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ANALYSIS OF MACROECONOMIC FACTORS ON JCI STOCK RETURNS FOR THE PERIOD OF 2001-20009

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Abstract

Many people find the perfect investment strategy that can help every investor to invest their money in stock exchange. Since, stock index movement in a country certainly cannot be separated from the conditions of the country's macroeconomic, this research will focus it to the several macroeconomic factors that may affect the return of stock indices such as inflation, SBI rate, money supply, exchange rate, net foreign flow, oil price, and how big the influence of these factors on the movement of stock using the JCI as sample index from period of January 2001–December 2009. Therefore, the main problems to be answered in this research are to find the right model of calculation, partial, and jointly correlation between macroeconomic variables and JCI returns. Since the data that have been examined has a deviation of one of the classical assumption which is heteroscedasticity problems, a sophisticated model, ARCH/GARCH was used to calculate the result..

Keywords : investment, macroeconomics, JSI return, ARCH/GARCH

Introduction

Indonesia can be categorized as one of country that has developed financial markets sufficiently, especially in capital market. Many people find the perfect investment strategy that can help every investor to invest their money in stock exchange. Since, stock index movement in a country certainly cannot be separated from the conditions of the country's macroeconomic, this research will focus it to the several macroeconomic factors that may affect the return of stock indices such as inflation, SBI rate, money supply, exchange rate (JPY/IDR, SGD/IDR, CNY/IDR, EUR/IDR, USD/IDR), net foreign flow, oil price, and how big the influence of these factors on the movement of stock using the JCI as sample index from period of January 2001 - December 2009. Therefore, the main problems to be answered in this research are to find the right model of calculation, partial, and jointly correlation between macroeconomic variables and JCI returns. Since the data that have been examined has a deviation of one of the classical assumption which is heteroscedasticity problems,a sophisticated model, ARCH/GARCH was used to calculate the result. As the results GARCH (8,0) is perform as the best model to measure the research with the exception of eliminating SGD/IDR and CNY/IDR from the macroeconomic variable which need to be examined since both of it has a multicolinearity problem and could increase error of the result.

Jointly, there is a significant correlation between growth of inflation, SBI rate, money supply, exchange rate (EUR/IDR, JPY/IDR, USD/IDR), NFF and international oil price to JCI stock returns in the period of January 2001 – December 2009 with consideration EUR/IDR and JPY/IDR result are higher than alpha 5%. However, the coefficient of determination concluded that the growth of inflation, SBI Rate, money supply, exchange rate (EUR/IDR, JPY/IDR, USD/IDR), NFF and international could explain JCI returns of 49.83% and the rest of 50.17% is explain by other variables which not examine in this research. There is a partial significant correlation between JCI returns to the growth of inflation, SBI rate, money supply, exchange rate (USD/IDR), NFF, and international oil price in the period of January

2001 – December 2009. The result hopefully could be a consideration for investors, companies and government in making decision. However, this is one of many ways to observe the correlation and forecasting. Both fundamental and technical studies can affect the value of this regression formula itself.

Theoretical Foundation

From the previous findings shown that many researchers in all over the world had tried to analyze and investigate the effect of macroeconomic variables on stock returns. However, each of researchers has their own way to analyze the data with also using different macroeconomic variables. This research will mainly discuss several macroeconomic variables such as inflation, SBI rate, money supply, exchange rate (JPY/IDR, SGD/IDR, CNY/IDR, EUR/IDR, USD/IDR), net foreign flow, oil price and its impact to JCI in the period of January 2001 – December 2009 using a time-series method.

