

Valuate Stock Based on Accounting Approach Using Feltham and Ohlson Model

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Abstract

Residual Income Model (RIM) is an accounting approach introduced and used by Feltham and Ohlson to measure firm value using future income based on most current information. The surplus relation applying firm earning and book value is used to forecast with consistent manner. This research uses RIM to value the pharmaceutical companies' stocks listed on the Indonesia Stock Exchange (IDX) for the year of 2010-2019 to be able to estimate the intrinsic or fair values of the companies' shares for the year of 2020-2023, compared to their current market values and used as the basis to make decisions. Macro economy information of Indonesia that strongly relate to the pharmaceutical companies are applied to forecast the future values of the companies and the stock market information to determine the market values and the investment interest rates. The stock intrinsic values of DVLA, INAF, KAEP, KLBF, MERK and PYFA are confirmed below the market values for the year of 2020-2023. But, the stock intrinsic values of SCPI are above the market values. Thus, the stock intrinsic values of TSPC are fair. There are 6 (six) company stocks overvalued or expensive, 1 (one) company stock is undervalued or cheap, and another is fair.

Keywords: Stock Valuation, Residual Income Model (RIM), Feltham and Ohlson, Pharmaceutical Companies.

1. Introduction

The investments in stocks require analysis to determine the market timing, when to buy or sell the stocks. A stock valuation generates intrinsic (fair) value information which compared to the stock market price to find a buy or sell position of certain stocks. Asset liquidation value, asset market value, and cost value to procure asset are three approaches that may be used to value an asset, one of them must be selected (Manurung, 2020). Taking into account the strengths and weaknesses of each method for valuing company stock will lead to arrive to a better estimate. A multiples approach can be employed to make comparative evaluation of a company's value in the market against its competitors or broader market.

The net income of a firm is closely relevant to the firm value or firm price. Several based accounting and financing approaches to value stocks have been developed over a long period (Manurung, 2020). In terms of equity valuation, [residual income](#) is the income generated by a firm after accounting for the true [cost of its capital](#). Interest expense on the [income statement](#) only accounts for a firm's cost of its debt, ignoring its [cost of equity](#), such as dividend payouts and other equity costs. Tabassam and Fahim (2022) predicted stock price and exchange rate using MGARCH-DCC Model. Viet *et.al* (2021) studied economic valuation of Forest Ecosystem Service. Feltham and Ohlson (1992) explained the use of surplus relation applying firm earning and book value to forecast with consistent manner using net accounting surplus, it is known as the Residual Income Model (RIM).

Like the other valuation approaches, the concept of discounted future income is also used in RIM. In the stock valuation, the RIM does not measure the firm value based on the present value of the expected future dividend or future cash flow, but rather on the future income based on all the most current information available. Think the cost of equity as the shareholders' opportunity cost or the required rate of investment return. Based on accounting information, Sutriani *et.al*

(2019) studied its impacts to performance of MSMEs. Ardyatna and Hasrini (2021) predicted stock price movement using Support Vector Machine. Yuxiang (2022) studied the valuation of private equity under uncertainty model.

The pharmaceutical industry is a sub sector of consumer goods industry. In 2019, the consumer goods industry was the sector that had the highest stock index among all industries on the Indonesia Stock Exchange (IDX), amounting to IDR 2,052.7. Sometimes, the pharmaceutical sector itself has a fairly high contribution to the stock index of the consumer goods industry, IDR 4,799, despite in 2019 it fell sharply compared to 2018, IDR 5,803. The Indonesia pharmaceutical industry produces and distributes medical needs. Apart from providing medical supplies according to Indonesia's regulation named Peraturan Menteri Kesehatan RI No. 1799 /Menkes/Per/ XII / 2010, this industry also focuses on medicine and other health matter research and development.

There was a Covid-19 virus pandemic in the world, including Indonesia in 2020. The World Health Organization (WHO) told that until June 2020 there were more than 100 candidates for the corona virus vaccines that had been being researched and tested in many countries. There is no vaccine to heal from Covid-19, people should protect their immunities and avoid themselves from being infected by Covid-19. The people consume lots of medicines and other medical needs. Due to, the pharmaceutical business in Indonesia has opportunity to increase profitability. This is the positive impact of consuming a lot of medicines and other medical needs. This means that investing in a pharmaceutical company could be an option at the time. However, before investing in shares of certain pharmaceutical companies, the stock values must be first valued.

The basic idea of this study is to find the intrinsic (fair) values of the stocks of the pharmaceutical companies listed on the Indonesia Stock Exchange in the period of 2010-2019 using RIM for the years of 2020 – 2023 and describes how the values of stocks valued using RIM.

2. Literature Review

2.1 Valuation Based on Accounting Approach

There are three approaches that can be used to value an asset, they are asset liquidation value, asset market value, and cost value to procure assets (Manurung, 2020). The future value of an asset can be determined by using two approaches, they are fundamental and stochastic approaches. Fundamental approach can be done using relative value approach, discount model approach, and contingency claim approach.

However, the analysts and investors tend to use the discount model and relative value approaches in general. The discount model approach explains the current stock price and is the result obtained by investors in the future discounted upon the company cost of capital. The company cost of capital is known as the Weighted Average Cost of Capital (WACC). Manurung (2020), the firm net income is relevant to the firm value or the firm price. Manurung (2011), the income approach must be first introduced, because most companies' objectives are to generate income. The discounting net income can be calculated by the following formula:

$$P_0 = \alpha * E \text{ (eps)} \quad [1]$$

Where,

$$\alpha = \frac{1}{1+WACC} \quad [2]$$

and the equation can be converted into the formula known as the discounted future income:

$$P_0 = \sum_{t=1}^{\infty} \frac{E_t}{(1+r_e)^t} \quad [3]$$

" P_0 = Intrinsic value of share period t, E_t (e_{t+1}) = Expected future earning period t+1, r_e = Cost of Equity Capital /opportunity cost".

