

## Conference Paper

# Dividend Policy: Analyzed from Stock Prices and Firm Size in Indonesia's Manufacturing Sector

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**ORCID**Wufron Wufron: <https://orcid.org/0000-0002-8287-3280>**Abstract.**

The purpose of this study was to examine the effect of stock prices and firm size on dividend policy in manufacturing companies in Indonesia. In this quantitative research inferential statistical analysis was used to test hypotheses. Based on certain criterias, purposive sampling technique was used. The data were taken from the company's financial statements from 2018 to 2021. The data were analyzed using multiple regression analysis in order to test the research model and the influence between variables. The results showed that the stock price and firm size on dividend policy is a fit research model. Stock prices had a positive effect on dividend policy, whereas firm size had a negative effect on dividend policy. Stock prices had a significant effect on dividend policy, while firm size had a significant effect on dividend policy. The findings in this study showed that the assets of manufacturing companies in Indonesia during 2018 to 2021 experienced fluctuations, this will directly affect the welfare of investors. The importance of this research is to jointly maintain the existence of all manufacturing companies in Indonesia because companies engaged in the manufacturing sector are very influential in the economic sector.

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## 1. Introduction

Key elements of a capital market include the company's capital requirements and investors' investment activity. Investors frequently use their money to buy stocks on the stock market. Investors who purchase stocks do so in the hopes of receiving a return in the form of a dividend or capital gain. An investor will learn more about a stock's prospects before buying it. Looking at stock price volatility statistics is one method for analyzing the possibility for profit and loss. The more the impact that volatility has on the instability of investor interest in investing funds, the greater the risk and uncertainty that investors must deal with. Some investors prefer volatile stocks because the chances of making capital gains are higher, but the downside is that the risk is also higher [1]. Due to the emergence of competitors in the business world with a large number of, both

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domestic and foreign competitors, every company in Indonesia must be able to handle and implement company management to be more professional. The success or failure of a business depends to a large extent on the financial decisions of the company. Matters that must be considered in financial management are investment, corporate funding, asset management, and dividend policy. These things are certainly important for the company, including the dividend policy.

The Company's income will either be dispersed as dividends to shareholders or maintained as retained earnings to fund future investments, according to the Dividend Procedure [2]. Dividends are payments made from a company's profits to its shareholders [2]. Dividends are crucial because they give current and prospective investors a chance to evaluate the company's performance and future possibilities. It becomes more difficult for a corporation to finance future expansion when it pays dividends. Therefore, it is necessary for the business to be able to determine the appropriate ratio between the retention and dividend payment ratios. The percentage of profits dispersed as dividends is known as the dividend payout ratio; the greater the dividend payout ratio, the less money is left over for retained earnings that can be reinvested in the business.

Dividends are distributed to shareholders in two ways: cash payments (cash dividends) and other forms (stock dividends). Companies that are profitable but offer limited chances for investors typically distribute the majority of their wealth to their shareholders. On the other hand, businesses that are still growing and unable to make significant profits choose paying smaller dividends. Researching the stock price, company size, and other characteristics can help analysts and investors considering investing in securities on the capital market perform an initial analysis of the firm's financial statements. As a result, in this study, researchers will look into how stock price and firm size affect dividend policy.

The stock price is the price of a share that trades on the stock exchange and is influenced by supply and demand [3]. A high stock price implies that future dividends will be extremely high, indicating that the stock price is related to the dividend payout ratio. This point of view is shared by Septiani et al. [4], whose research shows that stock prices have a partially positive effect on the DPR (Dividend Payout Ratio). This study's findings contradict those of Maghfiroh et al. [5], who discovered that stock prices have no effect on dividend policy, as measured by the Dividend Payout Ratio.

The firm size of a company is determined by the total assets of the company. Firm size can influence the number of dividends paid because the company's turnover and profits increase as it grows. If the company is able to generate a large enough profit, it will be

able to pay more dividends. This viewpoint is consistent with the findings of Ariwinata [6] research, which found that company size influences dividend policy. The findings of this study contradict the findings of Purwanti [7], who discovered that company size has no effect on the dividend policy, as measured by the Dividend Payout Ratio.

