

Dividend-Driven Trading Strategies: Evidence from the Warsaw Stock Exchange

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Published online: 14 March 2007
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Abstract This study presents an analysis of dividend-driven trading strategies based on dividend yield growth effects in the Polish stock market in the years 1994–2004. Results indicate that the dividend yield growth portfolios were capable of beating the market in the entire sample period. Their performance, however, was not consistent over time and the highest returns were obtained during final years. Empirical findings based on the analysis of different types of portfolios demonstrate the importance of dividends as a source of significant fundamental information items from stock market companies. At the same time, they show that a dividend investment strategy for the Polish stock market is most successful when the selection of stocks for the dividend yield growth portfolios is subject to further restrictions, most notably concerning company size.

Keywords Dividend yield growth · Emerging market · Investment strategy · Portfolio analysis · Stock market

JEL Classification G15

Introduction

In every financial market dividends are one of the most carefully watched and scrupulously analyzed types of corporate data. From an investment perspective

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dividend strategies have been attracting the attention of stock market participants as well as financial researchers and academic authors.

Existing financial literature presents rich empirical evidence about the profitability of dividend-driven trading strategies from many well established markets (Aharony and Swary 1980; Charest 1978; Filbeck and Visscher 1997; Kothari and Shanken 1997; Petit 1972; Visscher and Filbeck 2003). However, little is known about the role of dividends in the new emerging stock markets, especially those in Central and Eastern European countries.

This study deals with the stock market in Poland. In the last decade the Polish capital market has been subject to many substantial changes concerning its size, its role in the economy, the participation of foreign and domestic investors, taxation, etc. As a result, the Warsaw Stock Exchange (WSE) now ranks as a mid-sized European stock exchange and is one of the two largest in the Central and Eastern Europe.¹

The Polish market is particularly interesting for the investigation of dividend strategies because it is relatively new and there is little research on either dividends or investors' behavior in response to the release of new information contained in the dividends. Existing studies have focused mainly on the dividend policy of Polish companies and the factors influencing that policy (Duraj 2002; Sierpińska 1999), rather than on dividends as predictors of future stock market returns (Brzeszczyński and Gajdka 2005, 2006; Wypych 2004). One of the most important reasons is that equity is a new investment opportunity that did not exist in Poland before the 1990s.

The analysis in this paper contributes to the existing finance literature about dividends and dividend yield growth effects by providing evidence about the profitability of dividend yield growth strategies using data from the emerging Polish stock market. The empirical results obtained may be used for comparisons with the findings for other markets and may contribute to the formulation of more general conclusions about the informational role of dividends based on the evidence from this new, emerging economy.

The paper is organized as follows. A discussion of dividend models and strategies is presented in the second section, the research methodology is described in the third section, empirical results are reported in the fourth section, and conclusions are summarized in the last section.

Dividend Models and Strategies

Despite many economic changes in the last few decades, most corporations still face the same dividend issues, as those originally described by Lintner (1956) in the mid-1950s. Dividend policy was one of the first areas of corporate finance which was analyzed with sophisticated financial models and it has been one of the problems most often researched by leading financial experts. Yet, still much remains unexplained about the effect that cash dividends have on shareholders' wealth and other issues concerning company operations.

¹ In May 1997 it was granted designated offshore securities market status by the United States Securities and Exchange Commission. It was the first exchange in the region to achieve this status, which confirms the position of the WSE as a well regulated capital market meeting standards recognized in the USA.

The financial literature recognizes several dividend models which are sometimes divided into two general groups: the agency costs models and the signaling models (Megginson 1997). Agency cost models assume that dividend payments can be analyzed as an attempt to overcome agency problems that arise when corporate ownership and control become separated. These problems are particularly significant in large, slow growing companies that generate large quantities of free cash flow. In such firms the managers have many incentives to spend this cash flow rather than pay it out to shareholders. According to these models investors understand these incentives and pay a low price for a manager controlled firm that does not distribute its free cash flow to shareholders. They are willing to pay higher prices for companies that pay higher dividends. That is why announcements of dividend initiation or increases are associated with stock price appreciation.

According to dividend signaling models, dividends are needed to convey positive information from well informed managers to badly informed investors. Because it is a costly form of communicating information, only good companies can afford to pay dividends, and the most profitable ones, with the best prospects, will pay out the highest dividends.

The literature documents substantial empirical evidence supporting the existence of a dividend signaling effect and points out two equally important aspects of this phenomenon.

