The Relationship between Growth Rate and Outward Foreign
Dierct Investment of Thailand

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ความสัมพันธ์ระหว่างการลงทุนโดยตรงของไทยในต่างประเทศกับการเจริญเติบโตทางเศรษฐกิจ
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This paper determines whether there is a relationship between the growth rate in Thailand and outward foreign direct investment from ASEAN and Europe. The variables that have been adopted are outward foreign investment in ASEAN, outward foreign investment in Europe, foreign direct investment, and gross fixed capital formation, all of which have been measured using time series data from Quarter 1 in 2005 to Quarter 3 in 2021. The two-stage least squares model was employed in this investigation. The main findings are the outward foreign direct investment from ASEAN has a relationship with GDP and it also has an effect on the gross fixed capital formation. Furthermore, there is no relationship between foreign direct investment in Europe and GDP. The outward foreign direct investment from Europe has no impact on the gross fixed capital formation, which is a measure of economic growth that can be related to GDP growth.

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1. INTRODUCTION

1.1 Background

Many decades passed, the developing countries succeeded in developing their economic status until they could produce more products with high technology. Country's exports grew so large that they were able to accumulate huge international reserves. On the other hand, they had to face various pressures such as the exchange rate, labors, natural resources, and capital outflow.

Going out to invest in foreign countries, as foreign direct investment theory discusses the motives of investing abroad, the pursuit of the market acquiring or using raw materials in the country. They have been invested in enhancing efficiency for investors as well as avoiding undesirable conditions in investor countries. The incentives of foreign investment will not only allow the investor country to take advantage of the production factors in the host country. such as labor and natural resources with ease but it also reduces the pressure on the currency to a certain extent. The reason is the outflow of capital has resulted in the use of accumulated foreign currency and reduced the pressure on the exchange rate to some extent. Encouraging businesses to invest in foreign countries has also resulted in the existing business sectors in their own countries to survive and expand further. It may employ the aforementioned justification to examine the relationship or effect of foreign investing on the business of the invested country.

Thai Outward Foreign Direct Investment (OFDI) grew more than 31 times over the past 11 years, from 97,066.22 million baht in 2005 to 3,083,878.13 million baht in 2017. One of the reasons for the rapid increase in Thai direct investment is the Bank of Thailand's policy to relax capital flow regulations between the countries in October 2010. This will therefore cause the expansion of outward foreign direct investment in Thailand from 2011 until 2017. The way of many Thai companies' direct investment is through mergers and acquisitions with the local destination companies.

Thailand's government has placed greater emphasis on foreign direct investment in recent years, mostly because the country's leader wishes to encourage the country's investment in manufacturing, the hiring of more workers, and the transformation of technology. Unfortunately, Thailand is experiencing domestic turbulence and political sustainability concerns, which are affecting international investors' confidence, and as a result, the number of foreign investors coming to Thailand to invest has declined in recent years.

Figure 1: FDI and Thai OFDI from 2010-2015(Mil.USD)
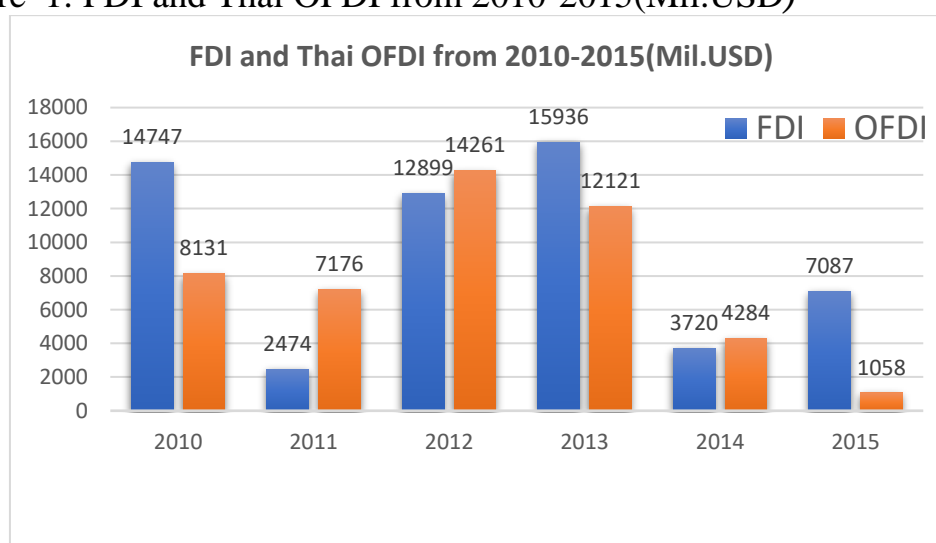
Source: Fiscal Policy office

From Figure 1, which shows Capital inflows and outbound foreign direct investment are two types of foreign direct investment between 2010 and 2015, it is found that the value of outward foreign direct investment is lower than foreign direct investment. Since 2011, this is the first year that outward foreign investment has been higher than inward foreign investment. In 2014, outward foreign direct investment had a value of 10,568 million dollars, increasing by 147 times compared with 2013 which had a value of 4,284 million dollars. It demonstrates that Thai investors have begun to show an interest in foreign country investment in order to seek a new market, resources, or high technology. Even though Thai foreign direct investment has grown a lot in the past, it hasn't been as big as it was before. On the other hands, Thailand's share of net foreign investment in gross domestic product (GDP) has risen over the last six years, it still isn't as high as other countries in the region for that time

period. Compared to neighboring countries like Singapore and Malaysia, where the average was 10% and 5%

Figure 2: The Destination of Thai OFDI 2007-2013
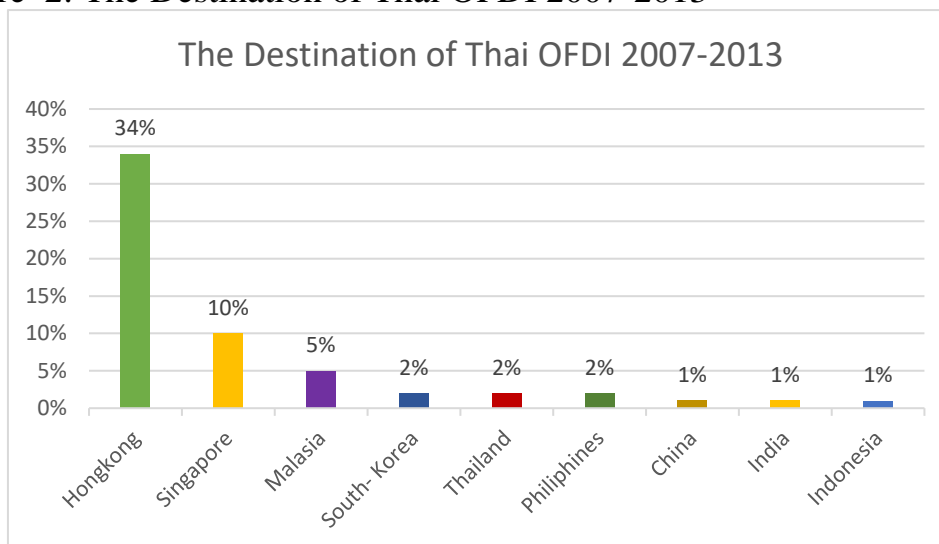
Source: World investment report 2015

Figure 2 illustrates the number one of most popular Thai business to invest abroad is the manufacturing sector, followed by mines and quarries Retail and wholesale repair of automobiles and motorbikes, chemical production, financial and insurance activities, which are mainly holding companies, respectively.