Where the firm cost of capital can be calculated using the following formula:

$$WACC = (r_d \times (1 - t)) \times \frac{D}{D+E} + r_e \times \frac{E}{D+E} \quad [4]$$

2.2 Valuation Based on Accounting Approach

The valuation based on accounting approach still uses Ohlson's neoclassical framework, starting from the assumption that the valuation meets the present value of expected dividends because the stock price valuations using accounting information (Ohlson 1990). The valuation using this approach seems relevant. Further, the well-known stock price valuation in this accounting approach is the stock price valuation of Feltham and Ohlson (1995). The valuation is as follows:

“bv_t = book value of the firm's equity date t, X = earnings for period (t-1,t), df = dividends, net of capital contributions, date t, fa = financial assets, net of financial obligation date t, i_t = interest revenues, net of interest expenses for period (t-1, t), oa_t = operating assets, net of operating liabilities date t, ox_t = operating earnings for period (t-1, t), c_t = cash flows realized from operating activities, net of investments in those activities date t, P_t = market value of the firm's equity date t”.

$$\begin{aligned}
 &bv_t = fa_t + oa_t \\
 &X_t = i_t + ox_t \\
 &bv_t = bv_{t-1} + x_t - d_t \\
 &i_t = (RF - 1) * fa_{t-1} \\
 &fa_t = fa_{t-1} + i_t - [d_t - c_t] \\
 &oa_t = oa_{t-1} + ox_t - c_t
 \end{aligned}$$

For the stock price with dividend as variable, the formula is as follows:

$$P_t = \sum_{i=1}^{\infty} R_F^{-1} E_t [d_{t+i}] \quad [5]$$

“P_t = Market Value / Price of Firm Equity Period t, R_F = risk free rate +1, d_t = Dividend period t. E_t [] = Expectations Operation Value based on information period t”.

where:

$$\begin{aligned}
 &d_t = c_t + R_F + fa_{t-1} - fa_t \\
 &\sum_{\tau=1}^{\infty} R_F^{-\tau} E_t [\tilde{d}_{t+\tau}] = fa_t + \sum_{\tau=1}^{\infty} F_F^{-\tau} E_t [\tilde{c}_{t+\tau}]
 \end{aligned} \quad [6]$$

By using the previous equation above, the stock price can be calculated as follows:

$$\begin{aligned}
 (1) \quad &P_t = fa_t + \sum_{\tau=1}^{\infty} R_F^{-\tau} E_t [\tilde{c}_{t+\tau}] \\
 (2) \quad &P_t = bv_t + \sum_{\tau=1}^{\infty} R_F^{-\tau} E_t [\tilde{x}_{t+\tau}^a] \\
 (3) \quad &P_t = bv_t + \sum_{\tau=1}^{\infty} R_F^{-\tau} E_t [\tilde{ox}_{t+\tau}^a]
 \end{aligned} \quad [7]$$

2.3 Residual Income Model (RIM)

In the stock valuation, the RIM does not measure the firm value based on the present value of the expected future dividends or the future cash flows, but rather on the future income based on all of the most current information available. The RIM values the intrinsic (fair) value of stock based on the present value of the residual income calculation and thus used to value the firm value. The RIM starts by getting the book value and then discounts the residual income to the shareholders' equity. However, the equity book value reported plus an unlimited amount of the discounted residual income, the equation can be written as:

$$V_t = B_t + \sum_{i=1}^{\infty} \frac{E [(ROE_{t+i} - r_e) B_{t+i-1}]}{(1 + r_e)^i} \quad [8]$$

“ V_t = Residual Income Model, B_t = Book Value at Period t , $E []$ = Expectations based on information period t , ROE_{t+i} = Return on Equity period $t + 1$, B_{t+i-1} = Book Value period $t + 1$, r_e = Cost of Equity Capital.”

Where the Cost of Equity Capital :

$$r_e = r_f + \beta [r_m - r_f] \quad [9]$$

“ r_e = Cost of Equity Capital, r_f = Risk Free Rate, β = Coefficient beta of a stock/ market risk sensitivity, r_m = Market Risk Premium.”

Where the market risk sensitivity can be calculated with the formula:

$$\beta = \frac{\text{Cov}(r_i, r_m)}{\text{Var } r_m} \quad [10]$$

“ $\text{Cov}(r_f, r_m)$ = Covariance of Risk Market Premium according to historical record, $\text{Var } r_m$ = Variance of Risk Market Premium”.

And the Return on Equity (ROE) can be calculated with the formula:

$$ROE = \frac{\text{Net Income}}{\text{Total Equity}} \times 100\% \quad [11]$$

3. Research Design

This research values the pharmaceutical companies listed on the Indonesian Stock Exchange (IDX) using accounting approach to determine the intrinsic or fair value of the shares in the period of 2010-2019. This valuation uses the Residual Income Model (RIM). Using the RIM requires assumptions and forecasts that determine the conditions of the firm's equity book value and how the return on equity book value obtained through the firm's net income by considering the rate of the return expected and then calculated with the current firm's equity value. Valuing by using RIM, the researchers must get through the following steps:

- a) Prepare an analysis of the Indonesia macro economy and pharmaceutical industry.
- b) Collect and classify historical data of each pharmaceutical company.
- c) Prepare the calculation and forecasting on the net income (the income statement forecasting).
- d) Prepare the calculation and forecasting on the trial balance (the forecasted balance sheet).
- e) Prepare the beta calculation or the market risk sensitivity / the regression of the covariance and risk premium variant.
- f) Calculate and forecast the cost of equity capital (COE).
- g) Calculate and forecast the return on equity (ROE).
- h) Value intrinsic (fair) value of the stock using RIM.

