

ARE DIVIDENDS IMPACTED BY THE TIMING OF MACRO DATA RELEASES? CASE OF WIG, DAX AND S&P500

Rafał BUŁA¹, Bartłomiej JABŁOŃSKI^{2*}

¹ University of Economics in Katowice, Faculty of Finance, Department of Investment;
rafal.bula@ue.katowice.pl, ORCID: 0000-0002-9890-7078

² University of Economics in Katowice, Faculty of Finance, Department of Investment;
bartlomiej.jablonski@ue.katowice.pl, ORCID: 0000-0002-9398-017X

* Correspondence author

Purpose: This paper attempts to reveal, on the one hand, whether dividend paid by dividend-paying companies from the WIG, DAX and S&P500 indices for the period 2017-2022 were characterized by positive dynamics of change in real terms, and whether decisions on the level of dividends recommended for payout are more determined by macroeconomic factors from the end of the year, in which the company generated financial results, or from the period, in which dividend decisions were made.

Design/methodology/approach: The research objective of this paper is accomplished by means of a thorough literature analysis. In the area of statistical methods, the authors refer to classical methods of correlational analysis, with a focus on non-parametric methods (Spearman's rho and Kendall's tau).

Findings: The analyses carried out made it possible to indicate that, for companies listed on the FSE and WSE, the only quantity correlated with changes in dividends paid is the PMI index, with a negative correlation for Polish companies and a positive one for German companies. This correlation occurs only if one considers December macroeconomic data readings. On the other hand, for NYSE-listed entities, statistically significant relationships were obtained for the PMI index (negative), the inflation rate (negative) and interest rates (positive). With the exception of interest rates, the correlations apply to both December readings and those from May of the dividend payout year. At the same time, the results indicate different decisions made by the boards of US, German and Polish companies in the face of the SARS-CoV-2 pandemic.

Research limitations/implications: The study was conducted on a limited number of analyzed companies and for a limited time range. Therefore, it could be biased, due to the deterministic stock sampling method and the research period.

Practical implications: Expanded knowledge of the impact of the timing of publication of macroeconomic parameters on decisions on dividend payouts and their amount. This knowledge is important for both investors and investment funds' boards. Consequently, one can make better investment decisions.

Social implications: Among the paper's social implications, the most important appears to be a possible change in the investors' attitude towards dividend-paying companies that not only pay dividends systematically, but also have positive dynamics of change, and the realization

that dividend decisions are affected not only by a number of determinants, but also by the timing of their occurrence. Ultimately, investors' needs could be better addressed.

Originality/value: The paper evaluates the impact of macroeconomic determinants on changes in dividend payouts by companies for the period 2017-2022. What is new in the paper is the analysis of whether the timing of the publication of macroeconomic parameters significantly affects the level of dividends paid, thereby filling our knowledge gap.

Keywords: dividend-paying companies, determinants of dividend policy, macroeconomic indicators, inflation.

Category of the paper: Research paper.

1. Introduction

A dividend paid by a company is a confirmation that the board is properly carrying out its responsibilities in managing the company, and thus acting in the interests of stockholders, while a systematically paid dividend is also a form of stockholder pressure on the board (Skousen, 2011, pp. 145-148). Therefore, analyzing the signals coming from the boards of companies, especially dividend aristocrats, is in the interest of not only institutional investors, but also long-term individual investors. One of the tools influencing the type of dividend-paying company's stock ownership and its attractiveness is the development of an automatic dividend reinvestment program (known as Drip¹), which, especially for dividend investors, is a facilitator when it comes to dividend reinvestment (Lichtenfeld, 2011, pp. 215-218).

The literature notes interest not only in the topic of stock price determination of dividend payout decisions (e.g., S. Desmukh., A.M. Goel and K.M. Howe, P. Asquith and D.W. Mullins Jr, B. Graham, M. Lichtenfeld, H. Rubin, and C. Spaht II, M. Skousen), but also the very dynamics of changes in dividends paid and their impact on the attitudes of capital market investors (among others, M. Baker and J. Wurgler, P. Asquith and D.W. Mullins Jr, J.R. Woolridge and C. Ghosh, F. Modigliani and M. Miller, D.J. Skinner and E.F. Soltes).

The results of the literature analysis indicate a logical connection, in particular, between two subject areas related to dividend payouts. On the one hand, stockholders, especially those who are oriented toward receiving dividends, analyze the systematics of the distribution of the financial result and whether the dividends paid are characterized by a positive growth rate. On the other hand, the boards of companies, when recommending the level of dividends to be paid to stockholders each year, reckon with a number of factors that determine not only the possibility of payout, but also its amount, including growth. Despite the extensive time frame and location of the research, it does not solve the following problem: since capital market investors count on the systematic payout of increasing dividends, whether they are actually increasing in real terms after taking into account the level of inflation and, moreover, whether

¹ Another similar program used by companies is Dsp – buying stocks directly from the company.

decisions on the level of dividends recommended for payout are determined, to a greater extent, by macroeconomic factors from the end of the year, in which the company generated financial results, or perhaps from the period (month), in which dividend decisions were made.

Therefore, the purpose of this paper is to reveal, on the one hand, whether dividend paid by dividend-paying companies from the WIG, DAX and S&P500 indices for the period 2017-2022 were characterized by positive dynamics of change in real terms, and whether decisions on the level of dividends recommended for payout are more determined by macroeconomic factors from the end of the year, in which the company generated financial results, or from the period, in which dividend decisions were made.

The research carried out refers, with its scope, to companies of the WIG, DAX and S&P500 indices, which in the period 2017-2022 paid dividends, with the possibility of not paying dividends once, due to the SARS-CoV-2 pandemic. All calculations were performed using MS Excel and Statistica.

2. Literature review and research hypotheses development

D.J. Skinner and E.F. Soltes (Skinner, Soltes, 2011) believe that the payout of dividends represents a stronger commitment of management to stockholders than the purchase of stocks for redemption. The strength of this commitment in such a case is further compounded by the application of the company's dividend policy with a plan to pay increasing dividends. In contrast, K.P. Fuller and M.A. Goldstein (Fuller, Goldstein, 2011, p. 457) note that monthly stock prices of dividend-paying companies outperform those of non-dividend-paying companies and, during periods of index depreciation, the difference in favor of the former widens to 2 percentage points. W. Al Salamat, M.Q.M. Momani and K. Batayneh (Al. Salamat, Momani, Batayneh, 2021, pp. 166-172), based on their research for the period 2010-2019 on the Jordan Stock Exchange, also found that dividend-paying companies are characterized by lower stock price volatility. Studies conducted by A. Williams and M. Miller (Williams, Miller, 2013, pp. 58-69) as well as K.P. Fuller and M.A. Goldstein (Fuller, Goldstein, 2011) also confirm the legitimacy of investments in dividend-paying companies. Regardless of changes in stock prices in the capital market, dividends provide a hedge against depreciation in the value of a securities portfolio. Moreover, H. Rubin and C. Spaht II (Rubin, Spaht, 2011, p. 12) noted that investors, who make investments in dividend-paying companies over a 10- or 15-year horizon, while reinvesting the dividends, guarantee their financial independence. Regardless of stock price changes, an ever-increasing dividend is an endless cash flow. F. Modigliani and M. Miller (Miller, Modigliani, 1961, p. 430) emphasize that, for companies following a fixed dividend policy, with a long-term target payout rate, investors will interpret any change in dividends as a change in board's view of the company's future and its profits. P. Asquith and

D.W. Mullins Jr. (Asquith, Mullins, 1983, pp. 77-96) point out that, when investing in dividend-paying companies, what matters is not only whether the company pays dividends consistently, but what the rate of its growth is. According to the authors, issuers that pay high dividends with high growth rates are characterized by stable stock prices. This is in the interest of the company's authorities, who, by proposing increasing dividends to stockholders, try to influence not only the type of dividends, but also the company's stock ownership structure. It is worth adding that a stable stock ownership during a downturn in the capital market will take advantage of the discount to add weight to the stock portfolio of such a company. Seeing the broader background of the company's operations and boards' decisions, it can also use the dividends received for this purpose. However, it is worth noting that the tradition of paying increasing dividends is popular in those countries with a developed capital market. Specifically, one points to issuers listed on the American (components of the S&P500 index), German (companies in the DAX index), or French (companies in the CAC40 index), and selectively Polish (components of the WIG index) market.

