by increasing their wealth. They found out that the standard deviation (risk) of net return of US manufacturers was only 2.3% per year. However, the standard deviation of the real exchange rate (dollar) was 13.5% high annually. This happened during the period from 1974 to 1986. Hence, they had further verified that the effect of exchange rate shocks on the wealth of both domestic and foreign firms is much larger than the effect of profitability shocks (Froot, Kenneth. A, Jeremy. C. S, 1991).

2.2 Empirical Review

2.2.1 Exchange Rate (EXR) and Foreign Direct Investment

Foreign Direct Investment (FDI) is defined as a sort of global monetary flow that permit a parent company or multinational corporation (MNC) to exert control over subsidiaries in foreign countries. Exchange rate, which also defined as the local currency price of a foreign currency, is significant for both of their own magnitude and volatility. Moreover, both sum of the foreign direct investment amount and the distribution of the investment expenditure among nations are affected by the exchange rate. The inflow of the FDI in 2019 had grew from $79 billion to $92 billion compared to the previous year. Parallelly, the stock of FDI was around $1.7 trillion. Nonetheless, there was a drop of 42% in global foreign direct investment in 2020. To further illustrate, Singapore was the 5th country with most FDI inflows in the world, after the United States, China, Netherlands, and Hong Kong. The FDI activities respond based on the behavior of currency rates.

The situation of currency depreciation occurs when the value drops compared to the other currency value, the FDI might face two possible consequences. Lower production cost of a country and lower wages in the country compared to the foreign competitors. Assuming the factors hold constant, the locational advantage of a country or its desirability as a location could receive a more productive capacity investment. To further illustrate, by this ‘relative wage’ channel, the foreigners are having a higher overall rate of return on their foreign investment during the depreciation of exchange rate of a country (Linda Goldberg, 2020).

The impacts on FDI by the exchange rate level are dependent on several fundamental considerations. First, the impact of the “relative wage” channel is lighter if there is

predicted exchange rate swings. This is due to the risk-adjusted expected rates of return across nation has been equalized by the interest rate parity conditions, the expected movement of the exchange rate might lead to higher financing cost of the investment project. According to this theory, the consequences of FDI getting stronger from exchange rate swings, happen when it was unanticipated and not the case accounted for the estimated costs of FDI financing project. Second, the fluctuation of the exchange rate must be bind to the changes in cost of production between countries and it was supposing not followed with an equally increasing wages and cost of production in the market for capital investment (Blonigen Bruce, 1997).

According to Aizenman (1992), there is an argument about the empirical relevance of the interest-parity proviso by the experts on the effects of exchange rate changes on foreign direct investment dispute the. Opposingly, it is suggested that the rate of return on-investment projects are dependent on capital market structure across countries due to flawed consideration of the capital market, causing. An additional compensation is required to pay back the lenders for the MNC that borrow globally to fund their overseas initiatives to meet the comparatively high expenses of monitoring their investments abroad in this situation. A point is mentioned by Froot and Stein where the imperfection of capital market exists which causes the lenders do not have precise information on their overseas investments.

Besides, a depreciation of the market destination currency increases the relative wealth of agents' source country, a situation where the destination market assets acquisitions might occur. A devaluation of the destination currency raises the relative wealth position of source country investors will increase, leading the relative cost of capital drops, causing the source country agents are now holding more of wealth in their currency-denominated form because of the value declining destination currency. Consequently, the competition between investors is more aggressive in other countries (Goldberg, Linda & Kolstad, 2005).

To further explain the significance of FDI activities exchange rate levels, volatility of exchange rates is important as well. The volatility effects can be diversified into two categories theoretically, such as "production flexibility" and "risk aversion." In consideration of the production system branches where the commitment of producers is necessary in the investment capital to both local and global capacity prior the acknowledgement of the absolute cost of production and particular commodities amount to be ordered from them in the future. Upon the exchange rates and the demand status are known, the producer is to commit to actual levels of employment and the production site. According to Aizenman (1992), he claimed that the exchange rate fluctuation which will affects the foreign investment is determined by capacity sunk costs. (i.e. the extent of investment irreversibility), the competitive structure of the industry, and the general convexity of the profit function in prices. The possible favorable price volatility on profits consequences is inconspicuous when the productive structure is under constant rather than manipulated factors. Higher volatility is more related to the ex-ante of FDI, while higher possibility for capacity surplus and production moving ex-post with the observed exchange rates based on the production flexibility arguments. The production flexibility arguments key assumption is where the producers can modify their utilization of factors when a stochastic input into profits is realized.

Despite theory mentioned that the total overseas investment portion increases when exchange rate volatility is stronger, but it does not imply that exchange rate fluctuation had tone down the local investment activities. According to Goldberg (2013), more research in which rising domestic outflows is not offset by increasing international inflows are to be found to prove that the domestic aggregate investment is dropping. In summary, the volatility of the exchange rate did not had a significant conflicting effect on the investment in the Singapore economy.

According to Michael Klein (2020), a strong exchange rate matters in attracting FDI in Singapore. FDI is predicated on the impacts of exogenous changes in real exchange rates on FDI flows, and it represents a partial equilibrium approach. Distinct forms of

disruptions may cause different relationships between FDI and currency rates, as detailed below. The influence of exchange rate fluctuations on price of asset and domestic cost of labor and capital has garnered the most attention among the hypothesized linkages between the real exchange rate and FDI. The currency depreciation stimulates the FDI by decreasing the domestic assets cost to the foreign investors. If there is a temporary real terms depreciation (as it might be possible for nominal depreciation expected to flow rapidly into local factors and output prices), land and acquisitions of other existing assets are more likely to happen in FDI as the foreigners always intend to take advantage of price bargaining in terms of currency. A more stable depreciations in real terms normally will raise the weight of greenfield investment by cutting the cost of factor, since the cheaper domestic labor are preferable. It might be relatively simpler for foreign enterprises to employ internal finance, cutting the related investing cost, by raising their relative wealth with the exchange rate conversion. As a result, the relative wealth of foreign businesses to domestic firms will increase due to the depreciation of the exchange rate.

As such, the current understanding suggests that the volatility of the exchange rate can help in industrial activity globalization without dampening domestic economic environment. The actual exchange rate swings can also influence FDI through the relative wage channels, relative wealth channels, and imperfect capital market reasoning. In other words, the exchange rate is positively correlated to FDI in Singapore.

2.2.2 Economic Growth (GDP) and Foreign Direct Investment

According to Simionescu's (2016) research, GDP and FDI have a positive and bidirectional relationship. Higher GDP, according to the study, would attract increasingly far-flung international investors. Chowdhury and Mavrotas (2015) applied the Toda-Yamamoto approach to test the causality relationship between FDI and GDP in Singapore. To illustrate, in December 2020, Singapore's Foreign Direct Investment

(FDI) grew by 24.7 percent of its nominal GDP and 23.2 percent in the preceding quarter. The data on Singapore Foreign Direct Investment in percentage of nominal GDP is updated quarterly and is available from March 1995 to December 2020. The calculation of Foreign Direct Investment as a percentage of Nominal GDP is based on CEIC using quarterly Foreign Direct Investment and quarterly Nominal GDP. The data of Foreign Direct Investment in local currency is provided by the Department of Statistics while Nominal GDP in local currency is provided by the Ministry of Trade and Industry. In March 1999, the data peaked at 43.3 percent, and in June 2003, it hit a new low of -11.1 percent. These empirical studies have shown that GDP and FDI have a positive relationship in Singapore. (Mohammad and Zulkornain, 2009)

According to Lin, Lee & Yang (2011), the factors of technical advancement are not well characterized, even though it has a favorable impact on economic growth. FDI brings in advanced technology from other countries that will affect the amount of technological growth in the host country. In neoclassical analysis, long-run economic growth takes capital accumulation, labor, and technological innovation into account. The prediction is that economies will converge to their steady-state equilibrium in the long run. In addition, the only way to achieve everlasting growth is through technological advancement.

According to Akalpler & Adil (2017), to see how FDI affects economic growth in the long run, the researchers used the Vector Error Correction Model to carry out the research for the period from 1980 to 2014. The findings reveal that there is insufficient evidence to prove gross savings, foreign direct investment, trade, and gross fixed capital development have a long-run relationship between each other. According to the findings, the factors do not granger cause another factor in the long run. Although gross fixed capital accumulation is favorably related to economic growth, these sets of factors (GDP and gross savings and FDI and international trade) are negatively correlated.

On top of that, Khan& Nawaz (2019) investigate the relationship between trade from the aspect of economic growth, FDI, and income distribution for the Commonwealth

of Independent States (CIS) in Singapore. FDI and trade both have a strong beneficial impact on income distribution, with trade having an inverted U-shaped curve. The data used in the study spans the years 1990 to 2016. The model is estimated using a system-generalized approach of moments. Exports from both developed and developing countries have statistically negligible results, whereas imports from advanced countries have a favorable link with income.

According to MPA Singapore (2022), the growing region of Singapore from the aspect of the strategic location of Singapore. Singapore is strategically located in the heart of Asia, at the crossroads of East-West commerce, and within a seven-hour flying radius of the burgeoning Asian market, allows enterprises to access the region's constantly increasing markets. Singapore acts as the linking hub that links Asia to the rest of the world and its position further solidifies with its broad access to regional and global markets. The unrivaled passenger and freight connections in Singapore is an efficient gateway to Asian markets. Singapore is also one of the most important marines and air freight transportation hubs in the world. Furthermore, Changi International Airport is the busiest port in the world as it has more than 6,500 weekly flights connecting it to 300 destinations in 70 countries. As one of Asia’s ancient commercial centers, Singapore has remarkable business, cultural, and linguistic ties to numerous Asian markets that make it an ideal site to serve the global business community in their growth in Asia. Furthermore, Singapore has a highly skilled workforce and openness to top global talent that make it more attractive.

According to Kindle-berger (1969), Foreign investment happens when a nation that is short on capital but has plenty of labor imports capital from another country that is short on capital but has plenty of labor. Foreign investment will continue until various countries' returns on capital are equalized. This, however, does not explain why the investment must be "direct" and involve a controlling stake in the company. To have access to high-return markets, simply obtaining securities that are, making a portfolio investment would suffice. The inefficiency of domestic private (capital) markets in converting capital inflows into productive resources, or the difficulty of transplanting

managerial know-how in a new nation, are two major grounds for investing to assume a controlling stake. FDI was primarily focused on market size and the aim to gain access to new markets to expand monopolistic control, penetrate strongly oligopolistic foreign markets, and react against or prevent foreign competitors from entering. This argument is supported by the fact that many multinational corporations are focused on acquiring top brands, notably in the food and consumer goods industries. Following that, research has focused on firm-specific benefits derived from economies of scale, multiplane economies, sophisticated technology, and product cycles, or marketing, and attributed to higher cost efficiency or product superiority. In the view of multinationals, direct expansion in a foreign country is found to be cheaper since many of their cost and product advantages are based on internal, indivisible assets like organizational and technological know-how.

In the viewpoint of Multinationals, it is found to be cheaper to expand directly in a foreign country since many of their cost and product advantages are based on internal, indivisible assets like organizational and technological know-how. This theory's predictions are supported by the substantial percentage of FDI in businesses where research and development and expertise are critical, such as pharmaceuticals and electronics. Finally, the requirement for vertical integration to provide manufacturing quality control has been discussed.

The Belt and Road Initiative (BRI) is a Chinese-proposed global development plan aimed at strengthening linkages along the 21st Century Maritime Silk Road and the Silk Road Economic Belt proposed by President Xi in 2013. It intends to facilitate the movement of products, capital, people, and ideas across Europe, Asia, and Africa through infrastructural development, linking an estimated 4.4 billion people in over 60 nations. The investments in countries along the Belt and Road from 2014 to 2017 were more than USD 60 billion (SGD 82.6 billion). As Singapore was one of the first countries to embrace the initiative, it receives one-third of all Chinese outbound investments to Belt and Road nations. The BRI's implementation necessitates physical infrastructure — roads, trains, ports, and aircraft – as well as a solid financial

framework. Singapore-based enterprises are well-positioned to assist these infrastructural upgrades as an international financial and economic center. Companies in Singapore may help with smart city systems, mixed-use parks, and urban planning. To guarantee that projects are long-term, bankable, and profitable to all stakeholders, Singapore's ecosystem of professional services provide experience in areas such as arbitration, mediation, financial and legal risk management, corporate structuring, and infrastructure project finance. Chinese businesses are gradually moving to international markets for their next phase of expansion after years of robust development fueled by the Chinese home market. Singapore enterprises are well-positioned to help Chinese companies expand into the area as they possess Southeast Asian experience and networks.

To further illustrate, GDP reflects the ability of a country in producing commodities as a whole, and it also measures the ability of a country in consuming commodities. The higher a country's GDP, the larger its market and its ability to produce and consumer,, the more appealing it is to the investors. This variable will be particularly appealing to FDI seeking new markets to develop its operations. (Chawla & Rohra, 2015). As such, economic growth is positively correlated to the FDI in Singapore.

2.2.3 Inflation (INF) and Foreign Direct Investment

Ordinary Least Squares (OLS) is the statistical technique used in this study, which uses data from time series spanning 1989 to 2019 to generate annual series data. According to the study's conclusions, inflation and FDI have a favorable balance. According to Ali, Mohamed & Zahir (2017), inflation has a positive relationship with FDI. Jadhav (2012) examined the effect of inflation in effectively attracting FDI into Singapore by using sample data for a period from 1989 to 2019. Inflation brings effect to FDI owing to the growing effect of FDI as a cheaper mechanism to trade abroad. In order to identify the significance, panel unit-root test, and multiple regression analysis is used. Correspondingly, inflation is shown by the result that it has a positive significant effect

on FDI in the reason that the likelihood value related to t-statistics of the coefficient is not categorized as alpha that is implemented by this study.

