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THE RELATIONS BETWEEN MOMENTUM, VALUE, SIZE, AND LIQUIDITY FACTORS AND STOCK RETURNS ON THE POLISH MARKET

Summary

The paper examines the relations between selected company characteristics and common stock returns. In the paper, we concentrate on four well-recognized fundamental factors determining stock returns: momentum, value, size and liquidity. First, we review the existing literature in the field. Second, we investigate the relationship between fundamental factors and stock returns on the Polish market. Our computations are based on all companies on the Warsaw Stock Exchange listed in the period 2000-12. Our research provides fresh out-of-sample evidence for momentum, value, size and liquidity premium from the Polish market.

Key words: value, size, momentum, cross-section of stock returns, Polish market, Warsaw Stock Exchange.

1. Introduction

The paper examines the relations between selected company fundamentals and common stock returns. Taking into account long finance literature, firm characteristics such as market capitalization, the ratio of book equity to market equity, the short-term history of past returns and daily turnover are important determinants of stock returns.

In the paper, we concentrate on four well-recognized fundamental factors determining stock returns: momentum, value, size and liquidity. First, we review the existing literature in the field. Second, we investigate the relationship between fundamental factors and stock returns on the Polish market. Our computations are based on all companies on the Warsaw Stock Exchange listed in the period 2000-12[2].

2. Theoretical basis

The relations between an asset's return and varied factors have been the most studied capital market phenomena over the past century. The capital asset pricing model

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presented and developed by Sharpe [1964], Lintner [1965] and Black [1972] has shaped for long time in what way scientists and financiers understand the relationship between an average return and risk. However, the growing empirical evidence demonstrated the inefficiency of market factor suggested in fully explaining security prices, as suggested by CAPM. As a consequence, researchers attempted to identify company characteristics which explain differences in common stock returns. Amongst these firm attributes the most prominent ones are: capitalization (size of company), the ratio of book equity to market equity (value of company), the short-term history of past returns [momentum] and daily turnover (liquidity of company stocks). Fama and French [1993] introduced to CAPM model value and size factors, based on individual stock characteristics. Following Fama and French [1993], other factors have been proposed in the literature and introduced to asset pricing models (most notably the momentum factor or liquidity factor) to examined these occurrence in stock returns.

In this part, we provided a brief overview of the momentum, value, size and liquidity factors and summarized the evidence for all of these.

2.1. Momentum factor

The momentum factor is based on the observation by Jagadeesh and Titman [1993] that stocks with a high past performance (winners) outperforms stocks with a low past performance (losers) in the short-term horizon. The momentum strategy relay on buying the winner portfolio and shorting the loser portfolio.

The initial study of this patterns in stock returns was the work of DeBondt and Thaler [1985]. They found strong evidence that recent good performing stocks become poor performers over 3-year and 5-year holdings. Jagadeesh and Titman [1993, 2001] performed an analysis similar to DeBondt and Thaler [1985] but with focus on a short-term investment horizon.

The evidence of momentum factor in returns of stocks in the international markets was proved by Asness [1994], Fama and French [1998, 2011], Rouwenhorst [1998], Liew and Vassalou [2000], Griffin, Ji, and Martin [2003], Grinblatt and Moskowitz [2004], Chui, Wei, and Titman [2010], Vu [2012], Groot et al. [2012], and Asness, Moskowitz, and Pedersen [2013].

2.2. Value factor

The value factor derived from the research on the so-called value effect. The value effect is tendency of value stocks (stocks with low prices relative to their fundamentals) to outperform growth stocks (stocks with high prices relative to their fundamentals). Alternative value measures used in the literatures are:

- B/M – the book value of equity divided by the market value of equity;
- E/P – the earnings after taxes divided by the market value of company's shares;
- past sales growth – the compounded growth rate in net sale for three years prior to portfolio formation.

Formal statistical evidence of the value effect were presented by Stattman [1980] and Rosenberg [1985]. They used the book to market ratio as a value indicator. Davis et al. [1994] confirmed the value effect in US stock markets. Chan et al. [1991] and Capaul et al. [1993] confirmed the value effect, but in outside the US markets.