Figure 3 : The Amount of Thai Direct Investment's Detail in 2005-2015 (Mil. USD)
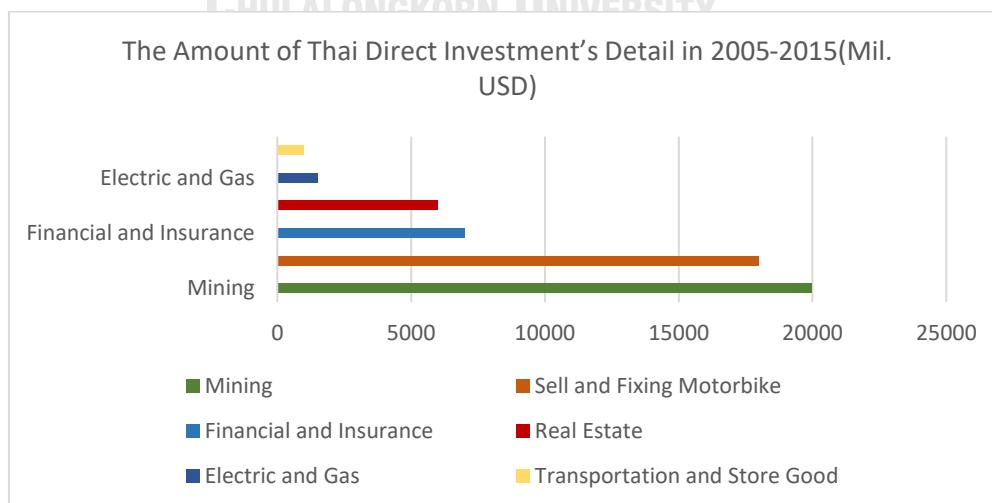
Source: BOT website

The ASEAN countries got the greatest amount of investment from Thai corporations between 2005 and 2015. Averaging 32.56 percent of total Thai direct investment abroad, ASEAN was the region where Thai direct investment was concentrated. However, the majority of Thai investment in ASEAN is concentrated in countries surrounding Thailand, such as Cambodia, Myanmar, Laos, and Vietnam, or the CLMV group as we call it, accounting for up to 27.97 percent of total ASEAN investment. One of the most attractive features for foreign investors in CLMV is the fact that it has a full source of natural resources and raw materials, has a huge workforce, pays relatively low salaries, and has a generalized system of preference that is favorable to the export of manufactured goods. Furthermore, Thailand is strategically placed in the heart of the ASEAN area, which shares borders with the CLMV countries, providing it with a geographic advantage for future expansion of manufacturing facilities.

A fascinating aspect of offshore direct investment is that it can have a good or negative impact on the economic growth of the country where it is invested. This is one of the most interesting aspects of offshore direct investment. The following is a description of the relationship between the variables that are present: Assuming that the foreign investment has a favorable correlation with the country's economic growth. where it is made, it is understandable why direct foreign investment helps to increase local output. The reason for venturing out to invest is that a new market can benefit from low-cost resources and labor, as well as the ability to learn technologies from other countries. It would unavoidably result in the importation of production elements or processed raw materials from other countries in order to make products at reduced costs and to encourage increased domestic production levels. Also of relevance is direct investment in ASEAN countries since it illustrates "how Thailand's economic growth will be affected by its direct investment in ASEAN countries and in Europe."

1.2 Research Questions

This paper aims to analyze the followings:

1. How does Gross Fixed Capital formation and Foreign Direct investment effect to Thai Growth Rate?
2. How the OFDI of ASEAN country effect the Gross fixed Capital formation?
3. How the OFDI of European Union effect the Gross fixed Capital formation?

The methodology is the Two Stage Least Square (TSLS)

1.3 Scope of the Research

Thai GDP and Gross Fixed Capital Formation (GFCF) have been collected on a quarterly basis from Q1: 2005 to Q3:2021. Information from the Office of the National Economic and Social Development Council is available for public use (NESDC) The other factor is the availability of credit from the Bank of Thailand and the National Statistical Office of Thailand based on the same range of GDP. It clearly shows where part of the information came from in the source of data.

1.4 The Advantage of This research

The study may be beneficial to market participants in the following ways: foreign investors, and government policymakers. After searching through this topic, the research will give you information that will help the policy maker decide on a new policy in some parts of the future. Creating a new policy to support investing in the future will not only help the country get more innovation and technology from foreign countries, but it can also help the country have more opportunities to get more employment in the future.

1.5 Independent variables

      1.1.1. Gross Domestic Product (GPD) of Thailand
      1.1.2. Outward Foreign Direct Investment
      1.1.3. GFCF of Thailand
      1.1.4. Foreign Direct Investment in Thailand
      1.1.5. UNEM of Thailand

1.6 Definition

   Gross Domestic Product (GDP) is the worth of a country's final goods and services produced during a specified time period and acquired by the final user is estimated (a quarter or a year). It is the sum total of all production within a country's borders. GDP is composed of goods and market-oriented services sale as well as certain non-market outputs, for instance, defense and informational services supplied by the government.

   Outward Foreign Direct Investment (OFDI) is a business model and plan in which a business owner expands seeks to expand its operations through an international country by new construction, acquisition, and/or extension of a foreign facility that already exists.

   Gross Fixe Capital Formation (GFCF) after deducting disposals, is the cumulative investment in fixed assets by resident producers over a particular time period. Additionally, certain gains in the valuation of non-produced assets that producers or institutional entities realize are included. Fixed assets are tangible or intangible assets that are developed because of industrial processes which are used consistently or constantly for a duration more than a year.

   Foreign Direct Investment (FDI) is concerned with the allocation that is made over an extended period of time and displays a long-term interest in and control of a business located in a particular economic system (overseas direct investment firm or mother enterprise) made by a resident entity in that economy in which the investment was made.

   Unemployment(UNEM) is a term that refers to a state in which an individual who is actively looking for work still has to find employment due to a shortage of open vacancies. Among economists, jobless is widely regarded as a critical indicator of the health of an economy.

2. LITERATURE REVIEW

To identify the interaction of OFDI, Lee (2010) discovered that the Japanese Gdp growth has a short-run influence on outward FDI in order to detect the interplay of OFDI. Furthermore, external FDI benefits GDP per capita only in the long run. While there is fear that outward FDI may result in the movement of manufacturing and Japan exports jobs to host countries, this paper contends that Outbound FDI-related actions are beneficial to the Japanese market in the long term, with only positive impacts on per capita income. Similar to Mohanty and Sethi (2019) examined the influence of outward foreign direct investment on human capital, gross capital creation, inflation, trade openness, and economic growth in the BRICS countries from 1985 to 2017 by using the well-known Fisher and Johansen tests for cointegration, as well as vector-error correction model. They discovered that while external FDI has a beneficial effect on human capital in the short run, it has a negligible effect in the long run. Additionally, the data indicate that outbound FDI has significantly boosted economic growth in the BRICS countries, both in the short and long run. Outward FDI and human capital have a bidirectional causality. OFDI was also supported by Ahmad, U.Draz and Yang (2015) have studied the impact of Outward Foreign Direct Investment (OFDI) on economic growth by using two methods. Firstly, they used the cross-country analysis for the population of ASEAN nations that were chosen, and They also used a time-series technique data for China. Both perspectives indicate that OFDI has a detrimental impact on the economic development. The study indicates that increasing foreign investment reduces domestic growth.

Some previous studies found that there is a relationship between FDI and the country's growth rate. For example, Herzer (2010) examined of the impact of outward foreign direct investment (FDI) on economic growthby combining two statistical strategies: cross-country analysis for a group of 50 countries and time-series estimation techniques for the US. The findings indicate that long-term causality is a two-way street, implying that gains in GDP and accompanying productivity improvements in turn allow enterprises to expand their international investment in turn. As a result, increased outbound foreign capital (FDI) is also a cause and an outcome of long-term economic growth. It is as

same as with Lee (2009) studied economic growth's effect on outbound FDI is examined using data from two high-income Asian countries: Japan and Singapore. In the short run, he found that There is a causal relationship between external FDI and Singapore's GDP per capita. , but there is no effect on Japan.

