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DETERMINANTS OF DIVIDEND POLICY – EVIDENCE FROM POLISH LISTED ENERGY COMPANIES

ABSTRACT

Purpose: Considering the significance of energy sector companies and the importance of corporate's payout policy, the aim of the study is to examine the dividend policy of companies operating in the energy sector. We focus on the energy companies listed on the Warsaw Stock Exchange over the period 2010–2019.

Methodology/approach: We test the relationship between dividend values and the firm's financial performance and other firm's characteristics (firm's size, the state Treasury's ownership and diversity in the sub-sectors) employing pooled regression functions of the dividend payouts. We study the decade prior to the COVID-19 pandemic. The empirical data were collected from EMIS and Notoria Serwis data bases.

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Findings: The study results show that the determinants of the dividend value are the size of a company and its efficiency measured by the VSMD ratio – the bigger company and the more efficient, the higher dividend paid. However, the findings indicate that the energy companies listed on the Warsaw Stock Exchange do not follow a consistent dividend policy.

Originality/value: The originality of the study lies in the fact that to measure firms' financial performance we use a multidimensional vector synthetic measure of their financial efficiency (VSMD). We employ for that a set of financial ratios which are typically used for describing corporate finance management.

Keywords: companies, energy sector companies, dividend, dividend policy, Warsaw Stock Exchange

1. INTRODUCTION

Dividend decisions rank among the most difficult due to the fact that numerous interest groups value them in addition to the corporation itself. There has been a continuous discourse on its importance since the studies conducted by Gordon (1959), Lintner (1956), Modigliani and Miller (1961). Researchers all over the world have been trying to explain the dividend policy decisions and the relationship between a firm's characteristics and dividend payments.

The energy sector is crucial for global economic growth. Energy sector companies play a central role in infrastructure development, impacting environmental sustainability, national security, and geopolitical dynamics. Overall, the energy sector is a linchpin of modern civilization, influencing various facets of society, the economy, and the environment.

Considering the significance of the energy sector companies and the importance of the dividend policy, the aim of the study is to examine the dividend policy of the energy companies. We focus on the energy companies listed on the Warsaw Stock Exchange. We test the relationship between dividend values and the firm's financial performance and other firm's characteristics (firm's size, the State Treasury's ownership of the companies, and diversity in the sub-sectors) employing pooled regression models.

We formulate the following research questions:

- What is the dividend payout policy of energy companies?
- What is the relationship between the financial efficiency, size and ownership of companies and their dividend policy?

The novelty of the study lies in the fact that to measure firms' financial performance, we construct and calculate multidimensional vector synthetic measures of their financial efficiency (VSMD) in each year of the study (Kompa et al., 2023). We employ for that a set of financial ratios that are typically used for describing corporate finance management (Kompa & Witkowska, 2021; 2022).

The research covers energy sector companies listed on the Warsaw Stock Exchange over the period 2010–2019. However, only those companies were selected that were listed throughout the study period and had a full record of distinguished financial indicators. Finally, nine energy sector companies were qualified based on 14 financial indicators.

The paper is presented as follows: after an introduction presenting the aim and scope of the paper, the second section contains the literature review, while the third section is devoted to the methodology and description of the data. The next section discusses the empirical findings. The final section provides concluding remarks.

2. LITERATURE REVIEW

Dividend payments to shareholders are benefitial on the one hand, but on the other, they represent a real cost for the business, decreasing internal funding. As a result, managers might be tempted to keep the profit and use it toward further investments. This mechanism could have a variety of consequences depending on the sector, the level of financial market development, and the theoretical concerns raised. The dividend policy is the outcome of several shareholder preferences and is based on the company's present and future financial circumstances as well as economic priorities (Sierpińska, 2022; Kaźmierska-Jóźwiak, 2019). In the literature, there are various internal and external factors discussed that may be relevant to dividend policy. Profitability is indicated as one of the most important factors determining dividend policy decisions. According to the signalling hypothesis, profitable companies strive to pay dividends, thus giving the market a positive signal about the health of the company (Jensen, Solberg & Zorn, 1992; Aivazian, Booth & Cleary, 2003).