Manufacturing firms are classified into several sectors, including the basic and chemical industries, various industrial sectors, and the consumer goods industry. However, the researcher will not focus only on each sector, because this study will focus on manufacturing companies listed in LQ45. Manufacturing companies are inconsistent in distributing dividends and some do not even distribute them. Stock prices, total assets (in thousands of rupiah) and DPR have increased and decreased or are commonly referred to as fluctuating, even in 2015 several companies in Indonesia did not distribute dividends to their shareholders. Among them are manufacturing companies listed in LQ45 which are included in the object of this research that companies in distributing dividends to their shareholders each year have different decisions.

According to Febrianti and Zulvia [8] research findings, company size has a negative and significant impact on the dividends of manufacturing businesses listed on the Indonesian stock exchange. According to Su'un [9] and Atiningsih and Izzaty [10], the size of the company has a significant and positive impact on the dividends of manufacturing companies listed on the Indonesian stock exchange. According to Aini et al. [11], stock prices have a significant and negative impact on the dividends of industrial companies listed on the Indonesian stock exchange. In the meantime, Harahap [12] and Nguyen et al. [13] asserts that stock prices have a favorable and considerable impact on dividends. From some of these studies there are differences in research results as a research gap, so researchers are interested in conducting research with the title Dividend Policy: Analyzed from Stock Prices and Firm Size in Indonesia's Manufacturing Sector.

## 2. Literature Review

### 2.1. Stock price

The stock price is the price of a share that appears on the stock exchange and is influenced by the supply and demand law [3]. Because it is the price of a stock in the ongoing market, the stock price is an easy-to-determine price on the real market; if the market closes, the market price is the closing price [14]. Stock prices are prices that occur on the stock exchange at a specific time and can rise or fall in a matter of minutes or even seconds [15]. It can depend on the demand and supply of stock buyers with

stock sellers. If a stock is oversubscribed, the price will tend to rise. On the other hand, if the stock is oversupplied, the price will tend to fall. The stock price used in this study is the closing price of the stock, because as we know that stock prices always go up and down, to equate the stock prices used in this study with eight objects, the closing stock prices are taken annually on these objects.

$$\text{Share Price} = LN \text{ closing price of shares}(1)$$

## 2.2. Firm size

A company's total assets determine its firm size. A company's total assets indicate its size. The more valuable the assets, the more valuable the invested capital [16]. Meanwhile, Riyanto [17] defines a company's size as its equity, sales, or asset value. According to these experts, a company's size can be determined by total assets, equity value, sales value, or asset value. The size of the company is determined in this study by the total assets or assets owned by a company, because larger companies will have a greater ability to obtain sources of funds that can be used to finance investments in order to obtain profits.

$$\text{Firm size} = LN \text{ total assets}(2)$$

## 2.3. Dividend policy

The magnitude of the profit distribution ratio to shareholders in the form of cash dividends, stock dividends, stock splits, and stock recalls of outstanding shares is determined by a dividend policy, which is a financial management policy [18]. The choice of whether to pay a company's profits as dividends to shareholders or to keep them as retained earnings in order to finance future investments is known as the dividend policy [19]. The Dividend Policy, in their opinion, determines whether the company's gains are paid out as dividends to shareholders or are held as retained earnings for corporate use.

$$(DPR) = \frac{\text{Total Dividend Divided}}{EAT}(3)$$

## 3. Research Methods

The investigation employed the associative approach. The associative approach is employed to establish the association between two independent variables and one

dependent variable. "One of the research methods that asks about the relationship between two or more variables is the associative method" [20]. A causal relationship is referred to in the associative research method. Finding the link between the independent and dependent variables is the aim of causal connection analysis. The data were analyzed using multiple linear regression. The target of the study is the population as a whole. 161 manufacturing businesses registered on the Indonesia Stock Exchange between 2018 and 2021 made up the study's sample (5 years). The sample meets specific requirements and is a subset of the population. Seven businesses used the purposive sampling method to collect samples based on predetermined criteria. The criteria used are manufacturing companies listed on the IDX, consistently listed on LQ45 from 2018 to 2021 and complete financial statements from 2018 to 2021. There are 161 manufacturing businesses listed on the Indonesia Stock Exchange between 2018 and 2021 that fit these criteria, while consistently listed in LQ45 from 2018 to 2021 there are 8 companies, and the complete financial statements from 2018 to 2021 are 7 companies. Based on these criteria, the final sample used in this study were 7 companies, namely: PT Aneka Tambang Tbk, Astra International Tbk, Semen Indonesia (Persero) Tbk, Gudang Garam Tbk, HM Sampoerna Tbk, Indofood Sukses Makmur Tbk and Kalbe Farma Tbk. Data obtained through the Company's Financial Statements Literature Study and processed using the Eviews version 10 tool to be analyzed and drawn conclusions.