According to Hong and Bui (2014), between 1991 and 2009, six ASEAN countries including Singapore, Vietnam, Malaysia, Indonesia, and Thailand were taken into account in this study. . Using the Feasible Generalized Least Squares (FGLS) model, inflation had no statistically significant impact on FDI inflows. Inflation is a key factor to illustrate macroeconomic instability. Consequently, the higher of the inflation rate will have a negative relationship to the FDI inflows.

According to Siddiqui & Aumeboonsuke (2014), the FDI inflow of Singapore, Indonesia, and Thailand was significantly affected by FDI. To further illustrate, using regression analysis, it was shown that the dependent variable, FDI, showed a positive connection with inflation directly, implying that when the inflation rate grows, FDI is surging up as well. Furthermore, Kahai (2004) created an empirical model of FDI, researchers gathered data for 55 developing countries from 1998 to 2000. Low inflation, according to this study, has an optimistic and considerable impact on the inflow of FDI to developing countries. Nonetheless, to investigate the influence of inflation on FDI in developing countries, the gravity model was used. They discovered that FDI is only important and beneficial in nations with low inflation rates.

Furthermore, Wafure and Nuruden (2010) mentioned that in the Nigerian economy, inflation is favorably related to FDI, however, the outcomes shown are not statistically significant. Based on Nurcahyo, Nur'ainy, and Nawangsari (2015), a t-test was used to test the effect of inflation on FDI in Singapore with the sample period from 1989 to 2019. In short, inflation in Singapore does not affect FDI. Thus, investors do not take inflation rate into account when it comes to investment decisions.

2.2.4 Trade openness and Foreign Direct Investment

Changes in trade openness have varying effects on the entrance of FDI to an economy, depending on the desire to engage in FDI activities. (Dunning, 1993). The ratio of trade (import + export) to GDP is frequently used to examine the openness of the economy. This ratio is frequently used as a barometer of trade restrictions. When investments are market-driven, trade restrictions (and thus reduced openness) can have a favorable influence on FDI. Otherwise, multinational corporations that involve in export-oriented projects have a higher preference to locate in a free economy, that is , as the imperfections that come with higher protection in trade, and usually impose higher transaction costs in exportation. Because FDI in this group is less likely to be market-seeking, the researcher anticipated that openness and FDI have a positive connection. (Erdal and Tatoglu, 2002).

The empirical literature has often focused on the influence of trade openness on FDI. However, capital account openness is likely to have an impact on FDI. For example, constraints on currency convertibility, such as foreign exchange control legislation, are supposedly in place to prevent FDI. The capital account openness gauge, unlike trade openness, does not have easily available data. This is especially true for market-seeking FDI, as conventional and ineffective policies make it difficult for foreign companies to repatriate profits. According to Resmini (2020), the benefits of increased openness, as expected in sectors where international trade flows in intermediate and capital products are substantial, were observed in a study of manufacturing investment in Central and Eastern Europe. Besides, a drop in openness will cause an increment in horizontal FDI, on the other hand, potential investment can be obtained from preventing trade obstacles by establishing manufacturing facilities in other countries. On top of that, Singh and Jun (1995) also discovered the importance of export orientation in attracting FDI, as well as the link between increased trade and FDI flows.

According to Busse and Hefeker (2007), since the emergence of international trade between countries, there has been a relationship between trade openness and FDI inflows. When a country is actively involved in partnerships with other countries or free trade agreements (FTA), it will potentially attract foreign investors to conduct

business here. In order to attract foreign investors, the larger trade volume of the host country is preferable. This is because it indicates that the economy is more open which will lower the entry standards of outside participation. It boosts both goods exports and imports, and businesses can offer their products to the free trade partners of the host country, broadening their market reach. As a result, in order to gain higher inflow of FDI, a higher trade openness in a country is highly preferable.

Other research has found out that FDI has several drivers such as trade openness, investment climate (prior or past FDI behavior), and political factors (the researchers used democracy as a parameter in this study). Besides, The determinants from the perspective of the host nation, involves the currency union in use; membership in a preferential trade agreement (PTA) (to evaluate openness and collaboration in trade activities and also investments);the rate of productivity, the GDP growth which is also known as the economic growth, tax rate and market size. (Eicher, Helfman, & Lenkoski, 2012)

Besides, Singapore's strong trade relation with China matters in FDI in Singapore. To illustrate, there has been a definite underlying growth in inbound direct investment flows in many emerging economies over time. Examples include China, high potential returns driven by long-term shifts in productivity, capital account liberalization policies, and long-term swings in real exchange rates are likely to be driving such developments. During this time, China was the most important source of net FDI. Singapore and China have built strong bilateral economic connections since the 1900s. As a result, Singapore gained the greatest trading partner which is China in 2017, and simultaneously, Singapore was the top foreign investor in China, which Singapore had invested US$4.8 billion (S$6.6 billion) in China in 2017. Several recent collaborations that showed the joint economic ventures between the two countries have grown over time. The joint effort involved the China-Singapore (Chongqing) Demonstration Initiative on Strategic Connectivity (CCI) and the Belt and Road Initiative (BRI) With their great capabilities in infrastructure, professional services, and innovation, Singapore corporations can make a significant contribution to these endeavors. Since

the 1990s, Sino-Singapore economic connections have centered on commerce and banking. As our partnership progresses, more Singapore enterprises are moving into the Chinese services sector. Consequently, the rising need for a premium standard of living and enhanced facilities in China had significantly improved the Singapore enterprises such as education, environmental services, food and healthcare.

According to Pradhan (2010), Singapore's FDI inflow has been affected by the trade openness in the Singapore economy. Singapore's trade openness is a strong advantage to attract FDI inflow and Singapore has provided proactive policy to sustain economic growth. Before being overtaken by New Zealand in 2018, Singapore remained as a leading country from the initial release of the World Bank's Doing Business index in 2003. Singapore successfully remained in second place in 2020 as well. Singapore has several competitive advantages over other countries as a favorable investment location mainly because of its conducive lending conditions towards the international investors, undemanding structure of rules and regulations, provide tax benefits, high quality industrial real estate park, and also lack of corruption which can indicate political stability. With the assistance of efficient and low taxes payment, and also enforcing contracts, the country presented an exceptional regulatory regime. Singapore, enhanced the risk-based approach for inspections and investigations, and also provided a greater public access to soil information and also justified the building permit obtaining process, which can be concluded by the dealing with construction permits was made easier in 2019.

2.3 Conceptual Framework

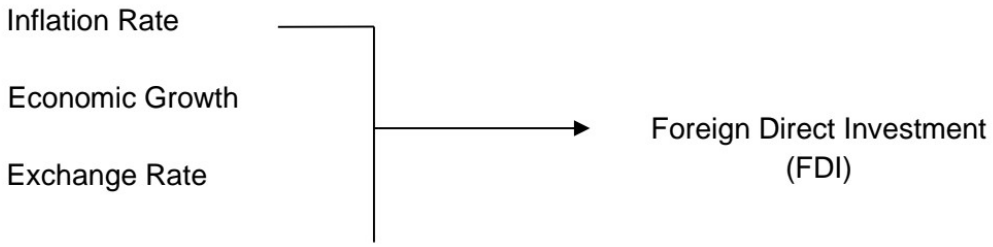

Figure 2.3: Conceptual Framework

Figure 2.3 shows the basic concept of our research. The objective of our research is to examine the relationship between Foreign Direct Investment (FDI) with inflation, exchange rate, economic growth, and trade openness.

2.4 Hypothesis Development

According to Veera, Chandran & Muhammad (2012), the term "hypothesis" refers to a conjectural relationship between two or more variables that has evident consequences for testing the stated relationships. Hypotheses are tentative predictions of predicted outcomes based on existing knowledge or a hunch that are articulated in such a way that the likelihood of the hypothesis can be accepted or rejected. Although it is possible to hypothesise that two variables have a substantial link, it is impossible to specify whether the relationship is positive or negative.

2.4.1 Hypothesis 1

H_1: There is positive relationship between Exchange Rate (EXR) and Foreign Direct Investment in Singapore.

2.4.2 Hypothesis 2

H_2: There is positive relationship between Economic Growth (GDP) and Foreign Direct Investment.

2.4.3 Hypothesis 3

H_3: There is no relationship between Inflation (INF) and Foreign Direct Investment in Singapore.

2.4.4 Hypothesis 4

H_4: There is positive relationship between Trade Openness and Foreign Direct Investment in Singapore.

The model below is used to examine the significance of Exchange Rate (EXR), Economic Growth (GDP), Inflation (INF) and Trade openness towards Singapore's Foreign Direct Investment.

$$\mathbf{Y = \beta_0 + \beta_1 X1 + \beta\ \beta_2 X2 + \beta_3 X3 + \beta_4 X4 + \mu.}$$

Where:

Y= Foreign Direct Investment in Singapore

X1= Exchange Rate (EXR)

X2= Economic Growth (GDP)

X3= Inflation (INF)

X4= Trade openness

Based on the previous studies, many researchers concluded that Exchange Rate, Economic Growth and Trade openness are positively correlated to FDI in Singapore. Whereases, Inflation has no effect on FDI in Singapore. The error term exists in this model showing that there might be indirect effects on the relation between FDI in Singapore. For instance, social issues, political issues, and others.

Therefore, we used hypothesis testing to examine the credibility of the model from the data sample for the purpose of making assumptions before doing further research. The null hypothesis (H_0) indicates that there is an insignificant relationship between all independent variables and FDI in Singapore. The alternative hypothesis (H_1) indicates that there is a significant relationship between all independent variables and FDI in Singapore. To further illustrate, there were **FOUR** independent variables to be tested, therefore, different independent variables will be represented as H_1, H_2, H_3 and H_4.

2.5 Gap of Literature Reviews

After evaluating all of the prior studies, various gaps may be identified to demonstrate the method's weaknesses. First, **lack of transparency** will be the first flaw that describes that because the review techniques aren't transparent. The ability to precisely reproduce the review technique is the basic rule of the scientific method, and the process used to generate the review should be transparent and documented in detail so that it can be repeated or confirmed. There is a possibility of bias if readers do not comprehend how to find, choose, and integrate research, or how to reject irrelevant research, and there is an unclear subjective consciousness that will affect the research's proper judgment. Furthermore, because problems may occur during execution, comments that cannot be replicated cannot be trusted. Non-replicable reviews cannot be modified or updated. Therefore, their history is restricted, and findings from many reviews on the same topic cannot be reconciled. According to Haddaway (2020), when we review literature, we may use journals that contain errors but cannot be updated, consequently, we will get the wrong information

Second, **lack of proper critical evaluation**. Some big studies are less credible than others due to methodological issues, which could lead to erroneous or biased results. Failure to appropriately analyze and explain the dependability of the included research can easily perpetuate these issues through synthesis, resulting in erroneous and biased findings. Furthermore, preliminary research may have issues with "internal validity," which refers to the method's accuracy. Confounding variables, lack of blindness,

failure to explain the existence of confounding variables, and a lack of trust, for example, all contribute to these issues. External validity difficulties may also affect comments, so the relevance of basic research and comment issues will vary, for example, when conducted in different spatial scopes. When reviewing the literature, for instance, we may make the error of selecting papers that are not as reliable as other literature. As a result, the literature review may provide us with inaccurate information.

The third gap is a **lack of relevancy**. A wide definition of stakeholders could serve as a foundation for a policy or practical decisions. (Haddaway, Dicks, Bethel, 2020). However, because stakeholder participation is constrained by the literature review, potential comments have little impact on decision-makers and so are irrelevant to our study. For instance, when we study variables that will affect FDI in Singapore, we may acquire irrelevant information from a sample of the population and as a result, they have no bearing on the mechanism's interpretation.

2.6 Conclusion

In a nutshell, several studies are conducted to determine the relationship of independent variables affecting the FDI. The conceptual framework shows the general idea of our research on the relationship between independent variables and FDI. Relevant theories and their theoretical framework to further explain their correlation. Empirical review and past studies from the researchers prove the relationship among

variables. Moreover, the hypothesis on the significance of their relationship has been conducted as well. Lastly, the gap in this literature has been mentioned. Further research on the correlation with each other will be carried out in the next chapter.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In this chapter, we focus on the methodology of the study. It includes research design, data description, data collection method, and the sources of data. The econometric model for the research is constructed to examine the relationship between the variables. Several tests were also applied to identify the effect of independent variables on the dependent variable. To test the stationarity and autocorrelation of the model, diagnostic checking has been applied.

3.1 Research Design

In this paper, the quantitative research method is adopted to conduct the study. The quantitative research method refers to the explanation of an issue or phenomenon by assembling numerical data and analyzing it by using mathematical methods (Aliaga & Gunderson, 2002).

3.2 Data Description and Collection Method

This paper focuses on investigating the factors affecting FDI in Singapore. There are 4 independent variables selected namely inflation, exchange rate, trade openness, and economic growth. The dependent variable for the study is FDI inflows. This study applies secondary data obtained from the World Bank. The sample period of the data is from 1985 to 2019. The net inflow of FDI is expressed in terms of US$ and trade openness is expressed in percentage of GDP, economic growth and inflation are expressed in annual percentage, and the exchange rate is expressed in LCU relative to US dollar.