Rajan and Zingales (1995) claim that large companies are more diversified, due to which they have less risk of bankruptcy. They have easier access to capital markets and therefore find it easier to raise capital to cover any liquidity shortfalls, and, consequently, as the size of the company increases, the chance of paying dividends increases. Size frequently serves as a reliable indicator of dividend payout, potentially indicating an influence from the lifecycle of a company (Ho, 2003; Aivazian et al., 2003, Denis & Osobov, 2008; Leary & Michaely, 2011; Jabbouri, 2016; Driver, Grosman & Scaramozzino, 2020).

High leverage raises the firm's risk and transaction costs, according to Rozeff (1982). Firms that use external finance incur large fixed payments due to their high leverage ratio (Kaźmierska-Jóźwiak, 2015). Leverage can be seen as a substitute for the extra cost of getting funds; however, it is open to different interpretations, like its role in agency matters or just as a general control factor (Driver, Grosman & Scaramozzino, 2020). Leverage is negatively correlated with dividends (Jabbouri, 2016; Al-Najjar & Kilincarslan, 2016).

Grullon et al. (2002) claim that increases in dividends are associated with subsequent decreases in risk and profitability and that the initial market response to the dividend increase is closely linked with the decline in risk. Aivazian et al. (2003) argue that the greater the uncertainty of the company's future earnings, the greater the risk and inability to pay dividends. We assume a negative relationship between risk and dividend payouts.

Dividend decisions might be influenced by a firm's liquidity as well. Firms with higher cash availability are more likely to pay dividends than firms with insufficient level of cash. Ho (2003) confirmed that dividend policies in Australia and Japan are positively affected by liquidity; a similar relationship was confirmed by Kaźmierska-Jóźwiak (2015) for Poland.

Another issue is the shareholder structure and its influence on the corporate's dividend decisions. Cross-country analyses provide evidence on the relationship between dividend policy and governance structures. These analyses demonstrate that the institutional and legal frameworks of firms influence their dividend policies (Adjaoud & Ben-Amar, 2010).

Studies examining the relationships between different shareholder categories and dividend policy tackle the problem of government ownership's influence (Aluchna, Berent & Kamiński, 2019). Cash dividends and state ownership have a positive relationship (Lin, Chiou & Chen, 2010). Studies conducted on the Polish market show a similar relationship (Sierpińska-Sawicz, 2014). This relationship can be explained by the agency theory: the state is interested in maintaining its control over companies due to the cash flows (Bradford, Chen & Zhu 2013; Aluchna et al., 2019). Nonetheless, most research indicates a negative relationship between dividend payments and state ownership (Al-Najjar & Kilincarslan, 2016; Ben-Nasr, 2015). The largest, primarily state-controlled enterprises in Poland have ineffective management boards (Aluchna et al., 2019).

Aluchna, Berent, and Kamiński (2019), based on the panel model results covering 3,297 observations on 516 nonfinancial companies listed on the Warsaw Stock Exchange in the years 2005–2014, state that higher state owenrship is associated with lower dividend payouts, so they confirm a negative relationship between the state's stake and dividend payments. The same relationship was observed in initial research on the Polish stock market conducted by Sierpińska-Sawicz (2014).

Sierpińska (2022) examined the dividend policy of energy sector companies listed on the Warsaw Stock Exchange over the period 2010–2018. She states that the energy sector companies do not pursue a stable dividend policy, impacting their valuation indices such as P/BV and P/E. The author claims that the companies within the sector have varying financing capacities and debt levels, influencing their ability to allocate net profits as dividends.

Dividend policy remains a subject of continued investigation worldwide, and the group of factors that can influence both, the decision to pay a dividend and the value of the dividend payout continues to expand. New studies are undertaken, taking into account new potential determinants of dividend payouts (Jarboui, 2017; Ellili, 2022; Ben Salah & Jarboui, 2022). The "dividend puzzle", described by Black (1976) over three decades ago, remains an important yet unsolved enigma in corporate finance.

