E-ISSN 2986-9455
P-ISSN 2987-0925

Journal Markcount Finance

Investment Opportunity Set (Ios): Between Opportunities and Threats for Pharmaceutical Companies in Indonesia

Siti Nurlatifah [1]
[1] *Universitas Krisnadwipayana, Indonesia*

Corresponding Author: Siti Nurlatifah, E-mail; sitinurlatifah@unkris.ac.id

ABSTRACT

Investment Opportunity Set (IOS) is the opportunity that a company has to make investments that can increase the value of the company. IOS can be influenced by various factors, one of which is the financial performance of the company. This study aims to examine the effect of financial performance on IOS in pharmaceutical companies listed on the Indonesia Stock Exchange (IDX) for the period of 2015-2020. Financial performance is measured by using profitability ratio, solvency ratio, and activity ratio, while IOS is measured by using Market Book Value to Equity (MBVE). This study uses quantitative data in the form of annual financial statements and stock prices of pharmaceutical companies obtained from the official website of IDX. The sampling technique uses purposive sampling with certain criteria, resulting in 54 data samples. The data analysis technique uses multiple linear regression analysis with SPSS for Windows version 26.0 program. The results show that financial performance simultaneously has a significant effect on IOS with F value of 18.859 and significance value of 0.000. Partially, profitability ratio has a positive and significant effect on IOS, solvency ratio has a negative and significant effect on IOS and activity ratio has a positive and significant effect on IOS. This study implies that pharmaceutical companies can increase IOS by improving financial performance, especially profitability ratio and activity ratio, and reducing solvency ratio.

Keywords: *Financial performance, Investment Opportunity, Pharmaceutical Companies*

INTRODUCTION

The pharmaceutical industry is one of the strategic sectors in supporting public health and welfare (Agboola dkk., 2020). The pharmaceutical industry also contributes to the national economy through job creation, increased added value, and foreign exchange from the export of pharmaceutical products (Albrecht & Chin, 2020).

Indonesia as the fourth most populous country in the world has great market potential for the pharmaceutical industry, along with population growth, increasing welfare, and changing consumption patterns.

However, the pharmaceutical industry in Indonesia also faces various threats and challenges that can hinder its development (Shamzhy dkk., 2019). One of the main threats and challenges is the dependence on imported raw materials, especially from China and India, which account for 90 percent of the total pharmaceutical raw material needs in Indonesia (Greco dkk., 2020). This makes the pharmaceutical industry vulnerable to price fluctuations, availability, and quality of imported raw materials (Betran dkk., 2021). In addition, dependence on imported raw materials also hampers the development of innovation and research in the pharmaceutical sector, due to the lack of support from the government and related industries.

Other threats and challenges faced by the pharmaceutical industry in Indonesia are the strict regulations imposed by the government and health authorities, both at the national and international levels. Some of the regulations that affect the pharmaceutical industry include Minister of Health Regulation No. 17/2017 on Drug Retail Pricing, Government Regulation No. 51/2019 on Government Procurement of Goods/Services, and Food and Drug Administration Regulation No. 8/2020 on Drug Registration (Achkari & El Fadar, 2020). These regulations aim to protect consumers, increase transparency, and ensure the quality of drugs circulating in Indonesia, but their impact is to reduce profit margins, lengthen and complicate the licensing process, and increase competition and price pressure for drug manufacturers.

The next threat and challenge facing the pharmaceutical industry in Indonesia is global competition, both from local and foreign drug manufacturers (Amorelli & García-Sánchez, 2021). Several factors affecting global competition include technological developments, globalization, and changing consumer preferences. Increasingly sophisticated technology allows drug manufacturers to develop new products that are more innovative, effective, and safe, but also require large investments and high risks (Zeng dkk., 2019). Increasingly integrated globalization makes it easier for drug manufacturers to enter new markets, but also faces barriers such as different quality standards, regulations, and cultures (Jung dkk., 2019). The changing preferences of increasingly diverse and critical consumers are forcing drug manufacturers to tailor their products to consumers' needs and wants, but also face challenges such as growing health, ethical, and environmental awareness.

In the midst of these threats and challenges, the pharmaceutical industry in Indonesia is also experiencing the impact of the Covid-19 pandemic that has hit the world since early 2020 (Yoo dkk., 2021). The Covid-19 pandemic has caused disruption to the health system which has a negative impact on industrial utilization. The Covid-19 pandemic has also caused a decrease in demand for a number of non-essential pharmaceutical sectors such as dermatology and aesthetics (Yoo dkk., 2021). On the other hand, the demand for products such as oncology, immunology and diabetes has

143

increased. In addition, the Covid-19 pandemic has also triggered uncertainty for the global pharmaceutical industry, both in terms of supply, demand and regulation.

