

**IMPACT OF THE COVID-19 PANDEMIC ON THE CHOICE
OF INVESTMENT STRATEGIES AND INVESTORS' BEHAVIOR
ON THE WARSAW STOCK EXCHANGE –
2017-2020 RESEARCH FINDINGS**

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Purpose: This paper attempts to reveal the potential differences between the portfolios of dividend-paying companies with growth or value potential and the same portfolios fortified with the financial instruments replicating precious metals or real estate price behavior in a turbulent global economy.

Design/methodology/approach: The research objective of this paper is accomplished by means of a thorough literature analysis. Moreover, the authors employ comparative analysis methods to explore the features of stock portfolios held by dividend-paying companies with value or growth potential and portfolios of the companies that are fortified with financial instruments replicating the price behavior of precious metals or real estate and uncover the similarities and differences. Research of the characteristics of financial instrument portfolio variants and comparison between them is conducted by means of standard deviation of the rate of return, coefficient of variation, the Pearson correlation coefficient and the Spearman's rank correlation coefficient. It was also assessed whether the estimated correlation coefficients were statistically significant through the use of a non-parametric correlation coefficient significance test.

Findings: The results of the empirical analyses conducted here reveal that the average annual return of portfolios held by dividend-paying companies with value and growth potential is lower than ETFs replicating precious metals. Furthermore, during the turbulent economy of 2020, the inclusion of precious metal assets boosted the rates of return of the Polish dividend-paying companies portfolios.

Research limitations/implications: The research was carried out on a limited number of the analyzed companies. Therefore, it could be biased, due to the deterministic stock sampling method.

Practical implications: Knowledge of the similarities and differences between dividend-paying companies with value or growth potential and the risk diversification of such companies' stock portfolios by means of instruments replicating the price behavior of precious metals or real estate is of great importance to both the 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 with value potential and financial instruments replicating the price behavior of precious metals or real estate. Ultimately, investors' needs could be better addressed.

Originality/value: What is new in the paper is the stock comparison of dividend-paying companies' with value and growth potential with precious metals and real estate-based instruments. The paper also attempts to compare efficiency of investing in the portfolio variants, capturing the effect of the SARS-CoV-2 pandemic, thereby filling our knowledge gap.

Keywords: COVID-19 pandemic, precious metals, ETFs, Spearman rank correlation coefficient.

Category of the paper: Research paper.

1. Introduction

The stock portfolios' rates of return are determined by the possible profit from the sale of stocks and a possible income from dividends distributed over the stock ownership period. In the long term, it is becoming particularly important to invest in the stocks of issuers that maintain a dividend policy and distribute dividends on a regular basis, generating steady income for the investor. However, ever since the publication of a paper by F. Modigliani and M. Miller (Miller, Modigliani, 1961) proving that there is no impact of dividend policy on the stock prices, this matter has proved to be the topic of extensive research and consideration in many scientific publications (Al-Malkawi, Rafferty, Pillai, 2010). In particular, it was considered a key issue to determine whether investing in dividend companies makes it possible to achieve above-average income (McQueen, Shields, Thorley, 1997). M. Lichtenfeld (Lichtenfeld, 2015, p. 63) states that for the 2001–2011 period, the average annual rate of return of the S&P Dividend Aristocrats Index was 7.1% compared to 2.9% average annual rate of return of the S&P 500 Index. A. Williams and M. Miller (Williams, Miller, 2013, pp. 58-69), however, based on the research conducted, found that during the financial crisis in the USA (especially 2008), the rates of return of companies that paid dividends on a regular basis (dividend aristocrats) were characterized by higher rate of return than the S&P 500 index. Together with the issue of dividend policy and dividend payments, the issue of the market ratios of these companies (P/E and P/BV) and how the level of these ratios actually determines the choice of dividend-paying companies' stocks is often cited. R.A. Haugen has conducted a research using both ratios, showing that companies with high P/BV ratio are characterized by the highest risk and the lowest rate of return (Haugen, 1999, pp. 2-10). However, R. Banz (1981) proved that this rate is even higher for companies with lower market capitalization. J. Czekaj, M. Woś and J. Żarnowski (2001) came to the analogous conclusions but pertaining to the Polish stock market and P/BV ratio. They proved that companies featuring low P/BV ratios have brought statistically significant above-average rates of return, as opposed to the companies with high P/BV ratio values.

This paper attempts to reveal the potential differences between the portfolios of dividend-paying companies with growth or value potential and the same portfolios fortified with the financial instruments replicating precious metals or real estate price behavior in a turbulent global economy.

The scope of the research covers investment strategies that include dividend-paying companies with value and growth potential and financial instruments replicating precious metals and real estate price behavior. According to the literature of the subject (Haugen, 1999, pp. 2-10), based on the P/BV parameter indications, dividend-paying companies are assigned to two groups – companies with growth potential and companies with value potential. Companies with a high P/BV indicator, i.e. above 1, were assigned to the first group, and those with a low P/BV indicator, i.e. below 1, were assigned to the second group.

It should be noted that there are studies on the attitudes and behavior of investors in the capital market, also including their investment strategies (among others, G.C. Selden, O.K. Burrell, W.S. Bauman, S. Benartzi, R.H. Thaler, J.R. Nofsinger, S.E.G. Lea, R.M. Tarp, P. Webley, R.A. Haugen, H. DeAngelo, L. DeAngelo and R.M. Stulz). These studies, however, do not address the division into dividend-paying companies with growth and value potential. Similarly, they fail to address the development and implementation of investment strategies in a turbulent global economy and incorporation of instruments regarded as “safe harbors” like precious metals (namely monetary metals such as gold and silver) and real estate.

