

# Application of the Least Squares Approach in Modelling Foreign Direct Investment Decisions

Ni Nyoman Aryaningsih\* I Made Ariana P. Rany Wedasuari Wayan Eny Mariani

Accounting Departement, Politeknik Negeri Bali

Badung, Indonesia

Corresponding Author, E-mail: [nyomanaryaningsih@pnb.ac.id](mailto:nyomanaryaningsih@pnb.ac.id)

## Abstract

Foreign direct investment shows an increase every year. A number of economists see foreign direct investment as a potential opportunity to promote a country's economic growth. The importance of comprehension for long-term investment decisions involves conducting a foreign direct investment decision analysis that utilizes mean values, median values, and standard deviations. This study was conducted to analyse foreign direct investment decisions concerning the potential long-term impact probability values. This study uses a quantitative approach, incorporating time series data collected from 2018 to 2024. The data analysis method utilizes the Least Squares Technique with EViews 13 software. The research results indicate that choices related to foreign direct investment can be influenced by evaluating probability values, calculating the average of direct investment, median numbers, and standard deviation figures. The research results suggest that the FDI opportunity values, based on the elevated average FDI value compared to both the median value and Standard Deviation value, imply that FDI choices may produce more favourable outcomes over time. Modelling FDI decisions with the Least Square method produces very accurate results. This research concludes that upcoming studies should concentrate on identifying and analysing feasible FDI in economic sectors that enhance community well-being, thus proving that FDI successfully boosts a country's economy.

**Keywords:** Least square method, Foreign direct investment, Decision investment

**JEL Code:** C2, G23, F46

**Orcid Number:** 0000-0002-9870-2216

**DOI:** 10.7176/JESD/16-6-04

**Publication date:** August 31<sup>st</sup> 2025

## 1. INTRODUCTION

Foreign direct investment (FDI) in Indonesia has demonstrated significant growth from 1990 to the present. The significance of this direct investment by various experts like Eduard et al. (2015) is viewed as a possible opportunity to enhance the economic growth of a nation. Therefore, it is crucial for domestic investment policymakers to possess accurate and thorough knowledge when making FDI decisions in Indonesia. The influence of the global economy and the progression of information technology is noted in the UNCTAD report (2001) cited in (Eduard et al., 2015), indicating that FDI worldwide has risen from \$209 million in 1990 to \$1,118 million in 2000. The growth of FDI has also reached developing nations such as Indonesia. In 1999, the World Investment Report observed that worldwide production and sales expanded at a quicker pace than global GDP and exports. Since 1990, companies globally have not only depended on output growth for exports but also on foreign direct investment (FDI). In 2008, the OECD countries attracted 50% of FDI. FDI growth from 2003 to 2007 was five times larger than the prior year. The UNCTAD Report (2012) indicates that from 2000 to 2012, FDI originating from BRICS nations rose from 6% to 27% (Eduard, et al., 2015). Nations with economic development and ample natural resources will draw in foreign direct investment. The economic circumstances in Indonesia will demonstrate this assertion. Similarly, (Solow, 1956); (Cicea & Marinescu, 2021); (Dao, Khuc, Dong, & Cao, 2024) demonstrate that FDI in different nations can affect income inequality and enhance a nation's output growth.

FDI in a nation is viewed not just as capital growth but also as a catalyst for technology exchange, as

noted by (Romer, 1990); (Crespo & Fontoura, 2007) identified four aspects of FDI concerning technology transfer, which include: labour mobility, demonstration effects, competition, and both backward and forward linkages within a country's economic sector. Evidence concerning labour mobility by Görg & Strobl (2005) indicated a transformation in the functioning of the workforce within local firms, resulting in improved human capital. Certain perspectives also suggest that the FDI Decision can be modelled. Nonetheless, certain questions emerge, what is the structure of modelling? Is it possible to create models based on mean, median, and standard deviation values? This study will analyze the issue of making FDI decisions utilizing the least square technique. Currently, there remains uncertainty regarding the formation of the modeler through mean, median, and SD values. This paper will offer a description and analysis of FDI modelling using the least squares method. The least square approach will be explained in the following methodology section. Additionally, the growth value reflects the average opportunity value and investment risk.

## 2. LITERATURE REVIEW

### 2.1 *Investment Theory*

The Markowitz model focuses on selecting an investment portfolio driven by the pursuit of anticipated return and risk (Tandelilin, 2017). The Markowitz model limits investment choices to portfolios consisting of risky assets. The core idea behind investment decisions is signalling theory. This theory proposes that investment spending conveys a positive indication regarding future corporate expansion, resulting in an increase in stock prices as an indicator of company value. Fisher characterized the discount rate as the return on investment or the internal rate of return. In contrast, Keynes labelled it the marginal efficiency of capital (Baddeley, 2003 & Alchian, 1955). Keynes (1936) asserted that investment persists until "there is no longer a type of capital asset with a marginal efficiency exceeding the current interest rate." Keynes did not view investment as a way to achieve equilibrium. Hayek (1941) and Fisher (1930), on the other hand, viewed investment as an excellent means to reach the optimal capital stock. In Keynesian theory, investment is not affected by any essential concept of capital stock. Instead, genuine or profound uncertainty comes to the forefront. Keynes believed that humans were inherently "animalistic" and that this, along with unpredictable and irrational expectations, led to perceiving investment as an adjustment process toward equilibrium.

