

# **Classical Assumption Test for Testing the Influence of Composite Stock Price Index, Inflation Level, BI Rate, and Rupiah Exchange Rate Toward Stock Price in Indonesia**

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## **Abstract**

Banking is a thing that has a big influence on the capital market. Capital market is a place where sellers and buyers meet to conducting stock sale and purchasing transactions. There are several factors that influence stock prices in the capital market, four of them are Composite Stock Price Index, inflation rate, BI rate, and exchange rate. In classical assumption test, there are four things to be tested, which are Autocorrelation Test, Multicollinearity Test, Heteroskedasticity Test, and Normality Test. In goodness of fit test, there are three things to be tested, which are F test, t test, and R test. By performing classical assumption test and goodness of fit test, regression model and the influence of Composite Stock Price Index, inflation rate, BI rate, and exchange rate to bank stock prices will be determined.

**Keywords:** Composite Stock Price Index, inflation rate, classical assumption test, goodness of fit test.

## **1. Introduction**

Banking is a thing that has a big influence on the capital market. The capital market is a place where sellers and buyers meet to buy and sell shares. Stock is a unit of value or bookkeeping in various financial instruments that refers to the ownership portion of a company (Bozkurt & Kaya, 2015). The stock price is the price of a stock that is on the stock exchange which is determined by the demand and supply of shares in the capital market. The stock price is proof of equity participation, where the shares have been circulating. There are several factors that affect stock prices, four of them, namely the Composite Stock Price Index (CSPI), the inflation rate, the BI rate, and the exchange rate. The classic assumption test are conditions that must be met in an Ordinary Least Square (OLS) linear regression model, so that the model can be used as a predictor or prediction tool.

The classic assumption test can measure the effect of these four components on the bank's share price in Indonesia. There are four components to be tested, namely the autocorrelation test, the multicollinearity test, the heteroscedasticity test, and the normality test. After the classic assumption test, a goodness of fit test will be carried out, namely the F test,  $t$  test, and  $R^2$  test. The goodness of fit test aims to estimate the regression model for the effect of the Composite Stock Price Index (CSPI), the inflation rate, the BI rate, and the exchange rate against stock prices. The banks tested in this study were taken from commercial banks that were well known to the public. Four random bank samples were taken, namely Bank Central Asia (BCA), Bank Bukopin, Bank Rakyat Indonesia (BRI), and Bank Danamon. The test carried out is to test the classical assumptions and the goodness of fit test. Henceforth, the influence of the Composite Stock Price Index (CSPI) will be determined, the inflation rate, the BI rate, and the exchange rate on bank stock prices in Indonesia (Lumiajiak et al., 2014)).

Thus, this study aims to: 1). Estimate the parameters of the regression model from the effect of the CSPI, the inflation rate, the BI Rate, and the exchange rate on bank stock prices in Indonesia. 2). Determine the effect of the CSPI, the inflation rate, the BI Rate, and the exchange rate on bank stock prices in Indonesia.

## 2. Methodology

The data used in this study are JCI data, inflation rate, BI rate, exchange rate, and stock prices of Bank BCA, Bank Bukopin, Bank BRI, and Bank Danamon. In this study, researchers used the help of computer software. The sample withdrawal criteria used by researchers are: 1) Banks found on the Indonesia Stock Exchange (IDX) during the July 2010 period s.d. June 2016. 2) Commercial banks that are well known to the public.

### 2.1 Regression Analysis

Regression analysis is a method of analysis that aims to show the mathematical relationship between the response variables with explanatory variables (Rawlings et al., 1998). The variables in regression analysis are usually called the independent variable ( $x$ ) and the dependent variable ( $y$ ).

The general equation model for multiple linear regression is as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \varepsilon_i \quad (1)$$

Equation (1) is then estimated to be

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n, \quad (2)$$

where  $\hat{Y}$  : estimates from  $Y_i$ ,  $\beta_0$ : intercept,  $\beta_i$ : slope for the independent variable  $X_i$ , which shows the influence of the independent variable  $X_i$  on the dependent variable  $\hat{Y}$  ( $i = 1, 2, 3, \dots$ ).

The Ordinary Least Square (OLS) method is used to predict the regression coefficient by minimizing the number of error squares  $\sum_{i=0}^n \varepsilon_i^2$

The OLS method estimator is

$$J = \sum_{i=0}^n \varepsilon_i^2 = \sum_{i=0}^n (y_i - \hat{y})^2, \quad (3)$$

where  $\sum_{i=0}^n \varepsilon_i^2$  is the number of error squares.