4. Findings

This research gets through the following stages:

- a) Collect the financial reports of each sample company in the year of 2010 - 2019.
- b) Key in the data of each company's balance sheet, income statement and cash flow needed to the available worksheet.
- c) Forecast the company's income statement and the balance sheet by analyzing the historical data of each company's financial report, each company's internal information, Indonesia's macro economy and the growth of pharmaceutical industry in Indonesia.

- d) Collect the monthly data of each company’s stock price from December 2010 until January 2020 and key in them to the worksheet.
- e) Collect the monthly data of Composite Stock Price Index (IHSG) from December 2010 until January 2020 and key in to the next stock price of each company.
- f) Calculate the company's stock return and the IHSG return.
- g) Calculate beta of each company by regressing the company’s stock return and the IHSG return.
- h) Move all company’s data such as equity value, net income, company’s beta to one place.
- i) Look for the newest and future risk free rate and keyed in to the data of each company with the same amount.
- j) Look for the market risk premium and keyed in to the data of each company with the same amount.
- k) Calculate the cost of equity capital of each company by adding the risk free rate with the beta multiplication, and the market risk premium subtracted from the risk free rate.
- l) Valuate the stock value of each sample company, 1 - 8.

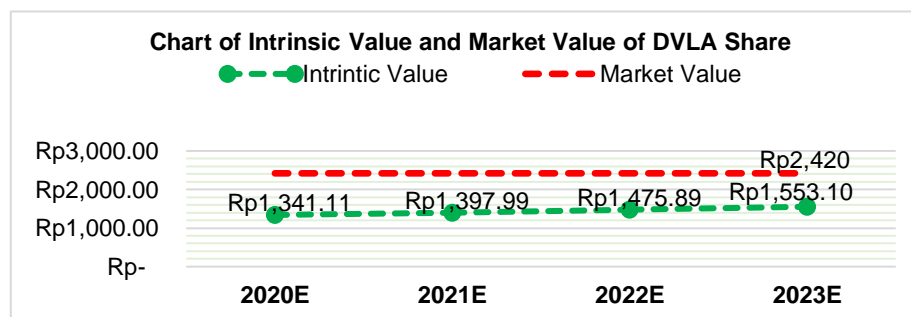
4.1 PT. Darya-Varya Labotorya (DVLA)

The DVLA’s stock valuation uses the assumption of the increase in revenues for 25% in 2020, 9% in 2021, and 7% in 2022 till 2024. The estimated revenue in 2020 was IDR 2,266.28 billion with the net income of IDR 192.85 billion that generated the equity value of IDR 1,328.89 billion.

In 2021, the estimated revenue was IDR 2,470.24 billion with the net income of IDR 213.46 billion and generated the equity value of IDR 1,468.27 billion. In 2022, the estimated revenue will be IDR 2,635.75 billion with the net income of IDR 208.08 billion and will generate the equity value of IDR 1,551.51 billion. In 2023, the estimated revenue will be IDR 2,812.34 billion with the net income of IDR 218.04 billion and will generate the equity value of IDR 1,638.72 billion. And in 2024, the estimated revenue will be IDR 3,000.77 billion with the net income of IDR 229.74 billion and will generate the equity value of IDR 1,730.62 billion.

The DVLA’s ROE for the years of 2020 until 2024 are sequentially 13.95%, 14.54%, 13.41%, 13.31%, and 13.27%. The cost of equity capital (re) is 5.94% obtained from the risk free rate (rf) of 7.12%, the beta of 73.23% and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 1,502.04 billion, IDR 1,565.75 billion, IDR 1,653.00 billion, and IDR 1,739.48 billion. The number of DVLA’s shares is 1,120,000,000 shares, so the intrinsic value of DVLA’s stocks for the years of 2020 until 2023 are sequentially IDR 1,341.11, IDR 1,397.99, IDR 1,475.89, and IDR 1,553.10.



Picture 1. Chart of Intrinsic Value and Market Value of DVLA Shares

As can be overviewed, the stock value of DVLA in the market on January 4th, 2021 was IDR 2,420. The market value was far above its intrinsic value. The value of DVLA’s stock in the market on January 4th, 2021 was expensive or overvalued.

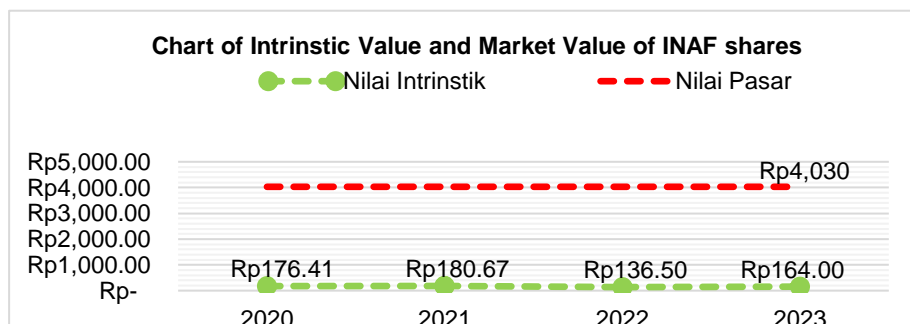
4.2 PT. Indofarma (INAF)

The INAF’s stock valuation uses the assumptions of the increase in revenues for 25.32% in 2020 and 15.95% in 2021, the decrease in revenues for -3.54% in 2022, -2.72% in 2023, and -4.50% in 2024. The estimated revenue in 2020 was IDR 1,703,318 million with the net income of IDR 11,298.2 million that generated the equity value of IDR 504,933.6 million.