First, dividend announcements are related to future earnings of listed companies and are believed to be good predictors of their future financial performance. There is evidence that the analysis of dividend value and its change over time may provide useful information about the company's financial standing and its ability to generate cash flow in the future (Bhattacharya 1979; DeAngelo et al. 1996, 2000; Gonedes 1978; John and Williams 1985; Miller and Rock 1985; Watts 1973; Williams 1988).

Second, there is evidence that information about dividends, in particular about changes in dividends, has a direct relationship with future stock market returns. The first studies documenting this effect were conducted by Aharony and Swary (1980), Brickley (1983), Charest (1978), Kwan (1981) and Petit (1972), and they were later extended by Ambarish et al. (1987), Bajaj and Vijn (1990), Denis et al. (1994), Dhillon and Johnson (1994), Healy and Palepu (1988), and Yoon and Starks (1995), among others.

According to both the agency costs models and the signaling models, knowledge about dividends is significant for both companies and the stock market. It may also be used for stock trading purposes, possibly leading to better results than the market.

There are different ways for investors to exploit knowledge concerning dividends. As mentioned above, information about dividend changes can be a good predictor of future stock market returns. Another dividend-driven strategy is based on the selection of high dividend yield stocks, which in the American market is commonly called the "Dogs of Dow" strategy. The international evidence on this strategy's profitability is, however, rather mixed. Its application in the US market was examined by McQueen, Shields and Thorley (1997), who reported that it was generally successful although the results varied in individual sub-periods. Visscher and Filbeck (2003) analyzed a similar strategy for Canadian data and found that it did beat the market, whereas a study conducted on the UK data by Filbeck and Visscher (1997) led to the conclusion that this type of strategy did not systematically

outperform the market. A strategy focused on the selection of high dividend stocks was also investigated by Brzeszczyński and Gajdka (2005) using data from the Polish stock market. It was found that this strategy beat the market in the 10-year period (1994–2004), but that this result was obtained due to the exceptionally good performance of the high dividend paying stocks in the last two years of the 10-year sample. Also Wypych (2004) in the analysis of the Polish market found that dividend paying stocks is abnormally profitable investment.

This study deals with the use of information about dividend changes. It investigates the relevance of changes in dividends for the variability of stock prices of Polish companies. The relationship between dividend change and subsequent change in stock returns is examined by building different types of portfolios composed of the highest dividend yield growth stocks, quoted on the WSE. The empirical analysis is extended by imposing specific, additional criteria on the dividend yield growth portfolios, which leads to more restrictive selection of their constituent stocks and provides more empirical evidence about their returns dynamics over time. Specifically, this study examines the effects of exclusion of very small companies from the portfolios as well as the effects of selection based on information about individual stock's book value in relation to market price.

Methodology

Database

Information about dividends and dividend yields for all stocks listed on the stock market in Poland was collected directly from the Warsaw Stock Exchange. The database covers the period from the opening of the stock market in Poland in 1991 until the end of 2004.

It is important to mention that in the 1990s most of the companies entering the stock market in Poland were relatively new or recently privatized firms, which had existed as joint-stock companies for a very short time and therefore had not paid previously any dividends.² Most of them were not obliged in any way and were under no pressure to pay out part of their profits regularly in the form of dividends and, in fact, many of them did not do so. This is the main reason why most of the stocks in the analyzed sample do not have an uninterrupted stream of dividends for the entire sample period. The companies which did pay dividends regularly also happened to change their value significantly from year to year. Therefore the dividend policy of Polish stock market companies has been in many cases very inconsistent, yet from the research point of view it makes Polish dividend data even

² Even now many companies have not yet developed a "habit" of satisfying the shareholders by paying out dividends (e.g., in 2004 less than 25 percent of the companies quoted on the WSE paid a dividend). This distinguishes corporate behavior on the stock market in Poland from that in most of more developed markets – but it is consistent with the practices common on other emerging stock markets.

more interesting for investigating dividend driven investment strategies.³ The data-set runs from 1994, which was the first year of existence of the benchmark index WIG20, and the investigation embraces the first 10 years of annual returns from June 1994 to June 2004.

Selection of Portfolios

This investigation follows the approach of Visscher and Filbeck (2003), and June of each year was chosen for portfolio rebalancing.⁴ The portfolios were re-shuffled on the last trading day of June each year from 1994 to 2003. This means that monthly and annual returns of the portfolios were computed for the periods beginning at the end of June 1994 and finishing at the end of June 2004.