3.3 Data Processing

Firstly, we collect the data for each variable from the World Bank. The data are reviewed and checked to ensure that the data obtained for 35 years are complete and correct. Secondly, the data is rearranged in Microsoft Excel and imported into the EViews software for analysis. Several tests are run with the aid of EViews to get empirical results. Lastly, the empirical results are analyzed and interpreted.

3.4 Source of Data

Table 3.1 Source and Measurement of Each Variable

Variables	Indicator Name	Unit Measurement	Source of Data
Foreign Direct Investment	FDI	Net inflow, BoP current US$	World Bank
Trade Openness	TRADE	Trade, percentage of GDP (%) (export-import per GDP)	World Bank

Economic Growth	EG	GDP per capita, current US$	World Bank
Inflation	INF	The GDP deflator, annual percentage (%)	World Bank
Exchange Rate	EXR	Official exchange rate, LCU relative to US dollar ($)	World Bank

3.5 Model Specification

The equation for this study is constructed to examine the factors affecting FDI in Singapore. The equation is specified as follows:

$$\widehat{FDI}_t = \beta_0 + \beta_1 TRADE_t + \beta_2 EG_t + \beta_3 INF_t + \beta_4 EXR_t + \mu_t$$

Where, $\widehat{FDI}_t$ denotes as foreign direct investment, $TRADE_t$ denotes as trade openness, EG_t denotes as economic growth, INF_t denotes as inflation, EXR_t denotes as exchange rate, μ_t denotes as the error term. In addition, t refers to the period of 1, 2, 3, …, 35.

3.6 Econometric Techniques

3.6.1 Unit root test

Unit root test examines the stationarity of the datasets. Stationarity is crucial because the data consist of uniform variance and mean over time, but if the data is non-stationary, the mean and variance will vary. This indicates that the data series have no long-run mean and further lead to a spurious time series and show no existence in the relationship between two variables. For instance, stationary data is important to avoid econometric problems such as affecting the t-statistic by the normality assumption in

the hypothesis testing. Thus, the Augmented Dickey-Fuller (ADF) test is used to examine the stationarity of the model and further apply Phillips-Perron (PP) unit root test to verify the stationarity of the model.

3.6.1.1 The Augmented Dickey-Fuller (ADF) Unit Root Test

The Augmented Dickey-Fuller test (ADF) is a formal test to examine stationarity in the model. ADF has an assumption that the model is normally distributed and the lag length is required to increase so that the impact of serial correlation can be reduced. If the lag length is too small, the error is serially correlated and will bias the test. On the other hand, if the lag length is too large, the test can lose power. ADF can also identify the problem of the unit root in the model. On the other hand, the ADF test also assumed that the error term is homoscedastic. The null hypothesis states that the time series has a unit root while the alternative hypothesis states the time series has no unit root. The decision rule is that we reject the null hypothesis if the p-value is lesser than the significance level of 1%, 5%, or 10%. Otherwise, we do not reject the null hypothesis and the data need to be transformed by using the difference method to achieve stationarity.

To conduct the test, a suitable lag length has to be chosen. Schwarz Information Criterion (SIC) and Akaike Information Criterion (AIC) can use to determine the suitable lag length. Both AIC and SIC are similar in the sense of the SIC and AIC are designed to choose a better model according to the lower value of SIC and AIC. However, the difference between AIC and SIC is that AIC can effectively deal with the model that has a relatively higher number of parameters and it can forecast better. However, for SIC, it can perform better than AIC in the sense of it can deal with a larger range of the statistical problem, and the sample size grows to infinity, it increases the probability to choose a more accurate model that leads to a more parsimonious model.

3.6.1.2 The Phillips-Perron (PP) Unit Root Test

PP test is also a unit root test that has become popular in time series analysis. The main difference between ADF and PP tests is PP test ignores serial correlation in the test regression and the error term is assumed to be heteroscedasticity. In addition, the PP test does not have to specify a lag length for the test regression. As with the ADF test, in the PP test, the null hypothesis is not rejected if the p-value is greater than the significance level. ADF and PP unit root test is different when it comes to correlation in the regression. ADF test power will have a problem when the AR order is specified wrongly and it will lead to the misapplication of ADF. PP test can avoid such problems and it can also avoid the determining of lag length for unit root checking. However, the PP test is relatively less powerful than ADF, as ADF can directly show the correct AR order of the variable with the help of E-views software. Hence, both tests are being used as ADF is used to examine the presence of unit root and the PP test is for double-checking.

3.6.2 The Johansen Methodology

The Johansen Methodology is used to determine the cointegration of the model and to examine the long-run equilibrium relationship of the variables. Cointegration is that certain linear transformations of the time series may be stationary even though the multivariate time series is integrated. Among the integrated variables, Johansen Methodology proposes that the time series variables will not move far away from the other variables. The Johansen methodology is dependent on the vector autoregressive (VAR) models. The Vector Autoregression (VAR) model is a means of conducting the test as it explains past and causal relationships among multiple variables over time and predicts future observations. The application of the Johansen Methodology can avoid the occurrence of spurious regression. The spurious regression will occur because the

variance of the error is not steadily estimated. This will cause the errors to be correlated and the standard t-statistics will be wrongly calculated.

3.6.3 Granger Causality test

In this paper, the econometric technique that is suitable and applicable for the study is the Granger Causality approach. The Granger Causality test is used to investigate the causal relationship between the two variables in a time series data. Granger Causality was formed on predictability and precedence. By giving the statistical description of observed responses, Granger Causality had shown the directed functional connectivity. The connectivity is useful in clarifying the observed response. In the Granger Causality approach, Granger Causality examines the relationship of the independent variable, which is to examine the data set if they are correlated. The Granger Causality test is performed by running a t-test and F-test. The null hypothesis is that the independent variable (Xt) does not Granger-cause dependent variable (Yt). Following that, the lag is chosen by undergoing the model order selection method. The decision rule is we reject the null hypothesis if the p-value is lesser than the significance level of 1%, 5%, or 10%. Otherwise, we do not reject the null hypothesis.

3.6.4 Vector Error Correction Model (VECM)

The Vector Error Correction Model (VECM) is suitable for examining the variables that have one or more cointegrating vectors. VECM can be used if cointegration existed in the variables. The error correction term VECM can show us how the equilibrium error is being adjusted and how the equilibrium will take place. The result that we get from VECM is useful in approaching the long-run coefficients. Under VECM, the t-statistics should show a result that is larger than 4 at a significance level of 0.01 and the t-statistics should show a result between 2 to 4 under a significance level of 0.05. Then t-statistic is being compared and the significance of the coefficient can be tested.

3.7 Conclusion

In conclusion, Chapter 3 discussed the methods that are used to conduct the research. In this research, a quantitative research method is being used, and secondary data are being retrieved from the World bank. At the same time, the data are being processed with Microsoft Excel and E-views. Unit root test, Johansen Methodology, Vector Error Correction Model (VECM), and Granger Causality Test are the econometric techniques used in this research.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, we will discuss the result of the tests that have been carried out. The stationarity of the variables is tested by using Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) unit root test. Furthermore, we had conducted the Johansen test to examine the existing co-integrated relationship between the variables. The Vector Error Correction Model (VECM) is used for the non-stationary data and finally, the Granger causality test is conducted to examine the causal relationship between the variables.

4.1 The Unit Root Test

4.1.1 The Augmented Dickey-Fuller (ADF) Test

Table 4.1:

ADF Test Results

	Level form with trend and intercept	**The first difference with intercept**
FDI	-2.024774	-8.148405***
EXR	-2.542162	-3.203797**
GDP	-2.036627	-4.184294***
INF	-4.933338***	-5.850673***
TRADE	-2.141308	-6.582623***

Source: EViews 11

Note:

** and *** represent significance levels of 5% and 1% respectively.

Based on Table 4.1, FDI, EXR, GDP, and TRADE are not stationary at level form with the trend and intercept at a significance level of 5 percent. Therefore, we reject the null hypothesis that the variables have a unit root. Then, first differencing with intercept is applied for the variables. The results show that all variables have no unit root and are stationary at first differencing at significance levels of 1 percent and 5 percent.

4.1.2 The Phillips-Perron (PP) Test

Table 4.2:

PP Test Results

	Level form with trend and intercept	**The first difference with intercept**

FDI	2.168288	-8.321630***
EXR	-2.175303	-3.194164**
GDP	-1.736320	-4.070214***
INF	-4.920931***	-10.12846***
TRADE	-2.095498	-6.582321***

Source: EViews 11

Note:
** and *** represent significance levels of 5% and 1% respectively.

According to Table 4.2, the results of the PP test are similar to ADF test results where FDI, EXR, GDP, and TRADE are not stationary at level form with trend and intercept. Thus, the variables are transformed to achieve stationarity. Then, the results show that all variables are stationary at first difference with intercept and the results are significant at 1 percent and 5 percent.

4.2 Johansen Cointegration Test

We are using the Johansen test to examine the existing cointegrated relationship between the variables. The main distinctive difference from the Engle-Granger test is Johansen test tolerates more than one cointegrated relationship between variables. The VAR Lag Order Selection Criteria have been carried out to choose the most optimal length of lag based on AIC and SC. SC is chosen as the criteria are more consistent and our data size is smaller. Hence, 2 lags are chosen to conduct the Johansen Test.

Table 4.3:
VAR Lag Order Selection Criteria

Lag	AIC	SC
0	84.18591	84.41266
1	77.07622	78.43668
2	75.91227*	78.40645*

Source: EViews 11

Table 4.4:

Johansen Cointegration Test Results

Hypothesized no. of CE(s)	Trace Statistic	Max-Eigen Statistic	5% CV Trace	Maximum Eigen value
0	**90.73757**	**35.36418**	**69.81889**	**33.87687**
≤1	55.37339	22.30358	47.85613	27.58434
≤2	33.06981	20.08944	29.79707	21.13162
≤3	12.98037	12.26848	15.49471	14.26460
≤4	0.711892	0.711892	3.841465	3.841465

Source: EViews 11

We have assumed the number of cointegrating vectors to determine whether there is an existing co-integrated relationship among the variables using trace test and Maximum Eigen value statistic at a 5% significance level. The results show that both the trace statistics (90.73757 > 69.81889) and Max-Eigen statistics (35.36418 > 33.87687) are higher than the critical value.

H_0: There is no long-run relationship between the variables

H_1: There is a long-run relationship between the variables

Reject the null hypothesis as trace and Max-Eigen statistics is larger than CV (5%) when the number of cointegrated variables is 0. Hence, there is a cointegrated relationship between variables. In summary, our variables, inflation, exchange rate, GDP per capita of Singapore, and trade openness are affecting each other in the long run.

4.3 Granger Causality Test

The data is now stationary which means the assumptions of conducting the Granger Causality test have been fulfilled. The Granger Causality test is now carried out to examine the causal relationship between the two variables.

Table 4.5:
Granger Causality Test Results

Granger cause	Probability
EXR cause FDI	0.8288
FDI causes EXR	0.1683
GDP cause FDI	0.2110
FDI cause GDP	0.0060
INF cause FDI	0.7316
FDI cause INF	0.1366
TRADE cause FDI	0.6012
FDI cause TRADE	0.0802

Source: EViews 11

4.3.1 Exchange Rate (EXR)

H_0: EXR does not granger cause FDI.
H_1: EXR does granger cause FDI.

From the table shown, we can see that EXR does not granger cause FDI since the p-value (0.8288) is higher than the significance level (0.05). Hence, do not reject the null hypothesis as there is no causal relationship between EXR and FDI.

4.3.2 Gross Domestic Product (GDP)

H_0: GDP does not granger cause FDI.
H_1: GDP granger cause FDI.

As we can see from the table above, the GDP does not granger cause FDI since the p-value (0.2110) is higher than the significance level (0.05). Thus, do not reject the null hypothesis since there is no causal relationship between GDP and FDI.

4.3.3 Inflation Rate (IFR)

H0: IFR does not granger cause FDI.
H1: IFR granger cause FDI.

The table above shows that the IFR does not granger cause FDI because the p-value (0.7316) is larger than the significance level (0.05). Thus, do not reject the null hypothesis since there is no causal relationship between IFR and FDI.

4.3.4 Trade (TRADE)

H0: TRADE does not granger cause FDI.
H1: TRADE granger cause FDI.

Referring to the table above, TRADE does not granger cause FDI because the p-value (0.6012) is larger than the significance level (0.05). Therefore, do not reject the null hypothesis since there is no causal relationship between TRADE and FDI.

4.4 Vector Error Correction Model (VECM)

As the Johansen Co-integration Test confirms that the variables are co-integrating, hence VECM model is more appropriate for the Granger Causality test. The lag length for all variables in the model was selected based on the result of SIC and the optimal lag length was one. The model with ECT is specified as follows.

Model specification:

$DFDI = 8210000000 - 1.3785ECT_{t-1} - 0.07599DFDI_{t-1} - 0.4483DFDI_{t-2} + 44300000000DEXR_{t-1} + 90700000000DEXR_{t-2} + 1731964DGDP_{t-1} - 1184200DGDP_{t-2} - 4680000000DINF_{t-1} - 1920000000DINF_{t-2} + 167000000DTRADE_{t-1} + 205000000DTRADE_{t-1} + \varepsilon_t$

Where,

DFDI = First difference of FDI in Singapore (net inflows, BoP, current US$)
DEXR = First difference of Exchange Rate in Singapore (LCU per US$)
DGDP = First difference of GDP Per Capita (current US$)
DINF = First difference of Inflation (annual %)
DTRADE = First difference of Trade (% of GDP)
ECT = Error Correction Term

ε_t = Error term

The VECM model is used for the correction of disequilibrium in the cointegration relationship and to test for short-run and long-run causality among the variables. The ECT is one of the means to correct the disequilibrium. It captures the speed of adjustment of any disequilibrium towards the long-run equilibrium state. In the model, ECT is negatively signed. It indicates that the disequilibrium is adjusted at a speed of 137.85% annually to achieve the long-run equilibrium state.