### 2.2 Model Testing

In this study, the model that has been obtained from the Ordinary Least Square (OLS) estimation will be tested with the classic assumption test and the Goodness of Fit test. The classic assumption test consists of a normality test, an autocorrelation test, a multicollinearity test, and a heteroscedasticity test. If the classical assumption test is met, the effect of the independent variable on the dependent variable will be seen using the Goodness of Fit test, which consists of the  $F$  test,  $t$  test and  $R^2$  test. The  $F$  test aims to determine the relationship between independent variables and independent variables. In the  $F$  test, there is a value of Number of Squares ( $JK$ ) which is consists of the Total Square ( $JK(T)$ ), Number of Regression Squares ( $JK(R)$ ), and the Remaining Square ( $JK(S)$ ) (Rawlings et al., 1998). The general formula is

$$JK(S) = \sum_{i=0}^n (y_i - \bar{y})^2; \quad (4)$$

$$JK(R) = \sum_{i=0}^n (\hat{y} - \bar{y})^2; \quad (5)$$

$$JK(T) = \sum_{i=0}^n (y_i - \hat{y})^2. \quad (6)$$

$JK(R)$  has degrees of freedom (df) of  $k$  and  $JK(S)$  of  $(n - k - 1)$ . Thus, the  $F$  test formula is

$$F = \frac{JK(R)/k}{JK(S)/(n-k-1)}. \quad (7)$$

*T* test shows the influence of one independent variable individually in explaining the variation of the independent variable (Draper and Smith, 1981). The *t* test formula is

$$t_{hitung} = \frac{\beta_i}{Se(\beta_i)}, \quad (8)$$

dengan *Standard Error* koefisien  $se_i$  adalah

$$Se(\beta_i) = \sqrt{\frac{\sum_{i=1}^n (Y_i - \hat{Y}_i)^2}{\sum_{i=1}^n (X_i - \bar{X}_i)^2}}. \quad (9)$$

The coefficient of determination ( $R^2$ ) measures the ability of the model to explain the variation of independent variables. The coefficient of determination is between zero and one. If the value is close to zero, then the ability of the independent variable in explaining the bound variable is limited. If the value approaches one, the ability of the independent variable in explaining the dependent variable is almost perfect (Rawlings, 1998). Equation  $R^2$  is

$$R = \sqrt{\frac{\sum_{i=1}^n (\hat{y}_i - \bar{y}_i)^2}{\sum_{i=1}^n (y_i - \bar{y}_i)^2}}. \quad (10)$$

$\hat{y}$  is the estimated value of the regression model,  $\bar{y}$  is the average value of  $y$ ,  $y_i$  is the value of  $y$ ,  $JK(R)$  is the sum of the square of the regression, and  $JK(T)$  is the sum of the total squares. To determine partial correlation

$$r_{y,x_i} = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{\sqrt{n \left( \sum_{i=1}^n x_i^2 \right) - \left( \sum_{i=1}^n x_i \right)^2 n \left( \sum_{i=1}^n y_i^2 \right) - \left( \sum_{i=1}^n y_i \right)^2}}. \quad (11)$$

### 3. Results and Discussion

The research data used in this study are the Composite Stock Price Index (CSPI), inflation rate, BI Rate, exchange rate, share prices of Bank BCA, Bank Bukopin, Bank BRI, and Bank Danamon taken from July 2010 - June 2016.

Table 1. Estimation Result of Model Parameters for the influence of CSPI, inflation rate, BI rate, and exchange rate on Bank BCA stock prices using Ordinary Least Square

Parameters	$(X'X)^{-1}X'Y$
$0 \beta$	-8039.00191
$1 \beta$	2.2810671
$2 \beta$	-13525.4279
$3 \beta$	12698.0565
$4 \beta$	0.73472562

Table 2. Estimation Result of Model Parameters for the influence of CSPI, inflation rate, BI rate, and exchange rate on Bank Bukopin's stock prices using Ordinary Least Square

Parameters	$(X'X)^{-1}X'Y$
$0 \beta$	383.3952
$1 \beta$	0.115999
$2 \beta$	-119.424
$3 \beta$	2398.532
$4 \beta$	-0.03514

Based on Table 1, the BCA Bank model is obtained as follows:

$$Y = -8039 + 2.28X_1 - 13525.43X_2 + 12698.06X_3 + 0.73X_4.$$

Based on Table 2, the Bank Bukopin model is obtained as follows:

$$Y = 383.39 + 0.11X_1 - 119.42X_2 + 2398.53X_3 - 0.03X_4.$$

Where  $X_1$  : Composite Stock Price Index (CSPI),  $X_2$  : inflation rate,  $X_3$  : BI Rate, and  $X_4$  : exchange rate.