2. Literature review and research hypotheses development

The perception of a group as a psychological, rather than physical phenomenon has been confirmed by researchers like G. Le Bon, S. Freud, C. Jung or A. Koestler (Le Bon, 1986 after Plummer, 1995, p. 11). Le Bon's observations suggest that the group displays specific characteristics such as a collective mind and an influence on the behavior of an individual, provided that such an individual becomes a member of the group. The group's influence on an individual is powerful enough to change one's existing beliefs (Koestler, 1978; Talbot, 1981 after Plummer, 1995, pp. 16-19). Group affiliation alters the individual's perception of personal responsibility and the population implements its objectives in an emotional and often irrational manner. This could explain financial instruments price change mechanism in the financial markets, as the co-existence of two groups with different perception of the future market trends and future valuation of an instrument results in different investment decisions. Notwithstanding the correctness of decisions made, an individual will seek validation and acceptance of their views within the group. Therefore, an individual identifies himself with other investors that belong to a group with similar investment philosophy. A rational investor always acts to maximize the profits, is not driven by emotions or pressure from the group of other gamblers,

and only follows information based on the reliable financial analyses (known as fundamental data) (Zaleśkiewicz, 2003, pp. 9-10). G.C. Selden, O.K. Burrell and W.S. Bauman are among the first to outline the application of the field of psychology to the capital market (Razek, 2011, p. 8). The authors indicate a new field of benefits that can arise from combining quantitative investment models with behavioral finance (Olsen, 1998, p. 10). *EMH – Efficient Market Hypothesis* was published in 1965 by E.F. Fama (Fama, 1995, pp. 75-80). According to the theory, the capital market is operated by the rational investors who are able to utilize public information to anticipate stock price changes. Meanwhile, an efficient market is a place with a huge number of rational and return-maximizing investors and information flow is free and unlimited for any investor. In 1970, P.A. Samuelson proved that information flowing into the capital market is quickly and appropriately interpreted by the investors (Samuelson et al., 1995, p. 445). However, the paradox of market efficiency is that if a hypothetical situation occurs, and all investors believe it exists and accept the required conditions, the market will instantly cease to be efficient. The reality, however, is that markets are neither efficient nor inefficient, so efficiency can only take different shades (Dembny, 2005, pp. 79-80). According to A. Timmermann and C.W.J. Granger, the efficient markets hypothesis is, however simple, hard to empirically verify. Identifying at least one accurate forecast constitutes an evidence against the efficient markets hypothesis, if uncertainty as to the choice of the best forecasting model is ignored. Otherwise, such proof can only be accepted if the optimal model selection methodology allows investors to identify the correct ex ante model (Timmermann et al., 2004, pp. 15-27). Also, the research by R.H. Thaler, J.R. Nofsinger and S.E.G. Lea, R.M. Tarpay, P. Webley (Thaler, 1999; Nofsinger, 2001; Lea et al., 1987) reveals that most investors tend to make financial choices hot-headed because they hope for fast profit. Investors are too hot-headed, lack self-control and struggle to defer financial gratification. Research by S. Benartzi, R.H. Thaler, however, indicates that investors revise their portfolios far too often. They no longer consider investing as a long-term process in favor of swift decisions of short-term importance. The authors believe that mental accounting and loss aversion play a significant role here (Benartzi et al., 1995, pp. 73-92). Investment principles indicate that all the revenue obtained should be considered collectively – for an economically reasonable investor it is not important whether they profit from the payment of dividends or the sale and acquisition of stocks¹. According to the research, investors distribute their income as if dividends and profit on sale constituted two separate incomes, and their purpose is also different. This is because collecting dividends is mainly related to a short-term consumption goal, while the profit on the disposal of stocks is associated with a long-term goal. H.M. Shefrin and M. Statman also conclude that those investors, who need cash for their current expenses, will look for stocks that provide them with regular dividend payments (Shefrin et al., 1984, pp. 253-282;

¹ It is also based on the estimation of the stock's income value, which recognizes stock price fluctuations (profit or loss) and dividends collected.

Zaleśkiewicz, 2003, pp. 134-136). Considering the prospect of investment, according to R.A. Haugen, the relationship between stock rate of return and P/E and dividend values becomes relevant when the period over which the relationship is considered extends (Haugen, 1999, pp. 69-94). This indicates that short-term market behavior does not correspond to what happens in the long term. It is particularly important when investors are creating their portfolios in the long term (see more: Zaleśkiewicz, 2003, p. 88). Therefore, investing in stocks of companies, whose issuer pays regular dividends becomes particularly important for the investor. Research conducted by K.P. Fuller and M.A. Goldstein (Fuller, Goldstein, 2011, pp. 457-473), H. Rubin and C. Spaht II (Rubin, Spaht II, 2011, pp. 11-19) and P. Asquith and D.W. Mullins Jr. (Asquith, Mullins, 1983, pp. 77-96) confirm that stock price behavior variations in favor of dividend-paying companies can be observed, especially during a bull market. E. Fama and K. French (Fama, French, 1992) carried out research of all stocks listed on the New York Stock Exchange, the American Stock Exchange and the over-the-counter market (Nasdaq) for the 1963-1990 period, taking into account the relationship between the book value of equity and the stock's market value. The correspondence of these values was analyzed by the authors of research by investigating behavior of the companies' P/BV parameter. The authors attributed a low P/BV parameter to companies being entities with value potential, while stocks of companies characterized by a high level of this parameter were considered to have growth potential. The research results indicate that an average annual rate of return for the companies with value potential was 24.4%, and for the companies with growth potential it was only 8%. R.A. Haugen has reached similar conclusions, by using the P/BV indicator to describe companies with growth and value potential (Haugen, 1999, pp. 2-10). By contrast, H. DeAngelo, L. DeAngelo and R.M. Stulz (DeAngelo, DeAngelo and Stulz, 2006) connected P/BV values to the dividend payments by companies. The authors believe that the higher the P/BV value of a company in the preceding year, the higher the possible dividend in the reference year. Meanwhile, research conducted by M. Baker and J. Wurgler (Baker, Wurgler, 2004, pp. 271-288) indicates that companies with higher P/BV values are paying dividends more often than those with low values of this parameter. During the periods of elevated inflation, stocks of the dividend-paying companies could be seen as attractive to the investors because dividend income is a real variable and investors collect dividends that are generally inflation-adjusted (Lee, 2000, p. 192).