#### 4. Results and Discussion

This section describes the discussion of related research results Dividend Policy: Analyzed from Stock Prices and Firm Size in Indonesia's Manufacturing Sector.

TABLE 1: Results of Multiple Regression Analysis.

Test	H <sub>0</sub>	Count stats		Sig
F	H <sub>01</sub>	7.83		0.00
T	H <sub>02</sub>	5.47	0.03	0.00
	H <sub>03</sub>	6.42	-0.02	0.00

Source: g Data Processing Results, Eviews 10

If the regression's significance value of 0.000 is less than the significance level of 0.05, or if the independent factors jointly affect the dependent variable, the F test is employed to assess these issues (table 1). This finding demonstrates that the dividend payment ratio is positively and significantly influenced by both the firm's size and stock price, enabling the regression model to forecast the dependent variable. Stock price

and firm size, the two independent variables in this study, can thereby forecast and influence changes in the dividend payout ratio. According to Brigham and Houston [21], the factors influencing dividend policy are based on alternative sources of capital, one of which is the cost of selling new shares. If a company needs to fund an investment, it can do so by reinvesting profits or issuing new common stock. Based on the constraints, one of which is cash availability, where only cash availability can pay cash dividends, cash shortages can limit dividend payments.

0.616448 is the determined coefficient of determination. This shows that 61.65% of the dividend payment ratio is determined by the stock price and the size of the company. The remaining 38.35% were influenced by the epsilon variable, which was other factors not investigated in this study. Stock price and firm size both have a significant impact on dividend policy. In LQ45 manufacturing businesses, stock price (stock price) has a favorable impact on DPR. With rising share prices, dividend payments to shareholders get bigger. On the other hand, the firm size has a bad indicator. This study suggests that a company's investment opportunities increase with size. The company's need to pay dividends would be reduced if current income were invested in opportunities with a positive net present value (NPV). As a result, big businesses choose to hold onto their profits instead of paying out dividends. The results of this study are in line with prior studies on *The Effect Of Stock Prices, Return On Assets, And Firm Size On Dividend Payout Ratio: Evidence From Indonesian Financial Service Companies* [4]. The study's findings demonstrate that, as indicated by the Dividend Payout Ratio, the factors stock price, return on assets, and business size have a strong and significant impact on dividend policy. This is because, with a probability value less than the significance value, the calculated F value is statistically significant and is higher than the table F value. The study's coefficient of determination was 0.719834. This indicates that the overall influence of all independent variables—stock price, return on assets, and firm size—on the dividend payout ratio is 71.98%. The remaining 28.02% are caused by other factors that were not looked at in his study. While assuming other variables in the regression equation were constant, the t-test was utilized to determine the impact of the independent variable on the dependent variable. By examining the likelihood, the t-test was also utilized to check the accuracy of the regression coefficient and establish if it was significant or not (sig value). The results of the processed statistical data above show the impact of the independent variables on the dependent variable. The impact of stock price on dividend payment ratio is the first hypothesis that this study tests, and it is found to be positive and significant. The stock price coefficient is positive at 0.0300, the t value is 5.465121 or greater than the t table is 2.0369, and the significance level

is 0.0000 less than 0.05, according to the table above. This means that the stock price has a significant and positive impact on the dividend payout ratio.

