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Combining Mean-Reversion of Sales Growth and Low Valuation Multiples into Single Investment Strategy

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Many researchers found that investing in stocks with low / high valuation multiples generates above-average / below-average long-term returns. At the same time the abundant research confirms that corporate sales growth and profitability are strongly mean-reverting, but stock markets seem to neglect this mean-reversion. This creates investment opportunities for those market participants who are aware of that phenomenon. We compared profitability of investment strategies based on valuation multiples and corporate sales growth on the Polish stock market in the period between 1999 and 2011. The simple strategies of investing in 20% stocks with the lowest / highest multiples generated above-average / below-average returns. At the same time the average return of low sales growth stocks significantly surpassed the return of high sales growth stocks. However, combining low / high multiples with low / high sales growth into two-factor strategies generates returns that are higher / lower than the returns of any single-factor strategy.

JEL Codes: G11 and C21

1. Introduction

The researchers found that relative values of valuation multiples (e.g. price-to-earnings or price-to-book-value) are informative about relative future stock returns. Specifically, long-term returns of different stock portfolios formed on the basis of multiples are negatively correlated with those portfolios' average values of multiples. This means that investing in stocks with low / high multiples generates above-average / below-average long-term returns. This is often interpreted as the evidence that markets tend to overvalue stocks with high multiples ("growth stocks") and to undervalue stocks with low multiples ("value stocks"). It is argued that this tendency to overvalue / undervalue stocks with high / low multiples stems from the investors' over-extrapolation of corporate historical financial results too far into the future.

The researchers also found that corporate financial results are characterized by mean-reversion. This means that companies which in any period show above-average / below-average results (as measured by e.g. sales or earnings growth) in the future tend to experience deterioration / improvement of those results toward economy-wide average levels. At the same time this mean-reversion seems to be unknown or neglected by markets. The result is the over-optimism / over-pessimism embedded in the earnings forecasts produced for companies with above-average / below-average historical earnings growth. In other words, investors tend to overestimate / underestimate future growth prospects of companies with relatively fast / slow historical growth.

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All this means that if at the same time:

- expected growth rates of earnings are positively correlated with historical growth,
- investors over-extrapolate past growth too far into the future,
- expected growth is positively correlated with valuation multiples,

then the stocks with high / low multiples should generate below-average / above-average returns (because high / low multiples stocks tend to provide negative / positive earnings surprises). Indeed, abundant research corroborates the negative relationship between portfolios' average multiples and their long-term returns.

Similarly, if investors overestimate / underestimate future growth of companies with above-average / below-average historical growth, then the portfolios composed of stocks with relatively high / low past growth should generate below-average / above-average returns. Indeed, our previous research shows that investing in Polish stocks with relatively fast / slow sales growth generates relatively low / high long-term returns.

The empirical question that we examine in this paper is whether two-factor portfolios, that are formed on the basis of information about multiples as well as information about past growth (proxied by last-year sales growth), generate returns different than portfolios based on single factors (i.e. on multiples or growth alone). Specifically, we test whether the portfolios composed of 20% stocks with the highest multiples and with above-average last-year sales growth generate returns that are lower than returns of portfolios based on any of the individual criteria (i.e. high multiples or high sales growth alone). We also explore the alternative strategy, i.e. we test whether the portfolios composed of 20% stocks with the lowest multiples and with below-average last-year sales growth generate returns that are higher than returns of portfolios based on any of the individual criteria. Putting it together, we examine the hypothesis according to which the information in past sales growth about future stock returns is incremental to the information embedded in multiples.

The remainder of the paper is organized as follows. In the next section we discuss the relevant literature. Next the data and methodology used in the study are described. Then the section that presents the empirical results follows. The paper closes with concluding comments.