4.4.1 Impulse Response Function

The impulse response function is conducted to determine the future and the present response of a variable when the impulse is implied on another variable. The horizontal line on the graph represents the period taken for the effects of shock decay to 0.

Interpretation of shock on the FDI

In the first diagram, we can see that a shock in the FDI causes itself to drop drastically and it has a decreasing fluctuation beneath the value before the shock. The value is yet to reach 0 even upon the 35th period. From the second diagram, the value of the exchange rate have little fluctuation but it takes more than 35th periods to reach 0. When it turns to GDP, we can observe that the value has increased shortly and dropped to negative value and fluctuated between the horizontal line. A clear fluctuating trend can be seen from the value of inflation rate. However, the impact is getting smaller as periods go on.The impact gets smaller and returns to 0 in the 35^{th} period. The impact on trade is not obvious but it is also yet to reach 0 at 35th period.

Interpretation of shock on exchange rate

We can observe that there is a small fluctuation on the FDI above the horizontal line until the 25th period. The exchange rate itself has risen and maintained at peak value until the 35th value. On the other hand, the value of GDP has dropped to a floor value and it has maintained until the 35th period. The inflation has declined sharply and recovered back in a short period followed by a little fluctuation right above 0. The trade has dropped and risen back then takes 15 periods to reach 0.

Interpretation of shock of GDP

The value of FDI has increased and dropped then maintained a certain value for more than 35 periods. The value of the exchange rate has increased from the negative region but it has not dropped for more than 35 periods. GDP itself has a high fluctuation trend and is yet to back 0 for 35 periods long. The inflation has responded to the shock by fluctuating and the fluctuation has decreased over the period. The shock has a low impact on trade but the impact does not get smaller over the period.

Interpretation of shock on inflation

We can see that the shock causes the FDI to fluctuate above the horizontal line and never drop to 0 for 35 periods long. The exchange rate has declined and remains in the negative region. The value took more than 35-period increases back to zero. The opposite result can be seen from the response of GDP. Next, the inflation has declined linearly and reached 0 right after the 25th period. The shock of inflation has caused a large impact on trade which causes it not to return to 0 for more than 35 periods. and it increases back and reaches back to zero within 30 periods.

Interpretation of shock on trade

The FDI has fluctuated on the horizontal axis for 35 periods. The exchange rate has the same response with FDI with a lower fluctuation trend. The same little fluctuation can be observed from GDP in the negative region right below 0. The inflation has fluctuated minimally on the horizontal axis. The trade has an average impact on itself and it is maintained for more than 35 periods.

4.4.2 Variance Decomposition

To determine the amount of information contributed from each variable to other variables, we have generated the outcome for 10 periods by using the EViews. It means that we forecast the contribution of each variable to other variables for 10 years into the future. We also divided the period into the short run and long run. The short-run variance decomposition is period 1 and the long run is period 10.

Table 4.6:

Variance Decomposition of FDI, 10 period

	S.E.	FDI	EXR	GDP	INF	TRADE
1	1.06E+10	100.00	0.00	0.00	0.00	0.00
2	1.25E+10	71.19	0.64	21.97	3.87	2.33
3	1.43E+10	61.4	1.79	21.76	10.30	4.76
4	1.56E+10	53.47	1.51	28.65	12.03	4.34
5	1.68E+10	55.71	1.46	27.92	10.49	4.41
6	1.84E+10	46.81	2.00	35.26	12.17	3.75
7	1.97E+10	46.51	2.27	34.21	13.05	3.97
8	2.09E+10	41.81	2.05	39.06	13.53	3.55
9	2.20E+10	41.88	2.14	38.68	13.71	3.58
10	2.32E+10	38.07	2.01	41.97	14.71	3.24

Source: EViews 11

Based on the results, 100% of forecast error variance in FDI is explained by FDI itself in the short run. The contribution from EXR, GDP, INF, and TRADE is strongly

exogenous in the short run as the percentage is zero. In the long run, the variables are exhibiting weak endogenous influence on the FDI except for GDP as we can observe that the result is increasing gradually. Hence, three of the variables have a very weak influence on predicting FDI in both short-run and long-run periods except for GDP. In addition, the influence of FDI on itself is doing lean the further we move into the future.

Table 4.7:

Variance Decomposition of Exchange Rate, 10 period

	S.E.	FDI	EXR	GDP	INF	TRADE
1	0.06	0.29	99.71	0.00	0.00	0.00
2	0.11	0.65	94.66	0.68	3.56	0.45
3	0.17	0.36	89.85	0.44	9.14	0.21
4	0.22	0.31	88.45	0.35	10.67	0.23
5	0.26	0.23	88.40	0.68	10.30	0.40
6	0.30	0.20	88.82	1.20	9.41	0.38
7	0.34	0.16	88.78	1.63	9.09	0.34
8	0.37	0.17	88.61	2.27	8.64	0.32
9	0.40	0.16	88.71	2.76	8.06	0.31
10	0.43	0.17	88.67	3.26	7.61	0.29

Source: EViews 11

Based on the results, only 99.71% of forecast error variance in the exchange rate is explained by the exchange rate itself in the short run and 88.67% in the long run. The contribution from FDI, GDP, INF, and TRADE is strongly exogenous in the short run as the percentage is nearly zero. In the long run, the variables are exhibiting weak endogenous influence on the exchange rate as the forecast error variance are below 10%. It implies that three of the variables have a very weak influence on predicting exchange rates in both short-run and long-run periods.

Table 4.8:

Variance Decomposition of GDP, 10 period

	S.E.	FDI	EXR	GDP	INF	TRADE
1	1799.29	12.05	52.05	35.90	0.00	0.00
2	3573.54	10.61	48.75	36.55	4.08	0.00
3	5282.54	6.42	41.16	39.61	12.69	0.12
4	6427.19	4.34	41.66	35.87	18.01	0.12
5	7557.52	3.14	45.26	33.21	17.85	0.54
6	8485.82	2.54	47.70	31.19	18.12	0.46
7	9471.53	2.13	48.03	29.81	19.60	0.42
8	10320.39	1.83	49.82	27.78	20.18	0.39
9	11157.49	1.57	51.28	26.58	20.11	0.45
10	11868.33	1.41	52.46	25.40	20.32	0.41

Source: EViews 11

For the outcome of variance decomposition of GDP, INF and TRADE exhibit strong exogeneity in the short run while FDI and EXR explain only 12.05% and 52.05% of forecast error in GDP respectively. The influence of FDI and GDP further declines as we move into the future. Whereas, EXR becomes more significant in predicting GDP in the long run. In the short run, GDP predicts itself by only 35.9% and the results decline over the period. It could be said that FDI, INF, and TRADE have a weak influence on predicting GDP except for EXR.

Table 4.9:

Variance Decomposition of Inflation, 10 period

	S.E.	FDI	EXR	GDP	INF	TRADE
1	2.03	26.00	0.03	4.51	69.46	0.00
2	2.76	27.90	26.88	3.66	38.24	3.32
3	2.98	26.15	24.33	6.78	39.80	2.94
4	3.58	40.08	17.18	11.27	28.08	3.39
5	3.62	39.72	17.97	11.30	27.63	3.39
6	4.02	45.51	15.06	12.39	22.36	4.68
7	4.02	45.45	15.06	12.48	22.33	4.68
8	4.28	48.09	13.68	12.73	19.91	5.60
9	4.29	48.14	13.71	12.77	19.80	5.58
10	4.49	49.97	12.92	12.60	18.17	6.33

Source: EViews 11

Next, inflation predicts itself by 69.46% in the short run while EXR and TRADE are strongly exogenous. GDP exhibits a very weak endogenous influence on inflation by contributing only 4.51%. As we move into the future, the influence of FDI becomes stronger on predicting inflation. Whereas the influence of inflation on itself decreases from period to period.

Table 4.10:

Variance Decomposition of Trade, 10 period

	S.E.	FDI	EXR	GDP	INF	TRADE
1	21.90	0.91	33.33	0.40	11.79	53.57
2	30.05	5.83	45.46	1.69	14.18	32.85
3	36.64	4.25	41.39	1.29	20.29	32.78
4	41.01	3.43	34.73	1.03	27.79	33.01
5	45.65	3.89	28.36	1.03	35.61	31.10
6	51.49	3.89	22.59	0.85	43.76	28.92
7	55.85	3.43	19.21	0.81	47.45	29.11
8	59.84	3.38	16.75	0.72	49.90	29.25
9	63.68	3.13	14.79	0.77	52.68	28.63
10	67.42	3.11	13.24	0.79	54.44	28.43

Source: EViews 11

The variance decomposition of trade in explaining itself is 53.57% in the short run but the influence decreases over the period to 28.43%. The FDI, INF, and GDP have very low contributions to forecast trade as they have only 0.91%, 11.79%, and 0.40% of forecast error in trade respectively. The information contributed by EXR decreases further as we move into the future while INF becomes stronger in predicting trade in the long run.

4.5 Conclusion

In summary, diagnostic checking, stationarity test, autocorrelation test, Johansen test, and Granger causality test have been carried out throughout this chapter. All the tests before the Granger causality test are conducted are to fulfill the criteria and assumptions of our main test, the Granger Causality test. In the next chapter, we will proceed with our conclusion with the implications, limitations, and recommendations.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.0 Introduction

This paper focuses on how EXR, GDP, INF, and TRADE affect FDI in Singapore. This chapter summarizes the empirical results analysis, discussion of major findings, and implications of the study. In addition, this section also discussed several limitations of our research, and recommendations for future research are provided.

5.1 Summary of Findings

Based on the result, macroeconomic factors such as inflation, economic growth, exchange rate and trade do not granger cause FDI. Inversely, FDI does granger cause GDP and trade. Since, the factors we choose are considered as the key element of macroeconomic factors, thus we can see that there is no significant relationship between FDI and macroeconomic factors. However, FDI is showing a suggestive relationship with microeconomic factors.

5.2 Discussion of Major Findings

The level of inflation is the utmost exogenous variable which indicates that the inflation rate does not affect the other variable in the cointegrating relationship. In this case, it is suggested that inflation will convey the shock to FDI or other variables when the inflation rate is affected by external shock. The effect of the inflation rate has affected the FDI in terms of the growing inflation rate will diminish the real earnings from investment and further lead to the depressing of FDI inflow. For instance, inflation will affect the FDI indirectly in terms of labor cost and infrastructure development which will distress the FDI decision-making (Valli, M., & Masih, M., 2014).

FDI is affecting the nation's economy in terms of the development of new and modern technology and also the transmission of technical skills. Under this circumstance, the nation will take advantage of the connection of the local economy and also market and capital formation. (Mustafa, A. M. M., & Santhirasegaram, S., 2013) These components are the key factors that affect economic growth. Instead of GDP affecting the amount of FDI inflow, instead, FDI inflow is affecting the GDP of Singapore. As the expanding economic activity brought by FDI has a short-term effect on GDP. Conversely, FDI will have less effect on GDP in the long run because the economic growth rate is decreasing as the dependencies of the developing countries, (Gupta, P., & Singh, A., 2016).

In an open economy, the exchange rate is crucial as a price and dominant determinant. FDI is a spill-over impact to improve the capacity of production of the local producer by committing to the advancement of technology and management, which has relation to the exchange rate. FDI has no impact on the domestic supply capacity which indicates that it does not affect the value of domestic goods and it can consider as zero escalation impact on the real exchange rate. Moreover, previous research showed that the upsurge in real exchange rate caused by the portfolio investments that carry higher volatility in private flow which has no contribution to local productive capacity will cause an appreciation in the real exchange rate (Lartey, E. K., 2007). In short, the cost

and demand effect of the exchange rate does not affect the FDI inflow. However, the wealth effect of the exchange rate is the factor that mainly affects FDI inflow (Tan, L., Xu, Y., & Gashaw, A., 2021).

The results of our findings on the causality between FDI and TRADE are inconsistent with previous studies. Our empirical results suggest that there is unilateral causality from FDI to TRADE while earlier studies found both variables to have bilateral causality. This causal relationship indicates that FDI could improve the export performance of the nation. Singapore has an extensive network of double tax agreements, strategic location, stable economic and political condition as well as an innovative business environment that attract a large amount of inward FDI such as advanced machinery and equipment. However, Singapore has a limited domestic market, the technology would boost productivity in the manufacturing industry. If the products are stuck in the market, the domestic market will be flooded and lead to demand-supply disequilibrium. Therefore, a trading activity especially exports become incredibly important to its market and economy. As Singapore is a country that is heavily dependent on exports, hence FDI is significant to its economy as it could improve the export performance. Other than that, the industrial linkage or spillover effects enable FDI inflows to further boost exports.