Pharmaceutical companies are one of the sectors that have a high Investment Opportunity Set (IOS), because they have great growth potential in the future. Pharmaceutical companies in Indonesia have a wide market share, as Indonesia is the country with the fourth largest population in the world and has a high demand for medicines (Jung dkk., 2019). In addition, pharmaceutical companies in Indonesia also have the ability to innovate and develop products, either through their own research and development or through collaboration with other parties (Manita dkk., 2020). This can improve the competitiveness and product quality of pharmaceutical companies in Indonesia.

However, pharmaceutical companies in Indonesia also face various challenges and threats that can reduce their Investment Opportunity Set (IOS), so Investment Opportunity Set (IOS) is important to study (Joseph dkk., 2019). The pharmaceutical industry is an industry that has a short product life cycle, a high level of risk, and large research and development costs (Adegbeye dkk., 2020). Therefore, pharmaceutical companies must be able to identify, evaluate, and utilize investment opportunities that can provide competitive advantage and added value to the company (Chen dkk., 2019). In addition, pharmaceutical companies must also pay attention to external factors that can affect their Investment Opportunity Set (IOS), such as market demand, consumer preferences, government regulations, industry competition, and scientific and technological developments.

According to Nurzaman (2023), Investment Opportunity Set (IOS) is a collection of investment opportunities owned by the company to increase company value. Firm value is the market value of all claims held by shareholders and creditors against the company's assets (Ribeiro dkk., 2020). Firm value can be increased by making investments that have a positive present value, namely investments that generate cash flows greater than the cost of capital (Schmitz & Leoni, 2019). IOS shows how much potential the company has to make profitable investments in the future (Leoni dkk., 2021), either in the form of new projects, market expansion, product diversification, or research and development (Su dkk., 2019). IOS is one of the factors that determine firm value, apart from dividend policy, capital structure, and other financial policies.

In this study, IOS is measured using the Market Book Value to Equity (MBVE) proxy, which is the ratio between the closing stock price and the number of shares outstanding to the company's total equity (Truby, 2020). MBVE illustrates how much the company's market value is compared to its book value. MBVE A high MBVE indicates that the company has great investment opportunities, as its share price reflects the market's expectation of the company's future growth (Li dkk., 2021). A low MBVE indicates that the company has little investment opportunities, as its share price reflects the company's poor or stagnant performance (Xue dkk., 2019). The MBVE proxy was chosen because it is considered more accurate and relevant in measuring IOS than other proxies, such as Tobin's Q, Capital Expenditure, or Research and Development.

According to Hidayah (2015), MBVE is calculated using the following formula:

MBVE = Share Price (closing) x Number of shares outstanding / Own Capital

The following is the value of Market Book Value to Equity, Return on Investment, Debt to Equity Ratio, and Total Asset Turnover of pharmaceutical companies listed on the Indonesia Stock Exchange in 2015-2020.

Table 1 Average Research Variables for the 2015-2020 Period

YEAR	ROI	DER	TATO	MBVE
2015	0,090	0,907	1,389	2,555
2016	0,088	0,950	1,368	5,860
2017	0,083	0,972	1,262	6,711
2018	0,170	1,229	1,110	6,879
2019	0,077	1,078	1,124	2,275

2020 0,080 1,206 1,086 6,900

Source: Data processed, 2022

Table 1 shows the average MBVE value of pharmaceutical companies listed on the IDX from 2015 to 2020.
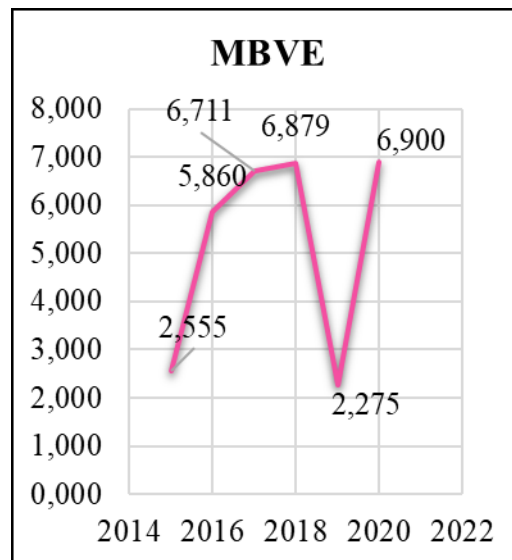