Previous research in the field of analysis of changes in dividend payouts and related decisions of dividend investors (increase or decrease in the share of stock portfolio of a given company, including complete divestment) has made it possible to recognize patterns of their behavior. First of all, it should be stated that an investor's income in the form of dividend is more important to them than the uncertain return from the sale of stocks (Cwynar, Cwynar, 2007; Kowerski, 2011). Therefore, some investors choose for their portfolios companies that pay dividends, at the same time abandoning investment in stocks of those entities, that do not systematically share part of the profit with stockholders. Therefore, the so-called "bird in the hand" theory means that the dividend received by the investor is more secure than capital gains, since the dividend paid out cannot be taken away from investors and profits transferred to subsequent investments can be lost at least in part through unsuccessful board decisions. M. Miller and F. Modigliani (Brigham, Houston, 2015, p. 582) rejected this theory², pointing out that most investors intend to reinvest dividends received in stocks of entities with similar investment risks. Therefore, the risk of cash transfer to investors is determined by the risk of cash flow from operating activities and not by the distribution policy.

It is worth adding that an increase in dividends is not a simultaneous guarantee of a higher dividend in the future. However, it is a signal that the company's board takes the dividend policy and investors seriously. The question should then be raised as to what happens when the board proposes to raise the level of future dividend and, at the same time, the company's financial results do not recognize an increase in individual elements (Lichtenfeld, 2015, p. 106). Despite the company's temporarily worse financial results, the board sends a signal that the company is able to pay a higher dividend and its future is not at risk. M. Miller and F. Modigliani (Hawawini, Viallat, 2007, p. 445) noted that companies are reluctant to change

² It has been named the "bird in the hand error".

the level of dividends paid, because such changes could suggest better or worse prospects for the companies' operations, respectively. J.R. Woolridge and C. Ghosh (Woolridge, Ghosh, 1986, pp. 20-32) conducted a study of 408 companies that had cut dividend payouts, divided into those that cut dividends and experienced a decline in earnings, those, whose board warned investors of deteriorating performance even before cutting dividends, and a third group, in which dividends were cut, but at the same time announced growth plans or improved financial result. The study found that most companies cut dividends as a result of deteriorating earnings, but if dividends were cut as a result of new investments, the decline in stock prices was milder, and stock prices returned to the trading level before the changes were announced.

Therefore, the decisions of boards to increase the planned dividend are mostly responsible for the increase in stock prices and the decrease or non-payment of the dividend causes a sell-off in stocks, and thus a decline in stock prices. This relationship has been called the signaling effect or the significant information hypothesis. Related to this theory is the concept of so-called dividend stickiness. Boards are reluctant to propose to start paying dividends if future payout is uncertain. In contrast, those companies that have paid dividends so far will try to maintain their dividend-paying company status. Therefore, companies paying dividends continuously on the basis of their adopted dividend policy attract certain groups of investors, particularly those, who prefer to receive dividends. This is the so-called dividend clientele effect, as described by F. Black and M. Scholes (Black, Scholes, 1974) in 1974 and F. Modigliani and M. Miller as early as 1961 (Miller, Modigliani, 1961). Research conducted by F. Allen, A.E. Bernardo and I. Welch (Allen, Bernardo, Welch, 2000, pp. 2499-2536) confirm that institutional clients, in particular, are attracted to those issuers that pay dividends. Research conducted by Evbayiro-Osagie E.I. and Osayuwa E.E (Evbayiro-Osagie, Osayuwa, 2023, pp. 155-169) for the period 2012-2020 of companies listed on the Nigerian Stock Exchange also confirm, that dividends paid in the past affect the systematics of the distribution of the financial result in the future.

It is worth noting one more aspect of systematic dividend payouts. Those boards that recommend paying dividends on an uninterrupted basis win the votes of stockholders, who count on their continued payment. Based on research conducted by S. Desmukh, A.M. Goel and K.M. Howe (Desmukh, Goel, Howe, 2013), it can be concluded, that overconfident CEOs pay lower dividends than rational CEOs. The study omitted the analysis of whether dividends were paid at a constant level over the long term or increasing. In the context of the cited issues of signaling and dividend stickiness, the so-called dividend feeding theory becomes important. A company's management, wishing to indirectly influence the behavior of stock prices, may start or even increase dividend payouts. According to a study conducted by M. Baker and J. Wurgler (Baker & Wurgler, 2004), companies that do not pay dividends are traded lower.

Since, in light of the cited attitudes of investor behavior, it becomes important how market participants react to changes in the amount of dividends paid, it is worth expanding the review of the literature and research to include the determinants of dividend payouts that affect the decisions of company boards to pay and, more importantly, changes in the amount of dividends paid. The issue of factors affecting dividends paid is widely described in foreign and domestic

literature (e.g. J.H. von Eije, W.L. Megginson, S.P. Ferris, N. Sen, H. Pei Yui, H. DeAngelo, L. DeAngelo, D. Skinner, A. Damodaran, M. Jagannathan, C.P. Stephens, M.S. Weisbach, E.F. Fama, K.R. French, G. Grullon, D.L. Ikenberry, A. Brav, J.R. Graham, C.R. Harvey, R. Michaely, B. Horbaczewska, R. Tuzimek, M. Kowerski, A. Szablewski, T. Słoński & B. Jabłoński). Due to their number and complex nature, they are shown to be divided into microeconomic determinants (such as available investment projects, net profit and retained earnings, cash flow, liquidity, cash, assets, equity, fixed capital, capital structure, depreciation level, return on assets (ROA), return on equity (ROE), the life cycle of the company, the need to maintain control over the entity, the level of debt and board's aversion to increasing debt, concluded contracts, and stockholder preferences), macroeconomic determinants (such as inflation, gross domestic product (GDP), interest rate levels, changes in the level of quotation of a country's currency, the dynamics of exports and imports, the tax system, the legal system and legal restrictions) and others, often described as market or psychological (such as economic sentiment, PMI, market indicators or capital market conditions). It should be added that due to the specificity of the listed determinants, their impact is not equal. For some, a lesser impact on dividend proposals can be indicated (e.g. concluded contracts, or the level of depreciation) and for others, a significant impact (e.g. the level of debt, the level of interest rates). Moreover, the determinants of dividends shown in the literature can take the character of stimulants, while others can take the character of destimulants, as shown in Table 1.

Table 1.

Selected stimulants and destimulants of the level of dividend payouts in alphabetical order

Determinants of the level of dividend payout	Type of influence on dividend payout
depreciation	destimulant
enterprise life cycle	stimulant
inflation	destimulant
cost of financing the entity's branch*	destimulant
new share issue – loss of control of the company	destimulant
tax burden on the parent company*	destimulant
foreign exchange restrictions and limitations*	destimulant
contractual restrictions	destimulant
GDP	stimulant
PMI	stimulant
debt level	destimulant
stockholder preference – counting on cash	stimulant
stockholder preference – counting on value growth	destimulant
investment projects	destimulant
cash flows	stimulant
favorability of tax policy	stimulant
favorability of legal conditions	stimulant
return on equity (ROE)	stimulant
cash	stimulant
P/BV ratio	stimulant
P/E ratio	destimulant
WIG index changes	stimulant
net profit, retained earnings	stimulant

* International companies.

Source: Jabłoński, Prymon, 2017, p. 46.

Given the subject matter of the paper, the following section focuses on the analysis of the most important of the macroeconomic determinants of dividend policy affecting the systematics and growth of dividends paid.