### 2.2 *Neoclassical Theory, Accelerator Principle, Q-Tobin Investment Model.*

Investment references additionally examine neoclassical theory, the accelerator principle, and Tobin's investment theory. All three theories assume perfect behavior by those making investment choices. Neoclassical and Tobin's investment theories distinctly assume the maximization of profit/value. The accelerator investment theory implicitly assumes this, suggesting that the ideal capital stock determines investment levels. Jorgenson's (1963, 1967, and 1971) neoclassical investment theory is fundamentally grounded in optimization. A company's task is to maximize profits in every period, resulting in the optimal capital stock. The assumption is that the production function can be represented in a typical Cobb-Douglas format. The ideal capital stock changes only partially during each period, with the adjustment factor being affected by the difference between actual and targeted capital (Mueller, 2003). As neoclassical theory asserts that capital adjusts quickly and completely to the desired capital stock, the investment function essentially disappears.

### 2.3 *Investment Theory*

The accelerator approach is often associated with the Keynesian model, primarily due to its assumption of stable prices. The acceleration principle was first proposed by Clark (1917) and is best known for its application in the business cycle by Samuelsson (1939a and b). The accelerator is essentially a particular case of neoclassical investment theory where the price factor has been reduced. Assuming that output prices stay unchanged and considering the price variable along with the expected investment value in the user's cost of capital, as indicated by Jorgenson (1963), the accelerator principle is well acknowledged. The anticipated capital stock is assumed to correlate with production. Investment over any designated timeframe will depend on an increase in production. By means of fluctuating pricing and incremental adjustments to the intended capital stock, the investment in each period depends on output prices, input expenses, and interest rates (the cost of capital). Vernon Smith (1961) demonstrated what he called the "logical inseparability" of 'marginal efficiency' alongside the 'accelerator' elements affecting investment spending. Smith (1961) utilized the calculus of variations to derive the results. Eisner and Strotz (1963) noted that lags in a company's investment process are a crucial factor influencing macroeconomic patterns. The investment process includes three types of delays: decision delays, delivery delays, and completion delays. These delays influence economic variations. The impact of expectations, the flexible accelerator model (changes in production), and their implications for public policy are analysed.

## 2.4 Q-Investment Model

Two main problems arise with the accelerator theory and neoclassical investment theory. It first indicates that both theories imply that in each period, the adjustment of the capital stock to the desired level is instant and complete during every period. The method involves integrating an adjustment cost function into the optimization problem (Gould, 1968; Lucas, 1967; Treadway, 1969). The second problem is that expectations have no effect in neoclassical and accelerator theories. Brainard and Tobin (1968) along with Tobin (1969) offered a resolution to this problem. Investment persists until the asset's market worth aligns with its replacement cost. Moreover, adding a marginal adjustment cost function to the profit function makes neoclassical theory logically indistinguishable from Q theory. The Q theory of investment, introduced by Brainard and Tobin (1968) and further developed by Tobin (1969), is also proposed. Geanakoplos (2008) & Lo (2004). Casti (2008) claims that acknowledging the potential for investors to develop expectations rooted in their assumptions about the actions of other investors creates a realm of induction instead of deduction. Rational Expectations Theory Traditional Deductive Method: In classical economic frameworks (e.g., the Efficient Market Hypothesis), it is assumed that investors create expectations through deductive reasoning. This indicates that investors utilize all accessible information, comprehend the fundamental economic model of the market, and maintain rational and impartial expectations. One more benefit of marginal Q compared to Tobin's Q and other performance metrics is that it mitigates the issue of endogeneity. Gugler & Yurtoglu (2003) tackled the endogeneity issue, highlighting the connection between profitability and investment. Eisner and Strotz (1963) asserted that delays in a firm's investment activities are significant factors affecting macroeconomic trends. The investment process involves three kinds of lags: decision lags, delivery lags, and completion lags. These delays affect economic fluctuations. The discussion includes expectations, the adaptable accelerator model (changes in output), and the effects on public policy.