3. DATA AND METHODOLOGY

We examine the dividend policy of the energy companies listed on the Warsaw Stock Exchange as well as the determinants of the dividend payouts. For this, we estimate the pooled regression functions of the dividend payouts (total dividend paid, dividend per share) according to the financial efficiency of companies using a vector synthetic measure of the financial performance of the company (VSMD), their assets, WIG subsector index membership, and the ownership structure. The pooled regression function is defined as follows:

$$y_{it+1} = \alpha_0 + \sum_{k=1}^{K} \alpha_k x_{it}^k$$
(1)

Where the dependent variable y_{it} is either the value of the dividend paid in the year (t+1) from the profits obtained in the previous period or the dividend per share paid in the year (t+1); explanatory variables represent the financial efficiency of companies, their assets, ownership of the company, and its belongingness to certain economic sectors:

- VSMD the vector synthetic financial performance measure VSMD_{it} or *Deviation* which is the deviation of VSMD_{it} evaluated for the energy companies from the median of VSMD_{it} calculated for all non-financial firms for each year;
- LnAssets natural logarithm of total assets;
- Treasury a binary variable equals 1 for companies owned by the State Treasury and equals 0 otherwise (i.e., for Bogdanka, Polenergia and Kogeneracja), *Treasury Share* a variable describing the share of capital that belongs to the State Treasury, and *Treasury** that equals 1 for State Treasury companies, 0.5 for Bogdanka and Kogeneracja, whose capital partly belongs to State Treasury companies, and 0 for Polenergia;
- Sector F and Sector E variables describing the belongingness of the subsectors oil and gas, and energy, respectively.

We study the decade prior to the COVID-19 pandemic, employing data from the Notoria Serwis and EMIS database resources. We use VSMD to assess the company in a multi-dimensional space of diagnostic variables (i.e., financial ratios). To construct such a measure for all considered companies and years of investigation, we selected 14 variables based on the literature (current ratio, quick ratio, debt ratio, return on assets, return on equity, return on sales, operating profit margin, days inventory outstanding, days sales outstanding, days payable outstanding, asset turnover ratio, earnings yield, book to market ratio, EBITDA/assets). The methodology for VSMD calculation is based on Vector Measure Construction Method techniques proposed by Nermend (2017) and applied by Kompa and Witkowska (2021).¹

The study covers the energy companies listed on the Warsaw Stock Exchange that belong to the WSE sub-sectors:

- energy PGE, Enea, Kogeneracja, Polenergia, Tauron;
- coal mining Bogdanka;
- oil and gas Orlen, Lotos, PGNiG.

Considered companies also differ in size: Lotos, Orlen, PGE, PGNiG, and Tauron are included in the WIG20 index; Enea and Bogdanka are included in the mWIG40 index; and Kogeneracja and Polenergia are included in the sWIG80 index.

It is important to note that all analyzed energy companies, with the exception of Polenergia, are either State Treasury companies, i.e., the State Treasury is the largest investor, or State Treasury firms' subsidiaries (see Table 1).

¹ Application of differently constructed (in terms of methodology and diagnostic variables) multidimensional synthetic measures for assessing companies' performance is used in variety of research, for instance, Piotroski (2000), Tarczyński and Tarczyńska-Łuniewska (2018), Kompa and Witkowska (2022), and Kompa et al. (2023).

Company	Bogdanka	Enea	Kogeneracja	Orlen	PGE	Polenergia	Tauron
1st share- holder	Enea	State Treasury	PGE	State Treasury	State Treasury	Kulczyk SA	State Treasury
Votes (%)	64.9	52.3	58.1	49.9	60.9	42.8	30.06

Table 1 Shareholder structure of the companies – 1st shareholder

Note: Lotos and PGNiG were also State Treasury companies and were acquired by Orlen in 2022.

Source: own elaboration.

4. EMPIRICAL RESULTS AND DISCUSSION

We estimated over a hundred models (1) for different representations of dividend policy and other variables using a sample containing 90 observations. The most representative results are presented in Tables 2–3. It is evident that models encompassing all groups of variables (i.e., assets, VSMD, ownership, and subsector belonging) explain changes in the dividend values by 43%–45%, although not all explanatory variables are statistically significant. Models with a reduced number of variables (to a minimum of 3 variables) demonstrate lower accuracy (R² equals 0.39). It is also noteworthy that, regardless of the sample used for estimation, dividend per share is captured by the models at 10% or 15% (models 4 and 12), even when the explanatory variables are statistically significant.