Figure 1 Average MBVE value of Pharmaceutical Companies Listed on the IDX 2015-2020 Period

Source: Data processed, 2022

Figure 1 shows a graph of the average MBVE value of pharmaceutical companies listed on the IDX from 2015 to 2020 (Golden & Kohlbeck, 2020). From the table and graph, it can be seen that the average value of MBVE of pharmaceutical companies fluctuates from year to year, with the highest value in 2017 and the lowest value in 2019. This shows that the IOS of pharmaceutical companies changes according to market conditions and company performance.

One of the factors that influence Investment Opportunity Set (IOS) is financial performance which is an indicator of the company's ability to generate profits, manage assets, bear debt, and create value for shareholders, Shinta & Laksito (2014) (Nazmi dkk., 2019). Financial performance is a description of the company's ability to manage its financial resources and create value for shareholders, Shinta & Laksito (2014) achieve its business goals.

Good financial performance can increase the value of the company, because it can attract and retain investors, customers, employees, and other stakeholders. Good financial performance can also increase IOS, because it can provide a positive signal to the market that the company has the potential to grow and develop in the future, Kebon & Surnyanawa (2017).

In this study, financial performance is measured using three financial ratios, namely Profitability Ratio, Solvency Ratio and Activity Ratio.

According to Silviana & Asyik (2016), the profitability ratio shows how much profit the company makes from selling its products (Kordab dkk., 2020). A high profitability ratio indicates that the company has the ability to generate large and consistent profits, so that it can provide high dividends to shareholders, or allocate these profits for business development. This attracts investors to invest in the company.

The profitability ratio used in this study is Return on Investment (ROI). ROI or return on investment is a ratio that shows the return on the number of assets used in the company, Return on Investment (ROI) is a ratio that measures how much profit the company makes from its total assets, Sari (2020) (Kurani dkk., 2023). ROI shows how effective the company is in allocating and returning invested capital. A high ROI indicates that the company has good financial performance, because it can generate profits that are greater than its capital costs (Mustangimah dkk., 2021). The ROI formula is Net Income / Total Assets

The solvency ratio used in this study is Debt to Equity Ratio (DER). Debt to Equity Ratio (DER) is a ratio that measures how much debt the company uses to finance its operations compared to its own capital. DER shows how much financial risk the company bears, because of the debt is an obligation that must be paid by the company. A low DER indicates that the company has good financial performance, because it can manage its debt well and is not too dependent on loans. The DER formula is Total Debt / Own Capital

The activity ratio used in this study is Total Asset Turnover (TATO). Total Asset Turnover (TATO) is a ratio that measures how efficiently a company manages its assets to generate sales (Abbasi dkk., 2019). TATO shows how productive the company is in

146

using its resources to create value. A high TATO indicates that the company has good financial performance, because it can generate greater sales than its total assets. The TATO formula is Sales / Total Assets

In several previous studies, there are differences in factors that affect Market Book Value to Equity (Budd dkk., 2020). Based on the results of research by Yendrawati and Adhianza (2013), it is stated that profitability has a positive effect on the set of assets. investment opportunity, activity ratio has a positive effect on investment opportunity set, and debt policy has no negative effect on investment opportunity set (Pirola dkk., 2019). Meanwhile, according to research by Saputro and Hindasah (2007), funding policy has a negative and significant effect on Investment Opportunity Set (IOS) while return on assets has a positive and significant effect on Investment Opportunity Set (IOS).

The purpose of this study was to examine the effect of financial performance on Investment Opportunity Set (IOS) in pharmaceutical companies listed on the Indonesia Stock Exchange (IDX) for the 2015-2020 period. This research is expected to make theoretical and practical contributions to academics, practitioners, and other stakeholders with an interest in Investment Opportunity Set (IOS) and the financial performance of pharmaceutical companies. This research is also expected to provide input for pharmaceutical companies in making optimal and strategic investment decisions.

RESEARCH METHODOLOGY

This research is a quantitative study with a causal approach that aims to examine the effect of financial performance on Investment Opportunity Set (IOS) in pharmaceutical companies listed on the Indonesia Stock Exchange (IDX) for the 2015-2020 period. This study uses quantitative data in the form of annual financial reports and stock prices of pharmaceutical companies obtained from the official IDX website.