Research conducted by I. Jabbouri (Jabbouri, 2016, pp. 283-298) for companies in the MENA region³ for the period 2004-2013 indicates a negative correlation between dividend payouts and the state of the economy. The author noted that managers of companies in the MENA region appear to increase dividend payouts during periods of economic slump in an attempt to reassure investors. Considering other international studies on the impact of gross domestic product (GDP) on the dividend policy of real estate companies, M. Romus, A. Rizga, M.R. Abdillah and N.B. Zakaria (Romus, Rizga, Abdillah, Zakaria, 2020, pp. 1-6) indicated that the rate of GDP growth has a positive impact on the performance of companies and on the dividend policy. On the other hand, from a study conducted by S.D. Misra (Misra, 2015, pp. 440-456) shows that the growth rate of real GDP positively and significantly affects the dividend payout ratio of Indian banking sector institutions. M. Kowerski (Kowerski, 2011, pp. 125-134, 269-279) conducted a study for the period 1995-2009, which shows that the economic situation of the country, as measured by the rate of change of GDP in the previous year, has a significant impact on dividend payout decisions in the base year. It is worth mentioning that this correlation applied only to companies with good financial condition and was not confirmed for companies in worse economic and financial condition. Moreover, in good economic times, companies that had not previously paid dividends began distributing the financial result to stockholders. These conclusions are also confirmed by studies conducted by W. Dębski and I. Bujnowicz (Dębski, Bujnowicz, 2008, p. 9), from which it follows that for the period 1994-2005 there was a strong link between the condition and development of the financial market and economic growth. Research conducted for the period 2002-2013 by B. Jabłoński and J. Kuczowic (Jabłoński, Kuczowic, 2015, pp. 443-457) among companies listed on the Warsaw Stock Exchange indicates that dividend decisions are significantly influenced by perceptions of the future, making GDP a better reflection than PMI of the sentiment of boards regarding dividend payouts. These conclusions correspond, to some extent, with the results of a study conducted by M. Kowerski (Kowerski, 2011, pp. 269-279) on the link between indicators characterizing economic sentiment (indicators calculated, for example, by the European Commission, the Institute of Economic Development of the Warsaw School of Economics or the PMI index were used as measures) and dividends paid. The author found that the better the economic sentiment was in June of a given year, the higher the dividends were in the same year. Interestingly, the author's research also shows that there is an increase in the likelihood of dividends being paid when the capital market is characterized by strong growths, i.e. possible increases or decreases in indices may have a greater impact on dividend

³ MENA is the area of the Middle East and North Africa. According to the World Bank, MENA countries include Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, the UAE and Yemen.

policy than changes in economic situation. The existence of a stable long-term relationship between dividend payouts and real economic activity, as well as the price level adjusted by inflation, was confirmed by T. Basse and S. Reddemann (Basse, Reddemann, 2011, pp. 33-64).

Slightly different findings are presented by the authors of a study of companies on the Pakistan Stock Exchange. F. Khan, A. Ullah, A.A. Muhammad and K.I. Muhammad (Khan, Ullah, Muhammad, Muhammad, 2019, pp. 111-121) conducted research for the period 2001-2017 for macroeconomic variables, from which there is a negative relationship between the interest rate, inflation rate and GDP growth rate and the dividend payout ratio. Also, research conducted by I.N. Yakuba (Yakuba, 2019, pp. 31-50) of companies listed on the capital market in Ghana for the period 2006-2015 does not confirm a strong determination of dividend payouts on the level of inflation. It is noteworthy, however, that the research concerned a specific group of institutions, namely banks, for which changes in inflation (its decline) and thus, as a consequence, a decline in market interest rates negatively affect the financial result (result from lending activities), and thus negatively affect the ability to pay dividends. Similar conclusions were reached by Evbayiro-Osagie E.I., Osayuwa E.E (Evbayiro-Osagie, Osayuwa, 2023, pp. 155-169) for financial companies listed in Nigeria. It is worth adding that, from the point of view of capital market investors, dividends paid may lose their significance especially when they are characterized by low or even negative growth rates. In a high-inflation economic environment, the real value of dividends in the period between the resolution on their distribution and the actual payment is declining at a rapid rate. H. Hazlitt (Hazlitt, 2007) and M. Skousen (Skousen, 2011) point out that high inflation reduces or even stops the payout of dividends. This phenomenon may result, in such macroeconomic conditions, from increased investment by companies dictated by the desire to preserve the value of cash in real assets. As E.F. Brigham and J.F. Houston (Brigham, Houston, 2015, p. 201) note, during periods when inflation is at a low level, a stable dividend policy and the payout of a fixed dividend is sufficient. However, according to the authors, when there is increased inflation, investors already expect rising dividends.

Studies of the impact on dividends paid of successive macroeconomic parameters conducted by H.W. Akani and Y. Swenem in Nigeria for the period 1981-2014 (Akani, Swenem, 2017, pp. 55-63) indicated a significant negative impact of interest rates and the rate of exchange on the dividends paid by manufacturing enterprises. Just referring to the impact of interest rates on dividend payments, it is worth referring to the results of studies conducted by M. Romus, A. Rizga, M.R. Abdillah and N.B. Zakaria (Romus, Rizga, Abdillah, Zakaria, 2020, pp. 1-6). The authors indicate that the interest rate did not have a significant impact on the dividend policy of the entities studied. Also A.A. Muhammad and F. Khan (Muhammad, Khan, 2018, pp. 111-121) observed a negative impact of the interest rate on the dividend payout ratios of textile companies for the period 2001-2017.

Based on the literature review and the identified research gaps, the following research hypotheses were defined:

H₁: Changes in gross domestic product are positively correlated with the level of dividends paid.

H₂: The PMI index is positively correlated with the level of dividends paid.

H₃: The inflation rate is negatively correlated with the level of dividends paid.

H₄: The level of interest rates is negatively correlated with the level of dividends paid.

Each of the indicated hypotheses was analyzed in two variants: in variant one, the relevant macroeconomic variables were considered on the basis of data as of the end of December of the year preceding the dividend payout, and in variant two – as of the end of May of the year of dividend payout. In addition, the study considered not only the absolute level of dividends paid (on an annual basis), but also their growth (absolute and relative). Thus, for each research hypothesis formulated, six sub-hypotheses were analyzed. A description of the research sample and research methodology is included in the next section of the paper.

3. Sample selection and methodology

The research sample was selected to provide, on the one hand, the broadest possible view of the issue at hand and, at the same time, by the decision of the authors, its selection is intended to be a certain compromise between the availability of data and the certainty of the findings and conclusions made.

In order to ensure that the diverse local conditions are reflected, the authors decided to study three markets: the US as the best-developed capital market, the German market – taking into account the economic ties between Poland and the Federal Republic of Germany – and the Polish market. Taking into account the objectives of this study and the desire to provide appropriate guidance also to those investing in the indicated markets, it was limited to the study of the largest companies listed on the indicated markets in terms of capitalization. For this purpose, when analyzing the Polish market, the 30 largest companies included in the WIG index were taken into account. Similarly, the analysis of the German market was based on data on the 30 largest companies making up the DAX index, while for the US exchanges – 30 entities from the S&P500 index (as of 30 September 2023).

Since the analysis conducted concerns dividend-paying companies, it became necessary to choose an appropriate criterion to classify a company as a dividend-paying company. Since the study period covered 2017-2022, it was decided to define a dividend-paying company as an entity that has paid dividends for at least five years in the indicated time frame. Thus, the fact of the occurrence of the SARS-CoV2 pandemic, the negative consequences of which could have affected the temporary suspension of dividend payouts, was taken into

account. Finally, 13 companies listed on the Warsaw Stock Exchange, 26 entities listed on the Frankfurt Stock Exchange and 24 entities of the New York Stock Exchange were included in the study. They are presented in Table 2.