Table 2

Variables	parameter	t–stat	parameter	t–stat	parameter	t–stat
Dependent variable	Model 1 Total dividend		Model 2 Total dividend		Model 3 Total dividend	
LnAssets	292,153.92	2.66***				
Sector F	508,339.99	2.18**	224,692.31	1.05		
Sector E	263,142.20	1.25	-65,335.09	-0.37	-216,875.36	-2.15**
Treasury	-291,953.43	-0.80	613,605.11	4.55***	692,998.11	6.20***
Deviation	457,915.08	5.78***	486,719.56	5.99***	473,563.46	5.89***
const.	-453,9157.91	-2.73***	-135,126.13	-0.91	-28,265.53	-0.26
R2	0.44		0.40		0.39	
Degrees of freedom	84		85		86	

Models estimated for years 2010–2019

Variables	parameter	t–stat	parameter	t–stat	parameter	t–stat
Dependent variable	Model 4 Dividend per share		Model 5 Total dividend		Model 6 Total dividend	
LnAssets			223,125.06	2.51 ***		
Sector F			255,928.03	2.15 **		
Sector E	-0.75	-2.37 ***			-215,381.33	-2.13 **
Treasury	-0.87	-2.50 ***	-16,029.80	-0.06	690,383.85	6.18 ***
VSMD	0.36	1.46	465,041.51	5.95 ***	468,669.07	5.88 ***
const.	1.87	5.54 ***	-3,821,620.45	-3.00 ***	-477,147.94	-3.34 ***
R2	0.15		0.44		0.39	
Degrees of freedom	86.		85.00		86.00	

Table 2 (continued)

Note: *, **, *** denote significance level $\alpha = 0.1, 0.05$ and 0.01 at which null hypotheses about zero value of the parameter may be rejected.

Source: own elaboration.

Two variables, namely the logarithm of assets and a measure of financial performance (VSMD or Deviation from VSMD), consistently exhibit a significant positive impact on total dividend payouts or dividend per share, at least at the 0.05 significance level. These findings are consistent with prior research indicating that a company's size is a significant factor in determining dividend policy (Kowalewski et al., 2007; Jaara et al., 2018; Nyere & Wesson, 2019; Kowerski & Kaźmierska-Jóźwiak, 2022). The results also support the idea that dividend payouts are influenced by a firm's financial efficiency in a given year (Kowerski, 2013).

Table 3

Variables	parameter	t–stat	parameter	t–stat	parameter	t–stat
Dependent variable	Model 7 Total dividend		Model 8 Total dividend		Model 9 Total dividend	
LnAssets					245,595.1	4.25***
Sector F	388,511.03	1.71***			276,173.8	2.25**
Sector E	80,012.25	0.44	-169,744.95	-1.56		
Treasury Share	7,273.53	3.00***	9,596.24	4.72***	-1,934.3	-0.63

Models estimated for years 2010–2019

Variables	parameter	t–stat	parameter	t–stat	parameter	t–stat
VSMD	385,030.14	4.62***	339,441.67	4.25***	477,013.0	6.06***
const.	-461,332.00	-2.41***	-222,101.30	-1.67***	-4152,497.7	-4.66***
R2	0.32		0.30		0.44	
Degrees of freedom	85.00		86.00		85.00	
Dependent variable	Model 10 Total dividend		Model 11 Total dividend		Model 12 Dividend per share	
Sector F	473,771.82	2.46***				
Sector E	158,012.86	0.97	-153,185.45	-1.44	-0.7532	-2.27**
Treasury*	714,925.71	4.28***	863,073.41	5.38***	-0.3816	-0.76
Deviation	477,722.88	5.86***	430,483.78	5.28***	0.5405	2.12**
const.	-947,488.43	-4.45***	-684,015.95	-3.61***	1.0585	1.79**
R2	0.39		0.34		0.10	
Degrees of freedom	85.00		86.00		86.00	

Table 3 (continued)

Note: *, **, **** denote significance level $\alpha = 0.1, 0.05$ and 0.01 at which null hypotheses about zero value of the parameter may be rejected.

Source: own elaboration.