Moreover, the supported evidence from Braunerhjelm & Oxelheim & Thulin (2005) used The link between domestic and outbound foreign direct investment is estimated using a panel regression approach with fixed industry variables. They discovered that differences in industrial structures between nations suggest the presence of FDI impacts. At the aggregate level, the link between domestic and international direct investment will also be insufficient in an economic policy setting. Reanalysis to the industry level in order to assess the home-country consequences of FDI might be viewed as critical for effective policy formulation and implementation. The currency rate has no association with FDI. Chen and Zulkifli (2012) used a vector error-correction model to examine the relationship between outbound FDI and economic development in Malaysia from 1980 to 2010. (VECM). He discovered that the statistics suggest that outbound FDI has a positive and considerable impact on GDP in the long run. In the short-term, Granger causation between outbound FDI and economic growthis not observed. Pradhan and Singh (2017) used Tobit-ML (maximum likelihood) estimation to investigate knowledge flows and external FDI: An investigation into the Indian automotive industry. According to the study's sample, there are 436 Indian automobile companies to choose from. They discovered that foreign direct investment (FDI) is a crucial element in the expansion of the Indian automobile industry.

The study found the supportive evidence between FDI and OFDI. For example, Kayam (2009) examined the determinants affecting outward foreign investment from 65 emerging and transition economies between 2000 and 2006. The primary hypothesis investigated is that outbound FDI is primarily driven by limited size of the market, trade circumstances, cost of production, and local company conditions are all factors to consider. The fixed effects estimate technique is used to analyze the effects of these elements by examining variables pertaining to income, trade, infrastructure, labor market circumstances, and economic stability. His data lends credence to the hypothesis that trade

liberalisation results in an increase in OFDI from poor countries. Additionally, the African market's small size demonstrates its impact on OFDI. As the market size, as measured by GDP, grows, we expect to see a decline in direct investment outflows. On the other hand, as African countries' average income or wealth increases, outflows are expected to increase.

On the other hand, there are various contradictory findings that demonstrate that Outward foreign direct investment (OFDI) and FDI is not one of the elements that can boost a country's growth rate. For example, Zhang and Daly (2011) investigated using pooled ordinary least squares, we can identify the elements that are driving this growth from both an economic and a strategic standpoint (POLS). A panel data analysis approach is used in this study to quantify the primary determinants of Outward foreign direct investment from China is measured using a variety of factors, such bilateral and multilateral trade, market size, GDP growth, openness, and natural resource endowment. It was shown that the association among outward Export of goods and services from China to host nation, GDP per capita in host country, yearly GDP growth in host country, and trade openness in host country are all appropriately signed and statistically significant, according to the findings of the study Apart from that, we find that there is no association between outward FDI and imports, currency exchange, consumer prices, and natural resources. Similar to Kim (2000) studied the effect on outward direct investment in the performance of home country based on evidence of Korea by using Ordinary Least Square regression to investigation. The finding is there is no indication that OFDI by Korean multinational enterprises harmed home country performance. Even though foreign corporations in Korea are less reliant on foreign capital than firms in developing countries because foreign direct investment (FDI) was minor in contrast to native investment and investment demand increased as a result of increasing exports, it does not appear that foreign direct investment has considerably displaced domestic investment. As previously stated, the lack of evidence that OFDI has a detrimental effect on home country performance is due to the fact that Korean OFDI is still in its infancy: OFDI is not large enough to have foreign direct investment (FDI), there is a considerable impact on the local economy, and the methods connected with OFDI are not complicated enough to completely

replace for exporting on a net basis. Additionally, it was revealed that the OFDI of Korean multinational enterprises has a beneficial effect on exports. The developing countries' large percentage of OFDI and the strong link that exists between parent companies and foreign affiliates appear to have aided in the beneficial effect on exports by increasing exports by parent companies to subsidiaries in other countries.

Moreover, the other studies found that OFDI and FDI not increase the country's growth as Lian, Lin and Ma (2011) studied the overview of outward FDI flows of China. Outward foreign direct investment (FDI) from China is primarily concentrated in Asia, with Hong Kong, Macao, and Korea accounting for the majority of the total (71 percent). In 2005, Foreign direct investment (FDI) from China was focused in tax avoidance schemes such as Hong Kong, the Cayman Islands, and the British Virgin Islands, according to the World Bank. All of these countries ranked among the 20 largest foreign direct investment (FDI) targets in 2015. Latin America also accounted for a significant percentage of Chinese FDI in 2005, accounts for 80 percent of overall FDI, followed by Europe, which received 3 percent, Africa, which received 3 percent, and North America, which received 2 percent of total FDI. A further discovery was made by the researchers: China's outbound foreign direct investment (FDI) had no impact on the nation's growth rate. Calderón (2014) studied the outward FDI in Brazil by using a random effects (RE) generalized least squares method to ex- plore the determinants of OFDI in Brazil. He found that the OFDI was not effect to investment in country and the Growth rate of country. Ali, Shan, Wang, and Amin (2018) studied using annual time series data from China, this study shows the relationship between the growth of economic growth inward direct investment. They used the asymmetric ARDL technique to analyze the data and found that the overseas investment is not affect the economic growth of China. Similar to Goh, Wong, and Tham (2013) used the Hausman–Taylor estimating approach to examine the trade links between inward and outward FDI. They discovered that foreign direct investment (FDI) and trade links are irrelevant since OFDI is controlled by the financial services industry, which is typically non-tradable. The method of fragmentation or outsourcing, on the other hand, has the potential to promote intra-firm trade in goods and services and Ali j Al- Sadig (2011) studied the effect of OFDI on internal investment in 121 countries. He

found that OFID had a negative effect to internal investment because there was no money in the country to balance the investment.

By synthesizing the existing literature, it is possible to conclude that OFDI may have a significant effect on productivity and as a result, the economic prosperity of the home country is impacted. The link between outbound FDI and economic development, on the other hand, remains uncertain and requires empirical investigation.

3. DATA

Time-series data is a collection of data points separated by time intervals, and it was used to initiate and execute the regression in this investigation. Quarterly data has been gathered from the first quarter of 2005 and will be collected until the third quarter of 2021. The time series data can be described and modelled using a specific technique that is designed specifically for time series data. The material in the following article will assist you in better understanding the notion of time series testing.

3.1 Time Series Data

A time series is a set of observations taken over a specified time period. The term "time series" consists of a set of statistics that has been collected and classified in a chronological manner across a time span. The time interval over which data is stored is referred to represents the frequency of occurrences in a time series. In the majority of investigations, correlation between findings is a possibility.

Time series graph was plotted to demonstrate the many forms of time series data. On the y-axis, this graph shows an observed value against an x-axis time increment. Data are classified into four distinct categories: Mean reversion data includes temporal trending data, seasonality, and structural breaks. Occasionally, each of these conditions needs the use of a separate statistical approach to test the observation.

A necessary but not sufficient feature of stationary time series. When the statistical features of a time series may not change across time, the time series seems to be stationarily distributed. Both the dependent and independent variables must be steady in order to test for a correlation between them. There are numerous approaches for performing a stationary test, which will be discussed in detail in the methodology chapter.