The research and analysis presented, despite the broad time span and inclusion of various stock exchanges, does not cover the research on how the inclusion of assets regarded as “safe harbors”, i.e. precious metals (monetary metals such as gold and silver) and real estate, affects rates of return and investment risk in dividend-paying companies portfolios. They also do not cover as to whether the division of dividend-paying companies into value and growth potential companies is important to the investor and how the characteristics of these portfolios evolve in a turbulent global economy.

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

- H₁: The average annual rate of return of dividend-paying companies portfolios with value and growth potential is higher than ETFs replicating precious metals.
- H₂: During the turbulent 2020 economy, the inclusion of precious metals assets or REITs has improved the Polish dividend portfolios' rates of return.
- H₃: The portfolios of dividend-paying companies with growth and value potential behave much like a portfolio made of companies replicating the real estate market.

3. Sample selection and methodology

In order to fulfill this paper's objectives, companies listed on the Warsaw Stock Exchange in Poland, which have been regularly paying dividends in the 2017-2020 period and their dividend payment policy dates back to at least 2006 (10 years of uninterrupted dividend payments), were covered by the research. 52 WSE listed companies were analyzed, namely: Asseco Business Solutions (ABS), ACAutogaz (ACG), Asseco Poland (ACP), Ambra (AMB), Aplisens (APN), Apator (APT), Aqua (AQU), Asseco South Eastern Europe (ASE), Atende (ATD), ATM Grupa (ATG), Budimex (BDX), Bank Handlowy w Warszawie (BHW), CCC (CCC), CEZ (CEZ), Firma Oponiarska Dębica (DBC), Dektra (DKR), Dom Development (DOM), ED Invest (EDI), Korporacja Gospodarcza Efekt (EFK), Elektrotim (ELT), Eurocash (EUR), Eurotel (ETL), Euro-Tax.pl (ETX), Ferro (FRO), Fabryka Sprzętu i Narzędzi Górniczych Fasing (FSG), Giełda Papierów Wartościowych w Warszawie (GPW), Przedsiębiorstwo Hydrauliki Siłowej Hydrotor (HDR), IFIRMA (IFI), Introl (INL), KGHM (KGH), KRKA (KRK), Zakłady Tuszczowe Kruszwica (KSW), Grupa Kęty (KTY), Lena Lighting (LEN), LPP (LPP), Neuca (NEU), Oponeo.pl (OPN), Bank Polska Kasa Opieki (PEO), PGS Software (PSW), Powszechny Zakład Ubezpieczeń (PZU), Fabryka Obrabiarek Rafamet (RAF), Silvano Fashion Group (SFG), Fabryka Farb i Lakierów Śnieżka (SKA), Sanok Rubber Company (SNK), Sonel (SON), Stalprofil (STF), Talex (TLX), Unibep (UNI), Wawel (WWL), WODKAN Przedsiębiorstwo Wodociągów i Kanalizacji (WOD), Grupa Azoty Zakłady Azotowe Puławy (ZAP), Grupa Żywiec (ZWC). The authors of this paper indicate that the research included particularly unusual year 2020, which was dominated by the worldwide SARS-CoV-2 pandemic and its impact on the individual companies' operation and dividend payments, and on the investment decisions made by investors.

Additionally, the research included, from the perspective of managed assets value, the largest dollar-settled ETFs replicating the prices of precious metals (gold and silver) and the real estate market. Two ETFs (namely ETC, or Exchange Traded Commodity) replicating gold (iShares Physical Gold ETC and Invesco Physical Gold ETC) and silver (WisdomTree

Physical Silver ETC and iShares Physical Silver ETC) market, which invest funds in physical precious metals, were selected for this analysis. The research also included two of the largest ETFs investing in REITs (hereafter ETF REIT), owning real estate located across the globe (Vanguard Real Estate ETF – office buildings, hotels, other real estates and iShares Developed Markets Property Yield UCITS ETF – broadly understood real estate market excluding the Greek market). Including ETFs investing in global REITs in the research is motivated by the need for a well-diversified real estate portfolio. Global coverage of the assets in their portfolios eliminates the risk that the real estate location and the REITs listing location will influence stock prices, which is the case for precious metals listings, are not determined by the asset location risk.

The research was carried out in the following stages:

1. Stage one – to identify companies with value and growth potential and make comparisons in terms of rates of return and risk among the WSE listed companies that have been paying dividends continuously in the 2017-2020 period.
2. Stage two – to analyze stock price movements of the Polish dividend-paying companies with value potential during the turbulent economy of 2020 and portfolio variants that include financial instruments replicating precious metals and real estate price behavior.

4. Investment strategy and investor behavior analysis – research findings for the 2017-2020 period

To select companies with value (portfolio 1), and growth (portfolio 2) potential, a P/BV ratio analysis of WSE listed, dividend-paying companies was conducted. It was assumed that low P/BV companies, i.e. below 1, will be included in Portfolio 1. High P/BV companies, i.e. above 1, in contrast, will be allocated to portfolio 2. Both portfolios were compared in terms of the rate of return obtained over the considered period. Each portfolio featured 10 companies with the best P/BV ratios in the considered group. In this research, portfolios were kept for one year (early January to the end of December), then, the annual rates of return were calculated for each portfolio and afterwards the procedure was repeated in a similar manner. Investment portfolio compositions and the rates of return of individual constituent companies over the past 4 years are presented in table 1.

