Journal of Applied Finance & Banking, Vol. 10, No. 2, 2020, 169-180
ISSN: 1792-6580 (print version), 1792-6599(online)
Scientific Press International Limited

The Effects of Macroeconomic Variables and Company's Financial Ratios on Stock Prices of Coal Mining Companies Listed in Indonesia Stock Exchange for the Period of 2013 - 2018.

Nidia Prastivini S. Sastralaga[1], Adler Haymans Manurung[2], Ferdinand D. Saragih[3] and Benny Hutahayan[4]

Abstract

This research aims to analyze the Macroeconomic variables and Company's financial ratios on the stock prices of coal meaning companies listed in the Indonesia Stock Exchange for the period of 2013 – 2018. The model of Panel data is used to estimate the relationship between macroeconomic variables and company's financial ratios on the stock prices of coal mining companies. The result of this this research are: debt to equity ratio significantly affects stock prices of coal mining companies at level of 10%, market capitalization significantly affects stock prices of coal mining companies at level of 5% and macroeconomic variables, such as oil prices, inflation, interest rates, exchange rates and coal prices have highly significantly effects on stock prices of coal mining companies at level of 1%.

JEL classification numbers: E3, E4, G1, Q4
Keywords: debt to equity ratio, market capitalization, oil price, inflation, interest rate. Coal price and panel data.

[1] Student of Accounting Department, Bina Nusantara University.
[2] Professor of Finance and Bankin, Management Department, Doctor Research In Management, Binus Business School, Bina Nusantara University, Member of Research Cluster of Financial Institution at FIA UI.
[3] Professor of Administrative Science, Head of Research Cluster of Financial Institution at FIA University Indonesia.
[4] Faculty of Administration Science, University of Brawijaya.

Article Info: Received: September 18, 2019. Revised: October 30, 2019.
Published online: March 1, 2020.

1. Introduction

Coal Mining Industry is very important to Indonesia Economy. Indonesia has rank of 5th in the world with reserves of 37 billion tons or 3.7% out of total coal reserves in the world and the first rank in the world coal exporter of 390 million tons or more than 30% of the global coal supply . Power Plant in Indonesia strongly needs production of coal mining industry to produce power electricity.

Coal Mining Industry very enjoyed receiving the highest price of coal untiI the end of 2012, because the coal price dropped to around of US$ 50. It affected coal mining companys' performance. After the year of 2012, some of the coal mining companies do efficiency to cut cost to survive the companies. It also affects stock prices on the stock exchange.

Bhandari (1988) and Hasan examined relationship debt to equity ratio to stock price. Basu (1983) and Banz (1981) examined relationship stock price and market value of stock. Piotroski and Roulstone (2004) and Shin (2019) examined relationship between characteristic industry to stock price. Abdalla et. Al (1997), Lee et.al (2010), Hajilee and Nasser (2014) examined relationship exchange rate to stock prices. Bodie (1976), Nelson (1976), Fama and Schwert (1977), Kaul (1987) and Kilian Park (2009) examined relationship inflation to stock prices. Hamilton (1993), Kaul (1996), and Kling (1985) examined relationship oil prices to stock prices.

Based on the previous explanation, this research wants to analyze the effects of Macroeconomic variables and Company's financial ratios on the stock prices of coal mining companies listed in the Indonesia Stock Exchange for the period of 2013 – 2018.

2. Theoretical Review

When academicians discuss stock return, it means that they discuss asset pricing of stock. Initially, asset pricing introduces single index model (SIM) is expressed as follows:

$$E(R_j) = \alpha + \beta_j * R_m + \varepsilon \quad (1)$$

where α is fundamental value and β*Rm is valued by market sentiment, ε is error term or error on wrong valuation or idiosyncratic error.

Sharpe (1964), Lintner (1965) and Mossin (1966) introduced Capital Asset Pricing Model (CAPM) as follows:

$$E(R_j) = R_f + \beta_j * \lfloor E(R_m) - R_f \rfloor + \varepsilon \quad (2)$$

where R_f is risk-free rate, β_j is market risk of stock j^{th} and R_m is market return, and ε = error term or Idiosyncratic risk or noise trading.