In 2021, the estimated revenue was IDR 1,975,057 million with the net income of IDR 27,316.6 million and generated the equity value of IDR 570,665.6 million. In 2022, the estimated revenue will be IDR 1,905,091 million with the net income of IDR 3,851.7 million and will generate the equity value of IDR 430,606.9 million. In 2023, the estimated revenue will be IDR 1,853.208 million with the net income will be IDR 10,595.9 million and will generate the equity value of IDR 525,928.7 million. And in 2024 the estimated revenue will be IDR 1,769,767 million with the net income of IDR 1,328.4 million and will generate the equity value of IDR 612,113.7 million.

The INAF’s ROE for the years of 2020 until 2024 are sequentially 2.09%, 4.79%, 0.89%, 2.01% 2023, and 0.22%. The cost of equity capital (re) is 3.67% obtained from the risk free rate (rf) of 7.12%, beta of 214.20% and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 546,757 million, IDR 559,933 million, IDR 423,064 million, and IDR 508,272 million. The number of INAF’s shares is 3,099,267,500, so the intrinsic value of INAF’s stocks for the years of 2020 until 2023 are sequentially IDR 176.41, IDR 180.67, IDR 136.50, and IDR 164.00.



Picture 2. Value and Market Value of Chart of Intrinsic INAF shares

As can be overviewed, the stock value of INAF in the market on January 4th, 2021 was IDR 4,030. The market value is far above the intrinsic value. The value of INAF's stock in the market on January 4th, 2021 was expensive or overvalued.

4.3 PT. Kimia Farma (KAEF)

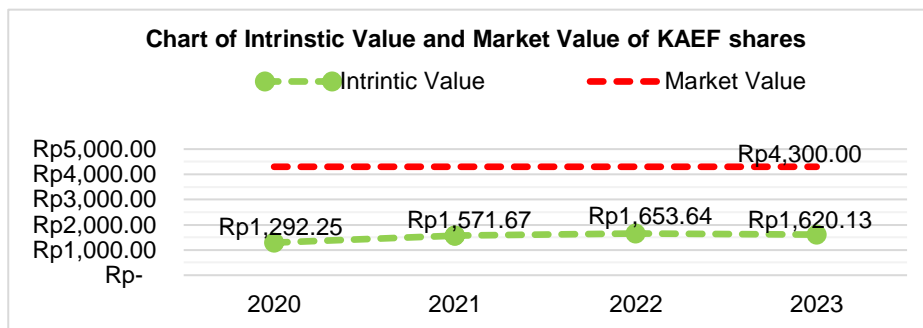
The KAEF’s stock valuation uses the assumption of the increase in revenues for 15% in 2020, 30% in 2021, and 5% in 2022 until 2024. The estimated revenue in 2020 was IDR 10,810.62 billion with the net income IDR 15.89 billion that generated the equity value of IDR 7,188.51 billion.

In 2021, the estimated revenue was IDR 14,053.80 billion with the net income of IDR 279.02 billion and generated the equity value of IDR 8,731.51 billion. In 2022, the estimated revenue will be IDR 14,756.49 billion with the net income of IDR 303.40 billion and will generate the equity value of IDR 9,190.79 billion. In 2023, the estimated revenue will be IDR 15,494. 32 billion with the net income of IDR 292.34 billion and will generate the equity value of IDR 8,994.37 billion. And in 2024, the estimated revenue will be IDR 16,269.03 billion with the net income of IDR 262.05 billion and will generate the equity value of IDR 7,738.95 billion.

In 2021, the estimated revenue was IDR 14,053.80 billion with the net income of IDR 279.02 billion and generated the equity value of IDR 8,731.51 billion. In 2022, the estimated revenue will be IDR 14,756.49 billion with the net income of IDR 303.40 billion and will generate the equity value of IDR 9,190.79 billion. In 2023, the estimated revenue will be IDR 15,494. 32 billion with the net income of IDR 292.34 billion and will generate the equity value of IDR 8,994.37 billion. And in 2024, the estimated revenue will be IDR 16,269.03 billion with the net income of IDR 262.05 billion and will generate the equity value of IDR 7,738.95 billion.

The KAEF’s ROE for the years of 2020 until 2024 are sequentially 1.71%, 3.20%, 3.30%, 3.25%, and 3.39%. The cost of equity capital (re) is 3.33% obtained from the risk free rate (rf) of 7.12%, beta of 235.43%, and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 7,177.18 billion, IDR 8,729.06 billion, IDR 9,184.32 billion, and IDR 8,998.20. The number of KAEF’s shares is 5,554,000,000, so the intrinsic value of KAEF’s stocks for the years of 2020 until 2023 are sequentially IDR 1,292.25, IDR 1,571.67, IDR 1,653.64, and IDR 1,620.13.



Picture 3. Chart of Intrinsic Value and Market Value of KAEF shares

As can be overviewed, the stock values of KAEF in the market on January 4th, 2021 was IDR 4,300. The market value was far above the intrinsic value. The value of KAEF's stock in the market on January 4th, 2021 was expensive or overvalued.