Table 2.
Companies qualified for the study

Stock exchange	Companies	Number of companies
Warsaw Stock Exchange	ACP.WA, BDX.WA, SPL.WA, CPS.WA, BHW.WA, ING.WA, LPP.WA, PEO.WA, PKN.WA, ZAP.WA, PZU.WA, ZWC.WA	13
Frankfurt Stock Exchange	ADS.DE, ALV.DE, BAS.DE, BAYN.DE, BEI.DE, BMW.DE, CON.DE, DTG.DE, DB1.DE, DHL.DE, DTE.DE, EOAN.DE, FME.DE, FRE.DE, HEI.DE, HEN.DE, IFX.DE, LIN.DE, MRK.DE, MUV2.DE, PUM.DE, RWE.DE, SAP.DE, SIE.DE, VNA.DE, VOW3.DE	26
New York Stock Exchange	AAPL.US, T.US, BAC.US, CVX.US, CSCO.US, KO.US, CMCSA.US, XOM.US, GE.US, HD.US, INTC.US, JNJ.US, JPM.US, MRK.US, MSFT.US, ORCL.US, PEP.US, PFE.US, PM.US, PG.US, VZ.US, V.US, WMT.US, WFC.US	24

Source: Own study.

In the next step, data on dividends paid (on an annualized basis) were downloaded from investing.com and stooq.com, as well as the levels of the indicated macroeconomic variables. In addition, quotes from Yahoo Finance were used in constructing hypothetical portfolios of stocks.

Conducting a comparative analysis for such a set of variables requires having the volumes to make comparisons. Thus, there is a need to make some normalization of the studied volumes. The comparability of data on dividends paid was ensured by standardizing the level of dividends for individual companies (for companies paying a fixed dividend, a level equal to zero was assumed). A similar procedure was carried out for increments (absolute and relative). On several occasions it was impossible to calculate the percentage change in the level of dividends due to their non-payout in the previous year. Such cases were excluded from further analysis.

When analyzing the dynamics of dividend changes, the researcher is faced with the problem of how to generalize the conclusions made for individual entities to the entire sample. Therefore, as a first step, the distributions of standardized dividend levels were analyzed, and in addition, the average dividend growth rate was estimated (based on untransformed data). For this purpose, the classical geometric average return was used, as well as the estimated average dividend growth rate based on an exponential regression model. In favor of the second solution is the fact that the geometric average return is, in fact, a function only of the initial and final dividend levels, while it completely ignores their formation in the remaining periods. Due to the significant variation in the quantities studied and the presence of extreme observations, the median, rather than the average, was chosen as the appropriate measure of the average change in the level of dividends.

The problem of generalizing the conclusions made can be avoided by analyzing a hypothetical portfolio built from the shares under consideration and rebuilt every year. In order to ensure that the various entities are treated equally, it was decided to build portfolios composed of equal shares of the indicated stocks (according to the price at the first session of the year), and then analyze the dividends attributable to the owners of such a portfolio. This approach also avoids the problem of a company's failure to pay dividends in a given year, as it is practically certain that at least one dividend-paying company included in such a portfolio will pay dividends. However, the problem arises, in this case, of the impact of the volatility of the prices of the stocks studied on the hypothetical dividends calculated in this way, since, in reality, the method indicated leads to an analysis of the dividend yield. Although asset price fluctuations may lead to different conclusions than the analysis of the dividend level itself, it was decided to carry it out in order to make a comparative analysis with the conclusions obtained for dividend levels.

Finally, the relationships between the aforementioned macroeconomic variables: inflation, the level of the PMI index, changes in GDP or the level of interest rates were examined based on methods of correlation analysis. For this purpose, Spearman's rank correlation coefficient and Kendall's tau were used. Since an analysis for individual entities does not seem advisable in view of the few observations available, the available data were considered collectively, excluding the cross-sectional aspect (which was made possible by prior standardization). The results of the analyses are presented in the next section.

4. Analysis of the impact of the timing of the publication of macroeconomic parameters on the level of determination of the change in dividend payouts of companies in the WIG, DAX and S&P500 indices

In the first step, following the previously formulated methodology of the study, the level of dividends for each analyzed entity was standardized. The results in tabular and graphical form are presented below, for each market separately.

Table 3.

Selected statistics characterizing the distribution of standardized dividends paid by companies listed on the WSE, FSE and NYSE in 2017-2022

Stock exchange	Measure	2017	2018	2019	2020	2021	2022
WSE	Mean	-0.01	-0.05	0.11	-0.89	0.10	0.74
	Median	-0.13	0.11	0.29	-0.89	0.12	1.04
	St.dev.	1.01	0.67	0.65	0.87	1.05	0.94
	IQ range	1.39	0.90	1.08	1.25	1.71	1.27
FSE	Mean	-0.71	-0.10	0.16	-0.13	0.02	0.76
	Median	-0.83	-0.07	0.10	0.13	0.33	1.11
	St.dev.	0.88	0.75	0.46	0.93	0.90	1.18
	IQ range	1.39	1.26	0.73	0.90	1.41	1.20

Cont. table 3.

NYSE	Mean	-1.11	-0.55	-0.19	0.23	0.62	1.00
	Median	-1.41	-0.84	-0.25	0.31	0.80	1.36
	St.dev.	0.86	0.57	0.66	0.38	0.74	0.89
	IQ range	0.30	0.46	0.42	0.37	0.16	0.42

Source: own research.

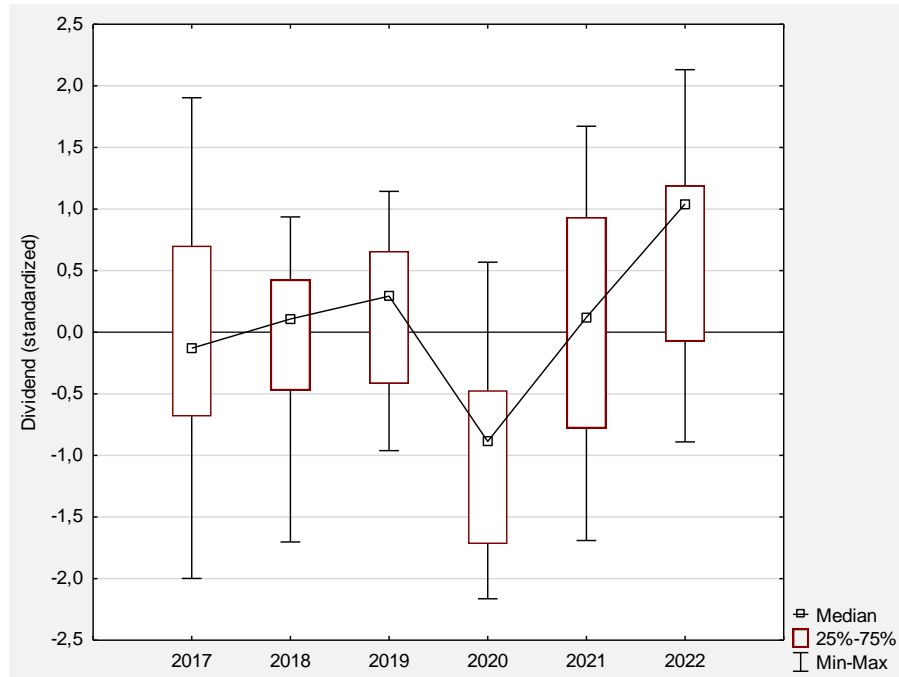


Figure 1. Distribution of standardized dividends paid by the surveyed companies listed on the WSE in 2017-2022.

Source: own research.