Fama and French (1993) is introduced three factor Model as follows:

$$E(R_j) = R_f + \beta_j * \lfloor E(R_m) - R_f \rfloor + \gamma * SMB_j + \lambda * HML_j + \varepsilon \quad (3)$$

where SMB is the difference between the returns on small- and big-stock portfolios with about the same weighted-average book-to-market equity, HML is HML is the difference, each month, between the simple average of the returns on the two high-BE/ME portfolios (S/H and B/H) and the average of the returns on the two low-BE/ME portfolios (S/L and B/L).

Carhart (1997) introduced a four-factor model by using variabel of Momentum (introduced by Jagadesh and Titman) as follows:

$$E(R_j) = R_f + \beta_j * \lfloor E(R_m) - R_f \rfloor + \gamma * SMB_j + \lambda * HML_j + \delta * Mom + \varepsilon \quad (4)$$

Where Mom is momentum.

Fama and French (2015) introduced a Five-factor model as follows:

$$E(R_j) = R_f + \beta_j * \lfloor E(R_m) - R_f \rfloor + \gamma * SMB_j + \lambda * HML_j + \delta * Mom + \varphi * Liq_j + \varepsilon \quad (5)$$

This model introduced Liquidity Variable as another variable that added to the previous model. ε is error term or idiosyncratic risk or noise trading for equation (2), (3), (4), and (5).

Debt to Equity Ratio has a relationship with stock prices. This ratio is expected to have a negative relationship with stock prices. If debt company increases, it will decrease the profit and at the end it makes stock prices drop. Bhandari (1988) and Hasan examined the relationship between debt to equity ratio and the stock prices. They found that it had a negative relationship.

Market Capitalization of a company is considered as size of company (Shalit and Shanker, 1977). Market Capitalization has positively relationship with stock prices. If size company increases, it will increase stock prices. Basu (1983) and Banz (1981) examined relationship stock prices and market values of stocks.

Interest rates have negative relationship with stock prices. If government increases the interest rates, it will decrease the stock prices. Many academicians and researchers have conducted research to analyze the relationship between exchange rates and stock markets, such as Abdalla et.al (1997); Dimitrova (2005); Homma et.al (2005); Agrawal et.al (2010); Lee et.al (2011); and Hajilee and Nasser (2014). Most of their research found that exchange rates had positive relationship with stock prices. If Exchange rate increases, the stock market will increase. When exchange rate increases, foreign investors have more money to invest. The more money to

invest the more demand to increase, so that it affects the increase in the stock market prices.

Inflation as a macroeconomic indicator has a negative relationship with the stock prices. If Inflation decreases, net company's profit will increase because cost of company decreases. But inflation is called as a hedge of investment in stock (Bodie, 1976). Nelson (1976) examined the relationship between inflation and the stock prices. Fama and Schwert (1977) stated in their research that U.S. government bonds and bills were a complete hedge against expected inflation, and private residential real estate was a complete hedge against both expected and unexpected inflation. Kaul (1987) also examined the relationship between inflation and stock prices. He mentioned that relationship caused the equilibrium process in the monetary sector. Kilian and Park (2009) also examined the relationship between inflation and the Stock Prices in US markets.

Oil Price have a negative relationship with the stock prices, because the increase in oil prices will increase the input of company to produce products but decrease the net profit and impact on decrease in the stock prices. Hamilton (1993) started to study the impact of oil Prices on macroeconomic variables, especially in relation to the Stock market prices. Kaul (1996) focused on examining the relationship between oil Prices and the Stock prices. He found that the reaction of United States and Canadian Stock prices to oil shocks could be completely accounted for by the impact of these shocks. Kling (1985) examined the relationship the oil price Shocks with the stock prices behavior. Papapetrou (2001) examined dynamic the relationship between oil price, stock prices and interest rates and economic activities in Greece. He also used VAR to examine these relationships. Kilian and Park (2009) also examined impact of oil price Shocks on the US stock prices. Antonakakis and Filis (2013) also examined the relationship betwee oil prices and the stock prices using time varying approach.

A Characteristic of Industry should also be considered as an indicator to increase or decrease stock prices. It has a positive impact on stock prices. Piotroski and Roulstone (2004) examined the relationship between characteristics of industry and stock price. Shin (2019) also examined the relationship between a characteristic of industry on stock prices. They found that the characteristic of industry has a significantl negative impact on stock prices.