## 3. RESERCH AND METHODOLOGY

The quantitative research method utilizes secondary data, specifically in the form of time series data covering the years 2018 until to 2024. FDI information is sourced from [www.bi.go.id](http://www.bi.go.id), as published by the Institution. The data analysis technique employs the Least Square Method and is executed using the Eviews 13 software.  $\beta$ to compare descriptive statistical values. When the mean and median values of the collected data show a significant disparity, it is essential to regard the least square method as a tool for analysis. This document aims to clarify uncertainties regarding the least square method not being a direct least square modelling. The modelling of FDI decision-making using econometric techniques is represented as a straightforward linear regression model utilizing the least squares approach with the following equation.

$$Y_{it} = \beta_0 + \beta_i X_i + \varepsilon_i$$

The explanation of formula (1) indicates  $\alpha$  = constant;  $\beta$  = parameter of estimated result;  $\alpha_i$  = various individual effects for each i-th individual,  $X'_{it}$  = ith observation of P independent variables. P independent variables for FDI are expressed in terms of mean value ( $X_e$ ), median value ( $X_d$ ), standard deviation value ( $X_s$ ),  $Y_{it}$  represents the probability of the FDI decision, and  $\varepsilon_{it}$  denotes the regression error. Regression modelling utilizing the least squares approach is structured as panel data. The RESET Ramsey Test is conducted on this panel data regression to evaluate the specifications of the linear or non-linear functional model. The Likelihood Ratio Test is applied for decision-making, selecting the greater value of the likelihood ratio. Following the RESET Ramsey Test and Likelihood Ratio (LR) tests, the subsequent step involves examining the panel data regression and assessing the classical assumptions in line with the stipulations of linear regression analysis. Panel data regression can be assessed using the Chow Test, Hausman Test, and Lagrange Multiplier Test. Requirements are assessed, including the normality test via the Jarque-Bera test, the heteroscedasticity test using the Glesjer test, and the autocorrelation test where the VIF value is < 10. The research hypothesis can be stated as: Null Hypothesis: There is no linear relationship between predictor variables and response variable.

## 4. RESULTS AND DISSCUSION

The findings of the FDI value analysis from 2018 to 2024 can be accessed through official banking institutions and have been released by Bank Indonesia. The FDI figure utilized in the panel data analysis represents the annual total value. Subsequently, the FDI value will be determined for the mean, median, and standard deviation. The potential for investment returns annually is executed through  $\text{normdist}(x)$ , followed by  $\text{normsdist}(z)$ . The subsequent step is a panel data regression analysis utilizing EViews 13. FDI information is derived from the

calculations of average value, median value, and risk value over a seven-year period from 2018 to 2024, as outlined in Table 1.

Table 1. Computation of Mean, Median, and FDI Risk Metric for 2018-2024

Years	FDI	Mean	Median	Risk value	Prob.
2018	20564,00	324,32	16,50	715,00	1,29
2019	23883,00	414,00	76,00	677,00	1,50
2020	18591,00	330,20	71,10	495,00	1,60
2021	21131,10	327,70	34,00	859,00	1,03
2022	25390,00	378,50	181,00	775,20	0,77
2023	21497,00	391,00	196,00	869,10	0,67
2024	24212,30	395,12	108,00	646,13	1,33

Table 1 shows the amount of foreign investment in Indonesia over a seven-year period (2018-2024). The economic conditions during these seven years reflect conditions from before COVID-19 to the assumed normal economic conditions. To predict FDI over the seven years, the least squares model can be derived from the mean, median, and investment risk values. These values are depicted in Figures 1 and 2 below.

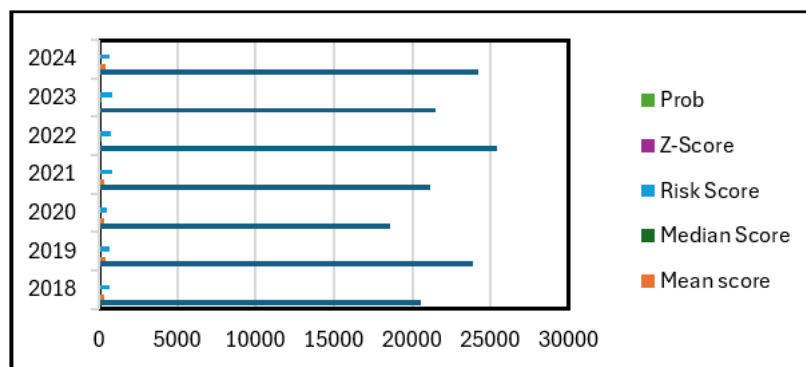


Figure 1. FDI Value in 2018-2024 in Indonesia

Figure 1 shows the development of foreign investment in Indonesia from 2018 to 2024. In 2022, the median value was the highest compared to other years. The median values of foreign investment in 2019 and 2024 were similar. The median values in 2021 and 2023 were similar. The median value of investment in 2020 was the lowest compared to other investment years over the past seven years. Furthermore, the investment value over seven years can be depicted as a normal curve, as in Figure 2.