2. Literature Review

The efficient market theory argues that "the market takes into account all information that is relevant to the valuation of assets when setting the price (such as earnings estimates, management team skill, industry conditions, estimated demand, etc.), and thus it is nothing but a big waste of time and money to try to outsmart the market" (Jones, 2008). This constitutes the fundament of so-called index investing, focused on trying to replicate the returns of the market instead of trying to beat it (Malkiel, 2007). However, this theory is in contrast with abundant research indicating that using simple strategies such as buying stocks with low values of multiples can in the long-run generate returns significantly exceeding returns of the market as well as returns of more sophisticated strategies (Basu, 1977; Goodmann, Peavy, 1985; Dreman, 1998; Fama, French, 1998; Lewellen, 2002; Damodaran, 2004; O'Shaughnessy, 2005; Bildik, Gulay, 2007; Siegel, 2008; Adam, Goyal, 2009).

Indeed, the focus on low multiples constitutes the core concept of so-called “value-investing”, popularized as long ago as in the first half of the previous century (Graham, Dodd, 1934; Greenwald, Kahn, Sonkin, van Biema, 2001; Graham, 2006).

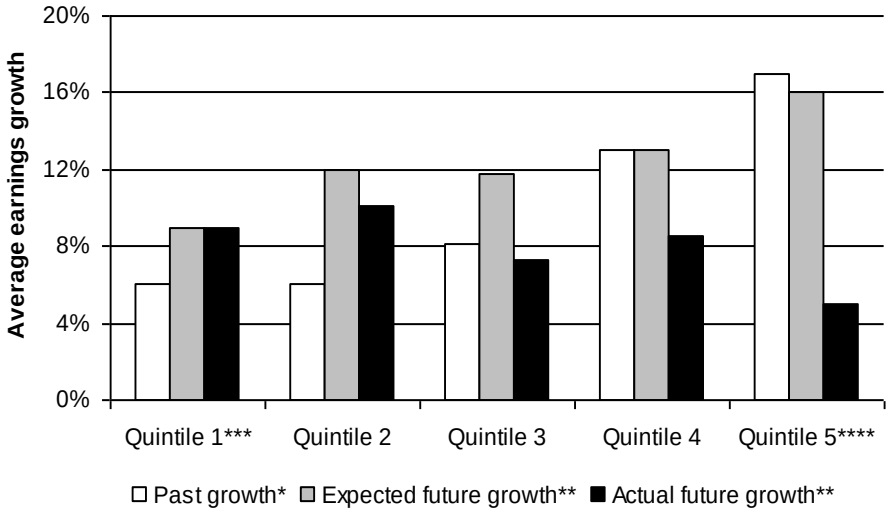
It seems that this supremacy of low-multiples strategies over strategies based on stocks with high multiples stems from investors’ neglect of mean-reversion of corporate earnings. Abundant research shows that the characteristic feature of corporate financial results is a long-term reversion of those results toward the economy-wide average levels (Mueller, 1990; Fama, French, 1999; Keil, Smith, Smith, 2004; Bajaj, Denis, Sarin, 2005; Murstein, 2003). One research, based on five decades of data, showed that only 10% of large U.S. companies had increased their earnings by 20% for at least five consecutive years, only 3% had grown by 20% for at least 10 years straight, and not a single one had done it for 15 years in a row (Zweig, 2001). This mean-reversion is at least partially caused by mean-reversion of sales growth. This means that the companies that in a given period show above-average / below-average sales growth in the following periods express the tendency to show slower / faster growth. Palepu, Healy and Bernard confirm this on the basis of the American data, stating that “sales growth rates tend to be mean-reverting: firms with above-average or below-average rates of sales growth tend to revert over time to a “normal” level (historically in the range of 7 to 9 percent for U.S. firms) within three to ten years” (Palepu, Healy, Bernard, 2004). In our previous studies we also confirmed the tendency of Polish companies’ sales growth and net profitability to revert toward the mean (Welc, 2010; Welc, 2011a).