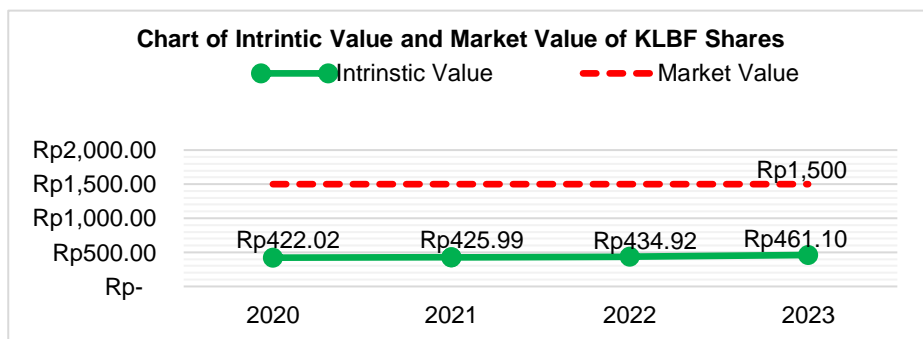
4.4 PT. Kalbe Farma (KLBF)

The KLBF’s stock valuation uses the assumption of the increase in revenues for 2.10% in 2020, 5.46% in 2021, and 4.30% in 2022 to 2024. The estimated revenue in 2020 was IDR 22,633.48 billion with the net income of IDR 2,758.67 billion that generated the equity value of IDR 17,702.15 billion.

In 2021, the estimated revenue was IDR 24,370.52 billion with the net income of IDR 3,170.58 billion and generated the equity value of IDR 18,246.24 billion. In 2022, the estimated revenue will be IDR 25,418.45 billion with the net income of IDR 2,916.06 billion and will generate the equity value of IDR 18,724.55 billion. In 2023, the estimated revenue will be IDR 26,511.44 billion with the net income of IDR 3,016.37 billion and will generate the equity value of IDR 19,986.46 billion. And in 2024, the estimated revenue will be IDR 27,651.44 billion with the net income of IDR 3,142.75 billion and will generate the equity value of IDR 21,190.82 billion.

The KLBF’s ROE for the years of 2020 until 2024 are sequentially 15.58%, 17.38%, 15.57%, 15.09%, and 14.83%. The cost of equity capital (re) is 5.36% obtained from the risk free rate (rf) of 7.12%, beta of 109.06%, and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 19,782.40 billion, IDR 19,968.20 billion, IDR 20,386.73 billion, and IDR 21,614.14. The number of KLBF’s shares is 46,875,122,110, so the intrinsic value of KLBF’s stocks for the years of 2020 until 2023 are sequentially IDR 422.02, IDR 425.99, IDR 434.92, and IDR 461.10.



Picture 4. Chart of Intrinsic Value and Market Value of KLBF shares

As can be overviewed, the stock value of KLBF in the market on January 4, 2021 was IDR 1,500. The market value is far above the intrinsic value. The value of KLBF's stock in the market on January 4, 2021 was expensive or overvalued.

4.5 PT. Merck Indonesia (MERK)

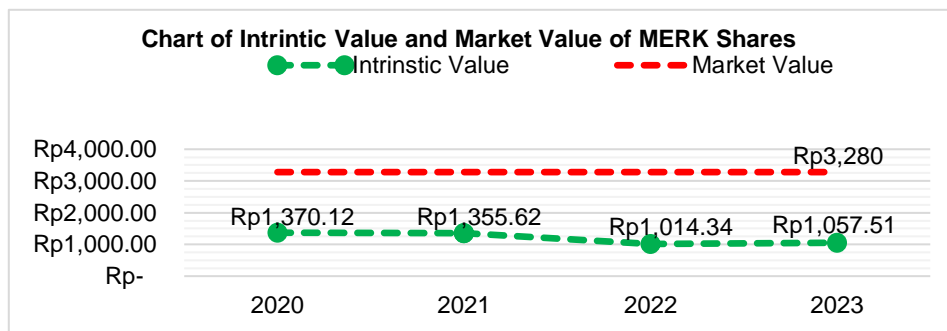
The MERK’s stock valuation uses the assumptions of the increase in revenues for 15% in 2020, 7% in 2021, the decrease in revenue for -40% in 2022, and the increase in revenue for 7% in 2023 and 2024. The estimated revenue in 2020 was IDR 856.33 billion with the net income of IDR 87.55 billion that generated the equity value of IDR 559.88 billion.

In 2021, the estimated revenue was IDR 899.15 billion with the net income of IDR 95.33 billion and generated the equity value of IDR 580.23 billion. In 2022, the estimated revenue will be IDR 539.49 billion with the net income of IDR 58.64 billion and will generate the equity value of IDR 427.44 billion. In 2023, the estimated revenue will be IDR 577.25 billion with the net income of IDR 61.74 billion and will generate the equity value of IDR 446.20 billion. And in 2024, the estimated revenue will be IDR 617.66 billion with the net income of IDR 65.91 billion and will generate the equity value of IDR 465.97 billion.

The MERK’s ROE for the years of 2020 until 2024 are sequentially 15.64%, 16.43%, 13.72%, 13.84%, and 14.14%. The cost of equity capital (re) is 6.53% obtained from the risk free rate (rf) of 7.12%, beta of 36.84%, and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 613.82 billion, IDR 607.32 billion, IDR 454.42 billion, and IDR 473.76 in 2023. The number of MERK’s shares is 448,000,000, so the intrinsic value of MERK’s stocks for the years of 2020 until 2023 are sequentially IDR 1,370.12, IDR 1,355.62, IDR 1,014.34, and IDR 1,057.51.

The RIM values for the years of 2020 until 2023 are sequentially IDR 613.82 billion, IDR 607.32 billion, IDR 454.42 billion, and IDR 473.76 in 2023. The number of MERK’s shares is 448,000,000, so the intrinsic value of MERK’s stocks for the years of 2020 until 2023 are sequentially IDR 1,370.12, IDR 1,355.62, IDR 1,014.34, and IDR 1,057.51.