3. Methodology and Data

3.1 Methodology

As mentioned before, this study aims to analyze the models of stock prices, and the company's ratios are calculated as follow:

$$STA = \frac{\text{Sales}}{\text{Total Asset}} \tag{6}$$

$$\text{ROE} = \frac{\text{Fixed Asset}}{\text{Total Assets}} \tag{7}$$

$$\text{PBV} = \frac{\text{Debt}}{\text{Equity}} \tag{8}$$

This research uses a model of Data Panel to estimate the relationship between some independent variables with the determined stock prices as dependent variable. The model of data panel is appropriate for small numbers of data with short time series and small companies as samples. Besides that, the model of data panel also shows time series and the cross-section as samples. Gujarati (2003) and Wooldridge (2006) stated that the models of data panel were as follow:

a. Pooled Data Model

Pooled Data Model is model that data combines all together and the model is as follows:

$$Y_{i,t} = \beta_1 + \beta_2 X_{2i,t} + \beta_3 X_{3i,t} + \mu_{i,t} \tag{9}$$

i = 1, 2, …, k

t = 1, 2, …, n

X's are no stochastic and $E(i_t) \sim N(0, \sigma^2)$

b. Fixed Effect Model

FEM is a model that ε_i and X's are assumed correlated.

$$Y_{i,t} = \beta_{1i} + \beta_2 X_{1i,t} + \beta_3 X_{2i,t} + \mu_{i,t} \tag{10}$$

i = 1, 2, … , k

t = 1, 2, … , n

c. Random Effect Model (REM)
REM is a model that ε_i and X's are assumed uncorrelated.

$$Y_{i,t} = \beta_{1i} + \beta_2 X_{1i,t} + \beta_3 X_{2i,t} + \mu_{i,t} \quad (11)$$

$$\beta_{1i} = \beta_1 + \varepsilon_i$$

i = 1, 2, … , k
t = 1, 2, … , n
ε_i is a random error with a mean value of zero and variance of σ_ε^2.

Judge (1982) explained how we choose FEM or REM as follows:

1. FEM may be preferable, when T (number of time series data) is large and N (the number of cross-sectional units) is small.
2. When T is small and N is large, if we strongly believe that the individual, or cross-sectional, units in our sample are not random drawings from a larger sample, FEM is appropriate. If the cross-sectional units in the sample are regarded as random drawings, the REM is appropriate.
3. FEM is an unbiased estimator, when individual error component ε_i and one or more regressors are correlated.
4. REM estimators are more efficient than FEM Estimators, when N is large and T is small and if the assumptions underlying REM hold.

3.2 Data

Data is gathered from the company that they published to public in newspaper or their website as mandatory requirement from government and Indonesia Stock Exchange, but macroeconomic data are obtained from Central Bank of Indonesia. Data are annually data collected from Year of 2013 to 2018. The data panel consists of only sixteen companies having the financial statements for that period. Then, stock prices (Y), market capitalization (MC), debt to equity ratio (DER), total asset turnover ratio (STA) and Fixed Asset Ratio (FAT), exchange rate (ER), coal price (CP), interest rate (INT), oil price (OP) and Inflation (INF) are calculated based on data collection. Data of stock prices, market capitalization, exchange rates, oil prices and coal prices are transformed to logarithm natural when model is run by using Eviews Program.

4. Results

The discussion of this study is divided into two analysis. The First discussion is about analysis of behavior of the variable using descriptive statistics. The second one is then about analysis of the causal effect the stock prices.

4.1 Descriptives Statistics

In this subsection, this research discusses about descriptive statistics of this research variable that is shown by Table 1 below.

Stock price has an average return of 9,45% with standard of deviation of 59,79%. Based on this figure, the return is to small and risk is to high. This result also shows that this sector is different with other sector such construction sector (Manurung and Usman, 2019).
Oil Price has average of US$ 66 and standard of deviation of 23.69 for the period of 2013 – 2018. Inflation has average of 5.05% and Standard of deviation of 1.39%. These figures also explain that inflation is too high but the volatility of inflation is still small.