Table 3 Estimation Result of Model Parameters for IHSG influence, inflation rate, BI rate, and exchange rate of the BRI Bank's share price using Ordinary Least Square

Parameters	$(X'X)^{-1}X'Y$
$\beta_0$	-9390.0445
$\beta_1$	2,55237432
$\beta_2$	-29192.902
$\beta_3$	67861.3711
$\beta_4$	0.33926498

Tabel 4 Estimasi Result Parameter Model pengaruh IHSG, tingkat inflasi, BI rate, dan nilai tukar terhadap harga saham Bank Danamon menggunakan Ordinary Least Square

Parameters	$(X'X)^{-1}X'Y$
$\beta_0$	9913.921202
$\beta_1$	0.499005895
$\beta_2$	17329.20177
$\beta_3$	-56828.0044
$\beta_4$	-0.41236889

Berdasarkan Tabel 3, diperoleh model Bank BRI sebagai berikut :

$$Y = -9390.04 + 2.55X_1 - 29192.90X_2 + 67861.37X_3 + 0.34X_4$$

Berdasarkan Tabel 4, diperoleh model Bank Danamon sebagai berikut :

$$Y = 9913.92 + 0.49X_1 + 17329.20X_2 - 56828X_3 - 0.41X_4$$

Where  $X_1$ : Composite Stock Price Index (CSPI),  $X_2$ : inflation rate,  $X_3$ : BI Rate, and  $X_4$ : exchange rate.

The classic assumption test for normality has been fulfilled, namely normally distributed data, no autocorrelation, no multicollinearity, and does not contain heteroscedasticity. Then the Goodness of Fit test will be conducted to determine the effect of independent variables with the dependent variable.

For BCA Bank,  $F_{hitung} = 349.4584405$ . With  $n = 72$ ,  $k = 4$ , we get  $n_1 = 4$  and  $n_2 = n - k - 1 = 72 - 4 - 1 = 67$ , so  $F_{tabel} = 2.51$ . Because  $F_{hitung} > F_{tabel}$ , then ditolak  $H_0$  is rejected and  $H_1$  is accepted, so there is an influence between the independent variables ( $(X_1, X_2, X_3, X_4)$  and the dependent variable ( $Y$ ). If  $t_{hitung}$  for  $X_1 = 19.63805622$ ,  $X_2 = -3.741475975$ ,  $X_3 = 2,286652836$ , and  $X_4 = 19.54671465$ , with  $\alpha = 0.05$  and  $n - k - 1 = 72 - 4 - 1 = 67$ , obtained  $t_{tabel} = 1.99601$ , then conclusion:  $t_{hitung} > t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_1$ ,  $X_3$ , and  $X_4$  have a significant effect on the dependent variable ( $Y$ ). If  $t_{hitung} < -t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_2$  has a significant effect on the dependent variable ( $Y$ ). The R-squared value of BCA Bank is 0.960671 or 96%, so the independent variable influences the dependent variable by 96% and the rest is influenced by other variables. While partial correlation between each independent variable and the dependent variable are:  $r_{X_1Y} = 0.896401035$ ,  $r_{X_2Y} = 0.070380379$ ,  $r_{X_3Y} = 0.60073313$ ,  $r_{X_4Y} = 0.900764507$ .

For Bank Bukopin,  $F_{hitung} = 1494.586803$ . With  $n = 72$ ,  $k = 4$ , we get  $n_1 = 4$  and  $n_2 = n - k - 1 = 72 - 4 - 1 = 67$ , so  $F_{tabel} = 2.51$ . Because  $F_{hitung} > F_{tabel}$ , then ditolak  $H_0$  is rejected and  $H_1$  is accepted, so there is an influence between the independent variables ( $(X_1, X_2, X_3, X_4)$  and the dependent variable ( $Y$ ).  $t_{hitung}$  for  $X_1 = 8.541635751$ ,  $X_2 = -0.3338249286$ ,  $X_3 = 2.092591206$ , and  $X_4 = -8.980887086$ , with  $\alpha = 0.05$  and  $n - k - 1 = 72 - 4 - 1 = 67$ , obtained  $t_{tabel} = 1.99601$ . Conclusion:  $t_{hitung} > t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_1$  and  $X_3$  have a significant effect on the dependent variable ( $Y$ ). If  $t_{hitung} < -t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so that  $X_2$  and  $X_4$  have a significant effect on the dependent variable ( $Y$ ). R-squared value of Bank Bukopin is 0.393293 or 39%, so the independent variable influences the dependent variable by 39% and the rest is influenced by other variables. While the partial correlation between each independent variable and the dependent variable is:  $r_{X_1Y} = 0.367446579$ ,  $r_{X_2Y} = -0.002469391$ ,  $r_{X_3Y} = -0.024736509$ ,  $r_{X_4Y} = -0.093247664$ .

