

HYPOTHESIS:

H0: There **is no relationship** between FDI flows into Vietnam and multiple variations factors under observations. (1)

H1: There **is a relationship** between FDI inflows and at least one of the independent variables.

1. Correlation coefficient (r).

A statistical method which is used to measure the strength and the direction of the dependent variable “FDI net flow” and 11 other independent variables are shown in Correlation Matrix (figure 1) below:

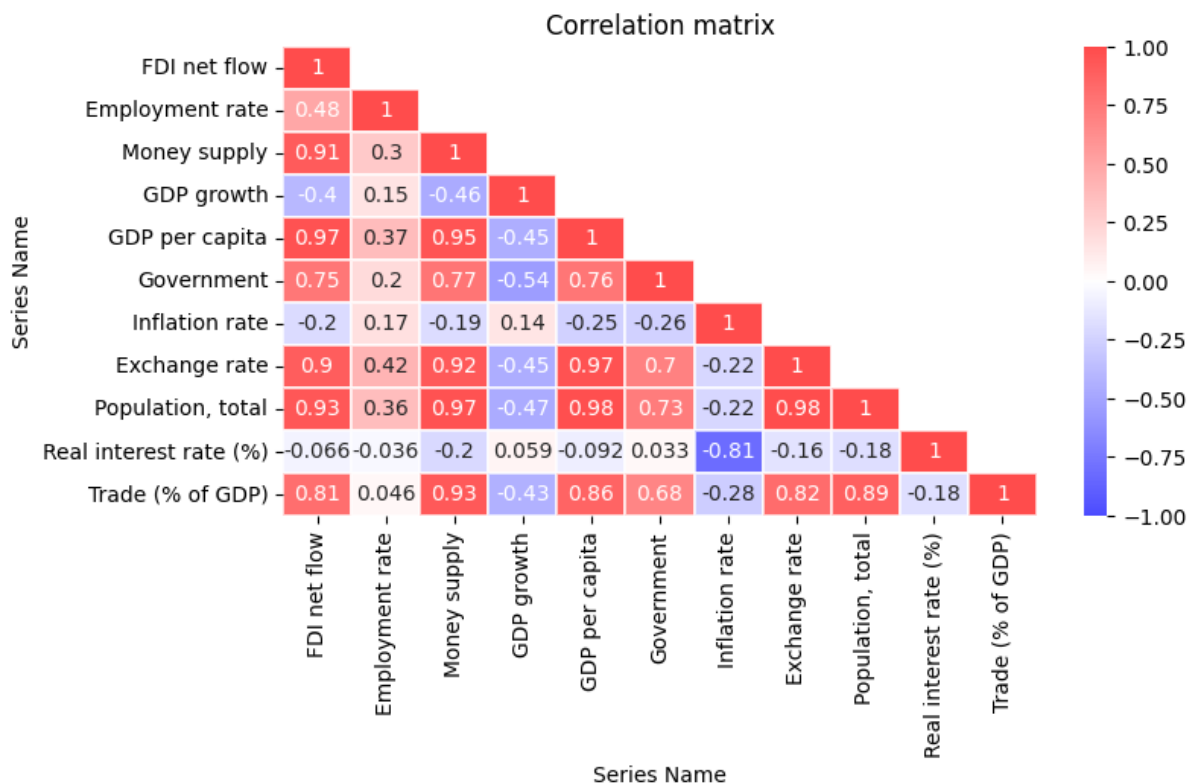


FIGURE 1: Expected relationship that meet the criteria between FDIs and other factors.

- **Low negative r:** GDP growth ($r = -0.4$), Inflation rate ($r = -0.2$), Real interest rate ($r = -0.066$)
 => Expected **medium negative relationship** between FDI net inflow with GDP (% growth) and Real interest rate (%)
- **Strong positive r:** Employment rate ($r = 0.48$), Money supply ($r = 0.91$), GDP per capita ($r = 0.97$), Government ($r = 0.75$), Exchange rate ($r = 0.9$), Population ($r = 0.93$), Trade ($r = 0.81$) .
 => Expected **strong positive relationship** between FDI net inflow with variations under investigation.
- **Medium positive r:** Employment rate ($r = 0.48$), Trade ($r = 0.81$)
 => Expected **medium negative relationship** between FDI net inflow with Employment rate (%) and Trade Openness.

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2. Regression model building and estimated procedures.