Table 1.

Compositions of portfolios 1 and 2 and the rates of return [%] of the respective companies in 2016-2020 – WSE listed issuers in Poland

Number of companies	1	2	3	4	5	6	7	8	9	10
Portfolio 1 ₂₀₁₇	WOD	CEZ	EFK	EDI	FSG	RAF	AQU	ACP	ZAP	ASE
Rate of return ₂₀₁₇	0.53	16.81	-11.52	4.19	18.73	-28.90	-9.94	-19.11	-11.63	42.86
Portfolio 2 ₂₀₁₇	ZWC	PSW	SFG	CCC	LPP	BDX	ETX	KRK	SKA	ACG
Rate of return ₂₀₁₇	7.27	12.41	-16.94	35.06	61.97	5.37	-0.71	-5.65	24.58	-1.42
Portfolio 1 ₂₀₁₈	WOD	CEZ	EFK	ZAP	FSG	EDI	RAF	STF	AQU	TLX
Rate of return ₂₀₁₈	-11.86	8.73	-7.56	-57.75	-1.19	-12.39	-19.84	-40.00	-1.24	-39.47
Portfolio 2 ₂₀₁₈	ZWC	SFG	PSW	CCC	ETX	KRK	LPP	BDX	ACG	SKA
Rate of return ₂₀₁₈	-2.12	-13.39	-39.60	-33.48	-9.09	5.13	-14.25	-43.76	5.12	-0.64
Portfolio 1 ₂₀₁₉	EFK	CEZ	WOD	FSG	RAF	STF	ZAP	INL	AQU	EDI
Rate of return ₂₀₁₉	-50.23	-5.84	21.90	-8.02	-7.29	-16.94	33.13	-23.07	1.28	26.70
Portfolio 2 ₂₀₁₉	ZWC	SFG	ETX	KRK	PSW	BDX	LPP	CCC	ACG	SKA
Rate of return ₂₀₁₉	6.06	-14.59	4.74	24.70	21.11	50.33	11.08	-43.88	7.83	5.81
Portfolio 1 ₂₀₂₀	CEZ	FSG	WOD	EFK	STF	ZAP	AQU	TLX	BHW	PEO
Rate of return ₂₀₂₀	5.26	-29.19	44.36	11.81	-4.68	-8.92	-3.16	-7.26	-33.55	-40.10
Portfolio 2 ₂₀₂₀	ZWC	CCC	SFG	ETX	KRK	BDX	PSW	LPP	IFI	SKA
Rate of return ₂₀₂₀	-2.81	-24.49	-31.43	-28.57	39.29	72.94	16.73	-6.33	68.57	9.20

Source: Own study.

Over the past 4 years, among dividend-paying companies on the Polish stock exchange, it was found that the higher average rates of return were generated by the companies with growth potential rather than value potential. For portfolio 2, made of 10 companies with the highest P/BV ratios, the average annual rate of return was 4.05% (see table 2).

Table 2.

Average annual rate of return generated by portfolios 1 and 2 made of 10 companies – Polish stock exchange

Portfolio variants	2017	2018	2019	2020	Average rate of return	Standard deviation of return
Portfolio 1 (companies with value potential)	0.20%	-18.26%	-2.84%	-6.54%	-6.86%	8.08%
Portfolio 2 (companies with growth potential)	12.19%	-14.61%	7.32%	11.31%	4.05%	12.62%

Source: Own study.

The 2020 analysis, however, as the world struggled with the SARS-CoV-2 pandemic and major turbulence, panic and consequent steep stock price declines developed in the financial markets, the average annual rate of return was higher for companies with growth potential at 11.31%, compared to -6.54% for companies with value potential (table 2). Polish dividend-paying companies with value potential in a turbulent 2020 economy were characterized by a considerably lower risk level (portfolio 1 standard deviation of $\sigma_{P1_GPW}=8.08$ p.p.) than dividend-paying companies with growth potential ($\sigma_{P2_GPW}=12.62$ p.p.).

In order to conduct the second stage of analyses, the listings of selected ETFs replicating gold and silver price movements in USD and PLN for the 2016–2020 period (rates of return for the 2017-2020 period) were presented in tables 3÷4.

Table 3.

Pricing of ETFs replicating gold price movements for the 2016-2020 period

	Items/Year	2016	2017	2018	2019	2020
Price (USD)	iShares Physical Gold ETC	22.8425	25.5075	25.1725	29.775	36.9675
	Invesco Physical Gold ETC	113.41	126.5	124.85	147.735	183.45
	Gold (1 Oz)	1150.91	1303.33	1282.56	1517.31	1898.71
Price (PLN)	iShares Physical Gold ETC	95.61	88.78	94.17	112.96	138.06
	Invesco Physical Gold ETC	474.67	440.26	467.07	560.48	685.11
	Gold (1 Oz)	4817.10	4536.04	4798.12	5756.37	7090.92
USD (PLN)		4.19	3.48	3.74	3.79	3.73

Source: Own study.

Table 4.