For BRI bank,  $F_{hitung} = 353.615271$ . With  $n = 72$ ,  $k = 4$ , obtained  $n_1 = 4$  and  $n_2 = n - k - 1 = 72 - 4 - 1 = 67$ , so  $F_{tabel} = 2.51$ . Because  $F_{hitung} > F_{tabel}$ , then ditolak  $H_0$  is rejected and  $H_1$  is accepted, so there is an influence between the independent variables ( $(X_1, X_2, X_3, X_4)$  and the dependent variable ( $Y$ ). IF  $t_{hitung}$  for  $X_1 = 23.52736585$ ,  $X_2 = -6.362485721$ ,  $X_3 = 6.235084644$ , and  $X_4 = 13.04139769$ , with  $\alpha = 0.05$  and  $n - k - 1 = 72 - 4 - 1 = 67$ , obtained  $t_{tabel} = 1.99601$ . Conclusion:  $t_{hitung} > t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_1$ ,  $X_3$  and  $X_4$  have a significant effect on the dependent variable ( $Y$ ). If  $t_{hitung} < -t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_2$  has a significant effect on the dependent variable ( $Y$ ). R-squared value of BRI Bank is 0.921177 or 92%, so the independent variable influences the dependent variable by 92% and the rest is influenced by other variables. While partial correlation

between each independent variable and the dependent variable are:  $r_{X1Y} = 0.921489262$ ,  $r_{X2Y} = 0.012786911$ ,  $r_{X3Y} = 0.593880254$ ,  $r_{X4Y} = 0.846180655$ .

For Bank Danamon,  $F_{hitung} = 43.8628305$ . With  $n = 72$ ,  $k = 4$ , we get  $n_1 = 4$  and  $n_2 = n - k - 1 = 72 - 4 - 1 = 67$ , so  $F_{tabel} = 2.51$ . Because  $F_{hitung} > F_{tabel}$ , then ditolak  $H_0$  is rejected and  $H_1$  is accepted, so there is an influence between the independent variables ( $(X_1, X_2, X_3, X_4)$ ) and the dependent variable ( $Y$ ). If  $t_{hitung}$  for  $X_1 = 4.392063897$ ,  $X_2 = 4.898342498$ ,  $X_3 = -6.343388717$ , and  $X_4 = -11.30920312$ , with  $\alpha = 0.05$  and  $n - k - 1 = 72 - 4 - 1 = 67$ , obtained  $t_{table} = 1.99601$ .

If  $t_{hitung} > t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_1$  and  $X_2$  have a significant effect on the dependent variable ( $Y$ ). If  $t_{hitung} < -t_{tabel}$  then  $H_0$  is rejected and  $H_1$  is accepted so  $X_3$  and  $X_4$  have a significant effect on the dependent variable ( $Y$ ).  $R$ -squared value of Bank Danamon is 0.739150 or 73%, so the independent variable influences the dependent variable by 73% and the rest is influenced by other variables. While the partial correlation between each independent variable and the dependent variable is:

$$r_{X1Y} = -0.38999695, r_{X2Y} = -0.05244681, r_{X3Y} = -0.669001679, r_{X4Y} = -0.78433493.$$

Table 5. Simpulan nilai parameter pengaruh IHSG, tingkat inflasi, BI rate, dan nilai tukar terhadap harga saham berdasarkan uji Ordinary Least Square (OLS)

Parameter Harga Saham	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$
Bank BCA	-8039.00191	2.2810671	-13525.4279	12698.0565	0.73472562
Bank Bukopin	383.3952	0.115999	-119.424	2398.532	-0.03514
Bank BRI	-9390.0445	2.55237432	-29192.902	67861.3711	0.33926498
Bank Danamon	9913.921202	0.499005895	17329.20177	-56828.0044	-0.41236889

#### 4. Conclusions

Based on the calculation of Ordinary Least Square (OLS), the value  $\beta$  (parameter) is obtained from the estimation of the JCI influence model, inflation rate, BI rate, and exchange rate on the stock prices of Bank BCA, Bank Bukopin, Bank BRI, and Bank Danamon which are listed in the Table 4.17. Based on the significance test, the effect of the CSPI ( $X_1$ ), the inflation rate ( $X_2$ ), the BI Rate ( $X_3$ ), and the exchange rate ( $X_4$ ) on stock prices ( $Y$ ) have a significant effect. However, the effect obtained from the partial correlation test ( $r$ ) is a positive effect for Bank BCA and Bank BRI and negative for Bank Bukopin and Bank Danamon.

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