The variables of this study consist of dependent variables, namely Investment Opportunity Set (IOS) as measured by the Market Book Value to Equity (MBVE) proxy, and independent variables, namely profitability as measured by the Return on Investment (ROI) proxy, solvency as measured by the Debt to Equity Ratio (DER) proxy, and activity as measured by the Total Asset Turnover (TATO) proxy. The following is a table of operational definitions of research variables:

Table 1. Operational Definition of Variables

No.	Variable	Definition	Formula	**Skala**
1	Investment Opportunity Set (Y)	Opportunities owned by the company to make investments that can increase	Market Book Value to Equity (MBVE) = Share Price (closing) x	Rasio

			company value	Number of shares outstanding / Own Capital	
2	Profitability (X1)	The company's ability to generate profits from its sales or operations	Return on Investment (ROI) = Net Income / Total Assets	Rasio
3	Solvency (X2)	The company's ability to meet its long-term obligations	Debt to Equity Ratio (DER) = Total Debt / Own Capital	Rasio
4	Activity (X3)	The efficiency of the company in managing its assets to generate sales	Total Asset Turnover (TATO) = Sales / Total Assets	Rasio

The data collection technique in this study uses documentation techniques by collecting published secondary data in the form of annual financial reports and stock prices of pharmaceutical companies from 2015 to 2020 which can be accessed through the official IDX website www.idx.co.id.

The research population in this study are pharmaceutical companies listed on the IDX in the 2015-2020 period, namely 12 companies. The sampling technique used in this study is purposive sampling, which is a sampling technique based on certain considerations in accordance with the research objectives.

The number of research samples obtained using purposive sampling technique was 9 pharmaceutical companies with 54 observations. The following is a table of population data and research samples of inclusion and exclusion criteria used in this study:

No	No Description Number of Companies	Number of Companies

1	The research population is Pharmaceutical Companies listed on the IDX for the 2015-2020 period.	12
2	Pharmaceutical companies whose financial statements have been audited by independent auditors but do not have a complete research period 2	2
3	Pharmaceutical companies that have complete data related to research variables but do not have complete data related to research variables 1	1
Number of Companies		9
Year of Observation		6
Number of Observations		54

The data analysis technique used in this research is multiple linear regression analysis, which is an analysis technique used to test the effect of independent variables on dependent variables that have a linear relationship. Multiple linear regression analysis was performed using the SPSS for Windows version 26.0 program. The steps of analyzing the data in this study are as follows: (1) Conduct a classic assumption test consisting of normality test, multicollinearity test, heteroscedasticity test, and data autocorrelation test. The classic assumption test aims to ensure that the research data meets the requirements for multiple linear regression analysis. (2) Conduct a model feasibility test (F test) to test whether the regression model used is feasible or not. The F test is carried out using a significance level of 5% or 0.05. If the probability value (sig.) is smaller than the significance level, then the regression model is feasible to use. (3) Conducting a partial significance test (t test) to test whether the independent variable significantly affects the dependent variable. The t test is also carried out using a significance level of 5% or 0.05. If the probability value (sig.) is smaller than the significance level, then the independent variable has a significant effect on the dependent variable. (4) Calculating the coefficient of determination (R^2) to measure how much influence the independent variables have on the dependent variable together. The R^2 value ranges from 0 to 1. The greater the R^2 value, the greater the influence of the independent variable on the dependent variable. (5) Compiling multiple linear regression equations based on the results of data analysis.

RESULT AND DISCUSSION

Classical Assumption Test

Table 1. Normality test

	Unstandardized Residual
Asymp. Sig. (2-tailed)	0,064[c,d]

Source: data processed by the author

The results of this study indicate that the normality test using the one-sample Kolmogorov-Smirnov test produces a significance value of Asymp. Sig. (2-tailed) of 0.064 and greater than the specified significance level, which is 0.05, so it can be concluded that the residual data is normally distributed.

Table 2. Multicolonearity test

Coefficients[a]

Model	Tolerance	VIF
ROI	0.881	1.135
DER	0.553	1.809
TATO	0.543	1.842

Source: data processed by the author

The results of the multicolonearity test resulted in the calculation of the tolerance value of each independent variable greater than 0.10, namely for the ROI variable of 0.881, the DER variable of 0.553, and the TATO variable of 0.543, which means that there is no correlation between the independent variables. Meanwhile, the value of the valance inflation factor (VIF) results of each independent variable is known to be less than 10, for the ROI variable of 1.135, the DER variable of 1.809, and the TATO variable of 1.842, so from this explanation it can be concluded that there is no multicolonierity between the independent variables in the regression model.