However, despite this evidence, mean-reversion seems to be neglected by analysts. One research found that the consequence of this is the fact that the most optimistic and most pessimistic earnings forecasts are usually too optimistic and too pessimistic and the forecasts’ accuracy can be improved by shrinking them toward the mean (Keil, Smith, Smith, 2004). Research by Chan, Karceski and Lakonishok (2003) confirms that analysts do rather poor job of forecasting earnings and they do not fully allow for the mean-reversion. Research in the field of behavioral finance finds that analysts and investors get mentally trapped in “anchoring bias”, causing them to overweigh the significance of recent observations when forming expectations about the future (Pompian, 2006). Montier (2009) states that in the USA in 1985-2007 period the growth stocks were expected to grow its future earnings by around 17% per annum on average (compared to the average growth of 16% in the prior five years) but the actual delivered future growth of those companies’ earnings was only 7% per annum on average. Even more staggering results were obtained for European markets, where in 1985-2007 growth stocks were expected to increase earnings by 16% per annum (compared to the historical growth of 17%) but the actual future growth delivered was only about 5% per annum. This is shown on Figure 1.

As can be seen, there is *positive* correlation between earnings’ past growth and expected growth, *negative* correlation between earnings’ past growth and actual future growth and *negative* correlation between earnings’ expected growth and actual future growth. The companies with above-average / below-average growth in prior five years are also expected to show above-average / below-average growth in the following years (hence the prior trends are to the large extent extrapolated into the future). But the reality is just the opposite: companies with above-average / below-average growth in prior five years experience below-average / above-average growth

in the following years. This creates some kind of "scissors effect": companies that provide the highest actual earnings growth are those that were expected to provide rather below-average growth (1st and 2nd quintile on Figure 1) and companies that provide the slowest actual growth are those that were expected to provide the fastest growth (5th quintile on Figure 1). Because of this one should avoid investing in companies that are expected to provide high earnings growth (due to high probability of negative earnings surprises) and instead should look for the companies that are expected to provide below-average growth (because the odds are that those companies will surprise positively). And what's equally important: due to the positive correlation between historical growth and expected growth one should avoid investing in companies that provided highest growth in the recent past and look for the companies that experienced below-average earnings growth in prior few years.

Figure 1: Earnings growth of European public companies in 1985-2007: past growth, expected future growth and actual future growth.



** average earnings growth in the last five years*
*** average in the following five years (after the time the forecasts are formed)*
****, **** companies sorted and divided into quintiles on the basis of price-to-book-value (P/BV) multiple; quintile 1 embraced 20% of companies with the lowest P/BV multiple (so called "value stocks") and quintile 5 embraced 20% of companies with the highest P/BV multiple (so called "growth stocks")*
Source: Montier (2009).

What seems to be equally important, corporate market values are formed on the basis of expectations. That's why growth stocks (i.e. stocks with relatively fast past and expected growth) tend to be over-valued (because their actual future earnings tend to lag behind expectations) and value stocks (i.e. stocks with below-average past and expected growth) tend to be under-valued (because their actual future earnings tend to surprise positively). This contention is supported by Figure 1, where we can see that there is positive correlation between portfolios' P/BV multiples and portfolios' past and expected earnings growth. Companies with slow / fast historical and expected growth are also characterized by low / high values of P/BV multiple (Quintile 1 and Quintile 5, respectively). But the relationship between P/BV multiples and future actual growth is evidently negative. Probably that is the most important reason staying behind the supremacy (as regards the long-term returns) of low-multiples portfolios over the high-multiples ones.

The research related to profitability of variuos investment strategies on the Polish stock market is relatively limited. This is so because the Warsaw Stock Exchange operates only since the beginning of the 1990s (and it was featured by limited number of listed companies until the second half of the 1990s). However, some research is already available. Czekaj (2006) found that buying new issued stocks (IPOs) on the first day of their quotation and holding them for three years turns out to be an unsuccessful investment strategy in Poland. Porcenaluk (2006) found the small effectiveness of the Analysts' Sentiment Index in predicting future stock returns. Sekula (2011) discovered that in 1999-2009 the abnormal returns were generated by companies with above-average EBIT growth. Czapiewski (2011) explored the wide range of fundamental ratios and found that most of them are useful in discriminating between undervalued and overvalued Polish stocks. In our previous research we confirmed that investing in Polish stocks with low / high multiples generates above-average / below-average returns (Welc, 2011b). Our research also found that in the case of Polish stock market investing in stocks with the fastest / slowest past sales growth generates below-average / above-average returns (Welc, 2011c). In this paper we contribute to the available research by combining both criteria into enriched investment strategy. We test the hypothesis according to which the information in past sales growth about future returns is incremental to the information embedded in multiples.