Table 1: Statistic of Descriptive Macroeconomic Variables and Financial Ratios

	Y	OP	BI	INF	ER	CP	DER	MC	FATO	STA
Min	-0.88078	43.29	4.56	3.2	10439	42.46	-1.44	0.013	0.001182	0.004
Max	2.414555	97.98	8.17	6.96	14248	67.22	34.05	66.2	0.63	1.87
Mean	0.094507	66.48667	6.388333	5.048333	12793.17	54.775	2.041373	7.430588	0.266472	0.734265
STDEV	0.597861	23.68825	1.391063	1.708173	1388.606	9.346323	4.623412	11.82648	0.149853	0.494149
Skewness	1.409023	0.638326	-0.00361	0.010127	-1.12805	-0.2725	4.861065	2.311038	0.447	0.438571
Kurtosis	2.784717	-1.93594	-1.73387	-3.00614	0.597403	-1.0461	27.54093	6.101902	-0.3179	-0.58752
Jarque Bera	33.94785	5.41528	4.668654	7.515433	2.263006	3.472483	2961.302	131.6879	50.18277	57.9686

Source: Research data, processed using Eviews Program

Exchange rate has average of Rp. 12.793 / US$1 and standard of deviation of 1388.61. The fluctuation of exchange rates is too high because the economy is not good to compare to another companies. Coal Price has average of US$ 54 and standard of deviation of 9.35. The fluctuation of coal price is still low but it makes some companies have problem in operation.
The discussion also goes to financial ratio companies of coal mining that data are shown in Table 1. The debt to equity ratio has 2 times in average and standard of deviation of 4.6. It means that the fluctuation of debt to equity ratio is still small and the ratio is similar to industry's expectation. The Market Capitalization has average of Rp. 1,686.8 billion and standard of deviation of 11.83. It means, the coal mining companies listed in Indonesia stock exchange is mostly homogenous.

4.2 Macroeconomics and Financial Ratio Variables

This subsection discusses about the effects of macroeconomic variables and company's financial ratios on the stock prices of company's coal mining. Firstly, it discusses about why this study uses fixed effect panel data. Then it continues to discuss the variables that affect stock prices of coal mining companies.
As mentioned above, this study uses fixed effect panel data, and samples are not selected randomly so that the fixed effect model is appropriate to estimate the relationship between macroeconomic variables and company's financial ratios and the stock prices of coal mining companies. The model is shown in Table 2 below.

Table 2: Model of Determine stock prices on coal mining Company

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-365.167	64.80513	-5.63485	0
OP	31.37139	5.666135	5.536647	0
INF	66.28474	11.38802	5.820565	0
BI	-448.248	75.80608	-5.91309	0
ER	44.15579	7.851364	5.623965	0
CP	-39.2438	7.186422	-5.46082	0
DER?	0.016132	0.009111	1.770606	0.0809
FATO?	-1.03875	0.708036	-1.46709	0.1468
STA?	-0.10764	0.094892	-1.13433	0.2605
MC?	0.01042	0.004579	2.275504	0.0259
Fixed Effects (Cross)				
_1—C	-0.04511			
_2—C	-0.20811			
_3—C	0.246753			
_4—C	-0.40881			
_5—C	-0.2446			
_6—C	0.624957			
_7—C	-0.42396			
_8—C	-0.0613			
_9—C	-0.06308			
_10—C	0.041058			
_11—C	0.265977			
_12—C	0.057978			
_13—C	0.195847			
_14—C	0.04782			
_15—C	-0.11524			
_16—C	0.089812			
R-squared	0.816934	Mean dependent var		0.142695
Adjusted R-squared	0.755053	S.D. dependent var		0.996549
S.E. of regression	0.494617	Sum squared resid		17.36986
F-statistic	13.20161	Durbin-Watson stat		2.415601
Prob(F-statistic)	0			

This model has R-squared of 81.69%. All variation of stock prices can be explained by all independent variables variation of 81.69%, the rest is by other variables. The figures above state that model is fit to explain the variation of stock prices and the figures of F test also support R-Squared.