3.2 Dependent Variable

Thai Gross Domestic Product (GDP) is the monetary worth of completed products and services acquired by the final consumer over a certain time period (say a quarter or a year). Thailand's economy is forecast to fall by 6.1 percent year on year in 2020, a rate comparable to that of the Tom Yam Kung Crisis. Due to the COVID-19 epidemic and government efforts to manage the outbreak, economic activity in a number of industries has been halted as a result of the outbreak. There has been a major impact on the tourism business as a result of international travel restrictions.

3.3 Independent Variable

During the course of analyzing Thailand's growth rate, the researchers came up with a concept of several variables that are mostly known in terms of internal and foreign direct investment, both in ASEAN and European countries. The following are the independent variables of financial variables in more detail:

1. Outward Foreign Direct Investment (OFDI) is Over the previous decade, Thailand's foreign direct investment has increased rapidly, and external inflows have recently surpassed domestic inflows. Thailand has surpassed Malaysia to become the second largest external investor in ASEAN in terms of foreign direct investment (FDI) shares in 2018. Outward investment is becoming increasingly important to the economy, with overseas foreign direct investment stocks as a proportion of GDP reaching 25 percent in 2018. Thai companies are expanding into ASEAN's neighboring countries and, increasingly, into other parts of the world. Slower domestic market development, higher labor costs, and limited access to export markets are all factors that have a substantial impact on Thai foreign direct investment (OFDI).

3.4 Source Of Data

Variable	Acronym	Source
Real Gross Domestic Product (GDP) Q1:2005-Q3:2021)	GDP	National Economic and Social Development Council (NESDC)
Outward Foreign Direct Investment in USD of ASEAN (Q1:2005-Q3:2021)	$OFDI_1$	Bank of Thailand
Outward Foreign Direct Investment in USD of European (Q1:2005-Q3:2021)	$OFDI_2$	Bank of Thailand
Gross Fixed Capital Formation	$GFCF$	National Economic and Social Development Council (NESDC)
FDI	IM	Bank of Thailand
Unemployment	$UNEM$	National Statistical Office Thailand

3.5 Conceptual Framework

Following the introduction of our variables to this study. The following clarification will include specifics regarding the analysis's processing. The process is illustrated in the chart below:

Methodology Framework

Figure 4: Methodology Framework
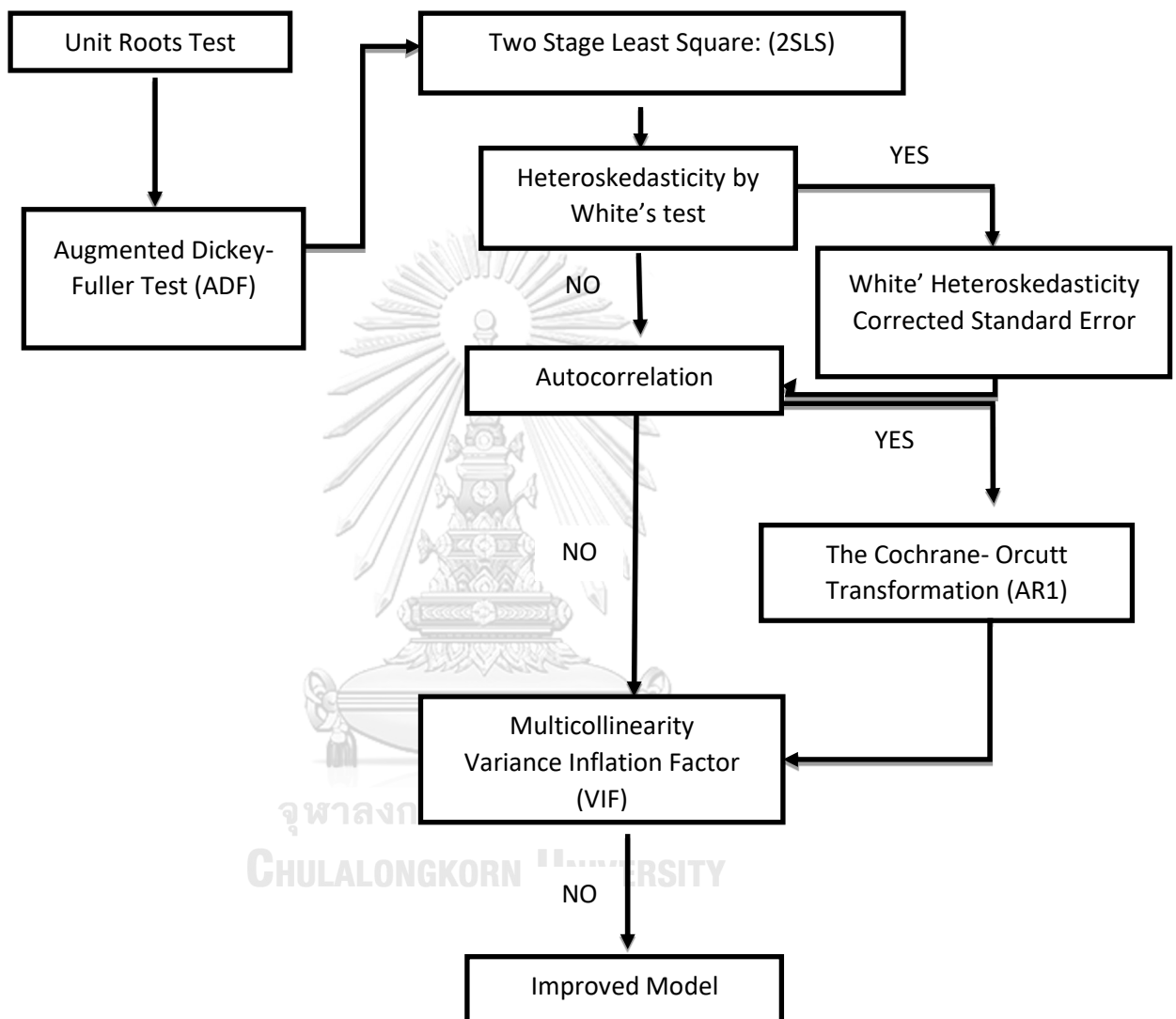
From Figure 4: The flow chart illustrating the analytical procedures used to arrive at the study's conclusions. The procedure begins with a stationary test using the Unit Roots Test. The Augmented Dickey-Fuller Test (ADF) is used to determine whether data are stable. Then, you have two alternatives for selecting the analysis. To begin, if the data pass the ADF test, we can proceed to the Two-Stage Least Squares test (2SLS). Second, if the data do not pass the ADF test, we can perform a log-

difference to make them more stationary, and then use the first analysis method

4. METHODOLOGY

The study of how outward foreign direct investment affects gross domestic product is mainly conducted in countries with relatively high foreign direct investment in developed countries. In contrast, for the developing countries, most of the investments made overseas are relatively small. In this study, it is necessary to clearly know the advantages or disadvantages of Thai foreign direct investment, especially the effect that it may have on the country's gross domestic product. To study whether Thai direct investment abroad affects the growth of the Thai economy or not, this research uses a statistical method known as the "two-stage least square model".

From the examination of documents and theoretical concepts, it was found that the impact of Thai direct investment affects the economic growth of Thailand through investment channels, therefore relying on the Simultaneous Equation System. It is necessary to verify the identifying properties of the system of continuity equations (identification). To determine whether the system's corresponding equation can be estimated Stimulating the related equations may cause endogeneity problems. Therefore, estimating with the Ordinary Least Square (OLS) method will result in parameter estimators that have the property of biased estimators and are not favorable unbiased linear estimators.

Therefore, this research was carried out to examine the identification properties. and solve the endogeneity problem of the system of equations due to the Two-Stage Least Square Model (2SLS).