Table 1. Previous Research Summary

Researchers	Year of Research / Samples Period	Variables	Research Methods	Result
Chen, Roll and Roll (Journal of Business, University of Chicago Press)	1986 / January 1953 - November 1983 (monthly basis)	(a) Industrial production, (b) Inflation, (c) Risk premium, (c) Consumption, (d) Oil price, (e) US stock market	APT	• Variables a, b, c significant with variable f • Variable d and e doesn't significant with variable f
Octavia (Undergraduate final project, Universitas Negeri Semarang)	2007/ 2003-2005 (monthly basis)	(a) IDR/USD exchange rate, (b) SBI rates, (c) JCI	• OLS • Multiple Regresion	Variable a and b cooperatively and partially influence variable c
Widjanarko (*School of Business and Management*	2008/2002-2007	(a) IDR/USD, (b) JPY/IDR, (c) EUR/IDR, (d) GBP/IDR, (d) JCI, (e) Price Indices of each sector	EGARCH	USD/IDR the most significant to JCI and majorities sectors followed by JPY/IDR, EUR/IDR, and GBP/IDR
Amanda (School of Business and Management)	2009/2003-2008 (quarterly basis)	(a) Indonesia Debt Outstanding, (b) GDP, (c) Inflation, (d) National Savings, (e) IDR/USD, (f) Balance trade, (g) FDI, (h) Premium, (i) SBI (j) Interest rate swap spread	• OLS • Multiple Regresion	• IDR/USD significant with swap spread except 2-year swap spread. • GDP relevant with long-dated swap spread (10 years) • SBI relevant with medium-dated maturities
Mangani (Investment Analysis Journal, University of Malawi)	2009/ 1983 – 2007 (weekly basis)	(a) Discount rate, (b) Gold Price, (c) JSE	ARCH and GARCH	Variable a and b significant with variable c
Frensidy (University of Indonesia)	2009/ January 2006 – October 2007 (daily basis)	(a) NFF, (b) Hang Seng, (c) IDR/ USD exchange rate, (d) JCI	ARCH and GARCH	Variable a, b, c affected variable d

Research Methodology

Analytical methods that will be used in this research are descriptive and quantitative analysis method by using an econometric model. The diagram on Figure 1 will generally describe the step on processing the time series data.

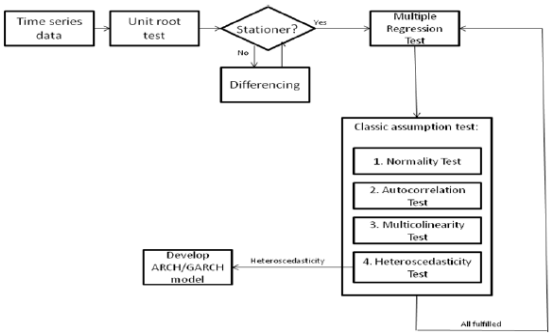

Figure 1. Data Processing Step

To reach the objectives and prove the hypothesis of research, the data that will be processed must be suitable. The step of data processing includes:

- Each group of data will be tested whether its stationer or not by using Unit Root Test.
- If the data is stationer, it will directly done parameter estimation by conducting Multiple Regression Analysis test. To make sure if the model obtained is feasible or not, needed to conduct the classical assumption tests. The aims are to make sure if the model contains a violation of the normality, multicollinearity, autocorrelation, and heteroscedasticity assumptions.
- If later proved that there is a problem on heteroscedasticity, multiple regression

models will be not feasible. Since that, the writer will attempt a more sophisticated

- model is ARCH and GARCH (p,q). But if there isn't a problem on heteroscedasticity (homoscedasticity), multiple regressions is can be conducted.

The entire processing will use Eviews 4.1software for statistical calculation. Data that used in this research is secondary data in the form of monthly time series data from January 2001 - December 2009.

Table 2. Data Collection Table

Variable	Sources	Type	Period
IHSG	Bloomberg	Monthly	Dec2000–Dec2009
Inflation	Bloomberg	Monthly	Dec2000–Dec2009
SBI Rate	Bloomberg	Monthly	Dec2000–Dec2009
Money Supply (M2)	Bloomberg	Monthly	Dec2000–Dec2009
JPY/IDR	Bloomberg	Monthly	Dec2000–Dec2009
SGD/IDR	Bloomberg	Monthly	Dec2000–Dec2009
CNY/IDR	Bloomberg	Monthly	Dec2000–Dec2009
EUR/IDR	Bloomberg	Monthly	Dec2000–Dec2009
USD/IDR	Bloomberg	Monthly	Dec2000–Dec2009
NFF	Bloomberg	Monthly	Dec2000–Dec2009
International Oil Price	Bloomberg	Monthly	Dec2000–Dec2009
Production Index	Bloomberg	Monthly	Dec2000–Dec2009

Data Analysis

Unit Root Test Result

Unit Root Test or stationer test need to be conducted since this research is using time-series data which could be determine by using Dickey-Fuller test with the critical value α 6 = 5% (-2.888932). Differencing is needed only for variables which have t-statistic (absolute value) below critical value α = 5% in order to make all the variables are completely stationer.