The value effect was observed in stocks returns by Chan, Hamao and Lakonishok [1991], Fama and French [1998, 2011], Rouwenhorst [1999], Lam [2002], Ghargohori [2009], Chui, Titman, and Wei [2010], Asness, Moskowitz, and Pedersen [2013]. Lischewski and Voronkova [2012], Kowerski [2006], Kowerski [2008], Żarnowski [2007], Czapkiewicz and Skalna [2010] , and Borys and Zamcik [2011], confirmed the value effect on the Polish equity market.

2.3. Size factor

The size factor is related to the size effect, which was firstly documented by Banz [1981]. Banz found that the smallest 20 per cent of firms earn an annual return that is 5 per cent higher than the return on other firms. In the other words, he showed that stocks with lower capitalization (small stocks) tend to have higher average returns. Banz carried out the research into return premium on small stocks during the 1936 – 1975 period for the stocks quoted on the NYSE.

In the literature are a variety of ways in which one can measure company size:
–   market capitalization – the market price of the company's share multiplied by number of shares outstanding;
–   total asset – the book value of total asset;
–   enterprise value – the market value of equity plus book value of net debt;
–   net sales – the difference between gross sales and sales returns.

Reinganum [1981] and Cook and Roseff [1982] confirmed the evidence of the size effect by using a broader sample and decile portfolios. The size effect was later confirmed by Blume and Stambaugh [1983] and Brown et al. [1983]. In particular, the size effect was detected in US markets and several international markets by a variety of researchers (Herrera and Lockwood [1994], Heston at al. [1999], Rouwenhorst [1999], Horowitz et al. 2000a, Fama and French [2008], Michou et al. [2010]).

However, Fama and French [2011] did not find the size premium in any of four global regions after examining returns over a 20-year horizon starting in 1990. Dimson et al. [2011] observed that higher returns of smaller companies did not exist for long periods of time.

Lischewski and Voronkova [2012] estimated the impact of size effect on returns in Polish equity market. They found that size factor plays an significant role in explaining returns from Polish stocks. The effect was also confirmed by Borys and Zemcik [2011].

2.4. Liquidity factor

The paper of Amihud and Mendelson [1986] broke ground to various studies showing that liquidity may be the relevant factor that explains stock returns. The rationale behind

is that illiquidity can be measured as costs of immediate execution and an investor willing to transact at a favorable price faces a trade-off.

A large part of existing literature confirms the presence of a liquidity effect on the US stock market (Amihud and Mendelson [1986], Brennan and Subrahmanyam [1996], Haugen and Baker [1996], Chalmers and Kadlec [1998], Datar et al. [1998], Brennan et al. [1998], Chordia et al. [2001] and Garleanu [2009]). The evidence for liquidity effect in international market was confirmed by Amihud et al. [1997], Hu [1997], Chan and Fa [2005]. The issue of liquidity factor in the Polish market was examined by Lischewski and Voronkowa [2012] and Waszczuk [2013].

3. Data and research design

We investigated the issue of returns to momentum, value, liquidity and size factors in the Polish market based on all stocks listed on the Warsaw Stock Exchange 30.11.2000 and 30.11.2012. The data came from Bloomberg. We used both listed and delisted stocks in order to avoid the survivorship bias.

We divided the stocks into three separate equal-sized groups classes on their fundamental characteristics:
  − B/M – value factor (book to market ratio);
  − S – size factor (market capitalization);
    –M – momentum factor (past year rate of return);
  − L – liquidity factor (average daily turnover).
We used only these stocks, which had all four computable characteristics in a given year. The number of stocks in the sample grew along with the development of Polish capital market from 36 at the beginning of the research period to 423 at the end.

Based on these characteristics, we constructed equal-weighted portfolios, which were reconstructed once a year on the 30th of November. The date was chosen intentionally in order to avoid look-ahead bias.

Next, we constructed long/short portfolios for each characteristic compounded of a long position in the highest-class portfolio and a short position in the lowest-class portfolios. For example, the B/M long/short portfolio was 100% long in the highest book--to-market ratio and 100% short in the lowest book-to-market ratio.

Finally, the performance of long/short portfolios were tested against two models: market model and CAPM [Cambell, Lo, MacKinlay 1997; Cochrane 2005]. The first one was the classical market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it},$$
$$E[\varepsilon_{it0}] = 0, \qquad var[\varepsilon_{it0}] = \sigma_\varepsilon^2,$$

where R_{it} and R_{mt} are the period-t returns on security and the market portfolio, ε_{it} is the zero mean disturbance term and a_i, β_i and σ_ε^2 are the parameters of the market model. We employed average cross-sectional returns of all stocks in the sample as the proxy for market portfolio. We took such approach in order to be consistent with the portfolios' equal weighting methodology.