In short, macroeconomics factors such as inflation, GDP, exchange rate do not affect FDI. However, microeconomics factors are more likely to bring effect to the inflow of Singapore. In general, when the tariff rate is increasing, it will depress FDI inflow. The tariff will affect the FDI in terms of the tariff treatment in the host and parent countries, the measurement of FDI activity and the type of tariff that is imposed on the investors. Moreover, the occurrence of double taxation will also further distress the FDI inflow. (Blonigen, B. A., 2005). According to OECD, tax policies encourage FDI as outbound investment will increase the efficiency of the accessibility of the foreign market and production scale economies, further surge up the net domestic income. The tariff rate is significant for investors to decide the location to invest, as the sensitivity of FDI to taxation is surging up and it shows that mobility of capital is growing. Besides that,

FDI is sensitive to tariff rates as the investors would like the business to gain advantage in large markets to cut down the cost of trade, such as transportation costs.

Labor cost is also one of the microeconomics factors that is likely to affect the FDI inflow. It brings a huge effect on the investment location decisions of firms is the labor cost. It is suggested by Bellak, C,. et al, (2008). that an increment in the labor cost will cause the FDI inflow to drop, which means a lower wage rate will tend to attract more FDI. At the same time, the FDI inflow is driven by labor cost and also productivity. Hence, for a country like Singapore, with high human capital which imposes a higher effect on the effective wage rate. In short, it is important for Singapore to focus on labor cost as the cost advantages are a crucial asset in the market, to attract more FDI inflow such as multinational companies, a lower labor cost is preferable. (Boermans, et al, 2011)

5.3 Implication of the studies

Singapore has used tax incentives to entice international investment. Low corporation taxes, tax exemptions for all foreign-sourced revenue in numerous areas, and greater tax incentives expressly for financial services and other businesses that the government is attempting to boost are all part of the package. According to World Trade Organization (2008), increase the maximum incentive period for pioneers who have their commercial activities in Singapore, are parties to more than 70 double taxation treaties (DTTs), have a tax dividend of 0%, and have the highest tax rate applied to their revenue is under 17%. As a result, international investors no longer care about interest rates because the country's tax benefits have saved them a lot of money. The predicted yield from interest rates is mitigated by the fact that Singapore has been particularly active in the trading market.

To further illustrate, Singapore has signed many bilateral and regional free trade agreements. One of the reasons for FDI is because of trade linkages (Salvatore, 1995).

Singapore promotes its openness in both the trade and investment sectors by participating in several FTAs, hence expanding the linkages for trading and investing partners. It is believed that by investing in Singapore and increasing its trade volume over time, enterprises operating within the nation would be able to access new markets outside through trading.

According to World Trade Organization (2008), the country's GDP grows as trading volume increases. A rising GDP indicates that the country's economy is growing. As can be seen from the preceding discussion, economic growth has a considerable impact on FDI inflow decisions. Higher economic growth entails more contribution and economic activity in the global market, as well as increased consumption, market size, and expenditure. As a result, investors anticipate more income from Singapore enterprises.

Apart from that, to boost economic growth, Singapore liberalized its financial and legal sectors. It intended to transform Singapore into a financial hub, with the city serving as a focal point for the financial services industry. It has evolved into a hub for financial services, particularly in the financial (banking) and insurance sectors.

5.4 Limitations of studies

We might face difficulties in using data from (SC) as our lag order selection criteria. This is because the number of lags we included in the Johansen test is small. This can be explained by the SC being more accurate with the large sample of lag. Hence, the accuracy of data might be affected despite our concern about other factors which lead us to choose the SC as our final decision.

Moreover, insufficient research is also one of the limitations of our studies. The macroeconomics variables might have fluctuated with the FDI of a country, but it does not tell the exact relationship between each other. The FDI of Singapore mainly

depends on the microeconomics factor with least related to the macroeconomic variables. Therefore, the empirical result of our studies is different from our expectations. As a result, we could not get a satisfactory conclusion with insignificant factors.

In addition, the omission of significant factors might also affect our results. This is because we might have omitted some macroeconomics factor or measurement of independent variable which would completely affect the empirical results. This can be explained by the variable that might have a significant causal relationship with the FDI. In the end, we could get an exactly different result with the variable.

5.5 Recommendation for future research

For future research, larger data may be included. As larger data is obtained, we could use more lag in our study. As the stability of SC is preferable, hence more lag is included to achieve a higher accuracy of data. Next, a larger quantity of lags will reduce the occurrence of the econometrics problem. As a result, the concern of SC on the number of lags can be resolved. Besides that, we should also explore deeper on the methodology approach to obtain a more desirable result. A restricted result is obtained due to a limited understanding of the methodology approach.

Furthermore, we can have better preparation in the development of the research topic in the beginning stage. It is crucial as the beginning stage has a high impact on the research. We should commit more to the research, to have a better understanding of the fundamentals elements that affect the FDI of Singapore. Other than that, a deeper understanding of the background of studies can effectively obtain a wider selection of the factors that affect the FDI in Singapore. On the other hand, we should use a wider research field, as it could include more variables including macroeconomic and microeconomic factors to better examine factors that affected FDI in Singapore. Moreover, other different countries can be included in future research. These countries

included the countries from ASEAN, AFTA, OPEC, and so on. This is because a wider selection of countries can show the different results between countries. Thus, a comparison between countries can be conducted which will lead to more attractive research.

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APPENDICES

Appendix 1: Augmented Dickey Fuller Unit Root Test on FDI

Appendix 1.1: Level Form with Trend and Intercept

Null Hypothesis: FDI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.024774	0.5674
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Date: 04/11/22 Time: 16:50
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI(-1)	-0.350044	0.172881	-2.024774	0.0516
C	-7.71E+09	5.19E+09	-1.484601	0.1477
@TREND("1985")	1.19E+09	4.82E+08	2.476998	0.0189

R-squared	0.168629	Mean dependent var	3.51E+09
Adjusted R-squared	0.114992	S.D. dependent var	1.34E+10
S.E. of regression	1.26E+10	Akaike info criterion	49.43597
Sum squared resid	4.92E+21	Schwarz criterion	49.57065
Log likelihood	-837.4114	Hannan-Quinn criter.	49.48190
F-statistic	3.143895	Durbin-Watson stat	2.210029
Prob(F-statistic)	0.057125		

Appendix 1.2: First difference with Intercept

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.148405	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI,2)
Method: Least Squares
Date: 03/15/22 Time: 13:32
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI(-1))	-1.477276	0.181296	-8.148405	0.0000
C	4.78E+09	2.22E+09	2.155747	0.0390

R-squared	0.681713	Mean dependent var	1.11E+09
Adjusted R-squared	0.671446	S.D. dependent var	2.18E+10
S.E. of regression	1.25E+10	Akaike info criterion	49.39206
Sum squared resid	4.83E+21	Schwarz criterion	49.48276
Log likelihood	-812.9690	Hannan-Quinn criter.	49.42258
F-statistic	66.39651	Durbin-Watson stat	2.125052
Prob(F-statistic)	0.000000		

Appendix 2: Augmented Dickey Fuller Unit RootTest on Exchange Rate

Appendix 2.1: Level Form with Trend and Intercept

Null Hypothesis: EXCHANGE_RATE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.542162	0.1151
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCHANGE_RATE)
Method: Least Squares
Date: 03/15/22 Time: 14:01
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE(-1)	-0.105628	0.041550	-2.542162	0.0164
D(EXCHANGE_RATE(-1))	0.454109	0.145636	3.118104	0.0040
C	0.155061	0.066515	2.331209	0.0267

R-squared	0.378774	Mean dependent var	-0.024644
Adjusted R-squared	0.337359	S.D. dependent var	0.071095
S.E. of regression	0.057873	Akaike info criterion	-2.774617
Sum squared resid	0.100479	Schwarz criterion	-2.638571
Log likelihood	48.78118	Hannan-Quinn criter.	-2.728841
F-statistic	9.145798	Durbin-Watson stat	2.081875
Prob(F-statistic)	0.000792		

Appendix 2.2: First Difference with Intercept

Null Hypothesis: D(EXCHANGE_RATE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.203797	0.0287
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCHANGE_RATE,2)
Method: Least Squares
Date: 03/15/22 Time: 13:33
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHANGE_RATE(-1))	-0.502552	0.156861	-3.203797	0.0031
C	-0.011811	0.011651	-1.013740	0.3186

R-squared	0.248746	Mean dependent var	0.001153
Adjusted R-squared	0.224512	S.D. dependent var	0.071274
S.E. of regression	0.062765	Akaike info criterion	-2.640134
Sum squared resid	0.122124	Schwarz criterion	-2.549436
Log likelihood	45.56220	Hannan-Quinn criter.	-2.609617
F-statistic	10.26432	Durbin-Watson stat	1.986923
Prob(F-statistic)	0.003134		

Appendix 3: Augmented Dickey Fuller Unit Root Test on GDP

Appendix 3.1: Level Form with Trend and Intercept

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.036627	0.5605
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 04/11/22 Time: 20:54
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.185589	0.091126	-2.036627	0.0509
D(GDP(-1))	0.354162	0.181492	1.951390	0.0607
C	864.8441	916.4072	0.943733	0.3531
@TREND("1985")	343.4425	164.1496	2.092254	0.0453

R-squared	0.192925	Mean dependent var	1783.054
Adjusted R-squared	0.109434	S.D. dependent var	2588.189
S.E. of regression	2442.469	Akaike info criterion	18.55262
Sum squared resid	1.73E+08	Schwarz criterion	18.73401
Log likelihood	-302.1182	Hannan-Quinn criter.	18.61365
F-statistic	2.310738	Durbin-Watson stat	1.782219
Prob(F-statistic)	0.097057		

Appendix 3.2: First Difference with Intercept

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.184294	0.0025
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 04/11/22 Time: 20:54
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.731352	0.174785	-4.184294	0.0002
C	1297.231	542.7797	2.389977	0.0231

R-squared	0.360934	Mean dependent var	-25.34855
Adjusted R-squared	0.340319	S.D. dependent var	3120.868
S.E. of regression	2534.792	Akaike info criterion	18.57230
Sum squared resid	1.99E+08	Schwarz criterion	18.66300
Log likelihood	-304.4430	Hannan-Quinn criter.	18.60282
F-statistic	17.50831	Durbin-Watson stat	1.777193
Prob(F-statistic)	0.000218		

Appendix 4: Augmented Dickey Fuller Unit Root Test on Inflation

Appendix 4.1: Level Form with Trend and Intercept

Null Hypothesis: INFLATION has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.933338	0.0018
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLATION)
Method: Least Squares
Date: 04/11/22 Time: 20:55
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.854333	0.173176	-4.933338	0.0000
C	2.028002	0.891774	2.274121	0.0300
@TREND("1985")	-0.039337	0.041746	-0.942298	0.3533

R-squared	0.444014	Mean dependent var	0.024739
Adjusted R-squared	0.408144	S.D. dependent var	3.098585
S.E. of regression	2.383809	Akaike info criterion	4.659374
Sum squared resid	176.1589	Schwarz criterion	4.794052
Log likelihood	-76.20935	Hannan-Quinn criter.	4.705303
F-statistic	12.37841	Durbin-Watson stat	2.102522
Prob(F-statistic)	0.000112		

Appendix 4.2: First Difference with Intercept

Null Hypothesis: D(INFLATION) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.850673	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLATION,2)
Method: Least Squares
Date: 04/11/22 Time: 20:55
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-1.904839	0.325576	-5.850673	0.0000
D(INFLATION(-1),2)	0.237992	0.185749	1.281254	0.2103
C	0.092976	0.482558	0.192673	0.8486

R-squared	0.771708	Mean dependent var	-0.179915
Adjusted R-squared	0.755964	S.D. dependent var	5.500505
S.E. of regression	2.717250	Akaike info criterion	4.926178
Sum squared resid	214.1200	Schwarz criterion	5.063590
Log likelihood	-75.81884	Hannan-Quinn criter.	4.971726
F-statistic	49.01521	Durbin-Watson stat	1.866786
Prob(F-statistic)	0.000000		

Appendix 5: Augmented Dickey Fuller Unit Root Test on Trade

Appendix 5.1: Level Form with Trend and Intercept

Null Hypothesis: TRADE has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.141308	0.2306
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRADE)
Method: Least Squares
Date: 03/15/22 Time: 14:03
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRADE(-1)	-0.233308	0.108956	-2.141308	0.0400
C	82.16275	38.30258	2.145097	0.0396

R-squared	0.125329	Mean dependent var	0.569787
Adjusted R-squared	0.097996	S.D. dependent var	23.89849
S.E. of regression	22.69733	Akaike info criterion	9.139394
Sum squared resid	16485.40	Schwarz criterion	9.229180
Log likelihood	-153.3697	Hannan-Quinn criter.	9.170014
F-statistic	4.585198	Durbin-Watson stat	2.095608
Prob(F-statistic)	0.039965		

Appendix 5.2: First Difference with Intercept

Null Hypothesis: D(TRADE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.582623	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRADE,2)
Method: Least Squares
Date: 03/15/22 Time: 13:33
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TRADE(-1))	-1.163370	0.176734	-6.582623	0.0000
C	0.974369	4.224529	0.230646	0.8191

R-squared	0.582946	Mean dependent var	0.227082
Adjusted R-squared	0.569493	S.D. dependent var	36.97330
S.E. of regression	24.25931	Akaike info criterion	9.274170
Sum squared resid	18243.94	Schwarz criterion	9.364867
Log likelihood	-151.0238	Hannan-Quinn criter.	9.304687
F-statistic	43.33093	Durbin-Watson stat	1.938042
Prob(F-statistic)	0.000000		