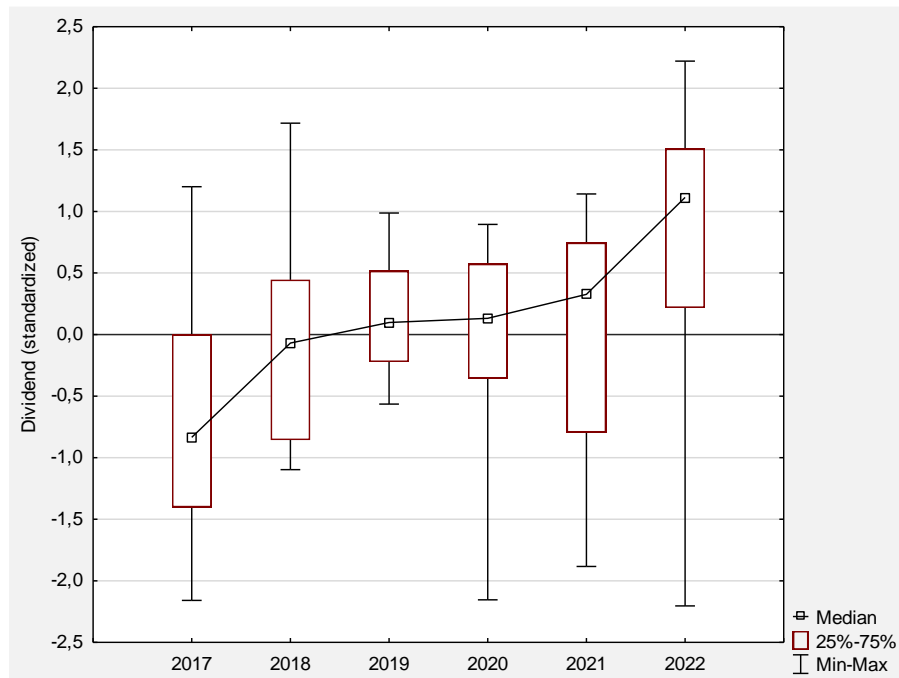


Figure 2. Distribution of standardized dividends paid by the surveyed companies listed on the FSE in 2017-2022

Source: own research.

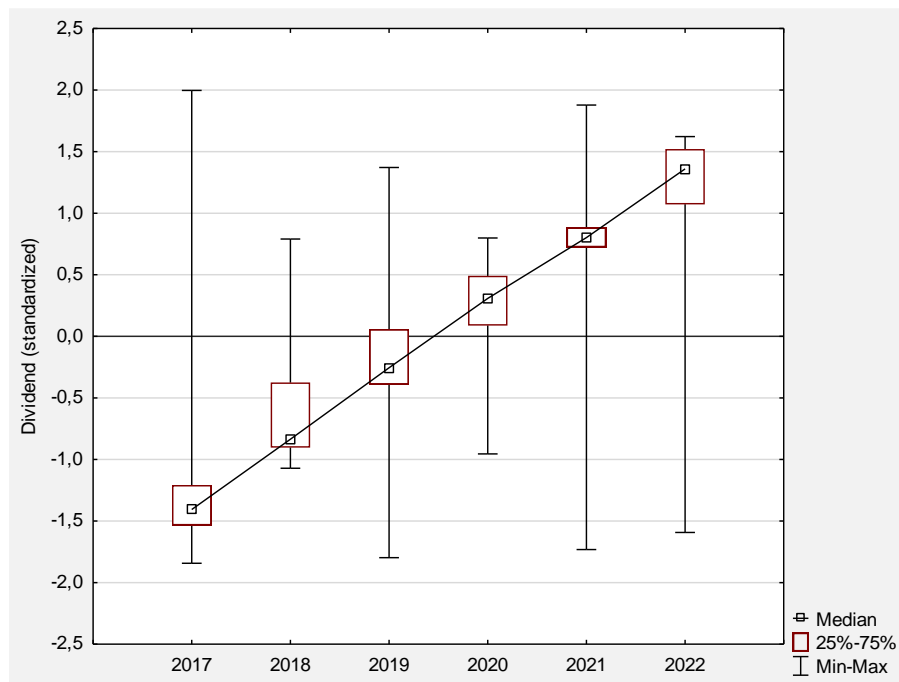


Figure 3. Distribution of standardized dividends paid by the surveyed companies listed on the NYSE in 2017-2022

Source: own research.

For each of the analyzed markets, there is an upward trend in the nominal level of dividends paid, but only in the case of the US market can we talk about the systematic nature of the recorded increases. German companies have decisively reduced the growth rate of payouts in 2019-2020. Polish companies, on the other hand, reacted to the onset of the SARS-CoV-2 pandemic with a sharp decline in dividends paid, which only returned to pre-pandemic levels in 2022. What should be noted is the greater homogeneity of the dividend policy of US companies vis-à-vis Polish and German companies expressed by a decisively lower quartile deviation in subsequent years. At the same time, there was no clear change with regard to the variation in the level of dividends over time, with the possible exception of a slight decline in the pre-pandemic period. In the next step, the level of dividends in real terms was analyzed (the consumer price index was chosen as the deflator).

Table 4.

Selected statistics characterizing the distribution of standardized actual dividends paid by companies listed on the WSE, FSE and NYSE in 2017-2022

Stock exchange	Measure	2017	2018	2019	2020	2021	2022
WSE	Mean	0.24	0.17	0.25	-0.83	0.01	0.17
	Median	0.39	0.32	0.50	-0.90	0.04	0.63
	St.dev.	1.08	0.71	0.72	0.90	1.07	1.00
	IQ range	1.57	0.63	1.22	1.25	1.74	1.27
FSE	Mean	-0.55	-0.00	0.28	0.01	0.02	0.24
	Median	-0.70	0.29	0.25	0.30	0.24	0.60
	St.dev.	0.89	0.82	0.50	1.07	0.99	1.23
	IQ range	1.63	1.31	0.76	1.21	1.43	1.70

Cont. table 4.

NYSE	Mean	-0.85	-0.35	-0.01	0.66	0.60	-0.05
	Median	-1.24	-0.38	0.11	0.73	0.82	0.59
	St.dev.	0.99	0.67	0.78	0.61	0.82	1.14
	IQ range	0.92	1.12	0.65	0.53	0.72	1.77

Source: own research.

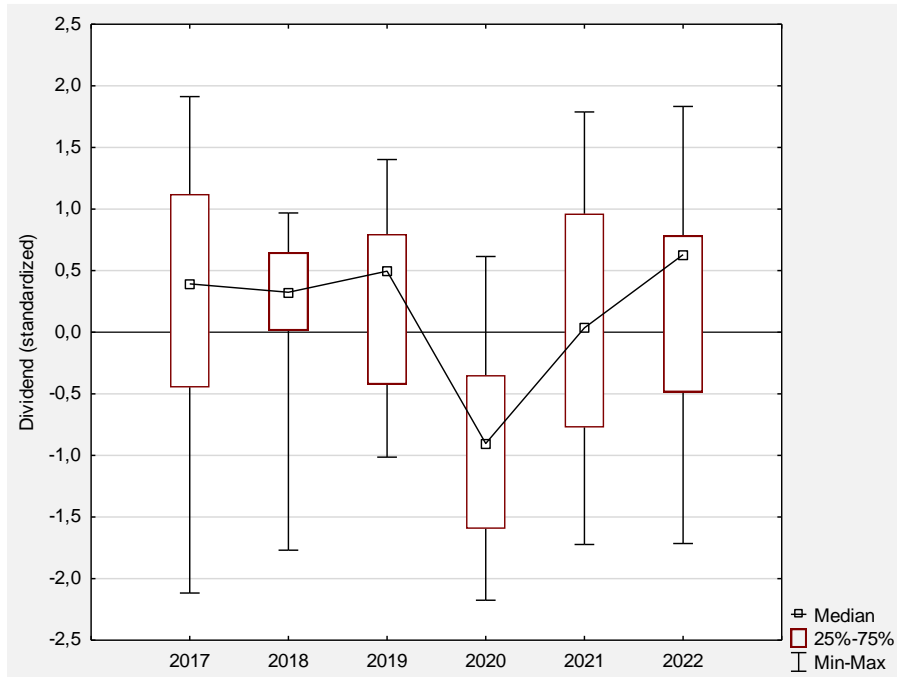


Figure 4. Distribution of standardized actual dividends paid by the surveyed companies listed on the WSE in 2017-2022.

Source: own research.