Under the regression model run using the `statsmodels` and `scikit-learn` libraries, we examine the correlation between the dependent variable “FDI inflows” and 10 other variables, specifically described through the following multiple regression equation:

$$\text{FDI} = \text{B0} + \text{B1} * \text{EMP} + \text{B2} * \text{X2_MS} + \text{B3} * \text{GDP}(\%) + \text{B4} * \text{GDP} + \text{B5} * \text{GVT} + \text{B6} * \text{INF} + \text{B7} * \text{EXR} + \text{B8} * \text{POP.} + \text{B9} * \text{RIR} + \text{B10} * \text{X10_TRADE.}$$

Where:

	<i>Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Data are in current U.S. dollars.</i>
FDI	
EMP	Employment to population ratio is the proportion of a country's population that is employed. Employment is defined as persons of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit. Ages 15 and older are also counted.
MS	Broad money (IFS line 35L..ZK) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government
GDP (%)	Annual percentage growth rate of GDP at market prices based on constant local currency (constant 2015 prices, expressed in U.S. dollars). GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.
GDP (percapita)	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.
GVMT	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service. Percentile rank indicates the country's rank among all countries covered by the aggregate indicators (0-100).
INF	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole.
EXR	Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).
POP	Total population is based on the definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.
RIR	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ by country, however, limiting their comparability.

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TRADE Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.

TABLE 1: Data dictionaries and formula sourcing from the original Work Bank Dataset.

The model above is estimated to measure and compare results based solely on data for FDI inflows into Vietnam, without considering any factors or data from other countries, covering the period from 1988 to 2022.

Since FDI is a long-term indicator that changes continuously over time and is influenced by two or more variables, the results or interpretations derived from this report's model may differ from those of many other variations. The variables used were randomly selected based on the most complete and preprocessed dataset available. Therefore, in this model, the random variables will be decomposed into common (*) and cross-sectional (*) components (excluding country-specific or time-specific effects)

3. Comparative results and interpretations.

a. OLS regression result.

OLS REGRESSION RESULTS

Dep. Variable:	FDI net flow	R-squared (uncentered):	0.994
Model:	OLS	Adj. R-squared (uncentered):	0.990
Method:	Least Squares	F-statistic:	273.9
Date:	Wed, 30 Jul 2025	Prob (F-statistic):	9.60e-17
Time:	18:28:15	Log-Likelihood:	-587.76
No. Observations:	27	AIC:	1196.
Df Residuals:	17	BIC:	1208.
Df Model:	10		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
Employment rate	1,08E+12	2.15e+08	5.009	0.000	6.22e+08	1.53e+09
Money supply	-1,28E+10	2.33e+07	-0.551	0.589	-6.19e+07	3.63e+07
GDP growth	-4,60E+11	1.81e+08	-2.546	0.021	-8.41e+08	7.87e+07
GDP per capita	1,46E+10	1.58e+06	9.234	0.000	1.13e+07	1.79e+07
Government	-1,08E+10	5.2e+07	-0.207	0.838	-1.2e+08	9.89e+07

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Inflation rate	-1,99E+11	8.4e+07	-2.367	0.030	-3.76e+08	- 2.16e+0 7
Exchange rate	-2,87E+08	2.65e+05	-1.085	0.293	-8.45e+05	2.71e+0 5
Population, total	- 11.316.35 5	229.025	-4.941	0.000	- 1.614.836	-648.435
Real interest rate (%)	-3,25E+11	1.24e+08	-2.624	0.018	-5.87e+08	- 6.37e+0 7
Trade (% of GDP)	6,91E+10	2.92e+07	2.369	0.030	7.55e+06	1.31e+0 8
Omnibus:	2.695	Durbin-Watson:	1.903			
Prob(Omnibus)	0.260	Jarque-Bera	1.417			
:		(JB):				
Skew:	-0.512	Prob(JB):	0.492			
Kurtosis:	3.460	Cond. No.	1.43e+0 8			

Notes:

[1] R^2 is computed without centering (uncentered) since the model does not contain a constant.

[2] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[3] The condition number is large, 1.43e+08. This might indicate that there are strong multicollinearity or other numerical problems.

TABLE 2: OLS regression Result (key highlights on blue shading).