Table 3. Autocorrelation Test

Model	Durbin-Watson

1.851

Source: data processed by the author

The results of the autocorrelation test durbin watson value in the figure is 1.851. The du and dl values are obtained from the durbin table. This study uses a sample size of 54 (n = 54) and the number of independent variables is 3 (k-3), so the dl table value is obtained at 1.462, the du table value is 1.628. While the 4-dl value is 2.538 and the 4-du value is 2.372. This result means that it can be concluded that the value du < d < 4-du = 1.628 < 1.851 < 2.372. So it can be concluded that there is no autocorrelation in the model.
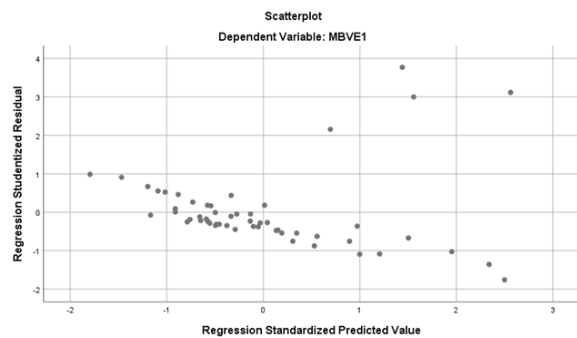
Figure 1. Heteroscedasticity Test

The results of the heteroscedasticity test from the scatterplots graph on MBVE show that the points spread randomly and are not patterned. It can be concluded that there are no symptoms of heteroscedasticity in multiple regression models.

Table 4. Model Feasibility Test (F Test)

Model	F	Sig.
Regression	18,859	.000[b]

Source: data processed by the author

Based on the output above, it is known that the sig value for ROI (X1), DER (X2) and TATO (X3) on Profitability (Y) = 0.000 <0.05. And obtained the value of f count 18.859> F table 2.79. So it can be concluded that the variables X1, X2 and X3 have a simultaneous influence or hypothesis H4 can be accepted.

Table 5. Partial Significance Test (t test)

Coefficients[a]

Model	t	Sig

ROI	-3,155	0.003
DER	5,801	0.000
TATO	-6,692	0.000

Source: data processed by the author

Table 6. Multiple Regression Test Results

Coefficients[a]

Model	Unstandardized Coefficients	
	B	Std. Error
(Constant)	14,362	1,621
ROI	-12,265	3,887
DER	3,172	,547
TATO	-9,246	1,382

Source: data processed by the author

It can be seen from the table above that the regression equation can be arranged as follows:

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + e$$
$$MBVE = 14.362 - 12.265 X_1 + 3.172 X_2 - 9.246 X_3 + e$$

Discussion

The effect of Profitability on and Investment Opportunity Set (IOS).

The results of this study indicate that Profitability proxied by ROI has a positive and significant effect on Investment Opportunity Set (IOS) proxied by MBVE. This can be seen from the partial t test results which show that the t value of the ROI variable is 3.155, which is greater than the t table value of 2.008 at a significance level of 5%.

The t table value is obtained using the formula t table = (a/2; n - k -1 or residual df), namely t table = (0.05/2; 54 - 3 - 1) = (0.025; 50) = 2.00856. In addition, the value of The significance of the ROI variable is 0.000, which is smaller than the significance level of 0.05. Based on these results, it is concluded that the first hypothesis (H1) is accepted.

The results of this study are in line with several previous studies which also found a positive and significant influence between profitability and Investment Opportunity Set (IOS). For example, research by Utama and Sulistika (2015) using a sample of manufacturing companies in Indonesia for the period 2009-2013, shows that profitability as measured by

ROE and ROA has a positive and significant effect on MBVE. Research by Indriaty et al. (2020) which uses a sample of mining companies in Indonesia for the 2014-2018 period, shows that profitability as measured by ROE and ROA has a positive and significant effect on MBVA.

The theoretical explanation of the results of this study is that profitability is an indicator of the company's ability to generate profits from its sales or operations. High profits indicate that the company has good efficiency and productivity, and can create added value for shareholders. High profits can also be used by companies to make investments that can increase company value, such as product development, research and innovation, market expansion, or acquisitions. This can increase the company's opportunity to make profitable investments, thereby increasing and the company's Investment Opportunity Set (IOS).