Additionally, there are numerous tests for time series data analysis, including the augmented Dickey-Fuller test (ADF), heteroskedasticity, and the Durbin-Watson test. To determine if an observation is stationary or not. Whenever the statistical features of a time series data do not vary over time, the time series is considered to be stationary. Furthermore, this chapter will cover the methodology used in this study

4.1 Model of Study

The statistical method that is used in this research is the Two-Stage Least Square Model (2SLS) to identify whether Thai outward foreign direct investment affects Thai economic growth.

4.1.1 Two-Stage Least Square Regression

Two-stage least squares regression (2SLS) is a predictive model for studying structural equations that uses two stages of least squares regression. This is an expansion of the OLS approach once the error terms of the regression model are related with the independent variables, this method is used.

This technique is used to fit models with instrumental variables. 2SLS variables are classified into four categories: dependent, exogenous, endogenous, and instrument. These are defined in the following manner:

Dependent Variable, this is the variable on which the exogenous and endogenous (but not the instrument) variables are to be regressed.

Exogenous Variables, both the model for the first step of regression and the model for the second step of regression are used. incorporate these independent variables. These are not associated with the second stage regression's random error values.

Endogenous Variables, each endogenous variable is the first stage of the regression equation, it is turned into a dependent variable. Each of these variables is regressed against all exogenous and instrumental factors. Taking the expected values from all these regressions as a starting point, the endogenous variables' original values are replaced by their projected values in the regression model for the second stage.

Instrument Variables, during each endogenous variable is turned to a dependent variable in the first stage of the regression equation. For each of them, the regression analysis includes both exogenous and instrument factors. Consequently, in the second stage regression model, the projected

values from these regressions are substituted for their original values in the endogenous variables.

Two-Stage Least Square Regression:

$$Y_t = \beta_1 + \beta_2 X_{ex} + \beta_3 X_{en} + \varepsilon_1 \quad\text{.........................(1)}$$

Where:

Y_t	=	The Dependent Variable's Value
X_{ex}	=	The Exogenous regressor variable
X_{en}	=	the Endogenous regressor variable
ε_1	=	Error term

The econometric techniques used to examine the relationship between three variables which are Thai Gross Domestic Product, Foreign Direct Investment and Outward Foreign Direct Investment of ASEAN. The Two-Stage Least Square (TSLS) regression used the quarterly data from Q1:2005 to Q3:2021. The following equation is an estimation:

$$GDP = \beta_1 + \beta_2 FDI + \beta_3 GFCF + \varepsilon_1 \dots\dots\dots\dots\dots (2)$$

$$GFCF = \beta_4 + \beta_5 OFDI_1 + \beta_6 GDP + \varepsilon_2 \dots\dots\dots\dots. (3)$$

$$GFCF = \beta_7 + \beta_8 OFDI_2 + \beta_9 GDP + \varepsilon_3 \dots.\dots\dots\dots. (4)$$

Where:

GDP	=	Thai Gross Domestic Product
FDI	=	Foreign Direct Investment in Thailand
GFGF	=	Thai Gross Fix Capital Formation
$OFDI_1$	=	Outward Foreign Direct Investment of ASEAN
$OFDI_2$	=	Outward Foreign Direct Investment of Europe
$\varepsilon_1, \varepsilon_2, \varepsilon_3$	=	Error term

4.2 Unit Root Test by Augmented Dicky-Fuller Test (ADF)

The idea behind AR model estimate is the augmented Dicky-Fuller unit root test (Dickey and Fuller 1979), which is supported by evidence made at fixed points in time Furthermore, consider the ADF test, which is a form of statistical significance test that can be applied. This implies that a hypothesis test is associated with the null and alternative hypotheses, and so test statistics and P-values are produced and reported. ADF's premise can be expressed as follows:

$$H_0 : \delta = 0 \quad \text{(Non-Stationary)}$$

$$H_1 : \delta < 0 \quad \text{(Stationary)}$$

The test begins by examining the stationary at level I(0); if H_0 is accepted, it indicates that Y_t at the confidential level is non-stationary or has a unit root. The data must take the first differentiate I (1). In opposite, if H_1 is accepted, it implies that Y_t is stationary at the confidential level. If H_0 is not rejected, each data point must be differentiated until the data becomes stationary. Accepting H_1 after the first differentiation implies that yt is steady at the first differentiation. In conclusion, the primary requirement for avoiding false regression findings when using time series data is that the data must be stationary.

There are three distinct types of ADF tests, which can be expressed mathematically as follows:

Random walk of a nonstationary series:

$$Y_t = \delta Y_{t-1} + \varepsilon_t \dots \dots \dots \dots \dots \dots (5)$$

Random walk with Drift:

$$Y_t = \alpha + \delta Y_{t-1} + \varepsilon_t \dots \dots \dots \dots \dots (6)$$

Random walk with Drift and Deterministic Trend:

$$Y_t = \alpha + \delta Y_{t-1} + \beta_t + \varepsilon_t \dots \dots \dots \dots \dots \dots (7)$$

Where:

Y_t	=	The value of the time series at time 't'
δ	=	The first lag's coefficient on Y
Y_{t-1}	=	The lag 1 of time series
α	=	A Drift
β_t	=	A Predictable Pattern
ε_t	=	An error term having a mean of zero and a variance of one
t	=	The worth at the present moment

4.1.2.3 Heteroscedasticity Test: White's test

White's test is used to detect whether a regression model contains heteroscedasticity. It is known as heteroscedasticity in a regression model, and it relates to the inequality scatter of residuals across different levels of a dependent variables in a regression model. This is in opposition to one of the basic assumptions of linear regression, which is that residuals are distributed equally across all levels of the response variable.

The reason that I used White's test for Heteroscedasticity instead of The Breusch-Pagan which is the model already include cross-tern or the original square variable. This is known as the null hypothesis for White's test, which states that the variances of the errors are identical as seen in the following equation:

$$H_0 = \sigma_i^2 = \sigma^2 \text{ (homoscedasticity)}$$

$$H_1 = \sigma_i^2 \neq \sigma^2 \text{ (heteroscedasticity)}$$

We are unable to reject the null hypothesis because the p-value is greater than 0.05. We do not have enough data to conclude that heteroscedasticity is represented in the regression model at this point.

4.1.2.4   Autocorrelation with Durbin-Watson

The Durbin–Watson statistic, In a regression analysis, the autocorrelation at lag 1 in the residuals (prediction errors) was discovered and identified by James Durbin and Geoffrey Watson. The following hypotheses were put forward for the Durbin Watson statistic:

$$H_0 = First\text{-}order\ autocorrelation\ does\ not\ exist.$$

$$H_1 = First\text{-}order\ autocorrelation\ exists.$$

Assumption is:

- That the errors are normally distributed with a mean of 0.
- The errors are stationary.

The test statistic is also calculated with the following formula:

$$DW = \frac{\Sigma_{t=2}^{T} (e_t - e_{t-1})^2}{\Sigma_{t=1}^{T} e_t^2} \dots\dots\dots\dots\dots\dots\dots. (8)$$

The Durbin Watson test produces a test statistic between 0 and 4, where:

- The values in the range of 1.5 – 2.5 indicating that they are independent
- The values are in the range of 2.6 – 4.0, indicating that there is a negative correlation.
- There are values in the range 0 – 1.4 indicating that there is a positive correlation.

However, if the Durbin-Watson values are less than 1.5 and larger than 2.5, this indicates autocorrelation, or that the independent variables have a link with one another, which complicates the analytical equation calculation. There is an issue with multiple linear regression.