Table 3. Stationer Test Result (Differencing)

Variable	t-statistic	Prob*	Conclusion
DJCI	-7.665739	0.0000	Stationer
DINF	-8.180889	0.0000	Stationer
DSBI	-4.745045	0.0000	Stationer
DMON	-10.71365	0.0000	Stationer
DJPY	-8.377867	0.0000	Stationer
DSGD	-8.887090	0.0000	Stationer
DCNY	-8.453889	0.0000	Stationer
DEUR	-11.12510	0.0000	Stationer
DUSD	-8.453889	0.0000	Stationer
DNFF	-10.11896	0.0000	Stationer
DOIL	-8.132954	0.0000	Stationer

Table 4. Variable Definition (Differencing)

Variable	t-statistic	Prob*	Conclusion
DJCI	-7.665739	0.0000	Stationer
DINF	-8.180889	0.0000	Stationer
DSBI	-4.745045	0.0000	Stationer
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DCNY	-8.453889	0.0000	Stationer
DEUR	-11.12510	0.0000	Stationer
DUSD	-8.453889	0.0000	Stationer
DNFF	-10.11896	0.0000	Stationer
DOIL	-8.132954	0.0000	Stationer

Multiple Regression Analysis (1)

Since the entire data already stationer, the next step is to testing the Multiple Regression. Before approving the multiple regression analysis, there are classical assumptions that need to be fulfilled.

Table 5. Multiple Regression Analysis (1)

Dependent Variable: DJCI
Method: Least Squares
Date: 07/25/10 Time: 12:56
Sample: 2001:01 2009:12
Included observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016114	0.007339	2.195460	0.0305
DINF	-0.000329	0.043227	-0.007614	0.9939
DSBI	-0.345372	0.154627	-2.233579	0.0278
DMON	0.004484	0.418490	0.010716	0.9915
DJPY	-0.425647	0.259245	-1.641872	0.1039
DSGD	1.410939	0.661437	2.133141	0.0354
DCNY	-0.453893	1.053946	-0.430661	0.6677
DEUR	0.022478	0.292947	0.076730	0.9390
DUSD	-1.150091	0.988467	-1.163510	0.2475
DNFF	-0.000114	0.000205	-0.556662	0.5790
DOIL	0.067089	0.068454	0.980062	0.3295

R-squared	0.600783	Mean dependent var	0.019787
Adjusted R-squared	0.554162	S.D. dependent var	0.074474
S.E. of regression	0.057967	Akaike info criterion	-2.761597
Sum squared resid	0.325939	Schwarz criterion	-2.488417
Log likelihood	160.1262	F-statistic	7.961496
Durbin-Watson stat	1.665451	Prob(F-statistic)	0.000000

Classic Assumption Test (1)

Classic assumption tests need to be fulfilled to gather significant outcome. If there are some deviations in this assumption it may cause some consequences that can lead to irrelevant results.

Multicolinearity Test (1)

The test will show whether if there is any correlation between independent variable by using matrix correlation. The result showed in Table. 6

Table 6. Multicolinearity (1)

	DINF	DSBI	DMON	DJPY	DSGD	DCNY	DEUR	DUSD	DNFF	DOIL
DINF	1	0.385	0.003	-0.073	-0.003	0.054	-0.076	0.050	0.008	-0.124
DSBI	0.385	1	0.221	0.207	0.206	0.220	0.079	0.218	-0.040	-0.115
DMON	0.003	0.221	1	0.301	0.455	0.398	0.399	0.402	-0.037	-0.101
DJPY	-0.073	0.207	0.301	1	0.857	0.805	0.716	0.789	-0.083	-0.340
DSGD	-0.003	0.206	0.455	0.857	1	0.915	0.828	0.909	-0.075	-0.211
DCNY	0.054	0.220	0.398	0.805	0.915	1	0.671	0.990	-0.027	-0.291
DEUR	-0.076	0.079	0.399	0.716	0.828	0.671	1	0.680	-0.146	-0.066
DUSD	0.050	0.218	0.402	0.789	0.909	0.990	0.680	1	-0.029	-0.293
DNFF	0.008	-0.040	-0.037	-0.083	-0.075	-0.027	-0.146	-0.029	1	-0.148
DOIL	-0.124	-0.115	-0.101	-0.340	-0.211	-0.291	-0.066	-0.293	-0.148	1