Pricing of ETFs replicating silver price movements for the 2016-2020 period

	Items/Year	2016	2017	2018	2019	2020
Price (USD)	WisdomTree Physical Silver ETC	15.46	16.01	14.6025	16.9675	24.745
	iShares Physical Silver ETC	15.8475	16.4313	14.9913	17.4425	25.44
	Silver (1 Oz)	15.95	16.95	15.49	17.85	26.39
Price (PLN)	WisdomTree Physical Silver ETC	64.71	55.72	54.63	64.37	92.41
	iShares Physical Silver ETC	66.33	57.19	56.08	66.17	95.01
	Silver (1 Oz)	66.76	59.01	57.96	67.73	98.55
USD (PLN)		4.19	3.48	3.74	3.79	3.73

Source: Own study.

Tables 5÷6, respectively, present the annual rates of return of the selected ETFs replicating gold and silver price movements in USD and PLN for the 2016-2020 period (rates of return for the 2017-2020 period).

Table 5.

Annual rates of return of the ETFs replicating gold price movements for the 2017-2020 period

	Items/Year	2017	2018	2019	2020
Price (USD)	iShares Physical Gold ETC	11.67%	-1.31%	18.28%	24.16%
	Invesco Physical Gold ETC	11.54%	-1.30%	18.33%	24.18%
	Gold (1 Oz)	13.24%	-1.59%	18.30%	25.14%
Price (PLN)	iShares Physical Gold ETC	-7.15%	6.08%	19.95%	22.22%
	Invesco Physical Gold ETC	-7.25%	6.09%	20.00%	22.24%
	Gold (1 Oz)	-5.83%	5.78%	19.97%	23.18%

Source: Own study.

Table 6.

Annual rates of return of the ETFs replicating silver price movements for the 2017-2020 period

	Items/Year	2017	2018	2019	2020
Price (USD)	WisdomTree Physical Silver ETC	3.56%	-8.79%	16.20%	45.84%
	iShares Physical Silver ETC	3.68%	-8.76%	16.35%	45.85%
	Silver (1 Oz)	6.30%	-8.62%	15.23%	47.81%

Cont. table 6.

Price (PLN)	WisdomTree Physical Silver ETC	-13.89%	-1.96%	17.83%	43.56%
	iShares Physical Silver ETC	-13.78%	-1.93%	17.99%	43.57%
	Silver (1 Oz)	-11.61%	-1.77%	16.85%	45.51%

Source: Own study.

Tables 5 and 6 demonstrate substantial differences in the rates of return of precious metals and ETFs depending on whether ETF listing prices are quoted in USD or PLN. The differences are particularly apparent in the years 2017–2018. Including the PLN listings, however, makes perfect sense as portfolios comprise of stocks from dividend-paying companies listed on the Warsaw Stock Exchange and therefore listed in PLN. Selected ETFs replicating silver and gold prices are perfectly reflecting precious metal price movements – the Pearson's linear correlation coefficient of the funds' and precious metals' rates of return for both USD and PLN listings is at 1.

Tables 7 and 8 present the listings, the rates of return and dividend rates of the selected REIT ETFs replicating stock price movements for REITs with portfolios composed of real estates all over the world. Data for the 2016-2020 period is presented in a similar manner as the precious metals market, in USD and PLN.

Table 7.*Vanguard Real Estate ETF parameters in USD and PLN*

	Items/Year	2016	2017	2018	2019	2020
Data for USD	Vanguard Real Estate ETF	67.72	71.04	66.76	86.06	82.09
	Dividends	2.31	2.96	3.11	2.88	3.18
	Rate of return		9.25%	-1.65%	33.23%	-0.91%
	Dividend rate		4.16%	4.66%	3.35%	3.87%
Data for PLN	Vanguard Real Estate ETF	283.46	247.23	249.73	326.48	306.58
	Dividends	9.67	10.29	11.63	10.93	11.87
	Rate of return		-9.15%	5.72%	35.11%	-2.46%
	Dividend rate		4.16%	4.66%	3.35%	3.87%
USD (PLN)		4.19	3.48	3.74	3.79	3.73

Source: Own study.

Table 8.*iShares Developed Markets Property Yield UCITS ETF parameters in USD and PLN*

	Items/Year	2016	2017	2018	2019	2020
Data for USD	iShares Developed Markets Property Yield UCITS ETF	20.77	23.09	21.83	26.46	23.94
	Dividends	0.80	0.77	0.94	0.81	0.72
	Rate of return		14.86%	-1.37%	24.93%	-6.80%
	Dividend rate		3.32%	4.32%	3.07%	3.01%
Data for PLN	iShares Developed Markets Property Yield UCITS ETF	86.93	80.36	81.67	100.38	89.41
	Dividends	3.33	2.66	3.53	3.09	2.69
	Rate of return		-4.49%	6.02%	26.70%	-8.26%
	Dividend rate		3.32%	4.32%	3.07%	3.01%
USD (PLN)		4.19	3.48	3.74	3.79	3.73

Source: Own study.

Unlike ETFs replicating precious metals market, for REIT ETFs, the investor's rate of return is contingent not only on the fund's price movements but also on the dividends received, distributed by REITs to their investors. The average dividend rate for the Vanguard Real Estate ETF was 4.01%, and for the iShares Developed Markets Property Yield UCITS ETF was 3.43%. For the entire analyzed period, the dividend rate of both funds was still above 3%.

Table 9 presents the average ETF rates of return for each group, i.e. replicating gold, silver and REIT prices and risk measures. Data presented in the table was estimated for the prices expressed in PLN. The application of each average in further analyses aims to eliminate potential differences in the ETFs' listings within their respective groups.

Table 9.

Average rates of return and risk measures of the ETFs groups

ETFs groups averages	2017	2018	2019	2020	Average annual rate of return	Standard deviation of return	Coefficient of variation
Average ETF Gold	-7.20%	6.08%	19.98%	22.23%	10.27%	13.66%	1.33
Average ETF Silver	-13.84%	-1.94%	17.91%	43.57%	11.43%	25.11%	2.20
Average ETF Reit	-6.82%	5.87%	30.90%	-5.36%	6.15%	17.45%	2.84

Source: Own study.