In this experiment we used data for all stocks quoted on the Warsaw Stock Exchange. The selection procedure for the dividend yield growth portfolios was as follows.

First, every June since 1994 all stocks which experienced dividend yield growth over the past year were identified. The selection criterion was the change of dividend yield (DY) indicator. The best 10 stocks constituted the “base” variant of the dividend yield growth portfolios. The first three years, i.e., 1994–1996, were an exception. In June 1994 all companies listed on the Warsaw Stock Exchange paying dividends were characterized by negative growth of the DY indicator compared to the previous year and, therefore, none of them met the selection criterion for inclusion in the portfolio. This means that the return of the portfolio for the first period, i.e., from June 1994 to June 1995, was set equal to 0. In the next 2 years, i.e., in June 1995 and 1996, only six companies increased their DY indicators, and all of them entered the portfolios. For this period the portfolios were composed of those six stocks only. In subsequent years, however, all portfolios in the “base” variant contained 10 stocks.

Second, additional selection criteria were imposed on the already built portfolios based on book value data. Small companies, which are often considered by stock market investors in Poland to be particularly risky, were excluded because of their generally inconsistent dividend policy. Additionally, the current relationship of each company’s book value to price was taken into account and the portfolios were restricted only to those stocks which have a price to book value (P/BV) ratio smaller than 1. Therefore the experiment is controlled for the size effect as well as the relative book value effect.

Third, the principle that the constituent stocks are equally weighted in all the portfolios (regardless of their number as well as the magnitude of change in the DY indicator and other factors) was adopted.

³ It is also important to mention that dividends in Poland in the analyzed period were paid with annual frequency only. The dividend tax rate for individual investors was 20 percent until 2000, 15 percent in the period 2001–2003, and 19 percent afterwards.

⁴ The intention has been to avoid the end of every calendar year, as this choice might lead to distorted results due to possible year-end speculation in stocks for tax and/or accounting reasons.

Fourth, a passive investment strategy was assumed, so the portfolios were held for exactly one year until the next June, when a new ranking of the DY growth stocks, based on the current information reported by the companies and the Warsaw Stock Exchange, was built and the portfolios were re-shuffled.

Finally, the following four portfolios, used in further empirical analysis, were obtained:

DYgrowth1 portfolio (or the “base” variant portfolio) - composed of the 10 stocks with the highest growth of the DY indicator. It is the broadest of the portfolios investigated in this study.

DYgrowth2 portfolio - consisting of stocks selected for the *DYgrowth1* portfolio with the exclusion of the smallest companies which had a book value lower than 100 mln PLN.

DYgrowth3 portfolio - consisting of the stocks selected for the *DYgrowth1* portfolio with the exclusion of the stocks having a P/BV indicator higher than 1.

DYgrowth4 portfolio - consisting of stocks meeting the selection criteria for both portfolios *DYgrowth2* and *DYgrowth3*, i.e., only big stocks with a book value higher than 100 mln PLN and having the $P/BV < 1$.

Next the compound annual returns of all four portfolios for a single year and the average annual compound returns for multiple-year periods were calculated. The annual returns for all portfolios were computed using the monthly returns and compounding them to obtain the annual returns values. Therefore, for the 1, 5, and 10-year periods, 12, 60, and 120 monthly returns were used, respectively.

The results were compared with the corresponding change of the benchmark index of the Polish blue chip companies WIG20 in all the sub-samples and the Student *t*-statistics were calculated to test significance of the differences between the portfolios' returns and the market return. Then the Sharpe ratios and Treynor indices were computed.⁵

The performance of the portfolios was also examined by reporting the returns obtained by both domestic and foreign investors (expressed in PLN and USD, respectively) from the strategies based on all four portfolios. Furthermore, the results were adjusted to simulate different levels of transaction costs. This calculation was motivated by the fact that different groups of investors have different costs when trading stocks. A small individual investor will incur a relatively higher cost in percentage terms than, for example, a large investment or pension fund. Therefore, since there is no uniform or average cost for the entire market, the returns of the portfolios were calculated taking into account various levels of hypothetical transaction costs: 0.5 percent, 1 percent, 1.5 percent, and 2 percent (as well as 0 percent for a theoretical case of no costs scenario).

⁵ We additionally compared the results for the portfolios' returns calculated without and with dividends. Interestingly, the conclusions were exactly the same, as the profits from this investment strategy were generated predominantly due to the stocks prices' appreciation while the actual dividend payments constituted only a very marginal part of those returns. More evidence on this effect is presented in a separate study in Brzeszczyński and Gajdka (2006).