Based on coefficient correlation matrix table above, it was found that there was some correlation values greater than 0.8 (Gujarati, 2003). Therefore, it can be said there are 8 serious problems with multicolinearity. Ignoring the multicolinearity may cause increasing of standard error of the model. Thus, the problems need to be solved. The suggestion is to eliminate independent variables that have a significant correlation with others independent variables. DSGD and DCNY show greatest problem on multicolinearity, therefore we eliminate DSGD and DCNY from the rest of data processing due to reaching the relevant and significant result. Since there are changes on variables, the multiple regressions need to be re-conducted

Re-conduct Multiple Regression Analysis

It couldn't be concluded yet if it is the best model and could be conducted to measure the research. There are still have to be tested if the multiple regression models already fulfilled the classical assumption test or not.

Table 7. Multiple Regression Analysis (2)

Dependent Variable: DJCI
Method: Least Squares
Date: 07/25/10 Time: 12:59
Sample: 2001:01 2009:12
Included observations: 108

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.014261	0.007256	1.965512	0.0522
DINF	0.005042	0.043553	0.115769	0.9081
DSBI	-0.337519	0.156421	-2.157759	0.0334
DMON	0.167856	0.415691	0.403800	0.6872
DJPY	-0.204154	0.227898	-0.895813	0.3725
DEUR	0.376793	0.240110	1.569252	0.1198
DUSD	-1.004549	0.248220	-4.047007	0.0001
DNFF	-9.82E-05	0.000208	-0.472921	0.6373
DOIL	0.089632	0.068044	1.317257	0.1908

R-squared	0.574990	Mean dependent var	0.019787
Adjusted R-squared	0.528524	S.D. dependent var	0.074474
S.E. of regression	0.058711	Akaike info criterion	-2.752740
Sum squared resid	0.341246	Schwarz criterion	-2.529229
Log likelihood	157.6480	F-statistic	9.146349
Durbin-Watson stat	1.630798	Prob(F-statistic)	0.000000

Classic Assumption Test (2)

Multicolinearity Test

Based on the correlation coefficient matrix in the table above, it was found that the correlation value is much smaller than 0.8 (Gujarati, 2003). Therefore, it can be stated is not there a serious problem with multicolinearity.

Table 8. Multicolinearity Test (2)

	DINF	DSBI	DMON	DJPY	DEUR	DUSD	DNFF	DOIL
DINF	1	0.385	0.003	-0.073	-0.076	0.050	0.008	-0.124
DSBI	0.385	1	0.221	0.207	0.079	0.218	-0.040	-0.115
DMON	0.003	0.221	1	0.301	0.399	0.402	-0.037	-0.101
DJPY	-0.073	0.207	0.301	1	0.716	0.789	-0.083	-0.340
DEUR	-0.076	0.079	0.399	0.716	1	0.680	-0.146	-0.066
DUSD	0.050	0.218	0.402	0.789	0.680	1	-0.029	-0.293
DNFF	0.008	-0.040	-0.037	-0.083	-0.146	-0.029	1	-0.148
DOIL	-0.124	-0.115	-0.101	-0.340	-0.066	-0.293	-0.148	1

Normality Test

From the normality test above, the probability of Jarque-Bera is 0.554243, or above $\alpha = 5\%$. We can conclude that there is no problem in normality.

Autocorrelation Test

The Durbin-Watson result below is show that it has 1.630798 as it value. According to the d Durbin-Watson statistic diagram, the value could categorize in non-autocorrelation area. However, since there are some weakness on using only Durbin Watson test, then ARCH LM Test is have to be conducted, in order to get relevant result.

Table 9. ARCH LM Test

F-statistic	0.460036	Probability	0.499099
Obs*R-squared	0.466754	Probability	0.494484

Arch LM test is also result the same conclusion with Durbin-Watson test. With a probability value of well above 0.05 could be ascertained if there is no problem of autocorrelation for models that have been fulfilled.