The highest average annual rate of return can be found in the silver market (11.43%), with the highest standard deviation of (25.11 p.p.). The lowest average annual rate of return, in contrast, was generated by the REIT ETFs portfolio (6.15%), at a risk that was 3.79 p.p. higher than that of the gold market. It is worth noting that, in this case, higher risk levels didn't correlate with higher average annual rate of return (figure 1).

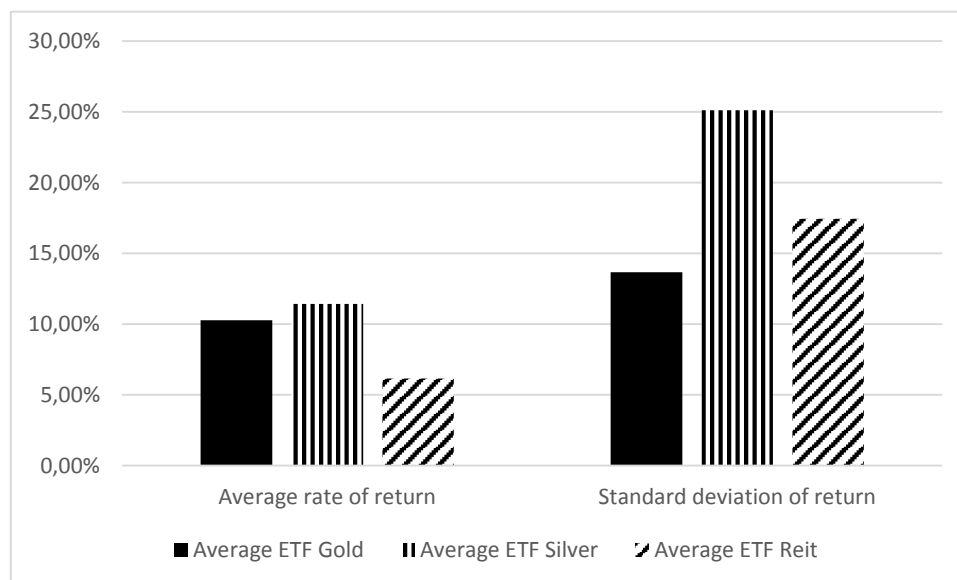


Figure 1. Parameters of the analyzed ETFs for the 2017-2020 period.

Source: Own study.

Among the asset groups analyzed, gold market has the lowest risk-return ratio (coefficient of variation at 1.33) and the highest – the REIT market (coefficient of variation at 2.84). The coefficients of variation presented for the ETF groups support the postulate of a well-balanced investor, who seeks to minimize risk and maximize return. Given the diversity of individual groups of ETFs, all of them will be included in the research concerning variants of portfolios made of dividend-paying companies with value potential (portfolio 1) and with growth potential represented by portfolio 2 (figure 2).

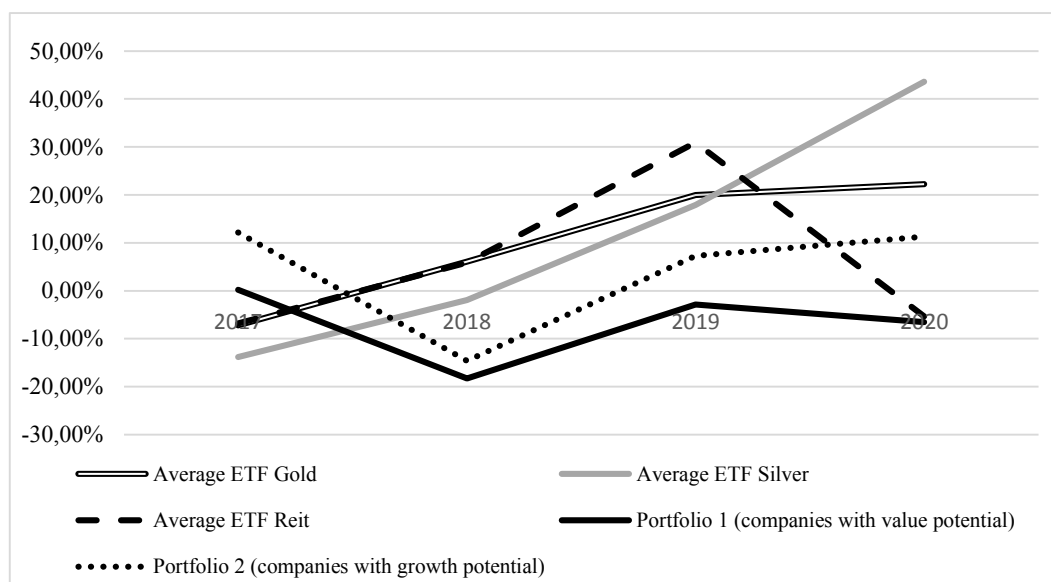


Figure 2. Returns of the analyzed portfolios and ETFs for the 2017-2020 period.

Source: Own study.

Table 10 presents portfolio variants that include dividend-paying companies with value (portfolio 1) and growth (portfolio 2) potential, along with ETFs representing gold and silver markets, and REITs. Equal participation of the individual portfolio components was assumed in the portfolio variants.

Table 10.