4.1.2.5   Multicollinearity test with VIF

One regulation that it needs to use for analyzing the Multiple Regression Analysis is that all factors are independent factors. It needs to be tested by using Tolerance Statistics and Variance Inflation Factor (VIF). If the tolerance value of the factor is nearly 1, it will show the independent factor. If the tolerance of the factor is nearly 0, it will show the multicollinearity problem. If the value of the variance inflation factor is nearly 10, it will show that the relationship of independent factors in multiple regression has a lot, which means there is a multicollinearity problem. For the analysis of the severity of multicollinearity, this was achieved by calculating the VIF value, where a higher VIF value indicates the correlation of the independent variables.

The general rule is that if VIF > 5 indicates correlation among independent variables. However, Kutner (2004) suggested that VIF>10 indicates correlation of independent variables. The VIF value can be calculated from:

$$VIF_k = \frac{1}{1 - R_k^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

The value of R_2 obtained by performing the regression of the independent variable k and the independent variable. The rest will assume that one independent variable will have a value of VIF. if the independent variables are not linearly correlated, or $R_2 = 0$, which means that VIF is equal to 1.

5. EMPIRICAL RESULTS

The examination of statistical data descriptions based on daily data, including Gross Domestic Product, FDI, OFDI, GFCF, and unemployment rate. The data set spans 67 quarters, beginning with the first quarter of 2005 and ending with the third quarter of 2021. The following are the findings:

5.1 Testing of Unit Root

Since time series data is included, the unit root test can produce unexpected findings. In 1979, American statisticians David Dickey and Wayne Fuller devised the Dickey-Fuller (DF) test. It is a common strategy in the year 2000. Additionally, they expand their analysis to include a more robust version of the unit root test known as the Augmented Dickey Fuller Test (ADF) (DF). This is the first and most critical stage in doing this investigation. If a time series does not exhibit seasonal or trending characteristics, it is said to be stationary. A more straightforward approach would be to adapt the stationary to any economics model, which would likewise produce the efficiency result.

Table 1 : Testing of Unit Root Statistic

Variable	Test ADF at Level	Test ADF with 1st Difference
	P-value	P-value
GDP	0.5897	0.0000*
FDI	0.0000*	-
GFCF	0.6127	0.0000*
OFDI-ASEAN	0.0000*	-
OFDI- Europe	0.0000*	-
UNEM	0.000*	-

Calculated by: GRETL   * is significant at the 0.05 level

In accordance with the findings in Table 1, the Augmented Dickey Fuller test is used to evaluate the null hypothesis of a unit root (that is, one that is not stationary) versus the alternative hypothesis of no unit root

(stationary). Critical values for finite samples are used in conjunction with 95% confidence intervals to indicate that the test is statistically significant. However, some variables investigated at the ADF level cannot be rejected, which indicates that these series are not stationary at the level; however, some variables examined at first difference using the ADF test can be rejected, showing that these series are not stationary at first difference.

5.2 The Analysis of Two Stage at Least Square (TSTS)

Stage least Square is one of the Linea instrumental estimators which is used to estimate the positive weight cause of effects. When we would like to use TSLS, they can separate by sequence as following: The dependent variable is for which prediction is required. Independent variables are those that contribute to the selection of the dependent variable. Furthermore, R-squared or Adjusted R-squared may be used to determine the amount of variance in a result that can be explained by difference in independent variables. R-squared continues to increase as the number of factors included to the multiple regression model increases. R-square shows the increasing of estimated variables which are adapted to the two state at least square.

The estimated equation as follow:

Model 1: The effect of Gross Fixed Capital formation and Foreign Direct investment to Thai Growth Rate.

$$\ln (GDP) = \beta_1 + \beta_2 \ln (FDI) + \beta_3 \ln (GFCF) + \varepsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Model 2: How the OFDI of ASEAN country effect the Gross fixed Capital formation.

$$\ln (GFCF) = \beta_4 + \beta_5 (OFDI_1) + \beta_6 \ln (GDP) + \varepsilon_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (10)$$

Model 3: How the OFDI of Big cap country effect the Gross fixed Capital formation.

$$\ln (GFCF) = \beta_7 + \beta_8 (OFDI_2) + \beta_9 \ln (GDP) + \varepsilon_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (11)$$

Table 2 : The Analysis Results

Variable	Model 1		Model 2		Model 3	
	Coefficient	T-Stat	Coefficient	T-stat	Coefficient	T-stat
β_1	$-4.39e+07$	-24.62***	193329	0.0006**	**163017**	**0.6628****
GDP	-	-	0.18552	-0.0003***	**0.189**	**2.985****
FDI	119.643	2.330**	-	-	**-**	**-**
GFCF	$3.47e+06$	26.39***	-	-	**-**	**-**
$OFDI_1$	-	-	8.341	0.0255**	**-**	**-**
$OFDI_2$	-	-	-	-	**-1.744**	**-1.294**
R^2	**0.763156**		0.53012		0.6157	
$Adjusted - R^2$	**0.733124**		0.52857		0.6049	
$Durbi - Watson$	**2.212**		2.0036		1.5659	

*** Significant at 1%, **Significant at 5%, * Significant 10%

Model with Coefficients That Have Been Substituted:

$$\ln(GDP) = -4.39e + 07 + 119.643\ln(\text{FDI}) + 3.47e + 06\ln(GFCF)\,.....(12)$$

$$\ln(GFCF) = 193329 + 8.341\,(OFDI_1) + 0.18552\ln(GDP)\,.......(13)$$

$$\ln(GFCF) = 163017 - 1.744(OFDI_2) + 0.189\ln(GDP)\,............(14)$$

The clearly observed result from Mode1 shows outcome from the two stage least square method that the adjusted R-square is equal to 0.7331, indicating that independent variables can explain approximately 73% of the change in the dependent variable. Foreign direct investment and the change in gross fixed capital formation have a positive coefficient of analysis of 119.643 and 3.47e+06. The Durbin-Watson is 2.212, which clearly shows the value of not facing an autocorrelation problem (independence). The result shows that FDI and the change in GFCF are factors that affect the change in Thai GDP, with both having a positive

relationship to GDP as well. The higher the change in gross fixed capital formation, the greater the change in Thai GDP will increase too. Furthermore, if foreign countries are interested in investing in Thailand, the Thai GDP will rise as a result of positive FDI feedback.

The result from Mode 2: it clearly shows that the adjusted R-square is equal to 0.52857, indicating that the change in GDP and outward foreign direct investment in ASEAN can explain approximately 52.8% of the change in gross fix capital formation in country. The outward foreign direct investment of Thailand and the Thai growth rate have a positive relationship to the change in gross fixed capital information of 8.341 and 0.18552. The Durbin-Watson coefficient is 2.0036, which clearly shows the value of not facing an autocorrelation problem (independence). The result shows that the outward foreign direct investment in ASEAN countries has a positive effect on the change in GFCF, which means, if the outward direct investment is increased, the change in GFCF will increase too. Furthermore, a change in GDP means that ASEAN outward direct investment will have a relationship with GFCF, implying an increase in the Thai growth rate. Therefore, if the change in GDP increases, the change in gross fixed capital will increase too, with positive feedback.

The result from Mode 3 is clear: it clearly shows that the adjusted R-square is equal to 0.6049, indicating that the change in GDP and outward foreign direct investment in Europe can explain approximately 60.49% of the change in gross fixed capital formation in a country. The Thai growth rate has a positive relationship with the change in gross fixed capital information of 0.189. On the other hand, outward foreign direct investment in Europe has a negative feedback on the change in GFCF of -1.744. Moreover, the P-value of OFDI in Europe is higher than the critical acceptable value of 0.05, so the outward foreign direct investment in Europe does not have any relationship to the change in GFCF and it cannot be estimated that it will have positive or negative feedback on the Thai growth rate. The Durbin-Watson coefficient is 2.0036, which clearly shows the value of not facing an autocorrelation problem (independence). The results show that outward foreign direct investment in European countries has nothing to do with the change in GFCF.