Because growth is often expressed by sales growth (instead of earnings), we focus on net sales growth. This is beneficial for the sample size and distribution because sales are always positive (except for small number of companies), opposite to earnings. This makes growth computations possible for every company and results in much smaller number of outliers.

3. The Methodology and Data

Our research embraced twelve-year period between February 1999 and February 2011. Although the Warsaw Stock Exchange operates since the beginning of the 1990s we omitted all the years before 1999 due to the small number of then listed companies. Because multiples show long-term tendency of mean-reversion (White, Sondhi, Fried, 2003) we assumed annual rebalancing of all the portfolios.

In our research we used price-to-earnings (P/E) and price-to-book-value (P/BV) multiples. The stock prices data were obtained from *money.pl*, and historical financial results were obtained from *Notoria Serwis*. At the end of February of each year we sorted all the companies in order of decreasing values of a given multiple and then we divided the stocks into five portfolios so that the first portfolio embraced 20% of companies with the highest multiples (growth stocks) and the fifth portfolio comprised 20% of companies with the lowest multiples (value stocks). We computed the multiples at the end of February in order to allow for the time lag between the end of the previous year and the time when all the quarterly reports concerning that year are available. We computed the multiples for all the companies for which all the necessary data were available and for which the calculation of a given multiple makes economic sense. Due to significant accounting differences we omitted all the financial companies as well as The National Investment Funds. The summary statistics of the multiples are presented in Table 1 and Table 2.

Table 1: Summary Statistics for P/E* Multiple.

Multiples at the end of:	Number of observ.**	Maximum / minimum	Arithmetic average	Median	Standard deviation	Coefficient of variation***
Feb 1999	106	182,3 / 1,4	13,3	8,0	20,0	150,8%
Feb 2000	101	536,1 / 3,9	24,8	11,2	56,8	229,2%
Feb 2001	85	407,2 / 1,9	22,9	9,5	54,2	236,7%
Feb 2002	67	3.639,7 / 0,1	95,0	15,2	458,5	482,6%
Feb 2003	78	740,0 / 0,5	28,1	11,4	84,7	301,8%
Feb 2004	97	1.187,1 / 2,3	42,3	18,6	126,3	298,3%
Feb 2005	119	856,5 / 0,7	32,7	14,0	84,0	257,3%
Feb 2006	141	2.070,8 / 3,3	55,4	18,7	197,9	357,4%
Feb 2007	155	1.473,7 / 3,0	64,5	23,7	171,3	265,7%
Feb 2008	230	14.019,7 / 0,0	92,4	17,8	925,5	1001,7%
Feb 2009	212	182,3 / 0,0	16,2	9,5	23,4	144,8%
Feb 2010	185	736,7 / 2,4	38,0	16,7	78,7	206,9%

** stock price at the end of February divided by net earnings per share in the previous calendar year*
*** all the companies with negative earnings were omitted*
**** standard deviation divided by arithmetic average*
Source: money.pl; Notoria Serwis; author's calculations.

Table 2: Summary Statistics for P/BV Multiple.**

Multiples at the end of:	Number of observ.**	Maximum / minimum	Arithmetic average	Median	Standard deviation	Coefficient of variation***
Feb 1999	128	5,5 / 0,2	1,0	0,7	1,0	97,8%
Feb 2000	146	18,2 / 0,3	1,7	0,9	2,5	152,7%
Feb 2001	134	12,7 / 0,2	1,2	0,7	1,5	129,6%
Feb 2002	127	5,4 / 0,2	1,0	0,7	0,9	86,4%
Feb 2003	121	4,5 / 0,1	0,9	0,7	0,8	88,0%
Feb 2004	130	62,6 / 0,4	1,9	1,5	2,0	104,8%
Feb 2005	137	12,5 / 0,5	2,2	1,7	2,0	88,9%
Feb 2006	172	25,0 / 0,5	2,9	2,0	2,6	90,3%
Feb 2007	179	23,2 / 0,0	3,8	2,9	3,6	94,1%
Feb 2008	256	18,9 / 0,2	2,7	2,0	2,2	83,7%
Feb 2009	298	12,4 / 0,0	1,4	0,7	3,6	265,5%
Feb 2010	291	13,8 / 0,1	1,7	1,3	1,5	89,6%