Table 10. Heteroscedasticity Test

F-statistic	1.588610	Probability	0.024401
Obs*R-squared	56.80317	Probability	0.027187

From the above table, p-value obtained from the Obs * R-square is close to zero or lower than the α (5%), so that it can be stated that the model have problems with heteroscedasticity. Therefore, the multiple regression equation (3) could not be conducted and the model will further use ARCH / GARCH to find the best model in this research.

Determining the Right Model

The final step in the search for the most feasible model to explain the relationship of these variables above are by trying to ARCH models, GARCH and TARCH. Table the results of several alternative models shown **Error! Reference source not found.**.

Table 11. Alternative Models

Model	P	Q	Akaike	Schwarz
Garch (1,0)	1	0	2.66065	2.40513
Garch (2,0)	2	0	2.646373	2.367624
Garch (8,0)	8	0	2.630625	2.212502
Garch (0,2)	0	2	2.752690	2.450712
Garch (0,3)	0	3	2.722272	2.397065
Garch (2,1)	2	1	2.752913	2.450935
Tarch (0,1)	0	1	2.772934	2.470956
Tarch (2,1)	2	1	2.743693	2.418485

In addition to the above models, have been tried as well as M-Arch model with standard deviation variance M-arch, and others models. Unfortunately, the results obtained are unsatisfactory because most variables are not significant and it has value of Akaike info creation and Schwartz info creation high enough. Based on Table 4.9 above, the model which relatively the most qualified is GARCH model (8.0) or also could be stated as ARCH(8) because it has the lowest Akaike info criterion and Schwarz info criterion. Both these values describe the magnitude of error that occurred.
Thus a better model for explaining the relationship of the research variables is :

$$DJCI = 0.006942 - 0.00001DINF - 0.308728DSBI - 0.000506DMON - -0.247665\,DJPY + 0.346389DEUR - 0.926950DUSD + 0.00000974NFF + 0.168043DOIL$$

with the variance or var (ε2t):

$$\sigma_t^2 = 0.002087 + 0.203443\varepsilon_{t-1} - 0.099856\,\varepsilon_{t-2} + 0.131905\,\varepsilon_{t-3} - 0.079580\varepsilon_{t-4} - 0.036455\,\varepsilon_{t-5} - 0.125947\,\varepsilon_{t-6} + 0.024607\,\varepsilon_{t-7} + 0.370798\,\varepsilon_{t-8}$$

Table 12. GRACH (8,0)

Dependent Variable: DJCI
Method: ML - ARCH (Marquardt)
Date: 07/22/10 Time: 23:39
Sample: 2001:01 2009:12

Included observations: 108
Failure to improve Likelihood after 11 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.006942	0.005794	2.734026	0.0063
DINF	-0.000001	0.064945	-2.937557	0.0306
DSBI	-0.308728	0.139911	-3.256667	0.0081
DMON	-0.000506	0.340022	-2.888331	0.0431
DJPY	-0.247665	0.182685	-1.355693	0.1752
DEUR	0.346389	0.187603	1.846389	0.0648
DUSD	-0.926950	0.236984	-4.151786	0.0000
DNFF	9.74E-06	0.000176	3.250803	0.0172
DOIL	0.168043	0.065393	3.616861	0.0240
Variance Equation				
C	0.002087	0.000756	2.762199	0.0057
ARCH(1)	0.203443	0.150638	1.350540	0.1768
ARCH(2)	-0.099856	0.116974	-0.853663	0.3933
ARCH(3)	0.131905	0.161317	0.817679	0.4135
ARCH(4)	-0.079580	0.079628	-0.999397	0.3176
ARCH(5)	-0.036455	0.073671	-0.494830	0.6207
ARCH(6)	-0.125947	0.074285	-1.695450	0.0900
ARCH(7)	0.024607	0.126209	0.194974	0.8454
ARCH(8)	0.370798	0.174204	2.128529	0.0333

R-squared	0.541496	Mean dependent var	0.019714
Adjusted R-squared	0.498334	S.D. dependent var	0.074467
S.E. of regression	0.062289	Akaike info criterion	-2.630625
Sum squared resid	0.349194	Schwarz criterion	-2.212502
Log likelihood	164.0797	F-statistic	3.701771
Durbin-Watson stat	1.604233	Prob(F-statistic)	0.000025

Result Analysis

According to the calculation, the entire independents variables jointly significant affected to the independent variable (JCI stock return) with probability of F statistic is also below the significant value α = 5%.
From the last equation which believed is the best model of the research, there are several independent variables that significantly affect the dependent variable (JCI return) and there are also not significantly affected. Variable DINF, DSBI, DMON, DUSD, DNFF, and DOIL has probability below the critical value α = 5% which conclude that those variables are significantly affect the independent variable (JCI stock return). Meanwhile, variables DJPY and DEUR have probability above the critical value α = 5% which conclude that the variables are not significantly affect with the level of value α = 5% to the independent variable (JCI stock return).