5.3 The Condition Examinations

To clarify, the results from the above, which use the two-stage at least square methods (TSLS), are appropriate for study or not. There are 3 general proposed assumptions for the regression that need verification.

Start by testing the heteroskedasticity. A significant observation made by the analysis is that all values are obtained from a constant variance sample with a constant error factor, a property known as homoscedasticity. If this null hypothesis were true, heteroskedasticity would arise because the error term is not stable. Whenever heteroskedasticity is eliminated, the model is particularly constant over time, but the estimator becomes less reliable and efficient. The general method that was selected to test the stable of variables is White's Test, where the null hypothesis and the alternative are shown below:

$$H_0 = \text{has Homoscedasticity}$$

$$H_a = \text{has Heteroscedasticity}$$

Table 3 : The result of Heteroscedasticity Analysis

White's test	Model 1	Model 2	Model 3
P-value	0.308914	0.200770	0.446651
Result	Accept Ho	Accept Ho	Accept Ho
	There is no issue of heteroskedasticity in the preceding three models.		

The second test is the Autocorrelation Analysis, which is required to determine whether the regression model's covariance between error terms is independent throughout period. When the same variables are substantially linked across measurements, the data is said to be autocorrelated. The Durbin-Watson test was used in this investigation, and the hypothesis and findings are provided in the table below.

$$H_0 = \text{has no Autocorrelation}$$

$$H_a = \text{has Autocorrelation}$$

Table 4 : The Result of Autocorrelation Analysis

Durbin-Watson	Model 1	Model 2	Model 3
P-value	**2.212**	2.0036	1.5659
Result	Accept Ho	Accept Ho	Accept Ho
	There is no issue of Autocorrelation in the preceding three models.		

The third test is the Multicollinearity Test; the major implication in the regression model is that the strong relationship between the regression coefficients does not occur, which is determined by the VIF (Variance Inflation Factor) Test, where the VIF value should not above 10 as shown in the table below.

Table 5 : The Result of VIF Analysis

Variable	Model 1	Model 2	Model 3
Testing VIF value	$\ln(FDI)$. 1.007 $\ln(GFCF)$. 1.007	$OFDI_1$ 1.311 $\ln(GDP)$. 1.311	$OFDI_2$ 1.453 $\ln(GDP)$. 1.453
Result	There is no issue of Multicollinearity in the preceding three models.		

6. CONCLUSION AND DISCUSSION

6.1 Conclusion

This research study provides an analysis of the relationship between the outward foreign direct investment of Thailand and the growth rate of the country. We demonstrate, using statistical techniques, that all variables are stationary at the first difference. The TSLS could be explained by both negative and positive impacts on GDP and GFCF. It also includes the one variable that could not be explained.

Outward foreign direct investment is playing an increasingly important role in Thailand. Thailand is entering an aging society, which causes the proportion of the domestic labor force to be limited. In addition, the government's policy launches the minimum wage of 300 baht across the country is forcing domestic operators to bear the cost. As a result of increased output, ASEAN countries are an important target for Thai businesses to invest in in order to maintain their competence in competition in the global market. Moreover, the situation of investment in ASEAN countries tends to expand continuously. Therefore, the impact of Thai direct investment in ASEAN countries on Thailand's economic growth was studied by the two-stage least squares estimation method (2SLS) in the quarterly period from the first quarter of 2005 to the third quarter of 2021, a total of 63 quarters.

Research found that when the foreign direct invest in country increased, It will increase Thai growth rate. Thai GDP will also rise with a significant level of 99 percent if there is a rise in the amount of gross fixed capital formation in the country. Moreover, the outward direct investment in ASEAN will have a positive feedback to GFCF. Outward foreign direct investment in Europe will not have a big impact on Thai GDPF. The study is quite clear to show that the increase in ASEAN'OFDI will affect with the GFCF in country and it has enough evidence to show that if OFDI in ASEAN increase, Thai Growth rate will increase too. This study's result is the same as Lee(2010) who discovered that OFDI will affect the Japanese GDP both in long run and short run. On the other hand, the study's result is difference as Ali, Shan, Wang, and Amin (2018) studied the dynamics between economic growth and overseas investment by using time series annual data from China. They found that the overseas investment is not affect the economic growth of China. The

GFCF shows that the country has more ability to invest directly in foreign country to invest in other businesses that can help Thai growth rate go up and Calderon (2014), who found that OFID had a negative effect on internal investment because there was no money in the country to balance the investment. Investments in other countries that help people in country, this means that Thailand should look for industries or investments that can benefit from ASEAN countries' economies in order to fully and efficiently benefit from their investments. such as the benefits of having all of nature's resources available. the country has a lot of people who work for low wages. tax and management benefits from countries where they have invested, such as investing in branches that have a lot of demand in the country where they are based.

6.2 Recommendation

The findings of the study revealed that outbound foreign direct investment in ASEAN countries has a statistically significant impact on the growth rate of Thailand. Researchers discovered that investing directly in ASEAN has a positive impact on Thailand's gross domestic product, which helps to better understand outward foreign direct investment between Europe and ASEAN. Because of this, businesses should invest or manufacture in industries that can make the most of a country's resources to their fullest capacity rather than those that cannot. One of the advantages of investing in ASEAN countries is that there is more labor available at lower wages, which can help you earn more profit in your firm. Furthermore, some ASEAN countries provide legal business assistance to those who wish to invest in their country, such as tax reductions, the introduction of more interested investors to your company, and the relaxation of restrictions and fees for transferring money to invest in ASEAN countries, among other things.

APPENDIX

Appexdix1: The Unit-Root test of FDI

```
Augmented Dickey-Fuller test for FDI
testing down from 10 lags, criterion AIC
sample size 66
unit-root null hypothesis: a = 1

  test with constant
  including 0 lags of (1-L)FDI
  model: (1-L)y = b0 + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.889734
  test statistic: tau_c(1) = -7.14828
  asymptotic p-value 1.308e-10
  1st-order autocorrelation coeff. for e: -0.010

  with constant and trend
  including 0 lags of (1-L)FDI
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.889706
  test statistic: tau_ct(1) = -7.09134
  asymptotic p-value 1.348e-09
  1st-order autocorrelation coeff. for e: -0.010
```

Appexdix2: The Unit-Root test of GDP

```
Augmented Dickey-Fuller test for GDP
testing down from 10 lags, criterion AIC
sample size 66
unit-root null hypothesis: a = 1

  test with constant
  including 0 lags of (1-L)GDP
  model: (1-L)y = b0 + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.0227813
  test statistic: tau_c(1) = -1.38831
  asymptotic p-value 0.5897
  1st-order autocorrelation coeff. for e: 0.170

  with constant and trend
  including 0 lags of (1-L)GDP
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.20118
  test statistic: tau_ct(1) = -2.34543
  asymptotic p-value 0.4086
  1st-order autocorrelation coeff. for e: 0.056
```

Appexdix3: The Unit-Root test of ln(GDP)

```
Augmented Dickey-Fuller test for ld_GDP
testing down from 10 lags, criterion AIC
sample size 65
unit-root null hypothesis: a = 1

  test with constant
  including 0 lags of (1-L)ld_GDP
  model: (1-L)y = b0 + (a-1)*y(-1) + e
  estimated value of (a - 1): -1.12656
  test statistic: tau_c(1) = -8.99702
  asymptotic p-value 4.879e-16
  1st-order autocorrelation coeff. for e: -0.003

  with constant and trend
  including 0 lags of (1-L)ld_GDP
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + e
  estimated value of (a - 1): -1.1738
  test statistic: tau_ct(1) = -9.38005
  asymptotic p-value 2.296e-17
  1st-order autocorrelation coeff. for e: -0.005
```