The Effect of Solvency on Investment Opportunity Set (IOS)

The results of this study indicate that Solvency proxied by DER has a positive and significant effect on Investment Opportunity Set (IOS) proxied by MBVE. This can be seen from the partial t test results which show that the t value of the DER variable is 5.801, which is greater than the t table value of 2.008 at a significance level of 5%. In addition, the significance value of the DER variable is 0.000, which is smaller than the significance level of 0.05. Based on these results, it is concluded that the second hypothesis (H2) is accepted.

The results of this study are in line with several previous studies which also found a positive and significant influence between solvency and Investment Opportunity Set (IOS). For example, Afriadi's research (2016) which uses a sample of manufacturing companies in Indonesia for the period 2010-2014, shows that solvency as measured by DER has a positive and significant effect on Investment Opportunity Set (IOS) as measured by MBVE. Adiputra and Hermawan's research (2019) which used a sample of mining companies in Indonesia for the period 2013-2017, shows that solvency as measured by DER has a positive and significant effect on and Investment Opportunity Set (IOS) as measured by MBVE.

The theoretical explanation of the results of this study is that solvency is an indicator of the company's ability to meet its long-term obligations. High solvency indicates that the company has a good balance between equity and debt, thus reducing the risk of bankruptcy and increasing investor confidence. High solvency can also allow companies to gain access to cheaper and more flexible sources of funds, thereby increasing the company's ability to make profitable investments, thereby increasing and the company's Investment Opportunity Set (IOS).

Effect of Activity on Investment Opportunity Set (IOS).

The results of this study indicate that Activity is proxied by a positive and significant effect on Investment Opportunity Set (IOS). *Opportunity Set (IOS) is proxied by MBVE. This can be seen from the partial t test results which show that the t value of the TATO variable is 6.692, which is greater than the t table value of 2.008 at a significance level of 5%. In addition, the significance value of the TATO variable is 0.000, which is smaller than the significance level of 0.05. Based on these results, it is concluded that the third hypothesis (H3) is accepted.*

The results of this study are in line with several previous studies which also found a positive and significant influence between activity and Investment Opportunity Set (IOS). For

example, research by Yendrawati and Adhianza (2013) which uses a sample of manufacturing companies in Indonesia for the period 2008-2012, shows that activity as measured by TATO has a positive and significant effect on Investment Opportunity Set (IOS) as measured by MBVE. This research is also in line with Rizky and Sari's research (2019) which uses a sample of mining companies in Indonesia for the 2014-2018 period, showing that activity as measured by TATO has a positive and significant effect on Investment Opportunity Set (IOS) as measured by MBVA.

The theoretical explanation of the results of this study is that activity is an indicator of the company's ability to manage its assets to generate sales or revenue. High activity indicates that the company has good effectiveness and efficiency, so that it can increase the company's cash flow and profit. High activity can also reflect the company's future growth potential, so that it can increase the company's market value. High activity can also allow companies to make investments that can improve the company's performance and competitiveness, thereby increasing the company's Investment Opportunity Set (IOS).

The effect of Profitability, Solvency, and Activity has a significant effect on Investment Opportunity Set.

The results of this study indicate that profitability is proxied by ROI, solvabilitas diproksikan dengan DER, and activity proxied by TATO simultaneously or together have a significant effect on Investment Opportunity Set (IOS).

This can be seen from the results of the F test which shows that the calculated F value is 18.85, which is greater than the F table value of 2.76 at the 5% significance level. The F table value is obtained using the formula F table = (a; k; n - k -1 or residual df), namely F table = (0.05; 3; 54 - 3 - 1) = (0.05; 3; 50) = 2.76. In addition, the significance value of the F test is 0.000, which is smaller than the significance level of 0.05. Based on these results, it is concluded that hypothesis four (H4) is accepted.

CONCLUSION

Based on the results of the analysis and discussion that has been carried out, it can be concluded that profitability, solvency, and activity have a significant effect on Investment Opportunity Set (IOS) both partially and simultaneously in pharmaceutical companies listed on the IDX for the 2015-2020 period.

This shows that these three variables can be indicators for investors to assess the company's potential growth and performance in the future. Companies that have high profitability, solvency, and activity tend to have high Investment Opportunity Set (IOS) as well, so that they can increase the company's market value.