Empirical Results

Tables 1 and 2 report the annual and multi period compound returns, the values of the t -statistics and the winning portfolio in each period. The annual returns of the portfolios and the WIG20 index are also shown in Fig. 1, while Fig. 2 illustrates the portfolios' returns and the market returns for 5-year periods.

The results clearly indicate that in the entire sample of 10 years, three out of four portfolios have obtained a better result than the WIG20 index. The "base" variant portfolio (*DYgrowth1*) gives higher returns than the market in five single year periods and two 5-year periods. The average compound annual return for the whole period of 10 years is 16.18 percent, compared to 12.11 percent for the WIG20 index.

The best results were achieved by the *DYgrowth2* portfolio, which excludes small companies stocks. It has beaten the market in six single year periods and, uniquely, in all the 5-year periods. The average compound annual return for the 10-year period is also much higher than in case of other portfolios, and it amounts to 48.70 percent. It is nearly four times as high as the market return. The *DYgrowth2* portfolio is also the only portfolio for which the average annual return for all 5-year periods is always positive (see, in particular, Fig. 2).

The portfolios *DYgrowth3* and *DYgrowth4* performed less well over the entire period; however they produced exceptionally outstanding results in the last two sub-periods (2002–2003 and 2003–2004). This is confirmed by the significance of the t -statistic in those years.

All portfolios share one interesting characteristic: they generated much poorer results at the beginning of the analyzed period but they improved over time. This finding might indicate that dividends started to play a more important role on the Polish stock market in the 2000s than before. A similar conclusion can be drawn about the role of the P/BV indicator, based on the exceptionally good results in later years of portfolios *DYgrowth3* and *DYgrowth4*.

Table 3 presents the values of the Sharpe ratios, which also show that the dividend yield growth portfolios performed better in the end of the sample. In the final 5-year period, from 1999 to 2004, all four portfolios have higher Sharpe ratio than the WIG20 index. Again, the best results were obtained by the portfolio *DYgrowth2*, which is the only portfolio with a positive value for its Sharpe ratio (equal to 0.81) over the whole sample 1994–2004. It also beats the market in all other multiple-year periods and in most of single year periods. Similar conclusions are revealed by the analysis of the Treynor index values in Table 4. They confirm the same pattern: the dividend yield growth portfolios perform better than the market after the year 2000 and the *DYgrowth2* portfolio consistently gives the best results throughout the entire sample period.

The rates of return for the entire 10-year investment horizon are presented in Table 5. It indicates that all four portfolios have made a profit; however, only in case of the first two of them is the return higher than the corresponding change of the WIG20 index. As in Visscher and Filbeck (2003), the investment strategy was simulated by assigning 100,000 units of the domestic currency (Polish zloty, PLN) at the start of the investment period in June 1994 to every portfolio, and its value was calculated after 10 years with rebalancing at the end of each year. The value of the best portfolio, *DYgrowth2*, in June 2004 increased by 486.99 percent in the zero-

Table 1 Returns for single year holding periods (June-to-June): Portfolios $DY_{growth1}$, $DY_{growth2}$, $DY_{growth3}$ and $DY_{growth4}$

	Single Year Holding Periods (1-year returns, June-to-June)										
	1994–1995	1995–1996	1996–1997	1997–1998	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003	2003–2004	
WIG20	8.82%	69.55%	3.41%	8.31%	0.68%	22.92%	-36.37%	-4.32%	2.93%	37.92%	
DYgrowth1 Portfolio Winner	-	36.33%	10.03%	-8.19%	1.08%	3.86%	-17.97%	-18.56%	77.08%	53.09%	
<i>t</i> -statistic	-	-1.800 **	0.329	-1.268	-0.071	-0.518	0.916	-0.716	2.538 **	0.809	
DYgrowth2 Portfolio Winner	-	66.83%	45.08%	-9.05%	1.88%	9.06%	-12.81%	27.13%	34.80%	60.62%	
<i>t</i> -statistic	-	-0.208	1.621 *	-0.984	0.216	-0.411	1.180	1.184	1.464 *	1.230	
DYgrowth3 Portfolio Winner	-	-	-10.89%	-9.05%	0.98%	-0.16%	-8.67%	-16.23%	77.08%	75.73%	
<i>t</i> -statistic	-	-	-0.350	-0.985	-0.063	-0.551	1.365 *	-0.717	2.538 **	1.413 *	
DYgrowth4 Portfolio Winner	-	-	-	-9.05%	7.93%	-12.96%	-12.81%	15.56%	34.80%	75.73%	
<i>t</i> -statistic	-	-	-	-0.985	0.389	-0.854	1.180	0.887	1.464 *	1.413 *	