The independent variables that affect stock prices can be grouped into two groups, i.e. macroeconomic variables and company's financial ratios. There are four ratios used for the company's financial ratios, i.e. debt equity ratio (DER), fixed asset ratio (FATO), total asset turnover (STA) and company's market capitalization. Debt to equity ratio and market capitalization significantly affect stock prices, but fixed asset ratio (FATO) and total asset turnover (STA) do not significantly affect the stock prices on coal mining companies. Debt equity ratio has a significantly positive effect on the stock prices at level of 10%. If DER increases one unit, then stock prices will increase by 0.016132 unit. Market capitalization (MC) has significantly positive effect on the stock prices at level of 10%. If MC increases one unit, then stock prices will increase by 0.01042 unit.

As mentioned before, macroeconomic variables which are being tested consist of oil price, inflation, interest rate using BI-Rate, exchange rate, and coal price. Oil price has a significantly positive effect on the stock price at level of 1%. The oil price should have a negative relationship with the stock price because the increase in oil price will make the company's costs increase and results in decrease in the stock prices. However, the increase in oil price results in increase in supply of the company's coal mining and in order to make higher profit the company's coal meaning increases the stock prices.

Inflation and interest rate have significantly effects on the stock price at level of 1%. The result of positive effect of stock prices on inflation is similar to the existing theory. Interest rate that affects stock price is also similar to the existing theory.

Exchange rate has significantly positive relationship to stock prices at level of 1%. If exchange rate increases by one unit, it will increase stock return or stock prices increase by 44.16 units. This result is similar to expected theory.

Coal price significantly negative effect on stock prices at level of 1%. If coal price increase by one unit, it will decrease the stock prices by 39.24 unit. The result is not similar to expected theory. The result is different to the theory because investor will sell their stock to make stock prices drop.

This research supports the previous research about the relationship between the stock prices and company's financial ratios, such as Basu (1983) and Banz (1981) in market value of stock, Bhandari (1988) and Hasan et.al (2015) in debt to equity ratio. This research also finds that there is a significant relationship between exogenous variables, especially macroeconomic variables and stock prices, such as Bodie (1976), kaul (1976) and Kilian and Park (2009) in inflation variable, Abdalla et. Al (1997), Lee et.al (2010), Hajilee and Nasser (2014) in exchange rate variable; Hamilton (1993), Kaul (1996), and Kling (1985) in oil price variable.

5. Conclusion

This research concludes the following points:

a. The moving averages of the stock prices and risks of the company's coal mining are high enough. This means that there is high risk to invest in the stocks of coal mining companies and the return is low compare to other stocks.

b. Debt to equity ratio has significantly effect on stock prices of coal mining companies and market capitalization has also significantly effect on the stock prices.
c. Macroeconomic variables, such as oil price, inflation, interest rate, exchange rate and coal price have highly significant effects on the stock prices of coal mining companies.

References

[1] Abdalla, I. S. A and V. Murinde, Exchange Rate and Stock Price Interactions in Emerging Financial Markets: Evidence on India, Korea, Pakistan and the Philippines; Applied Financial Economics; Vol. 7; 1997, 25 – 35.
[2] Antonakakis, N. and George Filis, Oil prices and stock market correlation: A time varying approach; International Journal Energy Statistics; Vol. 1, 2013, 17 – 29.
[3] Banz, Rolf W., The Relationship Return and Market Value of Common Stocks; Journal of Financial Economics, Vol. 9, 1981, 3 – 18.
[4] Basu, Sanjoy, The Relationship Between Earnings' Yield, Market Value and Return for a NYSE Common Stocks; Journal of Financial Economics, Vol. 12; 1983, 129 – 156.
[5] Bhandari, L. C. (1988); Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence; Journal of Finance, Vol. 43(2), 1988, 507-528.
[6] Bodie, Zvie, Common Stocks as A Hegde Against Inflation; Journal of Finance, Vol. 31 (2), 1976, 459 – 470.
[7] Chen, N. F.; Roll, R. and S. A. Ross (1986); Economic Forces and Stock Market; Journal of Business, Vol. 59(3), 1986, 383 – 403.
[8] Dumicic, K; Bregar, L.; and Berislav Zmuk (2014), Statistical Methods Use in Small Enterprises: Relation to Performance; Business Systems Research Vol. 5(3), 2014, 37 – 48.
[9] Fama, E. F. and G. W. Schwert, Asset Return and Inflation; Journal of Financial Economics, Vol. 5; 1977, 115 – 146.
[10] Fama, E. and French, K. (1992). Cross Section of Expected Stock Returns, Journal of Finance, 47(2), 1992, 427-450.
[11] Gujarati, D. N., Basic Econometrics; 4th eds.; MCGraw Hill, 2003.
[12] Hamilton, J. D, Oil and the Macroeconomy since World War II; Journal of Political Economy, Vol. 91(2),1983, 228 – 248.
[13] Hasan, S. S., Farooq, S. and M. Muddassir, Stock Returns Indicators: Debt to Equity, Book to Market, Firm Size and Sales to Price Journal of Poverty, Investment and Development, Vol. 16, 2015, 25 – 32.
[14] Hausman, J. A., Specification Tests in Econometrics; Econometrica, Vol. 46 (6), 1978,1251 – 1271.
[15] Jegadeesh, N., Revenue Growth to Stock Return; Working Paper of Department of Finance, University of Illinois at Urbana-Champaign, 2002.
[16] Jones, Charles M. and Gautam Kaul, Oil and Stock Markets; The Journal of Finance, Vol. 51 (2), 1996, 463-491.