Appendix 6: Phillips-Perron Test on FDI

Appendix 6.1: Level Form with Trend and Intercept

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		2.168288	0.9999
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.73E+20
HAC corrected variance (Bartlett kernel)	6.03E+19

Phillips-Perron Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Date: 03/15/22 Time: 14:05
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI(-1)	0.030834	0.085122	0.362232	0.7196
C	2.66E+09	3.31E+09	0.803773	0.4275

R-squared	0.004084	Mean dependent var	3.51E+09
Adjusted R-squared	-0.027039	S.D. dependent var	1.34E+10
S.E. of regression	1.36E+10	Akaike info criterion	49.55773
Sum squared resid	5.90E+21	Schwarz criterion	49.64752
Log likelihood	-840.4814	Hannan-Quinn criter.	49.58835
F-statistic	0.131212	Durbin-Watson stat	2.654677
Prob(F-statistic)	0.719560		

Appendix 6.2: First Difference with Intercept

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.321630	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.46E+20
HAC corrected variance (Bartlett kernel)	1.28E+20

Phillips-Perron Test Equation
Dependent Variable: D(FDI,2)
Method: Least Squares
Date: 03/15/22 Time: 14:05
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI(-1))	-1.477276	0.181296	-8.148405	0.0000
C	4.78E+09	2.22E+09	2.155747	0.0390

R-squared	0.681713	Mean dependent var	1.11E+09
Adjusted R-squared	0.671446	S.D. dependent var	2.18E+10
S.E. of regression	1.25E+10	Akaike info criterion	49.39206
Sum squared resid	4.83E+21	Schwarz criterion	49.48276
Log likelihood	-812.9690	Hannan-Quinn criter.	49.42258
F-statistic	66.39651	Durbin-Watson stat	2.125052
Prob(F-statistic)	0.000000		

Appendix 7: Phillips-Perron Test on Exchange Rate

Appendix 7.1: Level Form with Trend and Intercept

Null Hypothesis: EXCHANGE_RATE has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.175303	0.2185
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.004051
HAC corrected variance (Bartlett kernel)	0.007814

Phillips-Perron Test Equation
Dependent Variable: D(EXCHANGE_RATE)
Method: Least Squares
Date: 03/15/22 Time: 14:06
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE(-1)	-0.101582	0.042999	-2.362440	0.0244
C	0.138790	0.070066	1.980855	0.0563

R-squared	0.148509	Mean dependent var	-0.024588
Adjusted R-squared	0.121900	S.D. dependent var	0.070010
S.E. of regression	0.065604	Akaike info criterion	-2.553325
Sum squared resid	0.137726	Schwarz criterion	-2.463539
Log likelihood	45.40652	Hannan-Quinn criter.	-2.522705
F-statistic	5.581122	Durbin-Watson stat	1.074138
Prob(F-statistic)	0.024402		

Appendix 7.2: First difference with Intercept

Null Hypothesis: D(EXCHANGE_RATE) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.194164	0.0294
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.003701
HAC corrected variance (Bartlett kernel)	0.003661

Phillips-Perron Test Equation
Dependent Variable: D(EXCHANGE_RATE,2)
Method: Least Squares
Date: 03/15/22 Time: 14:06
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHANGE_RATE(-1))	-0.502552	0.156861	-3.203797	0.0031
C	-0.011811	0.011651	-1.013740	0.3186

R-squared	0.248746	Mean dependent var	0.001153
Adjusted R-squared	0.224512	S.D. dependent var	0.071274
S.E. of regression	0.062765	Akaike info criterion	-2.640134
Sum squared resid	0.122124	Schwarz criterion	-2.549436
Log likelihood	45.56220	Hannan-Quinn criter.	-2.609617
F-statistic	10.26432	Durbin-Watson stat	1.986923
Prob(F-statistic)	0.003134		

Appendix 8: Phillips-Perron Test on GDP

Appendix 8.1: Level Form with Trend and Intercept

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.736320	0.7128
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	5766372.
HAC corrected variance (Bartlett kernel)	7411699.

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 04/11/22 Time: 20:56
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.137926	0.088491	-1.558646	0.1292
C	1016.183	883.7331	1.149875	0.2590
@TREND("1985")	285.4707	160.1409	1.782622	0.0844

R-squared	0.101412	Mean dependent var	1724.675
Adjusted R-squared	0.043439	S.D. dependent var	2571.305
S.E. of regression	2514.837	Akaike info criterion	18.58190
Sum squared resid	1.96E+08	Schwarz criterion	18.71658
Log likelihood	-312.8923	Hannan-Quinn criter.	18.62783
F-statistic	1.749288	Durbin-Watson stat	1.394337
Prob(F-statistic)	0.190629		

Appendix 8.2: First Difference with Intercept

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.070214	0.0034
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	6035764.
HAC corrected variance (Bartlett kernel)	4999248.

Phillips-Perron Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 04/11/22 Time: 20:57
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.731352	0.174785	-4.184294	0.0002
C	1297.231	542.7797	2.389977	0.0231

R-squared	0.360934	Mean dependent var	-25.34855
Adjusted R-squared	0.340319	S.D. dependent var	3120.868
S.E. of regression	2534.792	Akaike info criterion	18.57230
Sum squared resid	1.99E+08	Schwarz criterion	18.66300
Log likelihood	-304.4430	Hannan-Quinn criter.	18.60282
F-statistic	17.50831	Durbin-Watson stat	1.777193
Prob(F-statistic)	0.000218		

Appendix 9: Phillips-Perron Test on Inflation

Appendix 9.1: Level Form with Trend and Intercept

Null Hypothesis: INFLATION has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.920931	0.0019
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	5.181144
HAC corrected variance (Bartlett kernel)	4.984471

Phillips-Perron Test Equation
Dependent Variable: D(INFLATION)
Method: Least Squares
Date: 04/11/22 Time: 20:57
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.854333	0.173176	-4.933338	0.0000
C	2.028002	0.891774	2.274121	0.0300
@TREND("1985")	-0.039337	0.041746	-0.942298	0.3533

R-squared	0.444014	Mean dependent var	0.024739
Adjusted R-squared	0.408144	S.D. dependent var	3.098585
S.E. of regression	2.383809	Akaike info criterion	4.659374
Sum squared resid	176.1589	Schwarz criterion	4.794052
Log likelihood	-76.20935	Hannan-Quinn criter.	4.705303
F-statistic	12.37841	Durbin-Watson stat	2.102522
Prob(F-statistic)	0.000112		

Appendix 9.2: First difference with Intercept

Null Hypothesis: D(INFLATION) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.12846	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	6.957289
HAC corrected variance (Bartlett kernel)	6.116403

Phillips-Perron Test Equation
Dependent Variable: D(INFLATION,2)
Method: Least Squares
Date: 04/11/22 Time: 20:58
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-1.538833	0.157021	-9.800173	0.0000
C	0.097638	0.474292	0.205861	0.8382

R-squared	0.755989	Mean dependent var	-0.126797
Adjusted R-squared	0.748118	S.D. dependent var	5.422470
S.E. of regression	2.721424	Akaike info criterion	4.898879
Sum squared resid	229.5905	Schwarz criterion	4.989576
Log likelihood	-78.83150	Hannan-Quinn criter.	4.929396
F-statistic	96.04339	Durbin-Watson stat	2.161825
Prob(F-statistic)	0.000000		

Appendix 10: Phillips-Perron Test on Trade

Appendix 10.1: Level Form with Trend and Intercept

Null Hypothesis: TRADE has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.095498	0.2476
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	484.8648
HAC corrected variance (Bartlett kernel)	454.5325

Phillips-Perron Test Equation
Dependent Variable: D(TRADE)
Method: Least Squares
Date: 03/15/22 Time: 14:07
Sample (adjusted): 1986 2019
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRADE(-1)	-0.233308	0.108956	-2.141308	0.0400
C	82.16275	38.30258	2.145097	0.0396

R-squared	0.125329	Mean dependent var	0.569787
Adjusted R-squared	0.097996	S.D. dependent var	23.89849
S.E. of regression	22.69733	Akaike info criterion	9.139394
Sum squared resid	16485.40	Schwarz criterion	9.229180
Log likelihood	-153.3697	Hannan-Quinn criter.	9.170014
F-statistic	4.585198	Durbin-Watson stat	2.095608
Prob(F-statistic)	0.039965		

Appendix 10.2: First Difference with Intercept

Null Hypothesis: D(TRADE) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.582321	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	552.8465
HAC corrected variance (Bartlett kernel)	553.2057

Phillips-Perron Test Equation
Dependent Variable: D(TRADE,2)
Method: Least Squares
Date: 03/15/22 Time: 14:08
Sample (adjusted): 1987 2019
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TRADE(-1))	-1.163370	0.176734	-6.582623	0.0000
C	0.974369	4.224529	0.230646	0.8191

R-squared	0.582946	Mean dependent var	0.227082
Adjusted R-squared	0.569493	S.D. dependent var	36.97330
S.E. of regression	24.25931	Akaike info criterion	9.274170
Sum squared resid	18243.94	Schwarz criterion	9.364867
Log likelihood	-151.0238	Hannan-Quinn criter.	9.304687
F-statistic	43.33093	Durbin-Watson stat	1.938042
Prob(F-statistic)	0.000000		

Appendix 11: Optimal Lag Selection in VAR Model

VAR Lag Order Selection Criteria
Endogenous variables: FDI EXCHANGE_RATE GDP INFLATION TRADE
Exogenous variables: C
Date: 04/11/22 Time: 20:59
Sample: 1985 2019
Included observations: 33

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1384.068	NA	2.51e+30	84.18591	84.41266	84.26220
1	-1241.758	232.8708	2.09e+27	77.07622	78.43668	77.53397
2	-1197.552	58.94023*	7.30e+26*	75.91227*	78.40645*	76.75148*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 12: Johansen Co-integration Test

Date: 04/11/22 Time: 21:01
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments
Trend assumption: Linear deterministic trend
Series: FDI EXCHANGE_RATE GDP INFLATION TRADE
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.668832	90.73757	69.81889	0.0005
At most 1 *	0.501916	55.37339	47.85613	0.0084
At most 2 *	0.466233	33.06981	29.79707	0.0203
At most 3	0.318453	12.98037	15.49471	0.1155
At most 4	0.022001	0.711892	3.841465	0.3988

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.668832	35.36418	33.87687	0.0330
At most 1	0.501916	22.30358	27.58434	0.2052
At most 2	0.466233	20.08944	21.13162	0.0694
At most 3	0.318453	12.26848	14.26460	0.1010
At most 4	0.022001	0.711892	3.841465	0.3988

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

FDI	EXCHANGE...	GDP	INFLATION	TRADE
-3.10E-10	14.90863	0.000693	1.501629	-0.010704
-1.67E-10	9.343175	0.000415	-0.188903	-0.036972
2.24E-10	-16.56911	-0.000454	-0.543192	0.023222
-9.31E-11	-4.819534	8.36E-05	0.228737	-0.022737
2.00E-10	-4.683018	-0.000343	0.130710	-0.004609

Unrestricted Adjustment Coefficients (alpha):

D(FDI)	4.44E+09	5.48E+08	-4.17E+08	1.30E+08	-4454417.
D(EXCHAN...	-0.007653	0.001375	0.028408	0.013322	0.001200
D(GDP)	611.3759	224.5192	-479.3544	-298.9446	-145.6651
D(INFLATION)	-0.288802	0.734958	0.339728	-0.601299	-0.040379
D(TRADE)	-8.872272	2.126816	-9.966207	2.616854	-0.616021

1 Cointegrating Equation(s): Log likelihood -1167.987

Normalized cointegrating coefficients (standard error in parentheses)

FDI	EXCHANGE...	GDP	INFLATION	TRADE
1.000000	-4.81E+10	-2234058.	-4.84E+09	34507006
	(6.1E+09)	(78877.1)	(5.8E+08)	(1.9E+07)

Adjustment coefficients (standard error in parentheses)

D(FDI)	-1.378500
	(0.58027)
D(EXCHAN...	2.37E-12
	(3.4E-12)
D(GDP)	-1.90E-07
	(9.9E-08)
D(INFLATION)	8.96E-11
	(1.1E-10)
D(TRADE)	2.75E-09
	(1.2E-09)

2 Cointegrating Equation(s): Log likelihood -1156.835

Normalized cointegrating coefficients (standard error in parentheses)

FDI	EXCHANGE...	GDP	INFLATION	TRADE
1.000000	0.000000	-717410.5	-4.17E+10	-1.12E+09
		(935908.)	(1.0E+10)	(3.4E+08)
0.000000	1.000000	3.16E-05	-0.765908	-0.023929
		(1.9E-05)	(0.20507)	(0.00689)

Adjustment coefficients (standard error in parentheses)

D(FDI)	-2.294761	1.17E+11
	(0.49828)	(2.5E+10)
D(EXCHAN...	2.14E-12	-0.101248
	(3.8E-12)	(0.19212)
D(GDP)	-2.27E-07	11212.50
	(1.1E-07)	(5526.15)
D(INFLATION)	-3.34E-11	2.561200
	(1.1E-10)	(5.61142)
D(TRADE)	2.40E-09	-112.4022
	(1.4E-09)	(67.6017)

3 Cointegrating Equation(s): Log likelihood -1146.790

Normalized cointegrating coefficients (standard error in parentheses)

FDI	EXCHANGE...	GDP	INFLATION	TRADE
1.000000	0.000000	0.000000	-5.39E+10	-1.50E+09
			(1.3E+10)	(4.6E+08)
0.000000	1.000000	0.000000	-0.229054	-0.006966
			(0.06165)	(0.00209)
0.000000	0.000000	1.000000	-17012.38	-537.5514
			(5082.96)	(171.929)