**Significant at the 0.05 level

*Significant at the 0.01 level

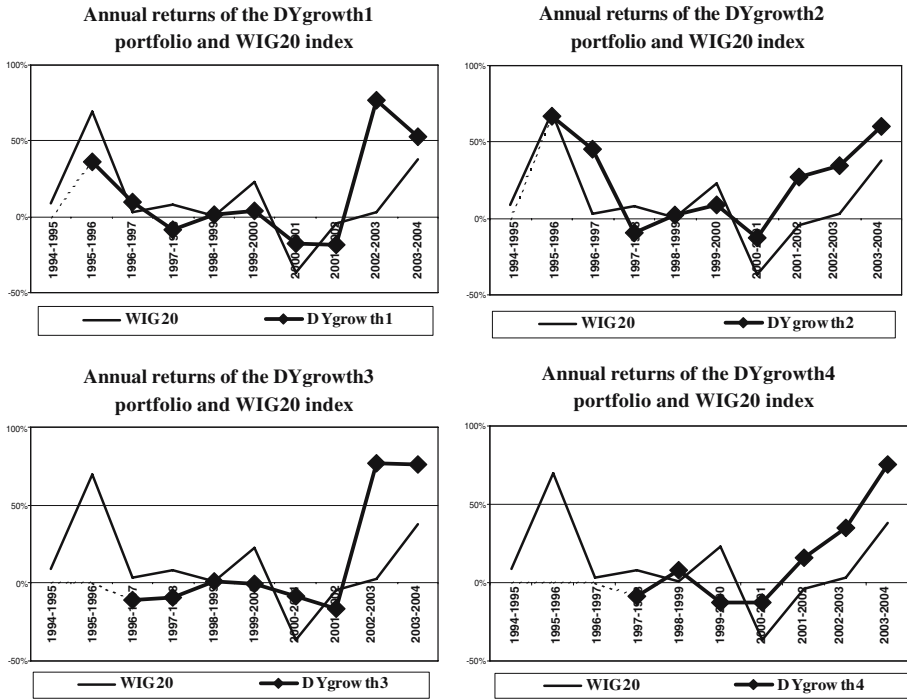
The *t*-Statistic was calculated based on the paired difference test.

Table 2 Returns for multiple-year holding periods (5- and 10-year returns, June-to-June): Portfolios *DYgrowth1*, *DYgrowth2*, *DYgrowth3* and *DYgrowth4*

	5-Year Holding Periods (5-year returns, June-to-June)					10-Year Holding Period (10-year returns, June-to-June)	
	1994–1999	1995–2000	1996–2001	1997–2002	1998–2003	1999–2004	1994–2004
WIG20	21.61%	27.00%	-2.36%	-3.68%	-4.49%	1.25%	12.11%
DYgrowth1 Portfolio Winner	7.84%	8.92%	-2.60%	-7.12%	4.84%	17.62%	16.18%
<i>t</i> -statistic	WIG20	WIG20	WIG20	WIG20	DYgrowth1 Portfolio	DYgrowth1 Portfolio	DYgrowth1 Portfolio
	-0.782	-0.918	-0.134	-0.572	0.517	0.821	0.139
DYgrowth2 Portfolio Winner	24.86%	28.92%	5.57%	2.40%	13.20%	32.34%	48.70%
<i>t</i> -statistic	DYgrowth2 Portfolio	DYgrowth2 Portfolio	DYgrowth2 Portfolio	DYgrowth2 Portfolio	DYgrowth2 Portfolio	DYgrowth2 Portfolio	DYgrowth2 Portfolio
	-0.002	0.174	0.693	0.575	1.197	1.598 *	0.882
DYgrowth3 Portfolio Winner	-3.63%	-3.66%	-5.07%	-5.97%	7.32%	27.54%	9.46%
<i>t</i> -statistic	WIG20	WIG20	WIG20	WIG20	DYgrowth3 Portfolio	DYgrowth3 Portfolio	DYgrowth3 Portfolio
	-1.245	-1.425 **	-0.262	-0.360	0.662	1.230	-0.355
DYgrowth4 Portfolio Winner	-0.37%	-2.91%	-5.10%	-2.78%	5.52%	21.55%	10.39%
<i>t</i> -statistic	WIG20	WIG20	WIG20	DYgrowth4 Portfolio	DYgrowth4 Portfolio	DYgrowth4 Portfolio	WIG20
	-1.002	-1.305 *	-0.120	0.236	0.835	1.120	-0.202

**Significant at the 0.05 level
 *Significant at the 0.01 level
 The *t*-Statistic was calculated based on the paired difference test.