The variance equation indicates that the data has a correlation with other factors, besides the independent variables which are the disturbance error from previous periods. ARCH (8) means that the data affected by the disturbance error from previous 8 months. For example, the returns of JCI on September are affected by the disturbance error of data from the previous January until August.

Joint Analysis
The relationship between dependent variable (DJCI) and independent variables (DINF, DSBI, DMON, DJPY, DEUR, DUSD, DNFF, and

DOIL) could be determined and analyzed by looking at the probability of F-statistic. According to the table 4.12, the probability of model GARCH (8,0) is below the α = 5%, which means there are a significant correlation between the entire independent variables and dependent variables that examined in this research. Therefore, Ho is rejected.

The number of probability of F-statistic means that the entire independent variables in jointly and significantly affect the dependent variable that examined in this research with level of confidence 95%. So, by using the model GARCH (8,0), it could be concluded that growth of inflation, growth of SBI rate, growth of money supply, growth of USD/IDR, growth of net foreign flow, and growth of international oil price jointly and simultaneously affect JCI stock returns with the confidence level of 95%.

The result of this calculation is expected since the monetary crisis that hit Indonesia for past years has devastated the Indonesian economy that previously experienced rapid economic growth which is causing the occurrence of inflation. Along with rising inflation and also the tendency of Bank Indonesia to lower the interest rate Bank Indonesia Certificates (SBI), then with interest rate cuts by Bank Indonesia Certificates (SBI) will encourage the growth of money supply, it is also followed by the weakening of rupiah exchange rate several currencies. Then the price of goods will also increase, since we were not separated from the inflation, the economic crisis that is still happening and global condition. However, for the development of the stock price index tends to increase, due to interest from investors to invest in the stock exchange. When interest rates high enough, higher than capital gains and dividends per annum that can be obtained from the trading floor, people will choose to save money in the bank. Conversely, when interest rates have weakened, then people will switch to the trading floor. However, whether the probability of F-statistic shows there is a significant correlation, the coefficient correlation (Adjusted R2) of the model shows the number of 0.498334. The number means that the growth of inflation, growth of SBI Rate, growth money supply, growth exchange rate (EUR/IDR, JPY/IDR, USD/IDR), growth of net foreign flow, and growth international oil price could explain JCI returns of 49,83% and the rest of 50.17% is explain by other variables which not examine in this research. The result makes sense since there are only 8 variables that examine on this research to represent macroeconomic factors, meanwhile there are still some of macroeconomic factors such as other world index (Dow Jones, Hang Seng, etc) and other factors which may could increase the percentage adjusted R2 and greatly affected to JCI returns. By looking at the result of coefficient determination and analysis above for further research, it is necessary to add more macroeconomic variables on the research. However, the future researchers need to be considered the fact that there are other factors that may also greatly influence return of JCI. Those other factors that need to be considered are non-macroeconomic factors such as the financial ratio and the internal problem of the companies which could not be measure statically. The political condition and global issue also could affect JCI returns. Local political condition and issues also could affect the performance of JCI, such as President Election, terrorism issues, etc.

Partial Analysis

The table below will systematically and in order explain the partial (t-test) conclusion from model GARCH (8,0) from the variable that has the strongest significant correlation down to the variable that has no significant correlation.