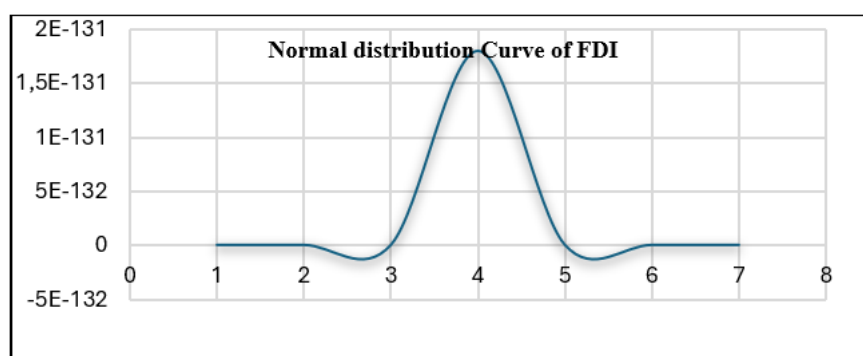


Figure 2. Normality Curve of FDI investment in 2018-2024 in Indonesia

Based on Figure 2, the normal curve can be explained that investment value is somewhat lower in 2022 and

2023. To demonstrate the investment value modelling over 7 years, this paper shows whether least squares modelling is used to analyse the possibility of investment having a feasibility value by using the mean, median, and standard deviation values. Furthermore, the least squares approach will be used to determine the potential feasibility of foreign investment decisions in Indonesia.

### 3.1 Assessing the linearity model for panel data.

The Ramsey Test intends to evaluate the correctness of the OLS model specifications for the data utilized in the research. Based on the EViews processing results, the FDI model specifications obtained from the mean, median, and standard deviation values satisfy the least square model criteria, as evidenced by the F-statistic Prob> 0.05 value of 0.1241. The specifications of the FDI model can be summarized as a linear model. Nonetheless, in additional evaluations concerning the precision of the linear model, the potential for incorporating independent variables can be assessed through the likelihood ratio value. The results from the calculations yielded a likelihood ratio value of 10.20563. A likelihood ratio of 10 indicates that the evidence supports the first hypothesis 10 times more strongly than the second hypothesis. Additionally, compute the unrestricted log-likelihood for a more intricate model and the restricted log-likelihood for a simpler model, and then contrast the two. The decision based on the likelihood ratio will select a greater value. The computation outcomes using the Eviews 13 software yield an unrestricted log-likelihood of 19.49912, surpassing the restricted log-likelihood of 14.39630. The interpretation of the unrestricted log-likelihood of 19.49912 indicates that the independent variable exerts a significant 19 times power effect on the dependent variable when the parameter estimates or coefficient estimate is free from any restrictions related to the variable.

Based on the results of the Ramsey RESET Test calculations, the research study related to whether FDI modeling from the Mean, Median and Standard Deviation measures is appropriate as a least squares modeling solution, the results of the T-test, F-Test, and Likelihood Ratio (LR) calculations can be shown as in Table 2.

Table 2. Computation of T-test, F-test, LR test

Test	Value	Degree of Freedom	Probability
T-statistic	2,5679	2	0,1241
F-statistic	6,5943	(1,2)	0,1241
Likelihood ratio	10,21	1	0.0014

The calculation results from the Eviews 13 program yield an unrestricted log-likelihood of 19.49912, surpassing the restricted log-likelihood of 14.39630. The interpretation of the unrestricted log-likelihood value of 19.49912 is that the independent variable exerts a significant 19 times influence on the dependent variable when the parameter estimates or coefficient estimate does not include the variable's restrictions.

### 4.2 Examination of Data Panel Regression.

The FDI panel data regression analysis indicates that the test generated by the Lagrange Multiplier Test provided evidence. The LM Test generates the CEM and REM Tests, as this Lagrange Multiplier Test is performed to decide between the CEM and REM Models. The results from the panel data regression calculation indicate that the Prob.F-cross section value exceeds 0.05, thus the CEM model is chosen. The foundation for the decision regarding this model is the FDI panel data regression analysis conducted over a span of 7 years utilizing the Common Effect model. Since the Prob.F-cross section values contain Obs \* R-squared results with Prob. Chi-square 0.2164 exceeds 0.05. The outcomes of the CEM model examination were chosen since all regression coefficients remain consistent across all individuals (cross-section) and time frames (time series). According to the outcomes of the panel data regression analysis, the results yielded the LM Test with CEM, which generated the Obs\*R-squared value with Prob.Chi-Square 0.2164> 0.05. Model selection using the F-Test indicates the outcomes of the straightforward model selection opted for by CEM. This outcome is confirmed by the Prob (F-test) value of 0.1719, which is greater than 0.05. Additional evidence from the Pooled Test yielded a P-value of 0.7065, which is greater than 0.05. These findings reinforce that the CEM modeler is correct since the panel data endorses a straightforward modelling approach known as Ordinary Least Squares.