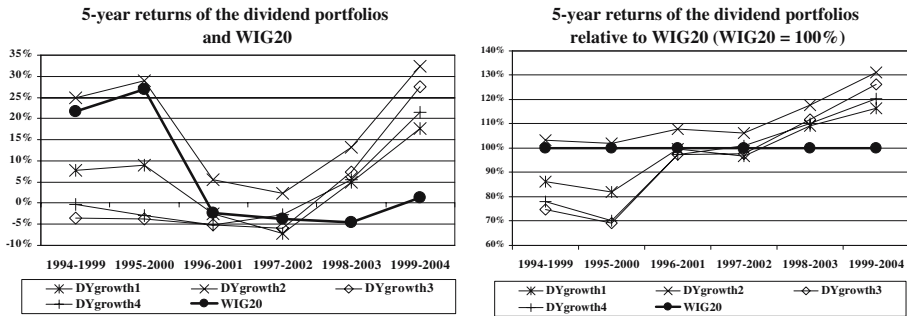


Source: Warsaw Stock Exchange (WSE) and own calculations.

Fig. 1 Returns of the dividend yield growth portfolios and the WIG20 index in years 1994–2004

costs scenario and it reached almost 400 percent when the highest assumed transaction cost of 2 percent p.a. was taken into account. The increase of the WIG20 index in the same period of time was 121.07 percent, which corresponds to a terminal wealth of 221,077 PLN (starting from 100,000 PLN in 1994).

The hypothetical returns from the point of view of the foreign investors were calculated in USD and were adjusted by the change in the PLN/USD currency rate.



Source: Warsaw Stock Exchange (WSE) and own calculations.

Fig. 2 Multiple-period 5-year returns of the dividend yield growth portfolios and the WIG20 index and the returns of the dividend yield growth portfolios relative to the WIG20 index (WIG20=100%) in years 1994–2004

If the same amount of 100,000 PLN was invested by exchanging USD into the PLN, the foreign investor would have to spend 41,667 USD in 1994 (the PLN/USD rate in June 1994 was 2.4). After 10 years, the value of the best performing portfolio (*DYgrowth2*) would translate into 380,751 USD (a return of 280.75 percent) in the no-transaction costs case (the PLN/USD rate in June 2004 was 3.7). However an investment in the poorest performing portfolio (*DYgrowth3*) and transaction costs of 2 percent p.a. would end up with a return close to zero.

Interesting results arise from investigation of the portfolios' composition in every year, i.e. analysis of the types of stock entering the dividend yield growth portfolios in every re-balancing period. It appears that at the beginning of the sample in the mid-1990s there was a high proportion of bank stocks, which completely disappeared in subsequent years. After the year 2000 they are replaced by smaller, non-financial companies.

The results clearly show that an investment strategy based on the change in dividend yield has been successful and that its performance has significantly improved over time. The highest returns on all the portfolios in absolute terms and relative to the WIG20 index were obtained in the more recent years, i.e., after the year 2000. This is consistent with the results from Brzeszczyński and Gajdka (2005) for portfolios built using the DY indicator only.

A similar conclusion can be drawn, although indirectly, about the P/BV ratio, which constituted an additional selection criterion for the portfolios. These findings may indicate that the fundamental data started to play an increasingly important role in the analysis and investment decisions of the investors in the Polish stock market.

A possible explanation for this phenomenon can be attributed to recent changes in the structure of investors in Polish stock market, i.e., the growing importance of institutional relative to individual investors. This is due to the following two reasons. First, in May 1999 a new group of market participants emerged as a result of pension system reform in Poland. Since that time several big pension funds have been active in the Polish stock market. They play a significant role, as they generate over 30 percent of the total market volume. Second, the accession of Poland to the European Union (EU) and the liberalization of capital flows have generated an increased interest in Polish stocks from international investment funds. These two factors are believed to be responsible for the structural change on the stock market in Poland and could have contributed to the growing role of institutional investors relative to individuals in the period after 1999. This situation is likely to explain the increasing significance of the fundamental data, in particular information about dividends and their dynamics and about companies' book value.