Picture 5. Chart of Intrinsic Value and Market Value of MERK shares

As can be previewed, the stock value of MERK in the market on January 4th, 2021 was IDR 3,280. The market value is far above the intrinsic value. The value of MERK’s stock in the market on January 4th, 2021 was expensive or overvalued.

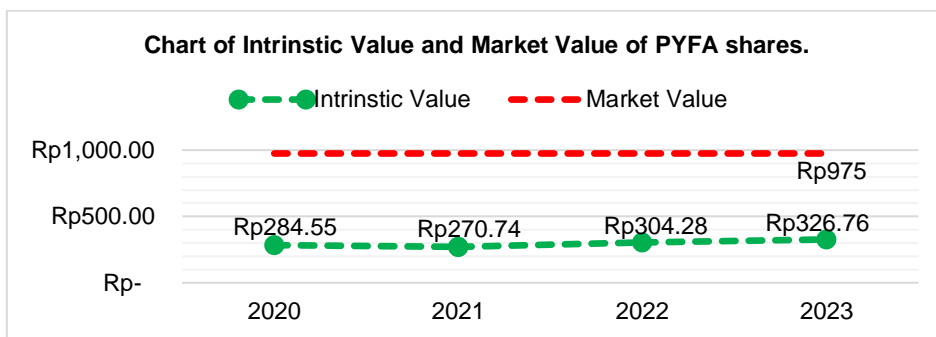
4.6 PT. Pyridam Farma (PYFA)

The PYFA’s stock valuation uses the assumptions of the increase in revenues for 10.62% in 2020, 12.16% in 2021, the decrease in revenue for -1.25% in 2022, the increase in revenue for 2.79% in 2023, and 5.36% in 2024. The estimated revenue in 2020 was IDR 247.11 billion with the net income of IDR 18.47 billion that generated the equity value of IDR 145.10 billion.

In 2021, the estimated revenue was IDR 306.60 billion with the net income of IDR 16.52 billion and generated the equity value of IDR 139.60 billion. In 2022, the estimated revenue will be IDR 302.77 billion with the net income of IDR 16.03 billion and will generate the equity value of IDR 157.82 billion. In 2023, the estimated revenue that will be IDR 311.21 billion with the net income of IDR 16.86 billion and will generate the equity value of IDR 169.96 billion. And in 2024, the estimated revenue will be IDR 327.90 billion with the net income of IDR 18.25 billion and will generate the equity value of IDR 188.14 billion.

The PYFA’s ROE for the years of 2020 until 2024 are sequentially 12.73%, 11.83%, 10.16%, 9.92%, and 9.70%. The cost of equity capital (re) is 6.38% obtained from the risk free rate (rf) of 7.12%, beta of 45.91%, and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 152.26 billion, IDR 144.87 billion, IDR 162.82 billion, and IDR 174.84. The number of PYFA’s shares is 535,080,000, so the intrinsic value of PYFA’s stock for the years of 2020 until 2023 are sequentially IDR 284.55, IDR 270.74, IDR 304.28, and IDR 326.76.



Picture 6. Chart of Intrinsic Value and Market Value of PYFA shares

As can be overviewed, the stock value of PYFA in the market on January 4th, 2021 was IDR 975. The market value is far above the intrinsic value. The value of PYFA's stock in the market on January 4th, 2021 was expensive or overvalued.

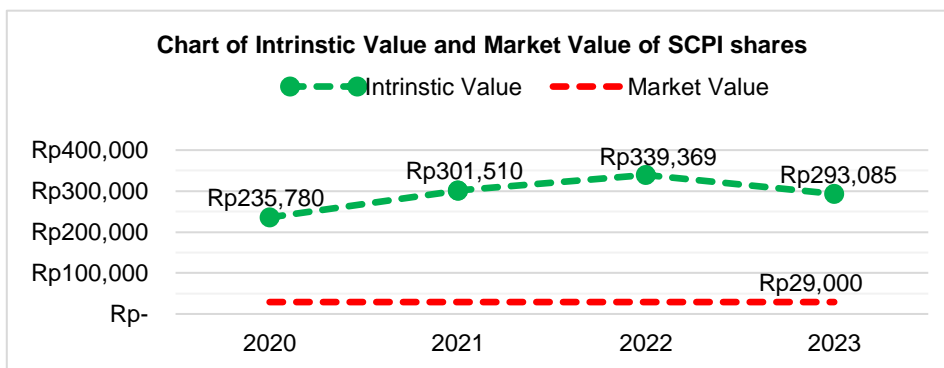
4.7 PT. Merck Sharp Dorhme Pharma (SCPI)

The SCPI's stock valuation uses the assumptions of the increase in revenues for 55.95% in 2020, 5.97% in 2021, 2.25% in 2022, the decrease in revenue for -12.74% in 2023, and the increase in revenue for 3.50% in 2024. The estimated revenue in 2020 was IDR 2,871.37 billion with the net income of IDR 143.66 billion that generated the equity value of IDR 743.45 billion.

In 2021, the estimated revenue was IDR 3,042.79 billion with the net income of IDR 181.97 billion and generated the equity value of IDR 1,016.02 billion. In 2022, the estimated revenue will be IDR 3,111.25 billion with the net income of IDR 158.53 billion and will generate the equity value of IDR 1,160.62 billion. In 2023, the estimated revenue will be IDR 2,714.88 billion with the net income of IDR 144.21 billion and will generate the equity value of IDR 1,020.15 billion. And in 2024, the estimated revenue will be IDR 2,809.90 billion with the net income of IDR 117.60 billion and will generate the equity value of IDR 1,054.86 billion.