Adjustment coefficients (standard error in parentheses)

D(FDI)	-2.388053	1.24E+11	5541069.	
	(0.58902)	(3.4E+10)	(1306911)	
D(EXCHAN...	8.50E-12	-0.571951	-1.76E-05	
	(3.7E-12)	(0.21465)	(8.2E-06)	
D(GDP)	-3.35E-07	19154.97	0.734290	
	(1.2E-07)	(7135.16)	(0.27349)	
D(INFLATION)	4.27E-11	-3.067797	-4.94E-05	
	(1.3E-10)	(7.48616)	(0.00029)	
D(TRADE)	1.65E-10	52.72903	-0.000745	
	(1.3E-09)	(75.6446)	(0.00290)	

4 Cointegrating Equation(s): Log likelihood -1140.656

Normalized cointegrating coefficients (standard error in parentheses)

FDI	EXCHANGE...	GDP	INFLATION	TRADE
1.000000	0.000000	0.000000	0.000000	3.21E+08
				(1.8E+08)
0.000000	1.000000	0.000000	0.000000	0.000784
				(0.00111)
0.000000	0.000000	1.000000	0.000000	38.03335
				(86.7374)
0.000000	0.000000	0.000000	1.000000	0.033833
				(0.00830)

Adjustment coefficients (standard error in parentheses)

D(FDI)	-2.400166	1.24E+11	5551942.	5.89E+09
	(0.60336)	(3.5E+10)	(1311937)	(2.3E+09)
D(EXCHAN...	7.26E-12	-0.636154	-1.65E-05	-0.024135
	(3.6E-12)	(0.20619)	(7.8E-06)	(0.01359)
D(GDP)	-3.07E-07	20595.75	0.709313	1067.649
	(1.2E-07)	(7086.70)	(0.26747)	(467.054)
D(INFLATION)	9.87E-11	-0.169814	-9.96E-05	-0.894586
	(1.2E-10)	(6.87691)	(0.00026)	(0.45323)
D(TRADE)	-7.82E-11	40.11701	-0.000526	-7.712490
	(1.3E-09)	(75.7741)	(0.00286)	(4.99394)

Appendix 13: Granger Causality Test

Pairwise Granger Causality Tests
Date: 04/11/22 Time: 21:04
Sample: 1985 2019
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
EXCHANGE_RATE does not Granger Cause FDI	33	0.18902	0.8288
FDI does not Granger Cause EXCHANGE_RATE		1.90072	0.1683
GDP does not Granger Cause FDI	33	1.64571	0.2110
FDI does not Granger Cause GDP		6.16728	0.0060
INFLATION does not Granger Cause FDI	33	0.31600	0.7316
FDI does not Granger Cause INFLATION		2.13955	0.1366
TRADE does not Granger Cause FDI	33	0.51819	0.6012
FDI does not Granger Cause TRADE		2.76487	0.0802
GDP does not Granger Cause EXCHANGE_RATE	33	0.87285	0.4288
EXCHANGE_RATE does not Granger Cause GDP		0.28847	0.7516
INFLATION does not Granger Cause EXCHANGE_RATE	33	1.06895	0.3570
EXCHANGE_RATE does not Granger Cause INFLATION		6.57211	0.0046
TRADE does not Granger Cause EXCHANGE_RATE	33	3.81548	0.0342
EXCHANGE_RATE does not Granger Cause TRADE		1.65632	0.2090
INFLATION does not Granger Cause GDP	33	0.01402	0.9861
GDP does not Granger Cause INFLATION		1.49198	0.2423
TRADE does not Granger Cause GDP	33	1.88714	0.1703
GDP does not Granger Cause TRADE		1.81403	0.1816
TRADE does not Granger Cause INFLATION	33	1.60567	0.2187
INFLATION does not Granger Cause TRADE		2.49351	0.1008

Appendix 14: Vector Error Correction Model (VECM) Estimation

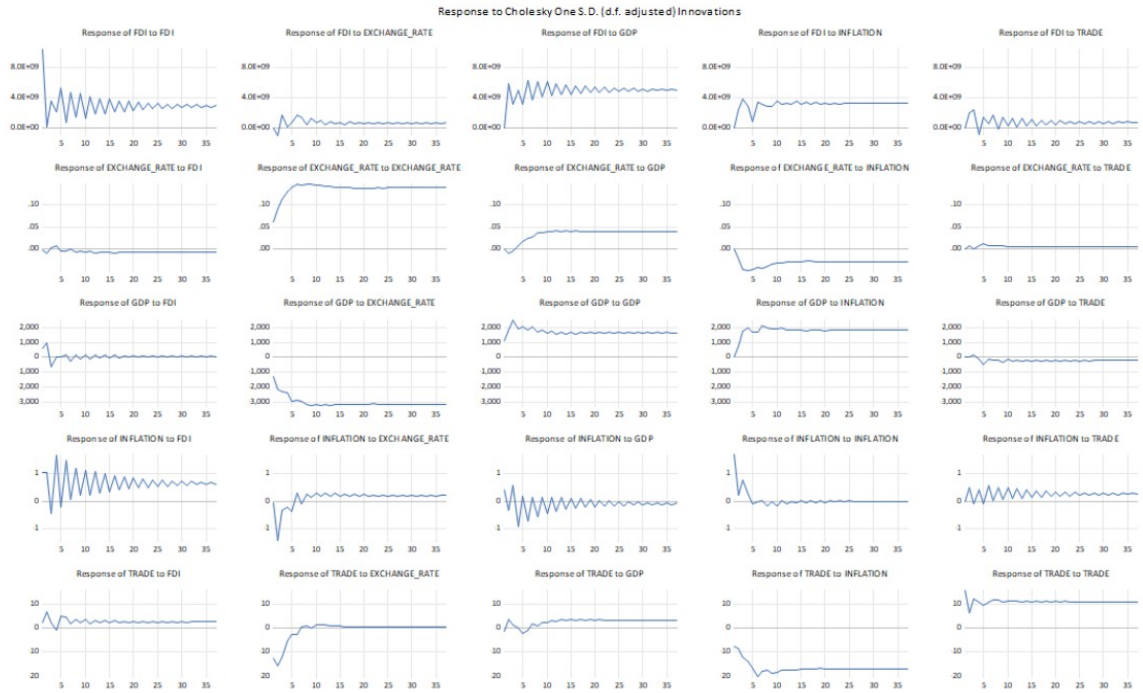
Vector Error Correction Estimates
Date: 04/11/22 Time: 21:04
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
FDI(-1)	1.000000
EXCHANGE_RATE(-1)	-4.81E+10 (6.1E+09) [-7.85587]
GDP(-1)	-2234058. (78877.1) [-28.3233]
INFLATION(-1)	-4.84E+09 (5.8E+08) [-8.39423]
TRADE(-1)	34507006 (1.9E+07) [1.80244]
C	1.15E+11

Error Correction:	D(FDI)	D(EXCHA...	D(GDP)	D(INFLATION)	D(TRADE)
CointEq1	-1.378500 (0.58027) [-2.37561]	2.37E-12 (3.4E-12) [0.70056]	-1.90E-07 (9.9E-08) [-1.92212]	8.96E-11 (1.1E-10) [0.80495]	2.75E-09 (1.2E-09) [2.29166]
D(FDI(-1))	-0.075987 (0.56936) [-0.13346]	-1.55E-12 (3.3E-12) [-0.46513]	1.47E-07 (9.7E-08) [1.51830]	-1.28E-11 (1.1E-10) [-0.11754]	-2.18E-09 (1.2E-09) [-1.85224]
D(FDI(-2))	-0.448276 (0.45176) [-0.99228]	1.18E-12 (2.6E-12) [0.44908]	-1.21E-07 (7.7E-08) [-1.57360]	-1.17E-10 (8.7E-11) [-1.35155]	-1.41E-09 (9.3E-10) [-1.51122]
D(EXCHANGE_RATE(-1))	4.43E+10 (5.9E+10) [0.74514]	0.603879 (0.34722) [1.73921]	-10144.01 (10110.2) [-1.00334]	-19.82190 (11.4042) [-1.73812]	63.47381 (123.060) [0.51579]
D(EXCHANGE_RATE(-2))	9.07E+10 (5.9E+10) [1.52683]	-0.004252 (0.34691) [-0.01226]	14655.28 (10101.3) [1.45083]	17.22611 (11.3942) [1.51183]	92.93787 (122.952) [0.75589]
D(GDP(-1))	1731964. (2704825) [0.64032]	1.48E-06 (1.6E-05) [0.09365]	0.141811 (0.45992) [0.30834]	-0.000157 (0.00052) [-0.30317]	0.011338 (0.00560) [2.02531]
D(GDP(-2))	-1184200. (1849724) [-0.64020]	8.31E-06 (1.1E-05) [0.76972]	-0.033184 (0.31452) [-0.10551]	0.000224 (0.00035) [0.63059]	0.000839 (0.00383) [0.21919]
D(INFLATION(-1))	-4.68E+09 (2.2E+09) [-2.09404]	0.000949 (0.01306) [0.07264]	-484.4171 (380.302) [-1.27377]	-0.281283 (0.42898) [-0.65571]	10.06917 (4.62899) [2.17524]
D(INFLATION(-2))	-1.92E+09 (1.2E+09) [-1.57097]	-0.005204 (0.00712) [-0.73074]	-129.3657 (207.367) [-0.62385]	-0.070460 (0.23391) [-0.30123]	4.383566 (2.52405) [1.73672]
D(TRADE(-1))	1.67E+08 (1.4E+08) [1.17146]	0.000390 (0.00083) [0.46843]	8.088149 (24.2284) [0.33383]	0.028347 (0.02733) [1.03723]	-0.702321 (0.29491) [-2.38151]
D(TRADE(-2))	2.05E+08 (1.2E+08) [1.71444]	-0.000174 (0.00070) [-0.24927]	8.502887 (20.3700) [0.41742]	0.004277 (0.02298) [0.18614]	-0.050304 (0.24794) [-0.20289]
C	8.21E+09 (3.6E+09) [2.24908]	-0.023975 (0.02131) [-1.12520]	1798.807 (620.413) [2.89937]	0.226527 (0.69982) [0.32369]	-10.07681 (7.55161) [-1.33439]
R-squared	0.620778	0.521161	0.696349	0.737282	0.462850
Adj. R-squared	0.412206	0.257800	0.529341	0.592788	0.167418
Sum sq. resids	2.24E+21	0.076368	64749103	82.38475	9592.915
S.E. equation	1.06E+10	0.061793	1799.293	2.029590	21.90082
F-statistic	2.976320	1.978882	4.169553	5.102487	1.566688
Log likelihood	-776.5230	51.20081	-277.7307	-60.53666	-136.6547
Akaike AIC	49.28269	-2.450051	18.10817	4.533541	9.290921
Schwarz SC	49.83234	-1.900400	18.65782	5.083192	9.840572
Mean dependent	3.68E+09	-0.023182	1815.677	-0.036149	-0.047527
S.D. dependent	1.38E+10	0.071727	2622.700	3.180518	24.00196

Determinant resid covariance (dof adj.)	3.64E+26
Determinant resid covariance	3.47E+25
Log likelihood	-1167.987
Akaike information criterion	77.06168
Schwarz criterion	80.03896
Number of coefficients	65

Appendix 15: Impulse Response Function



Appendix 16: Variance Decomposition using Cholesky (d.f. adjusted) Factors

Variance Decomposition of FDI:

Period	S.E.	FDI	EXCHAN...	GDP	INFLATION	TRADE
1	1.06E+10	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.25E+10	71.19211	0.642522	21.96707	3.871526	2.326774
3	1.43E+10	61.40387	1.785170	21.75712	10.29872	4.755124
4	1.56E+10	53.46689	1.509613	28.64882	12.03022	4.344459
5	1.68E+10	55.71496	1.469796	27.91513	10.49324	4.406872
6	1.84E+10	46.81090	1.999507	35.26096	12.17471	3.753919
7	1.97E+10	46.50626	2.269464	34.20714	13.04787	3.969260
8	2.09E+10	41.81416	2.049923	39.06380	13.52599	3.546137
9	2.20E+10	41.88360	2.138474	38.67933	13.71711	3.581493
10	2.32E+10	38.07196	2.010441	41.96655	14.70905	3.241997
11	2.42E+10	37.89686	2.012360	41.67834	15.18954	3.222896
12	2.52E+10	35.47824	1.880038	43.91527	15.75258	2.973882
13	2.61E+10	35.26096	1.853567	43.83392	16.07722	2.974328
14	2.70E+10	33.33051	1.762738	45.43674	16.68709	2.782917
15	2.79E+10	33.20840	1.725002	45.33263	16.98023	2.753739
16	2.87E+10	31.81202	1.647292	46.56720	17.36818	2.605313
17	2.95E+10	31.63414	1.623054	46.53571	17.62068	2.586414
18	3.03E+10	30.52609	1.563884	47.47077	17.97036	2.468896
19	3.10E+10	30.37477	1.539384	47.47635	18.16679	2.442709
20	3.18E+10	29.50470	1.492089	48.22345	18.43209	2.347672
21	3.25E+10	29.32962	1.473533	48.26477	18.60708	2.325007
22	3.32E+10	28.62195	1.435749	48.86177	18.83380	2.246725
23	3.39E+10	28.45728	1.418535	48.92308	18.97840	2.222705
24	3.45E+10	27.87434	1.387612	49.41486	19.16536	2.157826
25	3.52E+10	27.70579	1.373120	49.48959	19.29628	2.135224
26	3.58E+10	27.22077	1.347142	49.89517	19.45650	2.080418
27	3.64E+10	27.05875	1.333782	49.97874	19.57030	2.058429
28	3.71E+10	26.64907	1.311888	50.31843	19.70863	2.011982
29	3.77E+10	26.49159	1.299819	50.40581	19.81160	1.991181
30	3.83E+10	26.14352	1.280945	50.69232	19.93196	1.951252
31	3.89E+10	25.99338	1.269817	50.78125	20.02399	1.931566
32	3.94E+10	25.69396	1.253501	51.02546	20.12998	1.897095
33	4.00E+10	25.55111	1.243273	51.11361	20.21344	1.878572
34	4.06E+10	25.29201	1.228970	51.32347	20.30705	1.848503
35	4.11E+10	25.15678	1.219538	51.40990	20.38265	1.831132
36	4.17E+10	24.93042	1.206952	51.59175	20.46613	1.804752
37	4.22E+10	24.80278	1.198237	51.67549	20.53501	1.788473