[17] Judge, G. G., Hill, R. C., Griffiths, W. E. and H. Lutkepohl (1982); Introduction to the Theory and Practice of Econometrics; John Wiley & Sons, New York, 1982.
[18] Kaul, G., Stock Returns and Inflation: The Role of the Monetary Sector; Journal of Financial Economics 18, 1987, 253-276.
[19] Kilian, L and Cheolbeom Park, The Impact of Oil Price Shocks on the U.S. Stock Market; International Economic Review, Vol. 50(4), 2009, 1267-1287.
[20] Kling, John L., Oil Price Shocks and Stock Market Behavior; Journal of Portfolio Management; Vol. 12(1), 1985, 34 -39.
[21] Magyereh, A., Oil Price Shocks and Emerging Stock Markets: A Generalized VAR Approach; International Journal of Applied Econometrics and Quantitative Studies. Vol.1-2, 2004.
[22] Manurung, A. H. and B. Usman, Determinant of Stock Price of Construction Sector; Working Paper DRM, Bina Nusantara University, 2019.
[23] Manurung, Adler H. (2019), Model and Estimation: Management and Finance Research; Jakarta: PT Adler Manurung Press, 2019.
[24] Manurung, Adler H. and Jenry C. Manurung, Underpricing: Macroeconomic Variables; International Journal of Civil Engineering and Technology (IJCIET), Vol. 10(3), 2019, 1739 – 1745.
[25] Nelson, C. R (1976); Inflation and Rates of Return on Common Stocks; Journal of Finance, Vol. 31(2), 1976, 471 – 483.
[26] Ou, J., & Penman, S., Accounting measurement, price-earnings ratio, and the information content of security prices; Journal of Accounting Research, Vol. 27(Current studies on the information content of accounting earnings), 1989, 111-144.
[27] Penman, S., The articulation of price-earnings ratios and market-to-book ratios and the evaluation of growth; Journal of Accounting Research, 34(2), 1996, 235 - 259.
[28] Piotroski, J., and D. Roulstone, The Influence of Analysts, Institutional Investors, and Insiders on the Incorporation of Market, Industry, and Firm Specific Information into Stock Prices. The Accounting Review, 79(4), 2004, 1119-1151.
[29] Shalit, S. S. and U. Sankar, The measurement of Firm Size; Review of Economics and Statistics; Vol. 59, 1977, 290 – 298.
[30] Shin, Hyejeong, The effects of industry characteristics on stock price synchronicity around IFRS adoption; Investment Management and Financial Innovations, Volume 1691), 2019, 89 – 99.
[31] Wooldridge, J. M., Introductory Econometrics: A Model Approach, 3rd Eds.; Thomson, South-Western, 2006.
[32] Wu, Ying, Stock prices and exchange rates in a VEC model-the case of Singapore in the1990s, Journal of Economics and Finance 24(3), 2000, 260-274.

[33] Yang, Yongsheng and Xinjie Ma (2012); The Relationship between Exchange rate and Stock prices: An Empirical Study since the Exchange rate system reform of China; IEEE, 2012, 382 – 384.