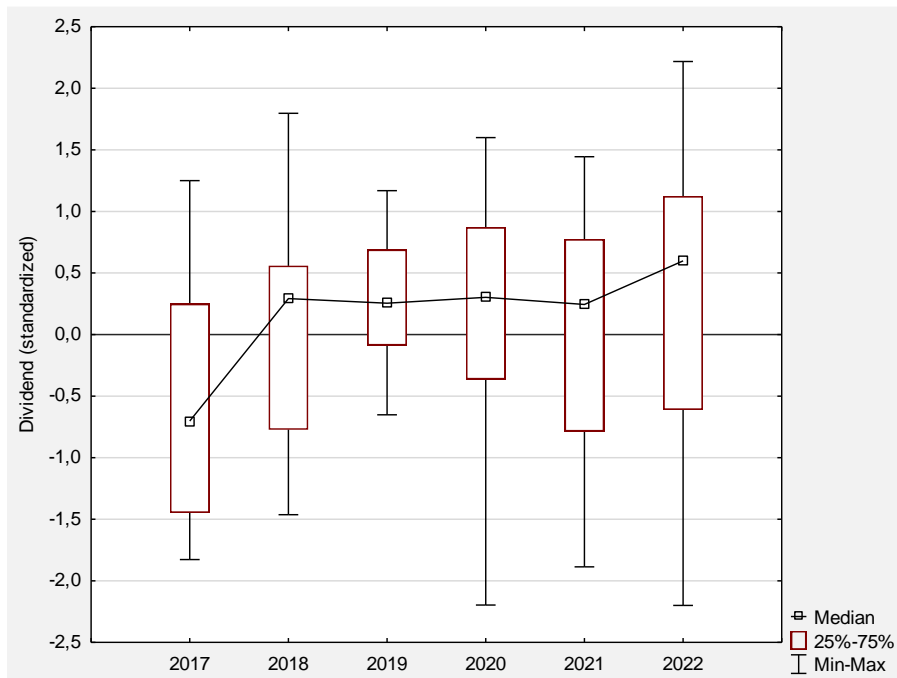


Figure 5. Distribution of standardized actual dividends paid by the surveyed companies listed on the FSE in 2017-2022.

Source: own research.

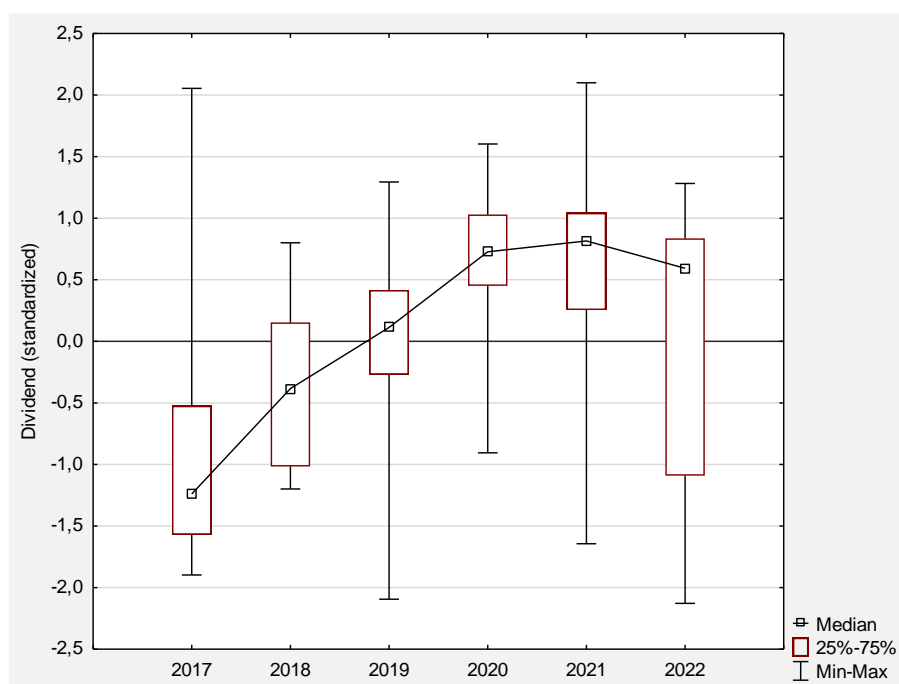


Figure 6. Distribution of standardized actual dividends paid by the surveyed companies listed on the NYSE in 2017-2022.

Source: own research.

Analysis of the level of dividends paid in real terms leads to slightly different conclusions. For companies listed on the WSE, it can be noted that, during the period under study, they maintained a similar level in real terms, with the exception of 2020 (the likely effect of the SARS-CoV-2 epidemic). Companies listed on the Frankfurt Stock Exchange showed an upward trend in the level of real dividends in 2017 and 2022, while in the remaining years dividends remained stable (this was not changed by the pandemic either). In contrast, a different picture is obtained by analyzing US companies: the value of dividends in real terms rose steadily until 2021, when the upward dynamics slowed down, and turned into a downward trend in 2022. The conclusions formulated previously are confirmed by the data describing the growth rate of dividends and the dividend yield during the period under study obtained by means of the regression function (Table 5).

Table 5.

Selected statistics characterizing the growth rate of dividends paid by companies listed on the WSE, FSE and NYSE in 2017-2022

Variable	Measure	Type	WSE	FSE	NYSE
Dividend level growth	Average	Nominal	6.14%	3.05%	4.46%
	Median	Nominal	4.98%	2.99%	5.68%
	St.dev.	Nominal	29.44%	14.08%	9.29%
	Average	Real	1.36%	0.56%	1.25%
	Median	Real	0.04%	0.51%	2.44%
	St.dev.	Real	28.09%	13.76%	9.00%
Portfolio dividend yield growth	Average	Nominal	4.79%	-0.18%	-1.78%
	Average	Real	0.26%	-2.58%	-4.80%

Source: own research.

The next step analyzed the fluctuations in the level of dividends of the annually reconstructed portfolio built in equal value shares from the stocks under study, i.e. actual development of the average dividend yield for the instruments indicated.

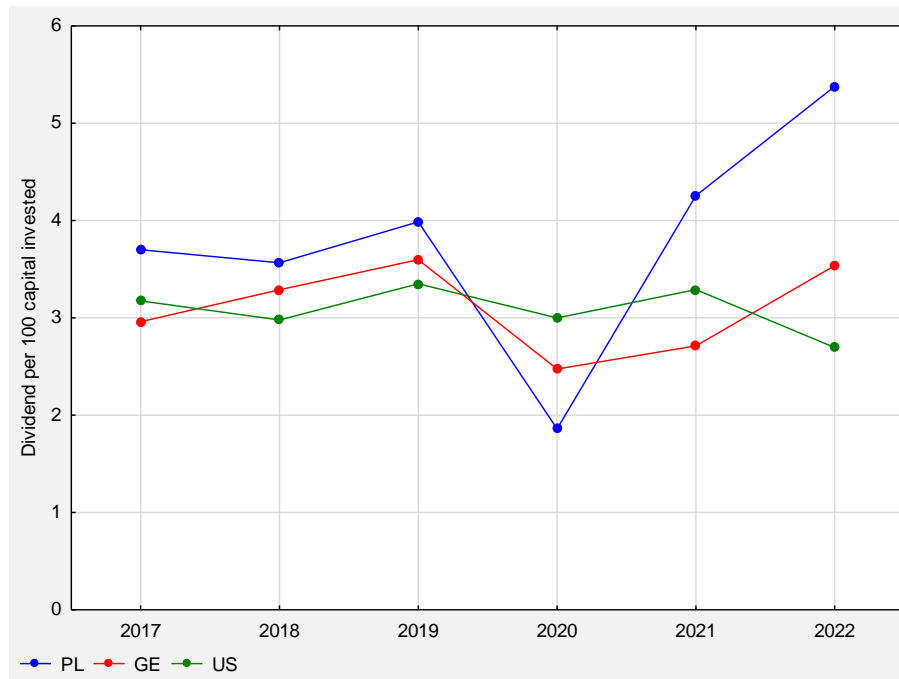


Figure 7. Average dividend yield of surveyed companies in 2017-2022.