The second premise of the study is that dividend payout ratio is positively and significantly influenced by firm size. According to the data in the table above, the firm size coefficient is negative at -0.0243, the t-count value is larger than or equal to 6.418800, the t table is 2.0369, and the significance level is 0.000 less than 0.05. This means that the size of the company has a negative and significant impact on the dividend payout ratio. The results of the partial test (t-test) show that the coefficient stock price is positive at 0.0300. This indicates that the dividend payment ratio increases by 0.03 units for every dollar increase in stock price. The t-statistic probability value is 0.1549 and exceeds the 0.05 criterion of significance. As a result, the dividend payment ratio of manufacturing companies listed in LQ45 is significantly and somewhat positively impacted by stock price. Stock Price (stock price) has increased and decreased in this study; technically, the stock price will fluctuate according to supply and demand. According to Samsul [3], the stock price is the price that appears on the stock market, where the price is influenced by the law of supply and demand for shares. Additionally, shareholders' or potential shareholders' decisions to buy, sell, or hold their shares will be influenced by the company's policy on the payment of cash dividends. Stock prices change as a result of investors' decisions to buy, sell, or hold onto their shares. The stock price influences the dividend payout ratio in a positive way, which means that the stock price is directly proportional to the dividend payout ratio. This means that in manufacturing companies, the higher the stock price, the higher the dividend payout ratio.

The current stock price is determined by dividends to be received in the future. If the stock price is high, the dividends paid in the future are likely to be high as well, because these shares are of high quality. When a company wants its share price to rise in the coming period, the manager will increase the dividend payout ratio to increase investor incentives to purchase company stock. The small influence of stock prices on dividend policy is due to the fact that even if the stock price rises, the dividend distribution will not necessarily increase because the previous dividend was determined based on the number of shares owned by investors. Furthermore, each company pays dividends in accordance with company policy, so the amount and form of payment may vary depending on the policy. There will always be a match between the number of dividends paid to investors and the number of shares issued by corporations. When a company wants to increase its share price in the next period, the manager will set a

higher DPR to increase investors' incentives to buy company shares, because the stock price is one of the draws for investors.

The results of this study are in line with those of a study by Septiani et al. [4] titled According to a study titled The Effect Of Stock Prices, Return On Assets, And Firm Size On Dividend Payout Ratio: Evidence From Indonesian Financial Service Companies, equities have a tangentially beneficial effect on the DPR. These findings confirm the Signaling Theory's claim that investors favor dividend income above capital gains in light of the empirical evidence they have presented. Dividend payments to shareholders rise in response to rising share prices, and vice versa.. This study is in line with research conducted by Wonggo [22] regarding the Analysis of the Effect of Profitability, Leverage and Stock Prices on Cash Dividend Policy (Study of LQ45 Companies on the Indonesia Stock Exchange for the Period 2018 - 2021), showing that stock prices have a significant effect and has a positive coefficient on the Dividend Payout Ratio (DPR) because the significance level is smaller than the value of  $\alpha = 0.05$ , which is 0.037. This is because one of the motivators for investors to invest is the stock price. This study contradicts Maghfiroh et al. [5] on the Impact of Financial Performance, Stock Prices on Dividend Policy. Entered in IDX High Dividend 20, demonstrating that the effect of stock prices on dividend policy, as proxied by the dividend payout ratio, is insignificant. On the contrary, they believe that dividend policy can have an impact on stock prices because dividend distribution policies influence investors or potential investors to sell, buy, or hold shares. When the distribution of high dividends signals to shareholders that the company is performing well enough to attract investors. When investors are interested in purchasing the company's stock, the share price rises.

The firm size coefficient is -0.0243, according to the findings of the partial test (t-test). Accordingly, for every increase in firm size, the dividend payment ratio will drop by 0.0243 units. When the value is less than 0.05, the probability value for the t-statistic is 0.000. It follows that firm size in LQ45 manufacturing enterprises has a considerable and partially negative impact on the dividend payment ratio. The entire assets of the company are used to calculate the firm size (company size) in this study [16]. Firm size has increased and decreased in this study. This can be caused by fluctuations in current assets, such as the company's sales proceeds. In this case, if the sales exceed the variable and fixed costs, the amount of income before tax is obtained. In contrast, if sales are less than variable and fixed costs, the company will lose money [21]. Firm size has a detrimental effect on the dividend payout ratio, which means that the two variables are inversely related. This implies that the dividend payment ratio decreases as the size of the company increases, because larger companies may have more responsibilities and



require more financing, causing them to increase retained earnings while decreasing dividend distribution.