REFERENCES

Abbasi, S., Keshavarzi, B., Moore, F., Turner, A., Kelly, F. J., Dominguez, A. O., & Jaafarzadeh, N. (2019). Distribution and potential health impacts of microplastics and microrubbers in air and street dusts from Asaluyeh County, Iran. *Environmental Pollution*, *244*, 153–164. https://doi.org/10.1016/j.envpol.2018.10.039

Achkari, O., & El Fadar, A. (2020). Latest developments on TES and CSP technologies – Energy and environmental issues, applications and research trends. *Applied Thermal Engineering*, *167*, 114806. https://doi.org/10.1016/j.applthermaleng.2019.114806

Adegbeye, M. J., Ravi Kanth Reddy, P., Obaisi, A. I., Elghandour, M. M. M. Y., Oyebamiji, K. J., Salem, A. Z. M., Morakinyo-Fasipe, O. T., Cipriano-Salazar, M., & Camacho-Díaz, L. M. (2020). Sustainable agriculture options for production, greenhouse gasses and pollution alleviation, and nutrient recycling in emerging and transitional nations—An overview. *Journal of Cleaner Production*, *242*, 118319. https://doi.org/10.1016/j.jclepro.2019.118319

Agboola, O., Babatunde, D. E., Isaac Fayomi, O. S., Sadiku, E. R., Popoola, P., Moropeng, L., Yahaya, A., & Mamudu, O. A. (2020). A review on the impact of mining operation: Monitoring, assessment and management. *Results in Engineering*, *8*, 100181. https://doi.org/10.1016/j.rineng.2020.100181

Albrecht, E., & Chin, K. J. (2020). Advances in regional anaesthesia and acute pain management: A narrative review. *Anaesthesia*, *75*(S1). https://doi.org/10.1111/anae.14868

Amorelli, M., & García-Sánchez, I. (2021). Trends in the dynamic evolution of board gender diversity and corporate social responsibility. *Corporate Social Responsibility and Environmental Management*, *28*(2), 537–554. https://doi.org/10.1002/csr.2079

Betran, A. P., Ye, J., Moller, A.-B., Souza, J. P., & Zhang, J. (2021). Trends and projections of caesarean section rates: Global and regional estimates. *BMJ Global Health*, *6*(6), e005671. https://doi.org/10.1136/bmjgh-2021-005671

Budd, J., Miller, B. S., Manning, E. M., Lampos, V., Zhuang, M., Edelstein, M., Rees, G., Emery, V. C., Stevens, M. M., Keegan, N., Short, M. J., Pillay, D., Manley, E., Cox, I. J., Heymann, D., Johnson, A. M., & McKendry, R. A. (2020). Digital technologies in the public-health response to COVID-19. *Nature Medicine*, *26*(8), 1183–1192. https://doi.org/10.1038/s41591-020-1011-4

Chen, C., Kuang, Y., & Hu, L. (2019). Challenges and Opportunities for Solar Evaporation. *Joule*, *3*(3), 683–718. https://doi.org/10.1016/j.joule.2018.12.023

Golden, J., & Kohlbeck, M. (2020). Addressing cheating when using test bank questions in online Classes. *Journal of Accounting Education*, *52*, 100671. https://doi.org/10.1016/j.jaccedu.2020.100671

Greco, L., Percannella, G., Ritrovato, P., Tortorella, F., & Vento, M. (2020). Trends in IoT based solutions for health care: Moving AI to the edge. *Pattern Recognition Letters*, *135*, 346–353. https://doi.org/10.1016/j.patrec.2020.05.016

Joseph, L., Jun, B.-M., Flora, J. R. V., Park, C. M., & Yoon, Y. (2019). Removal of heavy metals from water sources in the developing world using low-cost materials: A review. *Chemosphere*, *229*, 142–159. https://doi.org/10.1016/j.chemosphere.2019.04.198

Jung, E. H., Jeon, N. J., Park, E. Y., Moon, C. S., Shin, T. J., Yang, T.-Y., Noh, J. H., & Seo, J. (2019). Efficient, stable and scalable perovskite solar cells using poly(3-hexylthiophene). *Nature*, *567*(7749), 511–515. https://doi.org/10.1038/s41586-019-1036-3

Kordab, M., Raudeliūnienė, J., & Meidutė-Kavaliauskienė, I. (2020). Mediating Role of Knowledge Management in the Relationship between Organizational Learning

and Sustainable Organizational Performance. *Sustainability*, *12*(23), 10061. https://doi.org/10.3390/su122310061