Another reason why the highest returns in all portfolios came after the year 2000 may lie in the relative attractiveness of the dividend yield as compared with the risk free rate of interest. Until 2001 the risk free rate for the Polish market was higher than the average dividend yield for entire market, and for the 10 stock portfolios with the highest dividend yields as well. However, after 2000 the risk free rate decreased whereas the dividend yields, particularly for the stocks with the highest dividends, increased. Since then dividend yields in Poland have remained higher than risk free rates.

As long as risk free rate was high and the dividend yield relatively low, the dividend yield growth strategy turns out to have been non-profitable. It started being attractive

Table 3 Sharpe ratios for single and multiple-year holding periods (1-, 5- and 10-year returns, June-to-June.): Portfolios *DYgrowth1*, *DYgrowth2*, *DYgrowth3* and *DYgrowth4*

Period	Single Year Holding Periods												5-Year Holding Periods					10-Year Holding Period									
	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	
WIG20	0.03	0.93	-0.47	-0.21	-0.09	0.35	-1.98	-0.27	-0.03	1.12	0.21	0.38	-0.9	-0.83	-0.78	-0.34	-0.03										
DYgrowth1 Portfolio	-	0.45	-0.11 [†]	-0.72	-0.18	-0.24	-2.32	-2.38	1.86 [†]	1.63 [†]	-0.65	-0.36	-1.16	-1.77	-0.37 [†]	0.46 [†]	-0.20										
DYgrowth2 Portfolio	-	0.96 [†]	0.90 [†]	-0.53	0.11 [†]	-0.10	-0.61 [†]	0.62 [†]	0.97 [†]	1.86 [†]	0.24 [†]	0.48 [†]	-0.22 [†]	-0.28 [†]	0.31 [†]	1.01 [†]	0.81 [†]										
DYgrowth3 Portfolio	-	-	-0.56	-0.53	-0.17	-0.36	-1.45 [†]	-1.29	1.86 [†]	1.84 [†]	-1.45	-1.14	-1.15	-1.36	-0.17 [†]	0.86 [†]	-0.47										
DYgrowth4 Portfolio	-	-	-	-0.53	0.22 [†]	-0.93	-0.61 [†]	0.27 [†]	0.97 [†]	1.84 [†]	-1.04	-0.98	-0.91	-0.53 [†]	0.03 [†]	0.64 [†]	-0.26										

The Sharpe ratio was calculated based on the formula: $S = (d_t / S_{d_t}) \cdot \sqrt{n}$, where d_t is the mean monthly difference between the portfolio (or market) return and the risk-free return computed for n equal to 12, 60, or 120 months, respectively, and S_{d_t} is the sample standard deviation of the monthly differences of returns. The risk-free rate for the Polish market is the return of the 13-week Polish government treasury bill (rf_t); its monthly value for each month t was obtained using the following formula: $\sqrt[12]{1 + rf_t} - 1$ (where rf_t is the risk-free annual return obtained for every month).
 Bold numbers indicate positive value of Sharpe ratios.
[†] indicates the result better than the market.

Table 4 Treynor index values for single and multiple-year holding periods (1-, 5- and 10-year returns, June-to-June): Portfolios *DYgrowth1*, *DYgrowth2*, *DYgrowth3* and *DYgrowth4*