### 4.3 Evaluation of the Traditional Assumption

The linear model assessment in this research study is inseparable from the classical assumptions required in

the modeling. Referring to the results of the EViews process described previously, the next step is to conduct the classical assumption test results as outlined in Table 3.

**Table 3.** Computation of Classical Assumption Test

Diagnose Classical	Prob. (0,05)	Criteria
Normality Test -Jarque-bera	0,7051	Normal
Heteroskedasticity Test: ARCH	0,9275	Not heteroskedasticity
Heteroskedasticity Test: Glejser	0,1230	Not heteroskedasticity
Multicorrelation Test-VIF	VIF( 1,63; 1,79; 1,12) <10	Not Multicorrelation
Newey-West Test	ADF-Fisher Chi-sq (40,55; 38,92)	Not Autocorrelation

According to the findings from the classical assumption test, the FDI Decision modeling created through the Least Squares method complies with the criteria for utilizing a linear regression model. Thus, these results can be carried forward to the hypothesis test and determination test.

#### 4.4 Discussion

According to the findings from the linear or non-linear specification test of panel data, the re-grease model test of panel data, and the classical assumption test, it can be concluded that the procedures followed in the FDI Decision modeling using the Least Square Method have satisfied the defined criteria. Therefore, the subsequent step is to evaluate the hypothesis, examine the determination outcomes, and assess the alteration in the value of the FDI Decision. According to the outcomes of the hypothesis test, the linear relationship between the predictor variable and the outcome variable can be determined from the results of the probability value evaluation. Xe (0.0144); prob.Xd (0.0025), and Prob.Xd (0.0014) are all less than 0.05. This signifies that the null hypothesis, which claims there is no linear relationship between the variables, is dismissed. Consequently, the FDI Decision modeling utilizing the least square method is suitable and highly accurate.

**Table 4.** Computation of Least Squares Model

Predict.	Coefficient	Std. Error	t-Statistic	Prob.
C	1.563497	0.255944	6.108744	0.0088
Xe	0.003383	0.000661	5.121519	0.0144
Xd	-0.003545	0.000375	-9.463363	0.0025
Xs	-0.001794	0.000156	-11.46828	0.0014
R-squared (99,09%)				
Adjusted R-squared (98,18%)				
SE.Regr.(0,0473)				
SSR (0.0067)				
F-Test (109.42).				
Prob.F_Test (0.0015<0,05)				

Based on the results of the least squares model calculation, the value of the DFI decision model with the size of Mean, Media, SD is shown below. FDI Decision Modeling utilizing mean (Xe) < 0.05, median (Xd) < 0.05, and standard deviation (Xs) < 0.05 can generate an accuracy model with R2 0.9909 (99.09%) and Adj.R2 0.9818 (98.18%). Furthermore, to assess the response to changes in the distribution of FDI data, it can be calculated with the Elasticity of Mean as in Table 5.



Table 5. Computation Elasticity of Mean FDI

Predict.	Coefficient	St. Coefficient	Elasticity of Mean
Xe	0,0034	0,3597	1,0618
Xd	-0,0035	-0,6957	-0,2962Xe
Xs	-0,0018	-0,6679	-1,1072

Table 5 shows the results of the EM calculation with a standard measurement value of  $1 < EM < 1$ . If the EM value  $< 1$  indicates a very low response to changes in the amount of FDI in the Mean value. Conversely, if  $EM > 1$ , then the change in the Mean value is responded very strongly by changes in the increase in the amount of FDI. Table 5 shows the results of the EM calculation at the Mean value (1.06), Median value (-0.30), and value (SD-1.12). From the calculation results above, it can be concluded that the Mean FDI value is responded more positively compared to the Median value and SD FDI value. Thus, it is very wise for foreign investment decision makers to use the mean value to predict investment growth in a country. The recommendation for this result is that the Mean value test further proves how the Mean investment value per sector is able to increase the output/economic growth of each country. The results of this study can be confirmed by economists in several countries.