Variance Decomposition of EXCHANGE_RATE:

Period	S.E.	FDI	EXCHAN...	GDP	INFLATION	TRADE
1	0.061793	0.290587	99.70941	0.000000	0.000000	0.000000
2	0.113266	0.652690	94.66115	0.677762	3.562797	0.445604
3	0.165717	0.355677	89.85123	0.436600	9.141541	0.214953
4	0.215667	0.308623	88.44530	0.347185	10.66996	0.228930
5	0.261297	0.228251	88.39668	0.679886	10.29781	0.397368
6	0.302758	0.198382	88.81643	1.197969	9.408688	0.378528
7	0.339166	0.158098	88.77826	1.631448	9.089556	0.342638
8	0.373137	0.163495	88.60544	2.270419	8.643184	0.317459
9	0.404405	0.156225	88.70858	2.763384	8.060422	0.311390
10	0.432334	0.169951	88.66899	3.264526	7.608185	0.288345
11	0.458090	0.165074	88.65410	3.651500	7.257017	0.272304
12	0.482173	0.178495	88.60602	4.038255	6.920134	0.257095
13	0.504682	0.181959	88.61949	4.320789	6.630092	0.247666
14	0.525859	0.191484	88.60098	4.585992	6.386415	0.235126
15	0.545983	0.191666	88.61144	4.781600	6.188380	0.226918
16	0.565320	0.200141	88.60259	4.970971	6.007839	0.218455
17	0.583899	0.200885	88.62441	5.108081	5.854045	0.212581
18	0.601832	0.205904	88.62447	5.241877	5.721992	0.205758
19	0.619244	0.206052	88.64159	5.342721	5.608444	0.201189
20	0.636189	0.209975	88.64599	5.443259	5.504616	0.196161
21	0.652687	0.210073	88.66231	5.520325	5.414751	0.192542
22	0.668790	0.212708	88.66667	5.598787	5.333406	0.188428
23	0.684530	0.212750	88.67954	5.661126	5.261068	0.185514
24	0.699931	0.214908	88.68395	5.725147	5.193770	0.182227
25	0.715004	0.214956	88.69461	5.777103	5.133573	0.179754
26	0.729774	0.216604	88.69817	5.830743	5.077489	0.176992
27	0.744258	0.216734	88.70668	5.875330	5.026363	0.174897
28	0.758468	0.218102	88.70997	5.921120	4.978245	0.172567
29	0.772417	0.218260	88.71692	5.959828	4.934259	0.170732
30	0.786122	0.219382	88.71977	5.999420	4.892704	0.168728
31	0.799590	0.219584	88.72557	6.033397	4.854329	0.167123
32	0.812837	0.220529	88.72820	6.067910	4.817972	0.165385
33	0.825869	0.220742	88.73310	6.097917	4.784278	0.163958
34	0.838700	0.221540	88.73552	6.128238	4.752262	0.162437
35	0.851336	0.221766	88.73974	6.154912	4.722412	0.161167
36	0.863788	0.222445	88.74201	6.181721	4.694003	0.159825
37	0.876062	0.222671	88.74566	6.205566	4.667415	0.158685

Variance Decomposition of GDP: Period	S.E.	FDI	EXCHAN...	GDP	INFLATION	TRADE
1	1799.293	12.05296	52.05120	35.89584	0.000000	0.000000
2	3573.538	10.60531	48.75416	36.55495	4.080785	0.004796
3	5282.543	6.417699	41.16026	39.60860	12.68961	0.123835
4	6427.186	4.337766	41.66090	35.86683	18.01493	0.119570
5	7557.515	3.137356	45.26267	33.20544	17.85078	0.543753
6	8485.816	2.536591	47.69543	31.18879	18.12277	0.456418
7	9471.526	2.134418	48.02922	29.81271	19.60048	0.423173
8	10320.39	1.829724	49.81708	27.78075	20.17833	0.394113
9	11157.49	1.573454	51.28374	26.58119	20.11208	0.449536
10	11868.33	1.411615	52.46015	25.39511	20.31829	0.414844
11	12583.26	1.269812	53.22962	24.59285	20.48940	0.418321
12	13211.13	1.172542	54.17244	23.70512	20.54759	0.402315
13	13836.64	1.070247	54.87184	23.14998	20.49683	0.411101
14	14398.08	0.998292	55.50335	22.57135	20.53391	0.393108
15	14961.64	0.925614	55.95030	22.18262	20.54612	0.395345
16	15478.67	0.874563	56.45285	21.74978	20.53821	0.384602
17	15996.52	0.819095	56.80334	21.47620	20.51550	0.385865
18	16478.88	0.777606	57.15460	21.16457	20.52727	0.375951
19	16963.55	0.733879	57.41658	20.95370	20.51919	0.376643
20	17419.93	0.700676	57.70017	20.71118	20.51826	0.369712
21	17877.38	0.665281	57.90656	20.54757	20.51091	0.369677
22	18312.17	0.637264	58.12598	20.35582	20.51710	0.363833
23	18747.38	0.608031	58.29521	20.21983	20.51310	0.363829
24	19163.68	0.584463	58.47824	20.06241	20.51555	0.359331
25	19579.45	0.559944	58.61895	19.94856	20.51357	0.358978
26	19979.41	0.539706	58.77055	19.81689	20.51758	0.355279
27	20378.20	0.518881	58.89203	19.71831	20.51586	0.354923
28	20763.47	0.501393	59.02163	19.60658	20.51849	0.351909
29	21147.06	0.483502	59.12650	19.52084	20.51775	0.351414
30	21519.09	0.468227	59.23793	19.42473	20.52020	0.348913
31	21889.07	0.452713	59.33031	19.34914	20.51943	0.348402
32	22249.06	0.439272	59.42728	19.26586	20.52129	0.346299
33	22606.75	0.425694	59.50879	19.19887	20.52091	0.345746
34	22955.77	0.413779	59.59383	19.12599	20.52243	0.343970
35	23302.34	0.401806	59.66652	19.06618	20.52208	0.343414
36	23641.32	0.391171	59.74161	19.00200	20.52333	0.341892
37	23977.76	0.380535	59.80667	18.94831	20.52315	0.341335

Variance Decomposition of INFLATION:

Period	S.E.	FDI	EXCHAN...	GDP	INFLATION	TRADE
1	2.029590	25.99883	0.031754	4.512422	69.45699	0.000000
2	2.764087	27.89804	26.87927	3.660056	38.23863	3.324006
3	2.984088	26.14693	24.33268	6.780555	39.79944	2.940387
4	3.583598	40.07955	17.17764	11.27228	28.07556	3.394964
5	3.615288	39.71953	17.96680	11.29855	27.62800	3.387117
6	4.018590	45.50737	15.05883	12.39338	22.36312	4.677294
7	4.022482	45.45283	15.05894	12.47573	22.33135	4.681154
8	4.277924	48.08669	13.67818	12.72787	19.90835	5.598903
9	4.289774	48.14158	13.70788	12.76884	19.79907	5.582627
10	4.493779	49.97470	12.92160	12.60465	18.17344	6.325603
11	4.509064	49.92746	13.03545	12.65510	18.05190	6.330085
12	4.683215	51.59022	12.52289	12.32857	16.78437	6.773937
13	4.700164	51.61253	12.58038	12.35083	16.66357	6.792679
14	4.841210	52.85346	12.27206	11.99580	15.72226	7.156433
15	4.861521	52.95732	12.30585	11.96112	15.59390	7.181815
16	4.979335	53.97967	12.04305	11.64587	14.87522	7.456188
17	5.003225	54.14050	12.06173	11.57103	14.73724	7.489498
18	5.105243	54.98435	11.84388	11.29409	14.15888	7.718798
19	5.131889	55.18526	11.84734	11.19359	14.01530	7.758508
20	5.223171	55.91512	11.66188	10.94701	13.53279	7.943195
21	5.252492	56.13931	11.65494	10.83131	13.38403	7.990405
22	5.334966	56.76356	11.50294	10.61033	12.97532	8.147852
23	5.366917	57.00573	11.48835	10.48573	12.82239	8.197802
24	5.442379	57.54925	11.36091	10.28568	12.47084	8.333310
25	5.476586	57.79720	11.34299	10.15763	12.31621	8.385974
26	5.546395	58.27529	11.23574	9.975244	12.00931	8.504417
27	5.582441	58.52511	11.21481	9.847180	11.85507	8.557832
28	5.647661	58.95063	11.12357	9.679632	11.58375	8.662419
29	5.685158	59.19762	11.10075	9.553759	11.43164	8.716234
30	5.746563	59.57983	11.02219	9.399267	11.18932	8.809395
31	5.785206	59.82237	10.99774	9.276856	11.04044	8.862606
32	5.843417	60.16833	10.92924	9.133860	10.82208	8.946490
33	5.882923	60.40447	10.90378	9.015719	10.67727	8.998756
34	5.938451	60.72012	10.84325	8.882949	10.47892	9.074760
35	5.978586	60.94894	10.81712	8.769511	10.33872	9.125707
36	6.031838	61.23864	10.76314	8.645833	10.15727	9.195117
37	6.072408	61.45944	10.73670	8.537292	10.02202	9.244554

Variance Decomposition of TRADE:

Period	S.E.	FDI	EXCHAN...	GDP	INFLATION	TRADE
1	21.90082	0.906558	33.33173	0.404411	11.78662	53.57068
2	30.04793	5.830461	45.45634	1.685901	14.18077	32.84653
3	36.64373	4.249065	41.39327	1.291574	20.28941	32.77668
4	41.01346	3.432259	34.73119	1.032310	27.78956	33.01467
5	45.64661	3.892786	28.35577	1.033775	35.61384	31.10383
6	51.49158	3.887739	22.58602	0.849425	43.75511	28.92171
7	55.84559	3.425505	19.21332	0.808229	47.44546	29.10749
8	59.83991	3.381505	16.75056	0.723160	49.89640	29.24837
9	63.68266	3.128471	14.79159	0.771396	52.67930	28.62924
10	67.42435	3.109680	13.23710	0.788644	54.43870	28.42587
11	70.67828	2.906370	12.07808	0.937906	55.69387	28.38378
12	73.82132	2.842424	11.10159	1.000609	56.66855	28.38683
13	76.72866	2.730065	10.28834	1.138608	57.59636	28.24663
14	79.59501	2.678481	9.574743	1.214190	58.26729	28.26530
15	82.21045	2.576060	8.984980	1.341090	58.83640	28.26147
16	84.80390	2.544889	8.450721	1.396980	59.32266	28.28475
17	87.26625	2.470846	7.983688	1.490572	59.80363	28.25127
18	89.69818	2.441154	7.561372	1.536688	60.17330	28.28749
19	92.00833	2.381313	7.188840	1.606916	60.53857	28.28436
20	94.30989	2.358237	6.845034	1.639986	60.85339	28.30336
21	96.52096	2.311724	6.536802	1.692959	61.16383	28.29468
22	98.71586	2.290167	6.251864	1.719631	61.42289	28.31545
23	100.8317	2.251785	5.993973	1.761025	61.68182	28.31140
24	102.9360	2.233972	5.753572	1.782428	61.90674	28.32329
25	104.9742	2.202050	5.533991	1.816168	62.12863	28.31916
26	106.9958	2.185645	5.328975	1.834869	62.32015	28.33036
27	108.9606	2.158885	5.140178	1.862896	62.51095	28.32709
28	110.9097	2.144304	4.963058	1.879414	62.67858	28.33464
29	112.8089	2.121460	4.798983	1.903389	62.84373	28.33244
30	114.6912	2.108107	4.644620	1.918333	62.98992	28.33902
31	116.5300	2.088520	4.500750	1.938988	63.13448	28.33726
32	118.3523	2.076408	4.364952	1.952555	63.26372	28.34237
33	120.1361	2.059367	4.237789	1.970588	63.39089	28.34136
34	121.9033	2.048279	4.117433	1.982958	63.50563	28.34570
35	123.6366	2.033400	4.004216	1.998767	63.61861	28.34501
36	125.3537	2.023239	3.896786	2.010072	63.72131	28.34859
37	127.0405	2.010113	3.795352	2.024044	63.82218	28.34831

Cholesky Ordering: FDI EXCHANGE_RATE GDP INFLATION TRADE

Appendix 17: Graph of Variance Decomposition using Cholesky (d.f. adjusted) Factors