** stock price at the end of February divided by shareholders equity' book value per share at the end of previous calendar year*
*** all the companies with negative shareholders equity were omitted*
**** standard deviation divided by arithmetic average*
Source: money.pl; Notoria Serwis; author's calculations.

As the data show, in all the analyzed years there was considerable inter-company differentiation in terms of the multiples' values. It's noteworthy that in the case of both multiples the arithmetic average significantly exceeded the median in all the periods. This suggests that the distributions of both multiples are skewed and far from normal and there are plenty of outliers with unusually high multiples.

In order to verify the usefulness of multiples in detection of overvalued and undervalued stocks we treated all portfolios as alternative investment strategies. We assumed that buying stocks from the first portfolio is equivalent to strategy of investing in 20% most overvalued stocks and buying stocks from the fifth portfolio is equivalent to strategy of investing in 20% most undervalued stocks. Because in most cases the sample didn't divide equally by five we adjusted the number of stocks in the last portfolio. Within all the portfolios the equal weights for all the stocks were applied.

Then we computed the average returns of portfolios formed on the basis of corporate sales growth. At the end of February of each year we divided all the companies into five quintiles based on the criterion of sales growth in the previous year. We sorted all the companies in order of decreasing growth and then we divided them into quintiles in such a way that the first quintile embraced 20% companies with the highest sales growth and the fifth quintile embraced 20% companies with the lowest growth. Because in most cases the whole sample didn't divide equally by five we adjusted the number of stocks in the last portfolio. The summary statistics computed for sales growth are presented in Table 3.

Table 3: Summary statistics for sales growth*.

Period	Number of observ.	Maximum / minimum	Arithmetic average	Median	Standard deviation	Coefficient of variation**
1998	128	6,5 / 0,6	1,3	1,1	0,8	61,3%
1999	139	3,9 / 0,4	1,1	1,1	0,4	33,4%
2000	136	4,6 / 0,2	1,2	1,1	0,5	39,5%
2001	133	12,3 / 0,4	1,2	1,0	1,1	93,5%
2002	132	2,2 / 0,1	1,0	1,0	0,3	30,3%
2003	128	2,8 / 0,1	1,1	1,1	0,3	29,2%
2004	136	6,4 / 0,5	1,2	1,2	0,6	47,4%
2005	182	14,2 / 0,1	1,3	1,1	1,2	97,0%
2006	179	4,0 / 0,3	1,3	1,2	0,4	32,8%
2007	259	16,1 / 0,1	1,6	1,3	1,4	86,4%
2008	294	13,9 / 0,2	1,3	1,2	0,9	69,9%
2009	291	8,0 / 0,0	1,1	1,0	0,7	66,6%

** net sales in a given year divided by net sales in the previous year*
*** standard deviation divided by arithmetic average*
Source: Notoria Serwis; author's calculations.

As the data show, in all the years there was considerable inter-company differentiation in terms of sales growth. The coefficient of variation changed from year to year and lied in the range between 29.2% and 97%. In all the years except for 2002-2003 the arithmetic average exceeded the median. This suggests the presence of significant number of outliers with unusually high growth.

Finally, we combined both criteria (i.e. the multiples criterion and sales growth criterion) into two-factor strategy. We build the following portfolios:

1. high P/E and fast growth – portfolio consisting of those stocks from the group of 20% stocks with the highest P/E that in the previous year had sales growth above median sales growth among all the stocks,
2. low P/E and slow growth – portfolio consisting of those stocks from the group of 20% stocks with the lowest P/E that in the previous year had sales growth below median sales growth among all the stocks,
3. high P/BV and fast growth – portfolio consisting of those stocks from the group of 20% stocks with the highest P/BV that in the previous year had sales growth above median sales growth among all the stocks,
4. low P/BV and slow growth – portfolio consisting of those stocks from the group of 20% stocks with the lowest P/BV that in the previous year had sales growth below median sales growth among all the stocks.