Source: own research.

The dividend yield for the hypothetical portfolio of stocks followed a similar pattern to dividends alone only for the Polish stocks analyzed. The dividend yield of companies listed on the NYSE was relatively stable, while for instruments listed on the FSE it is noticeable that it declined during the SARS-CoV-2 pandemic and later returned to pre-pandemic levels. Thus, having analyzed the fluctuations in both the dividends themselves and the dividend yield, it can be indicated that the strongest reaction in the area of dividend policy to the SARS-CoV-2 pandemic was shown by managers of Polish companies, significantly reducing their payouts and increasing the level of retained earnings for fear of potentially adverse further changes in the general economic situation. This is also evidenced by an analysis of the decisions of the indicated entities to either increase or decrease dividends paid.

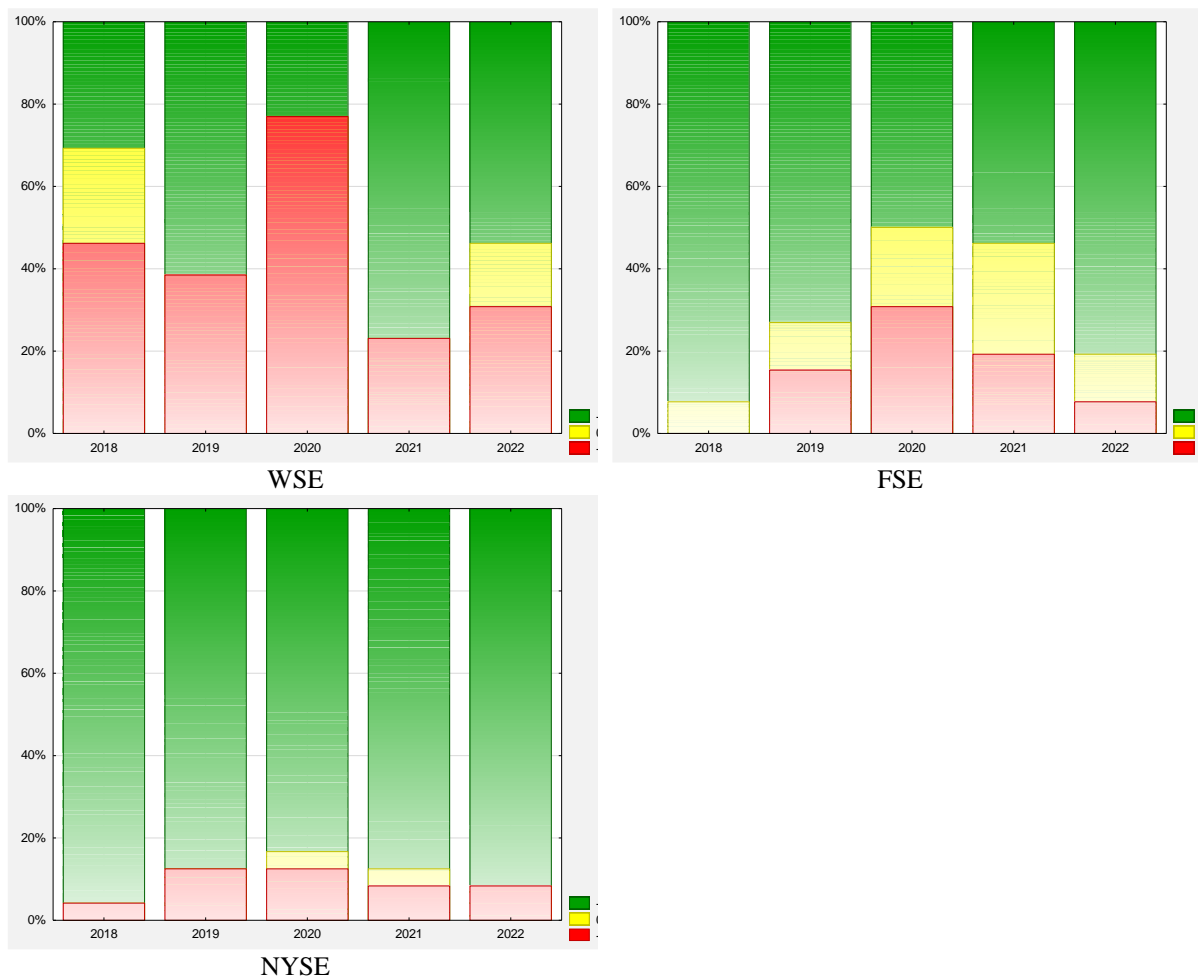


Figure 8. Decisions regarding dividends paid in the study sample in 2017-2022.

Source: own research.

It is further evident that the dividend policy of the largest US companies paying dividends is markedly different from that of Polish companies, although the decisions made during the SARS-CoV-2 pandemic were similar – in each of the analyzed markets, a greater number of companies reduced dividend payouts. In the case of the US, the difference is several times smaller than the Polish one (and is not necessarily related to the pandemic, as US companies began to limit payouts as early as 2019). Closer to the reactions of Polish entities were the decisions of German companies, although a significant disparity is also observable. It is worth noting that, regardless of economic conditions, about 90% of the surveyed companies listed on the NYSE increased the level of dividends paid. For both German and US entities, however, the impact of the increased inflation of 2021-2022 is evident, as despite the nominal increase in both countries there was a dramatic increase in companies paying dividends with a declining real value.