Average rates of return and risk measures of the portfolio variants

Portfolio variants	2017	2018	2019	2020	Average annual rate of return	Standard deviation of return	Coefficient of variation
Portfolio 1	0.20%	-18.26%	-2.84%	-6.54%	-6.86%	8.08%	-1.18
Portfolio 1/Etf Gold	-3.50%	-6.09%	8.57%	7.84%	1.71%	7.58%	4.45
Portfolio 1/Etf Silver	-6.82%	-10.10%	7.54%	18.51%	2.28%	13.26%	5.81
Portfolio 1/Etf Reit	-3.31%	-6.20%	14.03%	-5.95%	-0.36%	9.68%	-27.16
Portfolio 2	12.19%	-14.61%	7.32%	11.31%	4.05%	12.62%	3.11
Portfolio 2/Etf Gold	2.50%	-4.26%	13.65%	16.77%	7.16%	9.78%	1.36
Portfolio 2/Etf Silver	-0.82%	-8.28%	12.62%	27.44%	7.74%	15.72%	2.03
Portfolio 2/Etf Reit	2.68%	-4.37%	19.11%	2.98%	5.10%	9.94%	1.95

Source: Own study.

The investor could eliminate negative average annual rate of return of the companies with value potential by considering only precious metals assets in his portfolio (Portfolio 1/Etf Gold = 1.71% and Portfolio 1/Etf Silver = 2.28%). A portfolio of companies with growth potential, in contrast, saw an average annual rate of return increase in every case. The investor gained the highest annual average rate of return increase from Portfolio 1 and Portfolio 2, by incorporating ETF Silver funds. By including the gold market in both dividend-paying companies portfolios, the investor reduced the portfolios' risk (the standard deviation of the rates of return for portfolio 1 was reduced from 8.08 p.p. to 7.58 p.p., while portfolio 2 was reduced from 12.62 p.p. to 9.78 p.p.). Among the portfolio variants analyzed, dividend-paying companies with growth potential diversified by the gold market (Portfolio 2/Etf Gold) present the lowest risk-return ratio and dividend-paying companies with value potential diversified by the silver market (Portfolio 2/Etf Silver) present the highest risk-return ratio. Adding ETFs that replicate REITs to portfolio 1 and portfolio 2 improved the average annual rate of return to a lesser extent compared to the inclusion of precious metals. The diversification of all asset groups analyzed with ETFs reduced the coefficient of variation only for portfolio 2. Negative coefficient of variation values (Portfolio 1 and Portfolio 1/Etf Reit) are not to be interpreted.

The 2020 analysis, when panic and stock price declines impacted financial markets, diversification of portfolios with ETFs was a sensible solution by using precious metals (figure 3).

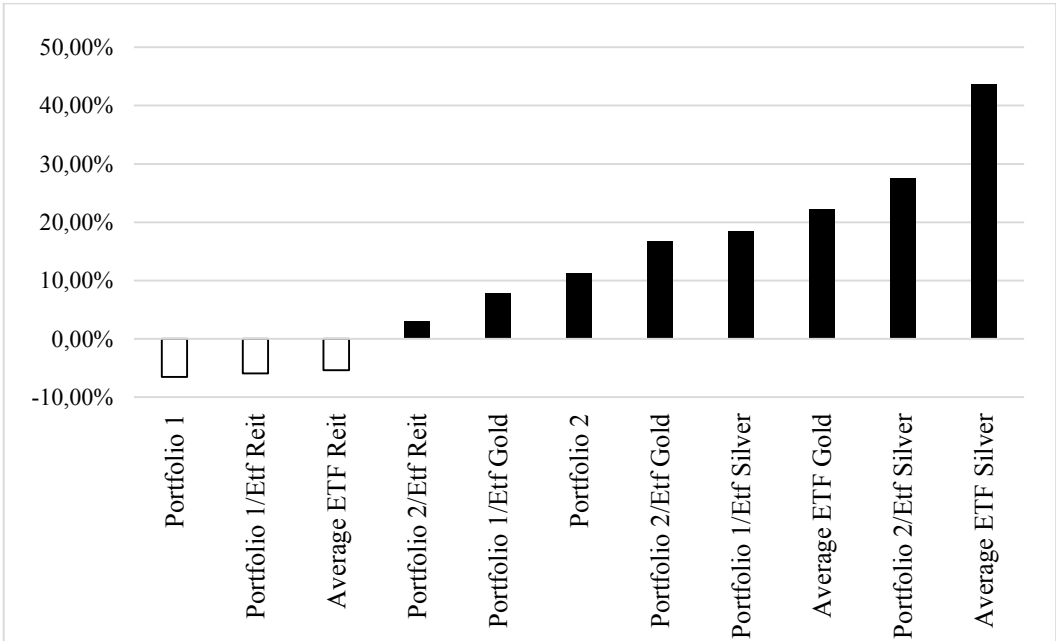


Figure 3. Ranked portfolio variants rates of return in 2020.

Source: Own study.

The highest rate of return in 2020 was generated by portfolios diversified by ETFs replicating silver and gold price movements. By including ETF Silver group assets, the profitability of portfolio 1 increased from -6.54% to 18.51% and portfolio 2 increased from 11.31% to 27.44%. Following the diversification of both dividend-paying companies' portfolios

with gold, their profitability also increased, but to a lesser degree (Portfolio 1 saw an increase from -6.54% to 7.84% and Portfolio 2 from 11.31% to 16.77%). Including ETFs replicating REITs in the composition of portfolios proved to be a sensible solution only for portfolio 1 (increase in average annual rate of return from -6.54% to -5.95%).

Additional analyses were conducted to analyze the relationship between portfolios made of dividend-paying companies (Portfolio 1 and 2) and portfolios of ETFs (replicating gold, silver and REIT prices). Pearson's linear correlation coefficient and Spearman's rank correlation coefficient were chosen as measures of relationship. It was also assessed whether the estimated correlation coefficients were statistically significant through the use of a non-parametric correlation coefficient significance test. A nonparametric t test was conducted to determine whether the estimated correlation was statistically significant. The closer the value of correlation coefficient is to 0, the weaker the relationship between the analyzed characteristics. Therefore, the following hypotheses were adopted:

H_0 : $\rho = 0$ (this is no relationship between the two characteristics in the sample),

H_1 : $\rho \neq 0$ (this is a relationship between the two characteristics in the sample).