The comparatively greater growth impact of FDI in developing nations versus underdeveloped nations suggests that FDI enables developing nations to expand more rapidly than underdeveloped ones (Dao et al., 2024). The findings of the aforementioned research align with Dao et al. (2024), as the potential for FDI decisions remains significantly elevated both in the short term and the long term. At the same time, the significantly higher rate of FDI growth in developing nations compared to developed ones means that developing countries depend more on funding from FDI to bridge the income disparity seen in developed nations. Foreign Direct Investment, when examined from the perspective of the money supply, demands an intricate analysis; thus, the issue concerning financial instruments for investing within a country that could foster its economic growth remains unsolved to this day (Topxhiu & Krasniqi, 2025). The study conducted by Olayungbo and Quadri (2019) examined the economic conditions of 20 African nations between 2000 and 2015. The findings of the research validated the beneficial impact of remittances and financial development on economic growth in both the short-term and long-term. These findings are backed by Chowdhury (2016); Bandura et al (2019). The analysis method employed by the researcher serves as the basis for comparing this paper's research to others. This study employs mean, median, and standard deviation for analyzing panel data specifications and estimating CEM test values, whereas other scholars utilize Pooled Mean Group and Mean Group/ARDL estimations that incorporate panel unit root tests and thorough cointegration analysis. The results of Cao & Kang (2020) indicate that remittances have a direct impact on economic growth.

The discussion regarding the studies ultimately shows that the findings of this research indicate that panel data estimation using the mean, median, and standard deviation can forecast significant positive value prospects. The modeling specifications for mean, median, and SD can be achieved with the RESET Ramsey Test, and LR yields robust linear model results. Panel data regression modeling employing mean, median, and standard deviation is evaluated through the LM test and CEM test. The findings suggest that FDI choices possess significant growth potential in the long run. The choice to apply the CEM model with the Least Square method is strongly validated by the results of the Pooled Test, which are highly significant. Nonetheless, the outcomes of the Common Trend test indicate a dismissal of the existence of a difference in time trends within the estimation results. The typical pattern from the panel data regression yielded 53.89 with a P-value of 0.99, leading to the rejection of the null hypothesis concerning time trend differences. This indicates that occasionally series exhibit varying trends, thus recommendations need additional analysis.

Based on all the processes and stages of modeling carried out in this study and the required assumptions, the FDI modeling with least squares can be displayed in Table 6 below.

Table 6. Computation of Modelling FDI using Least Squared

Least Squared Model		
$Y_{it} = 1.5634 + 0.0034X_e - 0.0035X_d - 0.00179X_s + e$		
R <sup>2</sup> (99,09%) Adj.R <sup>2</sup> (98,18%) SSE(4,72%)	Pooled Test (0,7065)	Common Trend Test 53,89 (0,99)

Modelling FDI decisions with mean ( $X_e$ ) < 0.05, median ( $X_d$ ) < 0.05, and standard deviation ( $X_s$ ) < 0.05 yields an accurate model with R<sup>2</sup> of 0.9909 (99.09%) and Adj.R<sup>2</sup> of 0.9818 (98.18%). The size of the error in the panel data regression model is between 0.91% and 1.82%, and the regression error stands at 4.7269%, which is less than 5%. The Pooled Test value of 0.7065 needs to be interpreted based on the context of the statistical method used. The term "Pooled Test" generally refers to a statistical test that combines data from multiple groups to increase the power of the analysis. However, this study did not perform a grouping of economic conditions before COVID-19 and the new normal, as should have been done, resulting in insignificant results. This is a limitation of the study. However, a solution provided with a Common Trend Test yielded a significant result of 0.99 > 0.05. This result indicates that the FDI trend during the 2018-2024 period is the same, thus meeting the parallel trend assumption. These results suggest that further testing using the DiD regression test is recommended to find a more accurate model, taking into account normal and abnormal economic conditions. This outcome is demonstrated by the value of Unrestricted Loglikelihood being greater than Restricted Loglikelihood. The unrestricted log-likelihood value of 19.49912 indicates that the independent variable exerts a substantial 19 times impact on the dependent variable, assuming the parameter estimate or coefficient estimate is made without any restrictions on the variable. Garcia-Santana et al. (2007) and Carbonell & Weiner (2018) indicated that FDI positively influences economic growth, depending on the country's environment and regulatory policies. Therefore, modelling the value of FDI to assess long-term growth of opportunity value demonstrates significant predictive power, allowing for the rejection of the notion that mean, median, and SD are unsuitable for predictions in linear modelling. The suggestion from this finding is to evaluate additional predictor variables, ensuring that the discussion regarding the use of mean, median, and SD values in modelling reaches a definitive conclusion. The outcomes of the Common Trend test indicate variations in time trends within the results, suggesting the necessity of examining stationary and non-stationary research that affects the results of the cross-variable predictor on the predictor.