Variables describing the State Treasury ownership become statistically significant in models that do not include a variable describing the company's size (*LnAssets*). *Probably due to the fact that State Treasury companies have significantly larger assets than other companies* (size effect). The study findings confirm that being a State Treasury company had a significantly positive impact on total dividend value. These results are consistent with the findings of other studies claiming that state-controlled companies pay higher dividends (Kowerski, 2014 and 2015; Bradford et al., 2013; Kien & Chen, 2020). However, one may notice that if dividend per share (model 4) is considered, the value of payouts is significantly smaller than in other companies.

According to several studies, cash dividend policy may be influenced by the tunneling motive of controlling owners, particularly by the state (Chen et al., 2009; Bian, Kuo, Pan & Zhang, 2022); however, this aspect should be examined in more detail. Study findings show that the energy companies listed on the WSE do not implement a stable dividend policy. This result is in line with Sierpińska (2022), who claims the that lack of a stable dividend policy in these companies may be one of the factors of their undervaluation on the stock exchange.

Variables describing subsectors show that companies belonging to the oil and gas subsector pay higher dividends than the ones belonging to the energy sector (or to the mining sector). Because the parameter standing by variable Sector F is significantly positive (in the models 1, 5, 7, 9, and 10), whereas the one standing by Sector E is significantly negative (in the models 3, 4, 6, and 12).

5. CONCLUSIONS

The results of the study indicate that the WSE listed energy companies do not follow a consistent dividend policy. It is worth notinig that in the pre-COVID-19 decade, all of the investigated energy companies distributed dividends, although only PGE and PGNiG did so on an annual basis. Due to the pandemic, the dividends paid in 2020 were much lower than those distributed in previous years.

The study results show that the determinants of the dividend value are the size of a company and the synthetic measure of financial performance (VSMD). Therefore, we can claim that the bigger the energy company and the more efficient it is, the higher the dividend paid. These findings are in line with prior studies (Jaara et al., 2018; Kowalewski et al., 2007; Kowerski, 2014; Nyere & Wesson, 2019; Kowerski & Kaźmierska-Jóźwiak, 2022).

The presented findings also confirmed the results of other studies (Kowerski, 2014; 2015; Bradford et al., 2013; Kien & Chen, 2020) that the state Treasury ownership has a significantly positive impact on dividend value, which was also in line with our experience and intuition. Consequently, the larger the State Treasury's ownership, the higher the dividend. However, the findings contradict the results presented by Aluchna et al. (2019) and Sierpińska-Sawicz (2014). This may be due to the fact that we only focused on energy companies. We found no evidence to support the claim that the state tunneling motivations have influenced the energy companies' dividend policies. More research has to be done on this topic.

Additionally, the estimated parameter shows that companies belonging to the oil and gas subsector pay higher dividends than those belonging to the energy sector (or mining sector).

The main limitation of the study is connected with the sampling method. Data was collected only for Poland and only for companies continuously listed on the Warsaw Stock Exchange during the study timeframe. Therefore, there were only 9 companies and 90 observations examined. Further research, employing the baseline developed in this paper, could analyze market changes during the COVID-19 (and post-COVID-19) pandemic timespan in reference to the preceding period. The research should also be expanded to other European markets.

REFERENCES

- Aivazian, V., Booth, L., & Cleary, S. (2003). Do emerging market firms follow different dividend policies from US firms? *Journal of Financial Research*, 26(3), 371–387. https://doi. org/10.1111/1475-6803.00064
- Adjaoud, F., & Ben-Amar, W. (2010). Corporate governance and dividend policy: shareholders' protection or expropriation? *Journal of business finance & accounting*, *37*(5–6), 648– 667. https://doi.org/10.1111/j.1468-5957.2010.02192.x