Kurani, A., Doshi, P., Vakharia, A., & Shah, M. (2023). A Comprehensive Comparative Study of Artificial Neural Network (ANN) and Support Vector Machines (SVM) on Stock Forecasting. *Annals of Data Science*, *10*(1), 183–208. https://doi.org/10.1007/s40745-021-00344-x

Leoni, G., Lai, A., Stacchezzini, R., Steccolini, I., Brammer, S., Linnenluecke, M., & Demirag, I. (2021). Accounting, management and accountability in times of crisis: Lessons from the COVID-19 pandemic. *Accounting, Auditing & Accountability Journal*, *34*(6), 1305–1319. https://doi.org/10.1108/AAAJ-05-2021-5279

Li, B., He, Q., Chen, F., Jin, H., Xiang, Y., & Yang, Y. (2021). Auditing Cache Data Integrity in the Edge Computing Environment. *IEEE Transactions on Parallel and Distributed Systems*, *32*(5), 1210–1223. https://doi.org/10.1109/TPDS.2020.3043755

Manita, R., Elommal, N., Baudier, P., & Hikkerova, L. (2020). The digital transformation of external audit and its impact on corporate governance. *Technological Forecasting and Social Change*, *150*, 119751. https://doi.org/10.1016/j.techfore.2019.119751

Mustangimah, M., Putera, P. B., Zulhamdani, M., Handoyo, S., & Rahayu, S. (2021). Evaluation of the Indonesia national strategic policy of science and technology development. *Journal of Science and Technology Policy Management*, *12*(3), 421–442. https://doi.org/10.1108/JSTPM-04-2020-0079

Nazmi, A., Martinez, S., Byrd, A., Robinson, D., Bianco, S., Maguire, J., Crutchfield, R. M., Condron, K., & Ritchie, L. (2019). A systematic review of food insecurity among US students in higher education. *Journal of Hunger & Environmental Nutrition*, *14*(5), 725–740. https://doi.org/10.1080/19320248.2018.1484316

Pirola, F., Cimini, C., & Pinto, R. (2019). Digital readiness assessment of Italian SMEs: A case-study research. *Journal of Manufacturing Technology Management*, *31*(5), 1045–1083. https://doi.org/10.1108/JMTM-09-2018-0305

Ribeiro, M. H., Ottoni, R., West, R., Almeida, V. A. F., & Meira, W. (2020). Auditing radicalization pathways on YouTube. *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*, 131–141. https://doi.org/10.1145/3351095.3372879

Schmitz, J., & Leoni, G. (2019). Accounting and Auditing at the Time of Blockchain Technology: A Research Agenda. *Australian Accounting Review*, *29*(2), 331–342. https://doi.org/10.1111/auar.12286

Shamzhy, M., Opanasenko, M., Concepción, P., & Martínez, A. (2019). New trends in tailoring active sites in zeolite-based catalysts. *Chemical Society Reviews*, *48*(4), 1095–1149. https://doi.org/10.1039/C8CS00887F

Su, S., Zhou, H., Xu, M., Ru, H., Wang, W., & Weng, M. (2019). Auditing street walkability and associated social inequalities for planning implications. *Journal of Transport Geography*, *74*, 62–76. https://doi.org/10.1016/j.jtrangeo.2018.11.003

Truby, J. (2020). Governing Artificial Intelligence to benefit the UN Sustainable Development Goals. *Sustainable Development*, *28*(4), 946–959. https://doi.org/10.1002/sd.2048

Xue, J., Xu, C., Zhao, J., & Ma, J. (2019). Identity-based public auditing for cloud storage systems against malicious auditors via blockchain. *Science China Information Sciences*, *62*(3), 32104. https://doi.org/10.1007/s11432-018-9462-0

Yoo, J. J., Seo, G., Chua, M. R., Park, T. G., Lu, Y., Rotermund, F., Kim, Y.-K., Moon, C. S., Jeon, N. J., Correa-Baena, J.-P., Bulović, V., Shin, S. S., Bawendi, M. G., & Seo, J. (2021). Efficient perovskite solar cells via improved carrier management. *Nature*, *590*(7847), 587–593. https://doi.org/10.1038/s41586-021-03285-w

Zeng, L., Ruan, M., Liu, J., Wilde, P., Naumova, E. N., Mozaffarian, D., & Zhang, F. F. (2019). Trends in Processed Meat, Unprocessed Red Meat, Poultry, and Fish Consumption in the United States, 1999-2016. *Journal of the Academy of Nutrition and Dietetics*, *119*(7), 1085-1098.e12. https://doi.org/10.1016/j.jand.2019.04.004