## 5. CONCLUSION

FDI studies from several expert research results indicate that FDI affects capital access, technology transfer, financial expertise, and local economic development. The study found that FDI volume modeling can be assessed using the mean, median, and standard deviation values, as demonstrated through LS modeling. The ordinary least squares method can be used to estimate the FDI decision-making modeling, which is highly accurate. The resulting model is highly accurate as demonstrated by model specification testing conducted through the Ramsey RESET Test, panel data regression analysis using the LM-CEM Test, classical assumption evaluation, hypothesis verification, and determination assessment. The FDI trend during the 2018-2024 period is similar, so the parallel trend assumption is met. These results can be recommended for further testing using the DiD regression test, to find a more accurate modeling by considering normal or abnormal economic conditions. The suggestion from this research finding is to use a broader range of predictor variables, which allows for the most effective assessment and resolution regarding FDI discussions on modeling group averages, individual averages, medians, and different and accurate standard deviations. For future researchers to explore the modeling of the relationship between the mean value of FDI, the value of potential growth which is believed to have a reciprocal relationship.

## Acknowledgement

We would like to thank the Institute for providing material facilities, the colleagues and student teams who supported this research, enabling us to achieve these results. We hope this research will serve as a basis for



making investment decisions in developing countries.

## References

- Aryaningsih, N. & Irianto.K. (2021). The Assesment of Capital Flow and Technology Transfer in Asparagus Production. *IJASEIT*, 11(1), 291–297.
- Alchian, A. A. (1955). Uncertainty, evolution, and economic theory. *Journal of Political Economy*, 63(3), 211–221.
- Baddeley, A. D. (2003). *Your memory: A user's guide* (2nd ed.). Marion Boyars Publishers.
- Brainard, W. C., & Tobin, J. (1968). Pitfalls in financial model building. *American Economic Review*, 58(2), 99–122.
- Clark, J. M. (1917). Business acceleration and the law of demand: A technical factor in economic cycles. *Journal of Political Economy*, 25(3), 217–235.
- Casti, J. L. (2008). *X-Events: Complexity theory and the future of global catastrophes*. Harper Collins.
- Werner, R.A. (2018). Does Foreign Direct Investment Generate Economic Growth? A New Empirical Approach Applied to Spain, *Economic Geography*, 94(4), 425–456
- Cicea, C. & Marinescu, C. (2021). Bibliometric analysis of foreign direct investment and economic growth relationship. A research agenda. *Journal of Business Economics and Management*, 22(2), 445–466.
- Crespo, N. & Fountura, M.P. (2007). Determinant factors of FDI Spillovers- what do we really know? . *World Development*, 35(3), , 410–425.
- Cao, S., & Kang, S. J. (2020). Personal Remittances and Financial Development for Economic Growth in Economic Transition Countries. *International Economic Journal*, 34(3), 1– 22.
- Chowdhury, M. (2016). Financial Development, Remittances and Economic Growth: Evidence Using a Dynamic Panel Estimation. *Margin-The Journal of Applied Economic Research*, 10(1), 35–64.
- Dao, T. B., et al. (2024). How does FDI Matter for Economic Growth? Evidence from a Comparative Study in Country Groups by Level of Development. *Contemporary Economics*, 18 (4), 374–390.
- Olayungbo, D., & Quadri, A. (2019). Remittances, financial development and economic growth in sub-Saharan African countries: evidence from a PMG-ARDL approach. *Financial Innovation*, 5(9), 1–25.
- Rehman, N. U., & Hysa, E. (2021). The effect of financial development and remittances on economic growth. *Cogent Economics and Finance*, 1–15.
- Eduard D., S. K. (2015). Emerging Markets Quantitative and qualitative analysis of foreign direct investments in developed and developing countries. *Procedia Economics and Finance*, 32, 256–263.
- Fisher, I. (1930). *The theory of interest*. Macmillan.
- Garcia-Santana, M., et al. (2016). Growing like Spain: 1995–2007. *Working Paper* 1609. Madrid: Banco de España.
- Görg, H. &. (2005). Spillovers from foreign from trough worker mobility: An Empirical Investigation. *The Scandinavian Journal of Economic*, 107(4),, 693–709.
- Gujarati, D. (2003). *Basic Econometrics*. McGraw Hill. Boston. 521–523.
- Gugler, K., & Yurtoglu, B. B. (2003). Corporate governance, dividend payout policy, and the interrelation between dividends, R&D, and capital investment. *Journal of Banking & Finance*, 27(7), 1297–1321.
- Gould, J. P. (1968). Adjustment costs in the theory of investment of the firm. *Review of Economic Studies*, 35(1), 47–55.
- Geanakoplos, J. (2008). The leverage cycle. *Cowles Foundation Discussion Paper*, No. 1715. Yale University, Cowles Foundation for Research in Economics.
- Hayek, F. A. (1941). *The pure theory of capital*. University of Chicago Press.
- Jorgenson, D. W. (1967). The explanation of productivity change. *Review of Economic Studies*, 34(3), 249–283.
- Jorgenson, D. W., & Griliches, Z. (1971). The explanation of productivity change. *Econometrica*, 39(3), 349–383.
- Jorgenson, D. W. (1963). Capital theory and investment behavior. *American Economic Review*, 53(2), 247–259.
- Jorgenson, D. W. (1967). The explanation of productivity change. *Review of Economic Studies*, 34(3), 249–283.
- Keynes, J. M. (1936). *The general theory of employment, interest and money*. Macmillan & Co.
- Lucas, R. E. (1967). Adjustment costs and the theory of supply. *Journal of Political Economy*, 75(4), 321–334.
- Lo, A. W. (2004). The adaptive markets hypothesis: Market efficiency from an evolutionary perspective. *Journal of Portfolio Management*, 30(1), 15–29.
- Mueller, D. C. (2003). *Public Choice III*. Cambridge University Press.
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98 (5, Part 2, 71–102.
- Solow, R. M. (1956). A Contribution to the theory of Economic Growth. *The Quarterly Journal of Economic*, 70(1), 65.
- Smith, V. L. (1962). An experimental study of competitive market behavior. *Journal of Political Economy*, 70(2), 111–137.
- Tandelilin, E. (2017). *Portofolio dan Investasi: Teori dan Aplikasi* [Portfolio and Investment: Theory and Application]. Kanisius.
- Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, 1(1), 15–29.