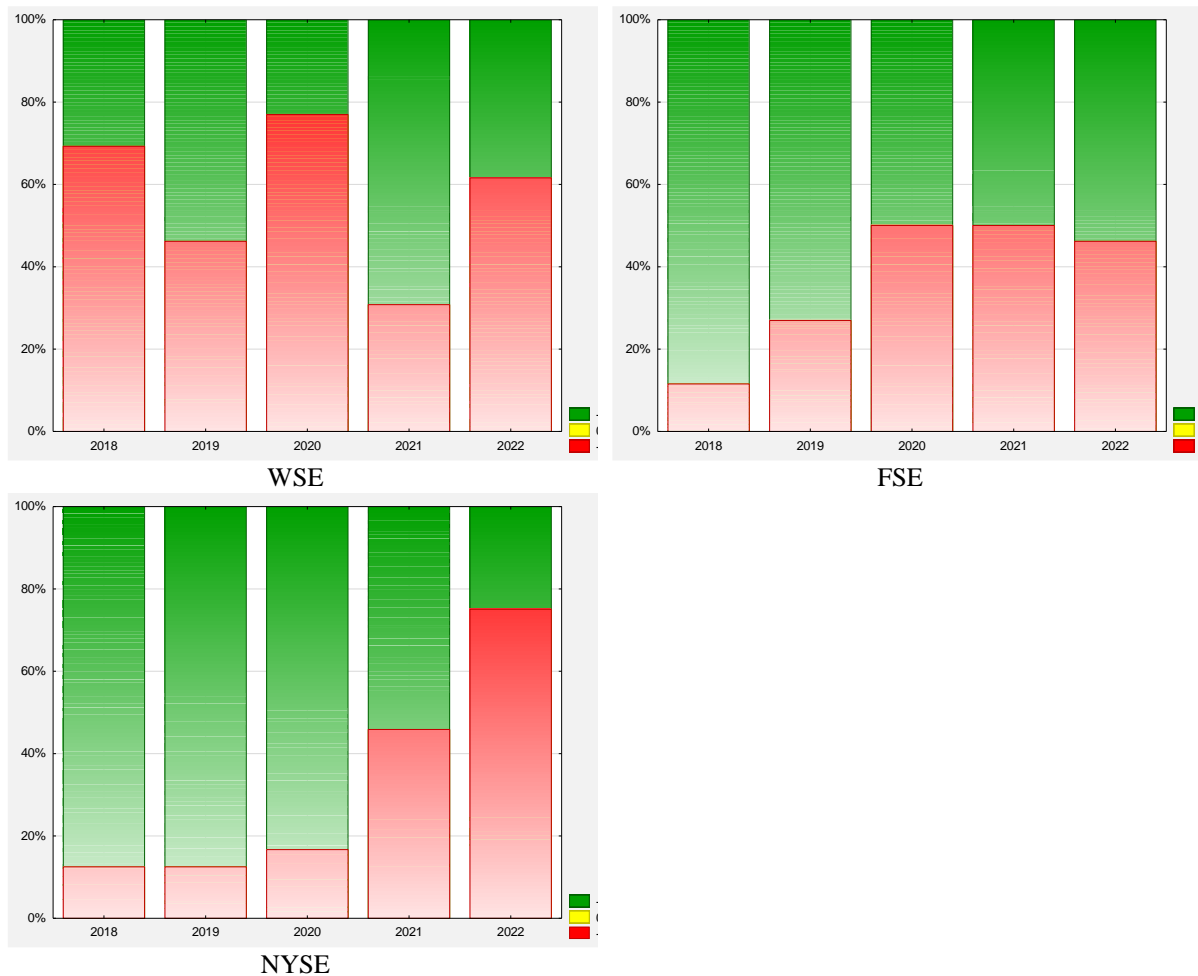


Figure 9. Decisions regarding dividends paid in real terms in the study sample in 2017-2022.

Source: own research.

In the next step, the impact of changes in selected macroeconomic quantities on the development of the level of dividends paid, their changes in absolute and relative terms was analyzed (Table 5 presents the results based on Spearman's rank correlation coefficient. Due to the convergence of conclusions, Kendall's tau values were not presented separately).

Table 6.

Spearman's rank correlation coefficient between selected macroeconomic variables (data as of the end of last December) and dividends and their absolute and relative changes for companies listed on the WSE, FSE and NYSE in 2017-2022

Stock exchange	Macro variable	DIV	Δ DIV	% Δ DIV
WSE	GDP	- 0.016	- 0.096	0.027
	PMI	- 0.183	- 0.234*	- 0.083
	Inflation	0.004	- 0.022	0.001
	Interest rates	- 0.016	- 0.096	0.027
FSE	GDP	0.093	0.087	0.103
	PMI	0.091	0.133	0.179**
	Inflation	- 0.024	- 0.036	- 0.094
	Interest rates	0.137	0.089	0.124

Cont. table 6.

NYSE	GDP	- 0.001	0.147	0.149
	PMI	0.040	- 0.212**	- 0.211**
	Inflation	0.063	- 0.216**	- 0.212**
	Interest rates	- 0.015	0.250***	0.269***

* - statistically significant at the 0.1 level; ** - statistically significant at the 0.05 level; *** - statistically significant at the 0.01 level

Source: own research.

Table 7.

Spearman's rank correlation coefficient between selected macroeconomic variables (data as of the end of May this year) and dividends and their absolute and relative changes for companies listed on the WSE, FSE and NYSE in 2017-2022

Stock exchange	Macro variable	DIV	ΔDIV	%ΔDIV
WSE	GDP	0.030	- 0.051	0.051
	PMI	- 0.138	0.061	- 0.055
	Inflation	- 0.025	- 0.111	- 0.032
	Interest rates	- 0.070	- 0.076	0.005
FSE	GDP	0.030	0.019	0.035
	PMI	0.026	- 0.109	- 0.100
	Inflation	- 0.024	- 0.036	- 0.094
	Interest rates	0.022	0.019	- 0.027
NYSE	GDP	0.028	0.038	0.048
	PMI	0.053	- 0.277***	- 0.271***
	Inflation	0.040	- 0.212**	- 0.211**
	Interest rates	0.015	- 0.023	- 0.001

* - statistically significant at the 0.1 level; ** - statistically significant at the 0.05 level; *** - statistically significant at the 0.01 level.

Source: own research.

Among the analyzed relationships, only the relationships between changes in the level of dividends (both in amount and percentage) and selected macroeconomic variables under study can be considered statistically significant. Absolute changes in the level of dividends showed a negative correlation with changes in the PMI index (macroeconomic data at the end of December, for Poland), while a positive correlation for German stocks (macroeconomic data at the end of December). For the macroeconomic data readings at the end of May of the relevant year, such correlations were not observed.

Table 8.

Decision to reject or not to reject research hypotheses for companies listed on the WSE, FSE and NYSE

Stock exchange	WSE	FSE	NYSE
H ₁	rejected (0)	rejected (0)	rejected (0)
H ₂	rejected (-)	not rejected	rejected (-)
H ₃	rejected (0)	rejected (0)	not rejected
H ₄	rejected (0)	rejected (0)	rejected (+)

Source: own research.

At the same time, the amount, as well as the percentage change in the level of dividends paid shows a statistically significant negative correlation with the PMI index for stocks listed on the NYSE, both for readings at the end of December and the end of May. At the same time,

analyzing the data at the end of December, one can see a positive correlation between interest rates and relative and absolute changes in the level of dividends paid by US companies. A discussion of the results obtained is presented in the next section.

5. Discussion and conclusions

The results obtained do not confirm the previous conclusions with regard to Polish companies or other countries analyzed so far. For companies listed on the WSE, the only relevant factor turned out to be the level of the PMI index in December of the year preceding the year of the dividend payout and, surprisingly, its impact turned out to be negative. Thus, it is possible that the improvement in the economy resulted in the company undertaking additional investments, which then translated into a decision to increase retained earnings and, as a result, lower the assumed growth of dividends paid (since it should be noted that the aforementioned measure is not correlated with the level of dividends, but their growth). The rationale for the existence of a time lag (since the May level of the PMI is not correlated with changes or the level of dividends paid) is the presumably long period of decision-making on additional investments by companies.

The opposite direction of correlation is seen for German companies. Increased December PMI readings are accompanied by decisions to increase dividends paid above average. At the same time, there is a lack of any correlation for the May readings. It is possible that German companies, anticipating an improvement in the economy, and having excessive reserves of previously accumulated capital, decide to partially transfer it to stockholders.

The correlations observed for US companies should be considered the strongest documented. Both absolute and percentage changes in dividends paid are significantly correlated with the PMI and inflation rate observed at the end of December and May. The conclusions obtained for changes in the price level have been previously confirmed in the literature (Khan, Ullah, Muhammad, Muhammad, 2019; Yakuba, 2019; Hazlitt, 2007; Skousen, 2011). It is worth noting, however, that in this study they refer not so much to the level of dividends as to their growth. The results obtained are somewhat natural, since a rising inflation rate accelerates the erosion of the value of retained earnings, prompting boards to slow the growth of dividends paid. The relationship between changes in dividends paid and the PMI is analogous to that of Polish companies, and a plausible explanation for this may be analogous, with the change that NYSE-listed companies show an equally strong negative correlation also for readings in May of a given year. This may indicate the greater importance placed by company boards on the latest macroeconomic data. At the same time, contrary to the results (Khan, Ullah, Muhammad, Muhammad, 2019; Akani, Swenem, 2017; Muhammad, Khan, 2018), the relationship turns out to be positive. This phenomenon can be explained by referring

to the expected reaction of the financial market to increases in interest rates, which generally leads to a decline in current prices. It seems possible that there is a desire to compensate for capital losses incurred due to rising interest rates with above-average dividend payouts. Nevertheless, the described mechanisms require further research.

Summarizing the research results obtained, it is necessary to emphasize the differences between the markets with regard to the relationship between dividend payments and macroeconomic variables – in particular, between the US market and European companies, as well as the similarities between the Polish and German markets. However, the indicated similarities in terms of dependence on macroeconomic quantities do not translate into similar dividend policies – entities listed on the WSE decide to increase dividends less often than those listed on the FSE or NYSE, and it can be presumed that they make dividend decisions dependent on current events (e.g. the SARS-CoV-2 pandemic). At the same time, it should be emphasized that the analysis carried out concerns only the largest entities, being also geographically limited. The authors hope to expand the subject and geographic scope of their study with a special focus on companies listed on other European stock exchanges. This issue will be the subject of their subsequent research.

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