For all the portfolios we computed annual nominal returns (between the end of February of a given year and the end of February of the next year). Next**,** we calculated the geometric average annual returns in the period between the end of February 1999 and the end of February 2011. We applied geometric average because it represents the constant return an investor must earn every year to arrive at the same final value that would be produced by a series of variable returns (Cornell, 1999). The dividends and transaction costs were disregarded due to the lack of any database regarding them. As the benchmark for the portfolios the returns of indexing strategy (based on the Warsaw Stock Exchange WIG Index) were used.

4. The Findings

The average nominal returns as well as Beta coefficients of the alternative strategies are presented in Table 4. The data confirm the supremacy of all the single-factor value strategies over the growth strategies, i.e:

1. the portfolio embracing 20% stocks with the lowest P/E significantly outperforms the portfolio of 20% stocks with the highest P/E (as well as the whole market),
2. the portfolio embracing 20% stocks with the lowest P/BV significantly outperforms the portfolio of 20% stocks with the highest P/BV (as well as the whole market),
3. the portfolio embracing 20% stocks with the slowest sales growth significantly outperforms the portfolio of 20% stocks with the fastest growth (but it doesn't outperform the market as a whole).

Table 4: The Average Returns and Beta Coefficients of the Alternative Portfolios.

	Portfolios formed on P/E multiple		Portfolios formed on P/BV multiple	
	Average annual returns	Beta	Average annual returns	Beta
Growth portfolios				
20% highest multiple stocks*	5,6%	0,93	7,2%	0,94
20% fastest sales growth stocks**	11,2%	1,36	11,2%	1,36
Highest multiple and fastest sales growth combined***	3,9%	0,87	4,5%	0,92
Benchmark (WIG Index)	11,2%	N/A	11,2%	N/A
Value portfolios				
20% lowest multiple stocks****	23,7%	2,00	26,7%	1,82
20% slowest sales growth stocks*****	19,9%	1,55	19,9%	1,55
Lowest multiple and slowest sales growth combined******	24,4%	1,49	31,0%	2,00

** strategy of investing in 20% stocks with the highest given multiple (P/E or P/BV, respectively)*
*** strategy of investing in 20% stocks with the fastest sales growth in the previous calendar year*
**** strategy of investing in those stocks from the group of 20% stocks with the highest given multiple that in the previous year had the sales growth above the median sales growth in the universe of all stocks*
***** strategy of investing in 20% stocks with the lowest given multiple (P/E or P/BV, respectively)*
****** strategy of investing in 20% stocks with the slowest sales growth in the previous calendar year*
******* strategy of investing in those stocks from the group of 20% stocks with the lowest given multiple that in the previous year had the sales growth below the median sales growth in the universe of all stocks*
Source: money.pl; Notoria Serwis; author's calculations.

Combining single factors into two-factor portfolios gives the results that are consistent with our expectations, i.e:

1. two-factor portfolio embracing those stocks from the group of 20% stocks with the lowest P/E that had the slowest (below median) growth outperforms both the portfolio of 20% lowest P/E as well as the portfolio of 20% slowest sales growth,
2. two-factor portfolio embracing those stocks from the group of 20% stocks with the lowest P/BV that had the slowest (below median) growth outperforms both the portfolio of 20% lowest P/BV as well as the portfolio of 20% slowest sales growth,
3. two-factor portfolio embracing those stocks from the group of 20% stocks with the highest P/E that had the fastest (above median) growth underperforms both the portfolio of 20% highest P/E as well as the portfolio of 20% fastest sales growth,
4. two-factor portfolio embracing those stocks from the group of 20% stocks with the highest P/BV that had the fastest (above median) growth underperforms both the portfolio of 20% highest P/BV as well as the portfolio of 20% fastest sales growth.