The small influence of company size on dividend policy; an increase in firm size does not always result in a decrease in dividend payout ratio in the future. This is due to the fact that the dividend payout ratio cannot be determined solely by looking at the company's size and cannot predict changes in the Dividend Payout Ratio. According to the findings of this study, companies with larger and higher profits prefer to keep their earnings to fund investments as growth opportunities rather than distribute them as dividends. This is in line with the principle of the pecking order. When looking for corporate finances, pecking order theory shows that businesses prefer to finance investments with internal funds and implement them as growth opportunities. The results of this study are in agreement with a study by Septiani et al. [4] titled "The Effect Of Stock Prices, Return On Assets, And Firm Size On Dividend Payout Ratio: Evidence From Indonesian Financial Service Companies," which discovered that the company has a negative impact on the dividend payout ratio. This study suggests that a company's investment opportunities increase with size. Given the abundance of investment alternatives, it would be preferable to use current income to invest in projects that have a positive net present value (NPV), hence lowering the company's need to pay dividends. This justification is supported by the residual dividend theory, which contends that a corporation doesn't set up a dividend policy until everything is profitable. This study is also consistent with Gusni [23] concerning The Determinants Of Dividend Policy: A Study Of The Financial Industry In Indonesia, which shows that the dividend payout ratio has a minor impact on dividend policy. This is because the size of the company does not always provide investors with certainty regarding the company's decision to distribute dividends. This study contradicts the findings of Jahfer and Mulafara [24], who found a significant positive relationship between a firm's SPV and its DY in both models. DPR is insignificant but positively related to stock price movement. Because, in his opinion, the greater the number of assets, the greater the opportunity for the company to distribute dividends. This study also contradicts previous research Wahyuliza and Fahyani [25], which found that company size has a positive effect on dividend policy as measured by the dividend payout ratio. They explained that the larger the company, the higher the dividend payout ratio; conversely, the smaller the company, the lower the dividend payout ratio. This is because an established and large company has easier access to the capital market, allowing it to create debt or generate larger funds and maintain a higher dividend payout ratio.

## 5. Conclusion

A research model that fits the stock price and firm size on dividend policy. Dividend policy is influenced positively by stock prices. Dividend policy is influenced positively by firm size. Dividend policy is heavily influenced by stock prices. The size of a company has a significant impact on dividend policy. According to the findings of this study, the assets of manufacturing companies in Indonesia experienced fluctuations from 2018 to 2021, which will have a direct impact on the welfare of investors. The importance of this research is to jointly maintain the existence of all manufacturing companies in Indonesia because companies engaged in the manufacturing sector are very influential in the economic sector. For academics and further researchers, this research can be a reference and reference that can be used to expand research in the same field and add insight to its development. Further research can use other objects, not only manufacturing companies listed in LQ45, but also industries from other sectors. Further research can also use other proxies as a measure of dividend policy, such as proxies based on residual policies, and others.

## References

- [1] Mawardi W. Determinants of the stock price volatility in the Indonesian manufacturing sector. *International Research Journal of Business Studies*. 2018;11(3):179-193.
- [2] Musthafa H. *Manajemen keuangan*. Penerbit Andi; 2017.
- [3] Samsul M. *Pasar Modal dan Manajemen Portofolio*. Edisi 2. Surabaya: Erlangga; 2015.
- [4] Septiani M, Ariyani N, Ispriyahadi H. The effect of stock prices, return on assets, and firm size on dividend payout ratio: Evidence from Indonesian financial service companies. *Diponegoro International Journal of Business*. 2020;3(1):17-27.
- [5] Maghfiroh A, Lukiana N, Irdiana S. Dampak Kinerja Keuangan, Harga Saham terhadap Kebijakan Dividen yang Masuk di Idx High Dividend 20. In *Progress Conference*. 2019;2(1):373-382.
- [6] Ariwinata IPS, Badjra IB. Profitability, company size, and gross domestic product on dividend policy (empirical study of service companies on the Indonesia stock exchange). *American Journal of Humanities and Social Sciences Research*. 2021;5(4):549-554.
- [7] Purwanti T. The effect of profitability, capital structure, company size, and dividend policy on company value on the Indonesia stock exchange. *International Journal of*