Next, p-value calculated by a test statistic was compared with significance level of α (assumed α value=0.05), thus:

- if p-value $> \alpha$, there are no grounds to reject H_0 ,
- if p-value $\leq \alpha$, H_0 should be rejected by assuming H_1 (the correlation is significant).

The research reveals (see tables 11 and 12) that a moderate degree of Pearson's linear correlation ($\rho_{\text{Pearson}} = 0.3137$) was observed only between portfolio 2 (portfolio with growth potential companies) and portfolio made of ETFs replicating silver prices. There are no grounds to reject H_0 hypothesis claiming that the variables are independent (p-value = 0.6863). In other cases, it can be concluded that there is no linear relationship between the analyzed variables. The results are somewhat different in the case of Spearman's rank correlation. A moderate correlation ($\rho_{\text{Spearman}} = 0.4$) was observed between portfolio 1 (portfolio with value potential companies) and all the ETFs analyzed, and again there are no grounds to reject the H_0 hypothesis. A very high, negative correlation ($\rho_{\text{Spearman}} = -0.8$), and therefore the most interesting relationship, emerged between portfolio 2 and the ETFs REIT companies portfolio, with p-value = 0.3333. It can be concluded that during the considered period, the portfolio of dividend-paying companies with growth potential performed to a large extent like the portfolio of companies replicating real estate market (but with an opposite sign). For the other two portfolios, however, the Spearman rank correlation was also slightly negative ($\rho_{\text{Spearman}} = -0.2$; p-value = 0.9167), meaning that there was no relationship between the analyzed portfolios.

Table 11.

Pearson's linear correlation coefficient, Spearman's rank correlation coefficient and p-value levels – Portfolio 1

2017-2020 Correlation	P1 and ETF gold		P1 and ETF silver		P1 and ETF Reit	
	rho	p-value	rho	p-value	rho	p-value
Pearson	-0.0987	0.9013	0.0170	0.983	0.0176	0.9824
Spearman	-0.4	0.75	-0.4	0.75	-0.4	0.75

Source: Own study in the R-CRAN statistical analysis package.

Table 12.

Pearson's linear correlation coefficient, Spearman's rank correlation coefficient and p-value levels – Portfolio 2

2017-2020 Correlation	P2 and ETF gold		P2 and ETF silver		P2 and ETF Reit	
	rho	p-value	rho	p-value	rho	p-value
Pearson	0.1055	0.8945	0.3137	0.6863	-0.1559	0.8441
Spearman	-0.2	0.9167	-0.2	0.9167	-0.8	0.3333

Source: Own study in the R-CRAN statistical analysis package.

5. Discussion and conclusions

A research, concerning the portfolio variants of the Polish dividend-paying companies diversified with ETFs replicating price changes of gold, silver or REITs in the years 2017-2020, was conducted, which revealed rates of return and risk differences, especially when the analysis is related to the financial market crisis and stock price declines. Most importantly, it should be demonstrated that the selected ETFs faithfully reflected the sentiment of the assets prevailing in a given group. The higher average annual rate of return of precious metals ETFs was accompanied by a higher risk and vice versa, which was proven by the coefficient of variation (average gold ETF of 1.33 and average silver ETF of 2.20). In light of the aim of the research and the hypotheses adopted, an analysis of the results obtained in 2020, as the world struggled with the COVID-19 pandemic, becomes important. By including precious metals assets in the portfolio, not only did the average annual rate of return of the Polish dividend-paying companies stocks increase, but it also had a positive impact on the annual rate of return in 2020 (with silver included, Portfolio 1 saw a rise from -6.54% to 18.51% and Portfolio 2 from 11.31% to 27.44%; with gold included, Portfolio 1 saw a rise from -6.54% to 7.84% and Portfolio 2 from 11.31% to 16.77%). Coefficient of variation applicable to the Polish dividend-paying companies stocks has also been reduced through the use of precious metals ETFs. Inclusion of ETFs replicating REITs in the investors' portfolios no longer show such positive developments, despite the fact that dividend payments from these companies were also included. Moreover, during the considered period, a portfolio made of dividend-paying companies with growth

potential was characterized by a high negative correlation with the portfolio of companies that replicate real estate market.

Based on the conducted research, the adopted research hypotheses were verified, and on this basis, it was concluded that:

H₁: The average annual rate of return of dividend-paying companies portfolios with value and growth potential is not higher, but instead it is lower than ETFs replicating precious metals.

This hypothesis was verified negatively.

H₂: During the turbulent economy of 2020, the inclusion of precious metal assets boosted the rates of return of the Polish dividend-paying companies' portfolios. In the case of ETFs including REITs, no increase in the rate of return of the Polish dividend-paying companies' portfolios was observed. This hypothesis was verified negatively in part.

H₃: During the considered period, a portfolio made of dividend-paying companies with growth potential was the only one to be characterized by a strong negative correlation with a portfolio of companies that replicate real estate market. This hypothesis was verified negatively in part.

Based on the comparisons carried out, concerning variants of portfolios made of dividend-paying companies, further divided into companies with value potential and with growth potential, including the precious metals market and REITs, recommendations for capital market investors can be indicated. Irrespective of the variants of the Polish dividend-paying companies' portfolios, their average annual rates of return were significantly elevated, when the precious metals ETFs were included. Those investors, who expect higher rates of return, should include precious metals in a physical form or the ETFs replicating fiduciary metal behavior in their portfolios.

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