Period	Single Year Holding Periods												5-Year Holding Periods						10-Year Holding Period	
	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	1994-1999	1999-2004	2004-2009	1994-1999	1999-2004	2004-2009		
WIG20	0.006	0.117	-0.034	-0.021	-0.010	0.036	-0.162	-0.028	-0.002	0.089	0.026	0.039	0.039	-0.083	-0.074	-0.030	-0.003	-0.003		
BETA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
DYgrowth1 Portfolio	-	0.059	-0.012 [†]	-0.076	-0.031	-0.033	-0.356	-0.367	0.191 [†]	0.146 [†]	-0.144	-0.055	-0.191	-0.317	-0.076	0.076 [†]	-0.039	-0.039		
BETA	-	0.74	0.90	0.91	0.59 [#]	0.59 [#]	0.28	0.24	0.84	0.81	0.38	0.60	0.51	0.41	0.36	0.44	0.44	0.40		
DYgrowth2 Portfolio	-	0.128 [†]	0.102 [†]	-0.055	0.020 [†]	-0.008	-0.075 [†]	0.081 [†]	0.092 [†]	0.165 [†]	0.052 [†]	0.070 [†]	-0.033 [†]	-0.044 [†]	0.050 [†]	0.138 [†]	0.146 [†]	0.146 [†]		
BETA	-	0.85	0.63	1.16	0.87	0.88 [#]	0.89	0.59	0.86	0.80	0.50	0.77	0.74	0.72	0.65	0.61	0.53	0.53		
DYgrowth3 Portfolio	-	-	-0.062	-0.055	-0.024	-0.041	-0.224	-0.169	0.192 [†]	0.181 [†]	-0.470	-0.258	-0.205	-0.245	-0.035 [†]	0.141 [†]	-0.119	-0.119		
BETA	-	-	1.06	1.16	0.73 [#]	0.73 [#]	0.30	0.45	0.84	0.91	0.26	0.41	0.54	0.47	0.37	0.48	0.33	0.33		
DYgrowth4 Portfolio	-	-	-	-0.055	0.038 [†]	-0.077	-0.075 [†]	0.034 [†]	0.092 [†]	0.181 [†]	-0.316	-0.217	-0.150	-0.082 [†]	0.005 [†]	0.096 [†]	-0.058	-0.058		
BETA	-	-	-	1.16	0.97	0.93 [#]	0.88	0.82	0.86	0.91	0.29	0.43	0.64	0.74	0.68	0.63	0.40	0.40		

The Treynor index was calculated based on the formula: $T = (d_1/\beta) \cdot \sqrt{n}$, where d_1 is the mean monthly difference between the portfolio (or market) return and the risk-free return computed for n equal to 12, 60, or 120 months, respectively, and β is the portfolio's beta (market beta is equal to 1).

Bold numbers indicate positive value of Treynor index.

indicates sub-periods where the estimate of the beta parameter was not statistically significant (in those cases the approximation of the beta value was calculated as the arithmetic average of the neighbouring periods betas, which were statistically significant).

† indicates the result better than the market.

Table 5 Returns of the dividend yield growth portfolios and the WIG20 index in years 1994–2004 (in PLN and USD)

	Return in PLN				Return in USD					
	Transaction Costs				Transaction Costs					
	0%	0.5%	1%	1.5%	2%	0%	0.5%	1%	1.5%	2%
WIG20	121.08%	110.78%	100.91%	91.45%	82.39%	43.40%	36.72%	30.32%	24.18%	18.31%
DYgrowth1 Portfolio	161.85%	149.86%	138.37%	127.35%	116.79%	69.85%	62.07%	54.62%	47.47%	40.62%
DYgrowth2 Portfolio	486.99%	462.28%	438.49%	415.62%	393.61%	280.75%	264.72%	249.29%	234.45%	220.18%
DYgrowth3 Portfolio	94.56%	85.39%	76.60%	68.19%	60.14%	26.20%	20.25%	14.55%	9.10%	3.88%
DYgrowth4 Portfolio	103.94%	94.46%	85.38%	76.67%	68.34%	32.29%	26.14%	20.24%	14.60%	9.19%

Returns in bold indicate the result, which is better than the returns from the benchmark index WIG20.

when dividend yields increased and risk free rates decreased. Also, the introduction in 2002 of an income tax on the interest from Treasury bills, bonds, notes and bank deposits for individual investors additionally diminished the relative attractiveness of interest income compared to dividend income (which started being taxed earlier).⁶

Conclusions

The empirical evidence presented in this study supports the hypothesis that portfolios composed of stocks exhibiting the highest increase of the dividend yield over the previous year can beat the benchmark WIG20 index. The results demonstrate the importance of dividends as one of the most significant items of fundamental information about stock market companies. At the same time, they show that a dividend strategy is most successful when selection of stocks for the dividend yield growth portfolios is subject to further restrictions, most notably concerning the size of the companies.

However, it is important to recognize that the dividend yield growth portfolios have not been systematically better than the index, which makes it difficult to formulate an unequivocal conclusion about the overall profitability of dividend-driven strategies in the Polish stock market in the entire analyzed sample period.

The return achieved on any stock market investment eventually depends on the level of the transaction costs, which can vary across different groups of investors. As demonstrated in this study, the costs of re-shuffling portfolios can also substantially affect the final results.

Acknowledgements We would like to thank Seth Armitage, Martin Bohl, David Brown, Ian Hirst, and the participants of the International Atlantic Economic Society conference, October 6–9, 2005, New York, NY for helpful comments on an earlier version of this paper.

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⁶ A stock capital gains tax for individual investors investing on the WSE was introduced in 2004.

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