The SCPI's ROE for the years of 2020 until 2024 are sequentially 19.32%, 17.91%, 13.66%, 14.14%, and 11.15%. The cost of equity capital (re) is 6.83% obtained from the risk free rate (rf) of 7.12%, beta of 17.86%, and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 848.41 billion, IDR 1,085.44 billion, IDR 1,221.73 billion, and IDR 1,055.11. The number of SCPI's share is 3,600,000, so the intrinsic value of SCPI's stock for the years of 2020 until 2023 are sequentially IDR 235,780, IDR 301,510, IDR 339,369, and IDR 293,085.



Picture 7. Chart of Intrinsic Value and Market Value of SCPI shares

As can be overviewed, the stock value of SCPI in the market on January 4th, 2021 was Rp. 29,000. The market value is far below the instrinsic value. The value of SCPI's stock in the market on January 4th, 2021 was cheap or undervalued.

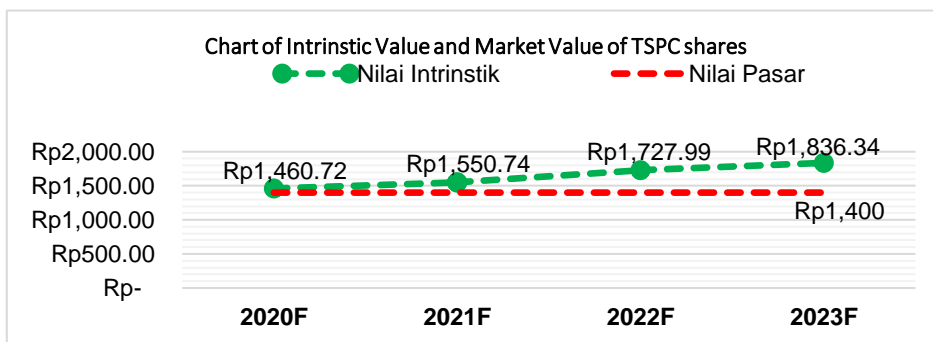
4.8 PT. Tempo Scan Pasific (TSPC)

The TSPC's stock valuation uses the assumption of the increase in revenues for 2.64% in 2020, 8.85% in 2021, 11.08% in 2022, 5.34% in 2023, and 6.14% in 2024. The estimated revenue in 2020 was IDR 11,284.08 billion with the net income of IDR 611.42 billion and generated the equity value of IDR 6,238.68 billion.

In 2021, the estimated revenue was IDR 12,282.72 billion with the net income of IDR 751.44 billion and generated the equity value of IDR 6,653.39 billion. In 2022, the estimated revenue will be IDR 13,643.65 billion with the net income of IDR 813.14 billion and will generate the equity value of IDR 7,513.99 billion. In 2023, the estimated revenue will be IDR 14,372.22 billion with the net income of IDR 792.60 billion and will generate the equity value of IDR 8,061.37 billion. And in 2024, the estimated revenue will be IDR 15,254.67 billion with the net income of IDR 755.75 billion and will generate the equity value of IDR 8,395.19 billion.

The TSPC's ROE for the years of 2020 until 2024 are sequentially 9.80%, 11.29%, 10.82%, 9.83%, and 9.00. The cost of equity capital (re) it is 5.97% obtained from the risk free rate (rf) of 7.12%, beta of 71.70%, and the market risk premium of 5.51%.

The RIM values for the years of 2020 until 2023 are sequentially IDR 6,573.23 billion, IDR 6,978.35 billion, IDR 7,775.95 billion, and IDR 8,263.55 in 2023. The number of TSPC's shares is 4,500,000,000, so the intrinsic value of TSPC's stocks for the years of 2020 until 2023 are sequentially IDR 1,460.72, IDR 1,550.74, IDR 1,727.99, and IDR 1,836.3.



Picture 8. Chart of Intrinsic Value and Market Value of INAF shares.

As can be overviewed, the stock value of TSPC in the market on January 4th, 2021 was IDR 1,400. The market value is fair with the intrinsic value. It can be said that the value of TSPC's shares in the market on January 4th, 2021 is fair.

5. Discussion and Recommendation

All the results of the intrinsic values and the current market values of all pharmaceutical companies can be overviewed as presented in the Table 1.:

Table 1. Table of Intrinsic Value, Market Value and Value Difference of Pharmaceutical Companies

Issuer	Years	Intrinsic Value	Market Value	Value Difference (Market Sentiment)
DVLA	2020	1,341.11	2,420	1,078.89
DVLA	2021	1,397.99	2,420	1,022.01
DVLA	2022	1,475.89	2,420	944.11
DVLA	2023	1,553.10	2,420	866.90
INAF	2020	176.41	4,030	3,853.59
INAF	2021	180.67	4,030	3,849.33
INAF	2022	136.50	4,030	3,893.50
INAF	2023	164.00	4,030	3,866.00
KAEF	2020	1,292.25	4,300	3,007.75
KAEF	2021	1,571.67	4,300	2,728.33
KAEF	2022	1,653.64	4,300	2,646.36