- Al-Najjar, B., & Kilincarslan, E. (2016) The effect of ownership structure on dividend policy: evidence from Turkey. *Corporate Governance*, 16(1), 135–161. https://doi.org/10.1108/ CG-09-2015-0129
- Aluchna, M., Berent, T., & Kamiński, B. (2019). Dividend Payouts and Shareholder Structure: Evidence from the Warsaw Stock Exchange. *Eastern European Economics*, 57(3), 227–250. https://doi.org/10.1080/00128775.2019.1568196
- Bian, H., Kuo, J. M., Pan, H., & Zhang, Z. (2023). The role of managerial ownership in dividend tunneling: Evidence from China. *Corporate Governance: An International Review*, 31(2), 307–333. https://doi.org/10.1111/corg.12478
- Black, F. (1976). The dividend puzzle. *Journal of portfolio management*, 2(2), 5–8. https://doi.org/ 10.3905/jpm.1976.408558
- Bradford, W., Chen, C., & Zhu, S. (2013). Cash dividend policy, corporate pyramids, and ownership structure: Evidence from China. *International Review of Economics & Finance*, 27(C), 445–464. https://doi.org/10.1016/j.iref.2013.01.003
- Brav, A., Graham, J. R., Harvey, C. R., & Michaely, R. (2005). Payout policy in the 21st century. *Journal of financial economics*, 77(3), 483–527. https://doi.org/10.1016/j.jfineco.2004.07.004
- Chen, D. H., Jian, M., & Xu, M. (2009). Dividends for tunneling in a regulated economy: The case of China. *Pacific-Basin Finance Journal*, *17*, 209–223.
- Denis, D. J., & Osobov, I. (2008). Why do firms pay dividends? International evidence on the determinants of dividend policy. *Journal of Financial economics*, 89(1), 62–82. https://doi.org/10.1016/j.jfineco.2007.06.006
- Driver, C., Grosman, A., & Scaramozzino, P. (2020). Dividend policy and investor pressure. *Economic Modelling*, 89, 559–576. https://doi.org/10.1016/j.econmod.2019.11.016
- Ellili, N. O. D. (2022). Impact of environmental, social and governance disclosure on dividend policy: What is the role of corporate governance? Evidence from an emerging market. *Corporate Social Responsibility and Environmental Management*, 29(5), 1396–1413. https://doi.org/10.1002/csr.2277
- Gordon, M. J. (1959). Dividends, earnings, and stock prices. *The Review of Economics and Statistics*, 41(2), 99–105. https://doi.org/10.2307/1927792
- Grullon, G., Michaely, R., & Swaminathan, B. (2002). Are dividend changes a sign of firm maturity? The Journal of Business, 75(3), 387–424.
- Ho, H. (2003). Dividend Policies in Australia and Japan. International Advances in Economic Research, 9(2), 91–100. https://doi.org/10.1007/BF02295710
- Hu, A., & Kumar, P. (2004). Managerial entrenchment and payout policy. *Journal of Financial and Quantitative Analysis*, 39(4), 759–790. https://doi.org/10.1017/S0022109000003203
- Jaara, B., Alashhab, H., & Jaara, O. (2018). The determinants of dividend policy for non-financial companies in Jordan. *International Journal of Economics and Financial Issues*, 8(2), 198–209.
- Jabbouri, I. (2016). Determinants of corporate dividend policy in emerging markets: Evidence from MENA stock markets. *Research in International Business and Finance*, *37*, 283–298. https://doi.org/10.1016/j.ribaf.2016.01.018
- Jensen, G. R., Solberg, D. P., & Zorn, T. S. (1992). Simultaneous Determination of Insider Ownership, Debt, and Dividend Policies. *Journal of Financial and Quantitative Analysis*, 27(2), 247–263.