The above findings corroborate that as regards the long-run returns the information embedded in historical sales growth is incremental to that in multiples. In other words, the observed multiples do not fully reflect the information carried by the historical sales growth.

In order to evaluate the riskiness of the portfolios we computed their Beta coefficients (slope coefficients of simple linear regressions with given portfolio returns as the dependent variable and WIG Index as the explanatory variable). The observation of the Betas presented in Table 4 indicates the positive risk-return relationship. Relatively high / low returns are associated with relatively high / low variability of returns. However, this risk-return relationship, although evident, is not monotonic (e.g. the portfolio combining lowest P/E and slowest growth has both higher return and lower Beta than the portfolio based on only lowest P/E).

To summarize, our analysis confirmed that the information in past sales growth about future stock returns is incremental to the information in the valuation multiples. Specifically, we found that combining low multiples with sluggish sales growth can boost long-term returns (but generally at the expense of the higher relative variability of returns) and combining high multiples with fast growth is a straight way to depress the long-run stock returns.

5. Conclusions

In the paper we compared the profitability of different investment strategies based on valuation multiples as well as corporate sales growth on the Polish stock market in 1999-2011 years. Especially, we tested the hypothesis according to which the information in past sales growth about future stock returns is incremental to the information embedded in multiples.

We found that investing in portfolio of stocks that are simultaneously characterized by relatively low multiples and relatively slow last-year sales growth generates long-term returns that exceed the returns of portfolios formed on the basis of the individual criteria (i.e. low multiples alone or slow sales growth alone). On the opposite, investing in portfolio of stocks that are simultaneously characterized by relatively high multiples and relatively fast last-year sales growth generates long-term returns that lag behind the returns of portfolios formed on the basis of the individual criteria (i.e. high multiples alone or fast sales growth alone). This means that information hidden in past sales growth about future returns is not fully reflected in observed valuation multiples.

However, we confirmed the presence of positive risk-return relationship. Relatively high average returns are generally (but not always) associated with relatively high risk (as measured by Beta coefficient). Therefore**,** investors following those low-multiple and slow growth strategies must face the necessity of tolerating relatively high variability of returns.

However, this study has some relevant limitations. First of all, the twelve-year period covered by the research is pretty short and embraces only several stock market cycles. Moreover, during the years under investigation Polish economy did not experience any single year of recession (i.e. decline of gross domestic product). This

means that the results can be somewhat biased in favour of low-sales-growth stocks. It's important qualification because in the case of recession (especially the deep and unforeseen one) the higher share of companies with decreasing sales could go bankrupt (instead of being able to revert toward the mean) and that would significantly depress the returns of slow-sales-growth investment strategies.

The abovementioned limitations of the study justify inclusion of longer samples (covering, e.g. twenty or thirty years of stock market data). Regrettably, extending our sample years further into the past (i.e. before 1999) is not viable owing to the small number of then listed companies. Also the double-digit inflation environment in which Polish economy functioned in the early and mid-1990s could probably distort the results.

Last but not least, our findings can be distorted by the survivorship bias. During the years under investigation some companies listed on the Warsaw Stock Exchange did go bankrupt and usually the bankruptcy was preceded by significant deterioration of their financial results. In many cases the collapse of sales just before bankruptcy would imply the inclusion of those companies into lowest-sales-growth portfolios. However, this very bankruptcy that followed often meant the loss of the whole shareholders value. Unfortunately these cases cannot be fully allowed for in this study because of the deficiencies of the databases available.

In terms of policy implications, it seems that market regulators and supervisors should strive to increase the awareness of the risks associated with high-growth stocks among market participants. The same applies to the investment education which seems to neglect this issue.

In the further research we would like to refine (as far as possible) our findings by allowing for the shortcomings described above. We'd also like to examine the theoretical and empirical causes staying behind the uncovered inability of observed valuation multiples to fully reflect the information carried by past sales growth. Specifically, we will explore the extent to which the aspects of reported earnings quality influence the results of this study.

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