Appexdix4: The Unit-Root test of OFDI1

```
Augmented Dickey-Fuller test for OFDIASEANORI
testing down from 10 lags, criterion AIC
sample size 66
unit-root null hypothesis: a = 1

  test with constant
  including 0 lags of (1-L)OFDIASEANORI
  model: (1-L)y = b0 + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.62324
  test statistic: tau_c(1) = -5.27974
  asymptotic p-value 5.278e-06
  1st-order autocorrelation coeff. for e: -0.006

  with constant and trend
  including one lag of (1-L)OFDIASEANORI
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -1.06839
  test statistic: tau_ct(1) = -6.44018
  asymptotic p-value 8.835e-08
  1st-order autocorrelation coeff. for e: -0.019
```

Appexdix5: The Unit-Root test of OFDI2

```
Augmented Dickey-Fuller test for OFDIEURO
testing down from 10 lags, criterion AIC
sample size 63
unit-root null hypothesis: a = 1

  test with constant
  including 3 lags of (1-L)OFDIEURO
  model: (1-L)y = b0 + (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -0.337468
  test statistic: tau_c(1) = -1.91719
  asymptotic p-value 3.246e-06
  1st-order autocorrelation coeff. for e: -0.069


  with constant and trend
  including 0 lags of (1-L)OFDIEURO
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + e
  estimated value of (a - 1): -1.14297
  test statistic: tau_ct(1) = -9.10158
  asymptotic p-value 2.577e-16
  1st-order autocorrelation coeff. for e: -0.001
```

Appexdix6: The Unit-Root test of GFCF

```
Augmented Dickey-Fuller test for GFCF
testing down from 10 lags, criterion AIC
sample size 66
unit-root null hypothesis: a = 1

  test with constant
  including 0 lags of (1-L)GFCF
  model: (1-L)y = b0 + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.0333329
  test statistic: tau_c(1) = -1.32172
  asymptotic p-value 0.6217
  1st-order autocorrelation coeff. for e: 0.017

  with constant and trend
  including 0 lags of (1-L)GFCF
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + e
  estimated value of (a - 1): -0.20457
  test statistic: tau_ct(1) = -2.60119
  asymptotic p-value 0.2798
  1st-order autocorrelation coeff. for e: 0.099
```

Appexdix7: The Unit-Root test of In(GFCF)

```
Augmented Dickey-Fuller test for ld_GFCF
testing down from 10 lags, criterion AIC
sample size 64
unit-root null hypothesis: a = 1

  test with constant
  including one lag of (1-L)ld_GFCF
  model: (1-L)y = b0 + (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -1.16917
  test statistic: tau_c(1) = -6.54566
  asymptotic p-value 5.232e-09
  1st-order autocorrelation coeff. for e: -0.012

  with constant and trend
  including one lag of (1-L)ld_GFCF
  model: (1-L)y = b0 + b1*t + (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -1.18482
  test statistic: tau_ct(1) = -6.56304
  asymptotic p-value 4.15e-08
  1st-order autocorrelation coeff. for e: -0.013
```

Appexdix8: Testing Heteroskedasticity Model 1

```
White's test for heteroskedasticity
   Null Hypothesis: heteroskedasticity not present
   using observations 2005:1-2021:3 (T = 67)
   Dependent variable: uhat^2
   Test statistic: TR^2 = 5.972395,
   with p-value = P(Chi-square(5) > 5.972395) = 0.308914
```

Appexdix9: Testing Heteroskedasticity Model 2

```
White's test for heteroskedasticity
   Null Hypothesis: heteroskedasticity not present
   using observations 2005:1-2021:3 (T = 67)
   Dependent variable: uhat^2
   Test statistic: TR^2 = 7.278042,
   with p-value = P(Chi-square(5) > 7.278042) = 0.200770
```

Appexdix10: Testing Heteroskedasticity Model 3

```
White's test for heteroskedasticity
    Null Hypothesis: heteroskedasticity not present
    using observations 2005:1-2021:3 (T = 67)
    Dependent variable: uhat^2
    Test statistic: TR^2 = 11.249511,
    with p-value = P(Chi-square(5) > 11.249511) = 0.446651
```

Appexdix11: Testing VIF Model 1

```
Variance Inflation Factors
Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

       FDI    1.007
    l_GFCF    1.007

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient
between variable j and the other independent variables
```

Appexdix12: Testing VIF Model 2

```
Variance Inflation Factors
Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

OFDIASEANORI    1.311
         GDP    1.311

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient
between variable j and the other independent variables
```

Appexdix13: Testing VIF Model 3

```
Variance Inflation Factors
Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

       GDP    1.453
   OFDIEURO    1.453

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient
between variable j and the other independent variables
```

Appexdix14: Testing TSLS Model 1

```
Model 1: TSLS, using observations 2005:1-2021:3 (T = 67)
Dependent variable: GDP

                 coefficient    std. error    t-ratio   p-value
      ------------------------------------------------------------
      const      -4.39746e+07   1.56622e+06   -24.62    1.08e-37  ***
      FDI         119.644        33.8094        2.330    0.0011    ***
      ld_GFCF     3.47905e+06    115683        26.39     1.80e-39  ***

Mean dependent var    3132420    S.D. dependent var    736846.8
Sum squared resid     2.37e+12   S.E. of regression    192276.3
R-squared             0.763156   Adjusted R-squared    0.733124
F(2, 64)              452.6372   P-value(F)            1.70e-38
Log-likelihood       -908.7024   Akaike criterion      1823.405
Schwarz criterion     1830.019   Hannan-Quinn          1826.022
rho                   0.555293   Durbin-Watson         2.212198
```

Appexdix15: Testing TSLS Model 2

```
Model 2: TSLS, using observations 2005:1-2021:3 (T = 67)
Dependent variable: GFCF
Instrumented: GDP

                  coefficient    std. error    t-ratio   p-value
      ------------------------------------------------------------
      const        193329        20377.8        0.0006   4.71e-09  ***
      OFDIASEANORI   8.34158       5.91827       0.0255   0.0482    **
      GDP            0.18552       0.00692329   -0.0003   9.03e-39  ***

Mean dependent var    765363.1   S.D. dependent var    148183.1
Sum squared resid     8.26e+10   S.E. of regression    35926.71
R-squared             0.530122   Adjusted R-squared    0.528570
F(2, 64)              533.9422   P-value(F)            1.19e-40
Log-likelihood       -1793.394   Akaike criterion      3592.787
Schwarz criterion     3599.401   Hannan-Quinn          3595.405
rho                   0.716927   Durbin-Watson         2.003647
```

Appexdix16: Testing TSLS Model 3

```
Model 6: TSLS, using observations 2005:2-2021:3 (T = 66)
Dependent variable: GFCF

                 coefficient    std. error    t-ratio   p-value
      ------------------------------------------------------------
      const       163017         366386         0.6628   4.79e-19  ***
      GDP           0.189259       0.122136     2.985    9.34e-46  ***
      OFDIEURO     -1.74406       161.686      -1.294    0.2579

Mean dependent var    769296.4   S.D. dependent var    145751.6
Sum squared resid     5.26e+11   S.E. of regression    91396.33
R-squared             0.615778   Adjusted R-squared    0.604914
F(2, 63)              1.615663   P-value(F)            0.206885
Log-likelihood       -2445.850   Akaike criterion      4897.701
Schwarz criterion     4904.270   Hannan-Quinn          4900.297
rho                   0.065862   Durbin-Watson         1.565947
```

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