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- Kaźmierska-Jóźwiak, B. (2015). Determinants of dividend policy: evidence from Polish listed companies. *Procedia Economics and Finance*, 23, 473–477. https://doi.org/10.1016/ S2212-5671(15)00490-6
- Kaźmierska-Jóźwiak, B. (2019). Corporate Payout Policy. Determinants Market Reaction Evaluation (Polityka wypłat na rzecz akcjonariuszy. Determinanty – reakcja rynku – ocena). Wydawnictwo Uniwersytetu Łódzkiego (in Polish). https://doi.org/10.18778/8142-541-4
- Kien, D. T., & Chen, Y. P. (2020). Ownership structure impact on dividend policy of listed companies on Vietnamese securities market. *Journal of Mathematical Finance*, 10(2), 223–241. https://doi.org/10.4236/jmf.2020.102014
- Kompa, K., & Witkowska, D. (2021). Synthetic measures in benchmarking of the New Silk Road countries. *Proceedia Computer Science*, 192, 3617–3626.
- https://doi.org/10.1016/j.procs.2021.09.135
- Kompa, K., & Witkowska, D. (2022). Vector Synthetic Measure of Firm Effectiveness. The case of Polish public companies. International Business Conference 2022 Sommerset West, Conference Proceedings.
- Kompa, K., Witkowska, D., & Hewitt, L. M. (2023). Women's Representation on Boards and the Financial Performance of Polish Public Companies in the pre-COVID Decade. *Gospodarka Narodowa. The Polish Journal of Economics*, 314(3), 34–47. https://doi. org/10.33119/GN/169434
- Kowalewski, O., Stetsyuk, I., & Talavera, O. (2007). Corporate governance and dividend policy in Poland. DIW Discussion Papers, No. 702, Deutsches Institut f
 ür Wirtschaftsforschung (DIW), Berlin. http://hdl.handle.net/10419/27227
- Kowerski, M. (2013). Investment opportunities vs. a propensity to pay dividends (Możliwości inwestycyjne a skłonność do płacenia dywidend). *Bank i Kredyt*, 44(6), 623– 646 (in Polish).
- Kowerski, M. (2014). Are listed SOEs paying too much in dividends? (Czy spółki giełdowe z udziałem Skarbu Państwa płacą zbyt duże dywidendy?) Research Papers of the Wroclaw University of Economics/Prace Naukowe Uniwersytetu Ekonomicznego we Wroclawiu, (344) (in Polish). https://doi.org/10.15611/pn.2014.344.24
- Kowerski, M. (2015). High Propensity to Pay Dividends by State-Controlled Companies in Poland. Tunneling or Maturity Effect? *Financial Internet Quarterly*, 11(4), 64–73. https:// doi.org/10.1515/fiqf-2016-0130
- Kowerski, M., & Kaźmierska-Jóźwiak, B. (2022). The proposal of corporate payout decisions' modelling. *Engineering Economics*, 33(1), 59–72. https://doi.org/10.5755/j01.ee.33.1.28496
- Leary, M. T., & Michaely, R. (2011). Determinants of dividend smoothing: Empirical evidence. *The Review of Financial Studies*, 24(10), 3197–3249. https://doi.org/10.1093/rfs/hhr072
- Lin, Y. H., Chiou, J. R., & Chen, Y. R. (2010). Ownership structure and dividend preference: Evidence from China's privatized state-owned enterprises. *Emerging Markets Fi*nance and Trade, 46(1), 56–74. https://doi.org/10.2753/REE1540-496X460106
- Lintner, J. (1956). Distribution of incomes of corporations among dividends, retained earnings, and taxes. *The American economic review*, 46(2), 97–113.
- Miller, M., & Modigliani, F. (1961). Dividend Policy, Growth and the Valuation of Shares. Journal of Business, 34, 411–433. https://doi.org/10.1086/294442

- Nermend, K. (2017). Methods of Multicriteria and Multivariate Analysis in Decision Making Support (Metody analizy wielokryterialnej i wielowymiarowej we wspomaganiu decyzji). PWN (in Polish).
- Nyere, L., & Wesson, N. (2019). Factors influencing dividend payout decisions: Evidence from South Africa. South African Journal of Business Management, 50(1), 1–16. https:// doi.org/10.4102/sajbm.v50i1.1302
- Piotroski, J. (2000). Value investing: Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers. *Journal of Accounting Research*, 38, 1–41. https://doi.org/10.2307/2672906
- Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *The Journal of Finance*, 50(5), 1421–1460.
- Rozeff, M. S. (1982). Growth, Beta and Agency Costs as Determinants of Dividend Payout Ratios. *Journal of Financial Research*, 5(3), 249–259.
- Samet, M., & Jarboui, A. (2017). Corporate social responsibility and payout decisions. Managerial Finance, 43(9), 982–998. https://doi.org/10.1108/MF-01-2017-0020
- Sierpińska, M. (2022). Dividend policy of listed energy companies in Poland. Inżynieria Mineralna, (1), 35–41. https://doi.org/10.29227/IM-2022-01-04
- Sierpińska-Sawicz, A. (2014). Dividend policy of state treasury shareholding companies. Journal of Economics & Management, 18(4), 225–241.
- Tarczyński W., & Tarczyńska-Łuniewska, M. (2018). The construction of fundamental portfolio with the use of multivariate approach. *Procedia Computer Science*, 126, 2085–2096. https://doi.org/10.1016/j.procs.2018.07.243