Table 12. Partial Analysis Table

Variables	Coef. Correlation	t-statistic	Prob	Conclusion
DUSD	-0.926950	4.151786	0.00000	Significant , negative correlation
DSBI	-0.308728	3.256667	0.00810	Significant, negative correlation
DOIL	0.168043	3.616861	0.01720	Significant, positive correlation
DMON	-0.000506	2.888331	0.04310	Significant, negative correlation
DNFF	0.000009	3.250803	0.01720	Significant, positive correlation
DINF	-0.000001	2.937557	0.03060	Significant, negative correlation
DEUR	0.346389	1.846389	0.06480	Not significant, positive correlation
DJPY	-0.247665	1.355693	0.17520	Not significant, Negative correlation

From the result above, there are 6 variables are significant below the level of value α = 5% and 2 variables are not significant since it has the value higher than = 5% in this research. Each partial correlation, will be explain and analyze further

Conclusions

All of the research objectives could be answered and concluded as below:

a) Since time series data that examined have a range of stock returns that not constant (heteroscdasticity), OLS assumption couldn't be fulfilled. As an alternative model ARCH / GARCH. GARCH (8,0) is perform as the best model to measure the research with the exception of eliminating SGD/IDR and CNY/IDR from the macroeconomic variable which need to be examined since both of it has a multicolinearity problem and could increase error of the result. The equation model of the research is below :

$$DJCI = 0.006942 - 0.00001DINF - 0.308728DSBI - 0.000506DMON - 0.247665\,DJPY + 0.346389DEUR - 0.926950DUSD + 0.00000974N\ 0.168043DOIL$$

with the variance or var (ε2t):

$$\sigma_t^2 = 0.002087 + 0.203443\varepsilon_{t-1} - 0.099856\,\varepsilon_{t-2} + 0.131905\,\varepsilon_{t-} 0.079580\varepsilon_{t-4} - 0.036455\,\varepsilon_{t-5} - 0.125947\,\varepsilon_{t-6} + 0.024607\,\varepsilon_{t-} 0.370798\,\varepsilon_{t-8}$$

The variance equation indicates that the data has a correlation with other factors, besides the independent variables which are the disturbance error from previous periods. ARCH (8) means that the data affected by the disturbance error from previous 8 months. For example, the returns of JCI on September are affected by the disturbance error of data from the previous January until Augustus.

b) Jointly, there is a significant correlation between growth of inflation, SBI rate, money supply, exchange rate (EUR/IDR, JPY/IDR, USD/IDR), NFF and international oil price to JCI stock returns in the period of January 2001 – December 2009 which has the probability of f-statistic below 0.05. However, the coefficient of determination concluded that the growth of inflation, SBI Rate, money supply, exchange rate (EUR/IDR, JPY/IDR, USD/IDR), NFF and international could explain JCI returns of 49.83% and the rest of 50.17% is explain by other variables which not examine in this research.

c) Partially, there is a significant correlation between JCI returns to the growth of inflation, SBI rate, money supply, exchange rate (USD/IDR), NFF, and international oil price in the period of January 2001 – December 2009 which has the probability of t-value below 0.05. The rest of the variables – EUR/IDR and JPY/IDR exchange rates resulted not significant to JCI stock returns since the probability of t-value above 0.05.

Further Research

Based on the above conclusions, the suggestions of the result hopefully can be given investors, companies, government or for further development of the research.

- Investors should consider the information about macroeconomic factors such as inflation, SBI rate, money supply, exchange rate (USD/IDR), NFF, and international oil price as the existence of information which can be used to predict the JCI returns in IDX is then used for making the right decision, in connection with their investment.
- Companies that make policy with other countries, such as exports and imports, must first examine the macroeconomic factors that can affect company such as inflation, SBI rate, money supply, exchange rate (USD/IDR), NFF, and international oil price, so in implementing and running the company, management can take an appropriate measures in order to attract investors on IDX.
- Government should also consider macroeconomic factors such as inflation, SBI rate, money supply, exchange rate (USD/IDR), NFF, and international oil price through policies that were taken, which was subsequently used to attract both domestic investors and foreign investors to invest their money on IDX due to the better of Indonesia economic condition.
- The limitations of the macroeconomic factors used as a basis for predicting the JCI returns limited to inflation, SBI rate, money supply, exchange rate (USD/IDR), NFF, and international oil price. Hopefully within the next experiment could added other factors and observe the effect to the JCI return. The limitations in making the research period which is only using 9 years data and 108 data sample. The further development of research could extend the period of research that could obtained better reflection of JCI return in IDX historitically.

Reminded that this is only one of many ways to observe the correlation and forecasting. Both fundamental and technical studies can affect the value of this regression formula itself. Therefore, there will be needed further development of the research.

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