KAEF	2023	1,620.13	4,300	2,679.87
KLBF	2020	422.02	1,500	1,077.98
KLBF	2021	425.99	1,500	1,074.01
KLBF	2022	434.92	1,500	1,065.08
KLBF	2023	461.10	1,500	1,038.90
MERK	2020	1,370.12	3,280	1,909.88
MERK	2021	1,355.62	3,280	1,924.38
MERK	2022	1,014.34	3,280	2,265.66
MERK	2023	1,057.51	3,280	2,222.49
PYFA	2020	284.55	975	690.45
PYFA	2021	270.74	975	704.26
PYFA	2022	304.28	975	670.72
PYFA	2023	326.76	975	648.24
SCPI	2020	235,780	29,000	206,780
SCPI	2021	301,510	29,000	272,510
SCPI	2022	339,369	29,000	310,369
SCPI	2023	293,085	29,000	264,085
TSCP	2020	1,460.72	1,400	60.72
TSCP	2021	1,550.74	1,400	150.74
TSCP	2022	1,727.99	1,400	327.99
TSCP	2023	1,836.34	1,400	436.34

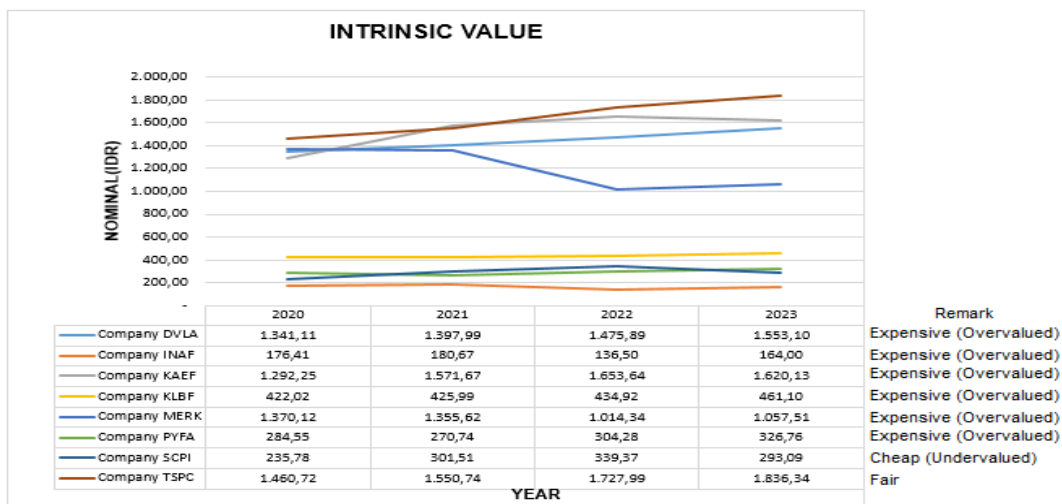
Between the intrinsic values and the market values there found differences, which is commonly known as market sentiment. This value is a part of the market model that is equal to the intrinsic value plus the market sentiment plus the number of errors.

However, this research discusses the valuation using RIM to find the intrinsic value of pharmaceutical companies' stocks and not to discuss how the market sentiment occurs. The market sentiment occurs every time or varies over time, it is caused by various factors. So, there must be the inclusion of many other factors to be able to discuss this market sentiment.

This stock valuation uses RIM to analyze the intrinsic (fair) value of stocks of the pharmaceutical companies listed on the Indonesia Stock Exchange (IDX) for the year of 2010 – 2019 using the current and future equity values, the current and future net incomes of the sample companies. It is done by forecasting the intrinsic values of the stocks of the sample companies for the year of 2020 – 2023 and looking into the past accounting and economic information. In addition to, analyzing Indonesia's macro economy, the cost of equity capital, the net income, and the ROE of the sample companies serves to discount the remaining net income of the shareholders' equities. It can be concluded that:

- 1) There are 6 (six) company stocks categorized expensive or overvalued. They are sequentially DVLA, INAF, KAEF, KLBF, MERK, and PYFA.
- 2) There is 1 (one) company stock categorized cheap or undervalued. It is SCPI.
- 3) There is 1 (one) company stock categorized fair. It is TSP.

Refer to the obtained intrinsic values based on the RIM analysis, there found the differences between the obtained intrinsic values and the market values, it is the market sentiment values and can be overviewed in the Table 1.



Picture 9. The Trend of Intrinsic Values obtained Using RIM

Market sentiment refers to the overall attitudes of investors toward a particular security or [financial market](#). It is the feeling or tone of the market, or it is a crowd psychology, as revealed through the activity and price movement of the securities traded in that market. In broad terms, the rising prices indicate the bullish market sentiment, while the falling prices indicate the [bearish](#) market sentiment.

Table 2. Value Difference Between The Intrinsic Values and The Market Values

COMPANY	YEAR			
	2020	2021	2022	2023
DVLA	1,078.89	1,022.01	944.11	866.90
INAF	3,853.59	3,849.33	3,893.50	3,866.00
KAEF	3,007.75	2,728.33	2,646.36	2,679.87
KLBF	1,077.98	1,074.01	1,065.08	1,038.90
MERK	1,909.88	1,924.38	2,265.66	2,222.49
PYFA	690.45	704.26	670.72	648.24
SCPI	206,78	272,51	310,369	264,085
TSPC	60,72	150.74	327.99	436.34

The suggestions of this research are:

- 1) This research uses the financial statement information of the years of 2010 - 2019, so the researchers who want to do similar research must also use the financial statement information of the following years.
- 2) The approach applied in this research is merely an accounting approach with the market data, so there has to be the other qualitative factors required to be considered.
- 3) The results of this research are the estimate intrinsic values of the stocks of pharmaceutical companies. Many things are not discussed in this research. However, investors can use the results of this research as a part of the consideration inputs, the comparison or the references when the investors want to sell, hold or buy certain stocks of the sample companies.
- 4) For the sample companies, the results of this research can be used to determine the estimated intrinsic values of their stocks in order to have good consideration in regards with their stock policies.

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