The regression analysis i.e. Ordinary Least Square (OLS) was applied on the dataset from 1988 to 2022 with the total predictors of 10 surveyed variants and the FDI net inflows:

- p_value for "**Employment rate**", "**GDP per capita**", "**Population, total**" is lower than 0.01 -> **strong** correlation relationship at **the significant level of 1%**
- p_value for "**GDP growth**", "**Inflation rate**", "**Real interest rate (%)**", "**Trade (% of GDP)**" is lower than 0.05 -> **strong** correlation relationship **at the significant level of 5%**
- p_value for "**Money supply**", "**Exchange rate**", and "**Government**" is a bit high (>+0.1) respectively -> there **no significantly** statistical influence on FDI flows, at least into Vietnam.

MODEL	R_square	Adjusted R_square	F test p_value
4	0.98348	0.97316	2,58E-12

TABLE 3: Summary the effectiveness of the full stack model.

The R-squared value of 0.9835 from table 3 extracting from table 2 indicates that approximately 98.35% of the variance in the dependent variable (e.g., FDI net inflows) is explained by the independent variables in the regression model. This suggests an excellent fit, meaning the model captures nearly all the variation in the outcome variable.

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The Adjusted R-squared value of 0.9732 (table 3) confirms that even after accounting for the number of predictors, the model still explains about 97.32% of the variability in FDI inflows. This slight decrease from R^2 is normal and shows that the model is not simply overfitting by adding all of the selected variables.

The p_value (p_value = 0.00000) shown in table 3 indicates that there was potentially measured to test our null hypothesis ($H_0(1)$) at the common significant level of 5%. There is strong statistical evidence that FDI inflows to Vietnam are significantly influenced by the set of 10 independent macroeconomic variables in your model. In simpler terms, at least one of the variables is significantly associated with changes in FDI inflows.

b. Model comparisons with different predictor based on R_square and Adjusted R_square.

As beforehand empirical results, predictive model PERFECTLY comes with 7 variables "Employment rate", "GDP per capita", "Population, total", "GDP growth", "Inflation rate", "Real interest rate (%)", and "Trade (% of GDP)" with the minimally significant level at 0.01 and 0.05. So moving apart will compare models with different size of determinants:

*** Dependent variable: Y_FDI**

*** Predictors:**

Model 1: X("Employment rate", "GDP per capita", "Population, total", "GDP growth", "Inflation rate", "Real interest rate (%)", and "Trade (% of GDP)") (base model)

Model 2: X("Employment rate", "GDP per capita", "Population, total", "GDP growth", "Inflation rate", "Real interest rate (%)", "Trade (% of GDP)", "*Money supply*").

Model 3: X("Employment rate", "GDP per capita", "Population, total", "GDP growth", "Inflation rate", "Real interest rate (%)", and "Trade (% of GDP)", "*Money supply*", "*Exchange rate*").

Model 4: X("Employment rate", "GDP per capita", "Population, total", "GDP growth", "Inflation rate", "Real interest rate (%)", and "Trade (% of GDP)", "*Money supply*", "*Exchange rate*", "*Government*") (constantly shown in table 3).

** red colouring factors will be added.*

Model	R_square	Adjusted R-squared	p-value
Model 1	0.982956	0.976676	1,94E-09
Model 2	0.983101	0.975591	2,36E-08
Model 3	0.983436	0.974666	2,39E-07
Model 4	0.983484	0.973162	2,58E-06

TABLE 4: 4 model summaries comparison

The p_value for the whole 4 model as a whole are also 0.0000, which means, are significantly meaningful to predict the FDI Flow into Vietnam. This suggests that FDI inflows may be

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influenced by a wide range of factors. Therefore, it is essential to identify which groups of factors serve as the most accurate predictors of FDI inflow.

Model 4 observed the highest R^2 cause we imply the entire selected 10 factors but hold the minimum score of adjusted R^2 . Meanwhile, the model 1 is expected as the most effective model with the R^2 of 0.9829 and the highest Adjusted R^2 of 0.9766. With the coefficient of determination of 0.9834, the highly percentage of variations will be explained by model 4 but the accurately actual model performance will be observed at the model 1 with the maximum of Adjusted R^2 at 0.9766. As a result, approximately 97.66% of variability in the FDI inflows would be caused under 1-based model independent variables including "Employment rate", "GDP per capita", "Population, total", "GDP growth", "Inflation rate", "Real interest rate (%)", and "Trade (% of GDP)". This implies that there are very few other factors which have a bearing on FDI inflows to Vietnam.

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