- Seecology. 2020:060-066.
- [8] Febrianti D, Zulvia Y. Pengaruh Struktur Kepemilikan, Leverage, Ukuran Perusahaan Terhadap Kebijakan Dividen Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia Tahun 2013-2017. *Jurnal Ilmiah Mahasiswa Ekonomi Manajemen*. 2020;5(1):201-219.
- [9] Su'un SU. Effect of ownership structure, company size and profitability on dividend police manufacturing company's value in Indonesia Stock Exchange. *Australian Journal of Basic and Applied Sciences*. 2015;9(20):618-624.
- [10] Atiningsih S, Izzaty KN. The effect firm size on company value with profitability as intervening variable and dividend policy as moderating variable. *International Journal of Economics, Business and Accounting Research (IJEBAR)*. 2021;5(4).
- [11] Aini DN, Wijaya C, Nugroho BY. Analisis interest rate, stock returns, dan Implied volatility terhadap credit default swap (CDS) di Indonesia. *Fakultas Ilmu Sosial dan Ilmu Politik Universitas Indonesia*; 2012.
- [12] Harahap AK. Pengaruh Earning Per Share dan Harga Saham terhadap Dividen Kas Perusahaan Manufaktur di Bursa Efek Indonesia Tahun 2006-2008. *Jurnal Manajemen dan Bisnis*. 2011;1(2).
- [13] Nguyen DT, Bui MH, Do DH. The relationship of dividend policy and share price volatility: A Case in Vietnam. *Annals of Economics & Finance*. 2019;20(1).
- [14] Hussainey K, Oscar Mgbame C, Chijoke Mgbame AM. Dividend policy and share price volatility: UK evidence. *Journal of Risk Finance*. 2011;12(1):57-68. <https://doi.org/10.1108/15265941111100076>
- [15] Darmadji T, Fakhrudin HM. *Pasar Modal di Indonesia*. Edisi 3. Jakarta: Salemba Empat; 2012.
- [16] Sujarweni VW. *Kupas Tuntas Penelitian Akuntansi dengan SPSS*. Yogyakarta: Pustaka Baru Press; 2016.
- [17] Riyanto B. *Dasar-Dasar Pembelanjaan Perusahaan*. Edisi Keempat. BPFE-Yogyakarta; 2013.
- [18] Darmawan M. Dividend omission announcement effect to market reaction in Indonesia Stock Exchange. Published in: *Integrated Journal of Business and Economics*. 2018;2(2):14-28.
- [19] Sartono A. *Manajemen keuangan teori dan aplikasi*, Edisi Empat. Yogyakarta: BPFE; 2012.
- [20] Sugiyono. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta; 2018.
- [21] Brigham EF, Houston JF. *Dasar-Dasar Manajemen Keuangan* . Edisi 11 Jilid 2. Jakarta: Salemba Empat; 2011.

- [22] Wonggo F. Analisis Pengaruh Profitabilitas, Leverage Dan Harga Saham Terhadap Kebijakan Dividen Tunai (Studi Pada Perusahaan Lq-45 Di Bursa Efek Indonesia Periode 2009–2013). *Jurnal Berkala Ilmiah Efisiensi*. 2016;16(1):40-52.
- [23] Gusni G. The determinants of dividend policy: A study of financial industry in Indonesia. *Jurnal Keuangan dan Perbankan*. 2017;21(4):197346.
- [24] Jahfer A, Mulafara AH. Dividend policy and share price volatility: Evidence from Colombo stock market. *International Journal of Managerial and Financial Accounting*. 2016;8(2):97-108.
- [25] Wahyuliza S, Fahyani R. Pengaruh pertumbuhan perusahaan, ukuran perusahaan, struktur modal dan return on equity terhadap kebijakan dividen pada perusahaan manufaktur yang Terdaftar di bursa efek indonesia. *Jurnal Benefita: Ekonomi Pembangunan, Manajemen Bisnis & Akuntansi*. 2019;4(1):78-86.