- Topxhiu, R. M., & Krasniqi, F. X. (2025). Remittances, Financial Development and Economic Growth-A Dynamic Panel Data Approach. *Contemporary Economics*, 19(2), 208-229.
- Treadway, A. B. (1969). On rational entrepreneurial investment decisions. *International Economic Review*, 10(3), 388-401.

Ni Nyoman Aryaningsih as the corresponding author is a lecturer and researcher of applied economics at a university since 1992. Experienced in undergraduate education in 1992 in Business World Economics, Master's Education in 1997-1999 at Brawijaya University in financial management, Doctoral Education in the Doctoral Study Program in Economics at Udayana University in 2011-2015. Currently, the author works as a lecturer and researcher at the Bali State Polytechnic Vocational College at the D3, D4/S1, and Applied Master's levels. The author has expertise in the field of Applied Economics, Business Management and has begun actively writing various books, several of which have been successfully published. The author received the highest academic award in the field of Managerial Economics dated November 1, 2023. The author has expertise in the field of Economics-Management. To realize a career as a professional lecturer, the author is active as a researcher in the fields of business management, microeconomics, financial institutions, Digital financial transactions. Digital literacy, entrepreneurship, investment decisions, and related fields of management economics. Some of the research that ,Education. The author is also active in community service to practice and develop research results for rural and urban communities. The author is also active in scientific forums FAME for Society National and International IJASTE, ICAST, and ICoSTAS. The author has scientific works on managerial economics (2018-2025),

I Made Ariana, as lecturer in the Applied Managerial Accounting Undergraduate Study Program, Department of Accounting, Bali State Polytechnic, specializes in financial accounting. In 1991, he completed his undergraduate education in the Management Department, Faculty of Economics, Udayana University, Bali. In 1997, he completed his undergraduate education in the Accounting Department, Faculty of Economics and Business, Udayana University. In 2006, he completed his Master's degree in the Master of Accounting Postgraduate Program, Airlangga University, Surabaya. In 2024, he completed his doctoral education in the Management Science Study Program, concentrating in financial management, Faculty of Economics and Business, Udayana University. In addition to teaching, the author is also active in research and community service.

P. Rany Wedasuari graduated with a Bachelor's degree in Accounting in 2016 and a Master's degree in Accounting in 2020. Currently, she is a lecturer at the Bali State Polytechnic in the field of management accounting. Business Management Accounting. The author also has experience as Head Accounting for a national distributor company. The author also conducts research in the field of green accounting and financial economics in the hotel industry. In addition, the author is also active in national and international scientific meetings, such as ICOSTAS and ICAST. Discipline in time management has led her to become an author in several national and international journals.

Eny Mariani, W. Bachelor's degree at Telkom University Bandung majoring in Business Management. Master's degree in Accounting at Udayana University. Currently as a lecturer in fields such as Cost Accounting, Financial Management, Corporate Budgeting, Entrepreneurship, Competency Analysis and Entrepreneurial Orientation. The author is a lecturer at the Bali State Polytechnic. The author is also active in scientific meetings at the 2018 International Conference on Innovation in Research (ICIIR) entitled Seller Rights and Obligations of Marketplace in Indonesia; International Conference on Research of Educational Administration Management (ICREAM) 2019 with the article title The Characteristic of Business Incubator Tenant, ICBAE 2020: Proceedings of the 2nd International Conference of Business, Accounting and Economics with the article entitled The Entrepreneurial Orientation of STMIK STIKOM Indonesia's Students, The 8th UPI Global Conference on Business, Management and Entrepreneurship in 2023 with the article entitled The Trend of Transaction on E-Commerce by Millennial Generation, International Conference on Sustainable Green Tourism Applied Science in 2024.