The other model we employed was Capital Asset Pricing Model. The long/short portfolios excess returns were regressed on market portfolio excess returns, accordingly to CAPM equation:

$$R_{pt} - R_{ft} = \alpha_i + \beta_i[R_{mt} - R_{ft}] + \varepsilon_{pt},$$

where R_{pt}, R_{mt} and R_{ft} are annual long/short portfolio, market portfolio and risk-free returns, and a_i and β_i are regression parameters. We used 1-year WIBID rates to represent the risk-free rate. The a_i intercept measures the average annual abnormal return [so called Jensen-alpha]. In both models, our zero hypothesis is that the alpha intercept is not statistically different from zero, and the alternative hypothesis states that it is actually different from zero. We found the equation parameters using OLS and tested them in both parametric and non-parametric (bootstrap) way.

4. Results and interpretation

The Table 1 shows descriptive characteristics of the portfolios constructed based on fundamental characteristics.

TABLE 1.

Descriptive statistics of class portfolios, 2000-2012

Factor	Average annual rate of return			Standard deviation			Beta*		
	Lowest	Middle	Highest	Lowest	Middle	Highest	Lowest	Middle	Highest
V	8.90%	14.26%	19.45%	47.13%	47.46%	58.82%	0.91	0.90	1.15
M	6.80%	16.21%	19.84%	54.45%	49.43%	51.52%	1.05	0.97	1.00
S	18.15%	16.21%	19.84%	63.40%	49.43%	51.52%	1.21	0.97	1.00
L	21.43%	11.99%	9.22%	57.90%	52.84%	43.44%	1.11	1.02	0.82

* Calculated against average return of all stocks

Source: own elaboration.

The value, momentum and liquidity portfolios behaved similarly to patterns observed on the developed markets. High book-to-market ratio, high momentum and low liquidity stocks noted higher returns than other stock classes. The exception was the size factor. In this case smaller stocks did not perform better than larger ones.

The next table (Table 2.) presents the analysis of long/short factor portfolios.

The long/short factor portfolios, 2000-2012

Long/short portfolios	V	M	S	L
Desrciptive statistics				
Average annual rate of return	16.4%	9.7%	2.8%	15.6%
Standard deviation	24.3%	28.2%	32.5%	39.3%
Correlation with market returns[****]	0.90	0.27	0.76	0.87
Market model				
β	0.52	0.10	0.48	0.91
z-stat $_{par}$	*4.36****	*0.63*	*2.58****	*2.97****
α	0.13	0.12	0.01	0.13
z-stat $_{par}$	*2.07***	*1.44*	*0.16*	*0.86*
z-stat $_{non\ par}$	*1.66**	*1.65**	*0.02*	*0.53*
CAPM				
β	0.53	0.11	0.49	0.90
z-stat $_{par}$	*4.47****	*0.69*	*2.66****	*3.00*
α	0.10	0.07	-0.02	0.13
z-stat $_{par}$	*1.63*	*0.85*	*-0.18*	*0.85*
z-stat $_{non\ par}$	*1.38*	*0.88*	*-0.45*	*0.52*

[*] Significantly different from 0 at 10% level.
[**] Significantly different from 0 at 5% level.
[***] Significantly different from 0 at 1% level.
[****] We employed stock universe equal-weighted return as the market proxy.

Source: own elaboration.

All the long/short portfolios showed single- or double digit average annual returns: the highest in case of value factor and the lowest in case of size factor. However, in most cases (with the exception of B/M market model), the excess returns were not statistically significant. We suppose, that it may be due to high factor volatility and relatively short time series available.

Summing up, our computations showed that historically in Poland it was possible to build factor-based portfolios which outperformed the broad market portfolio. Nonetheless, the Polish market seems too young to derive some significant statistical interferences.

5. Conclusions

In the paper, we investigated whether the relations between four well-recognized factors: value, growth, momentum and liquidity – is present on the Polish market. We performed a long/short portfolio analysis based on all stocks listed on the Warsaw Stock Exchange between 2000 and 2012. We observed, that portfolios formed based on all the four factors delivered positive stock returns. However, only in case of value factor the abnormal returns were significantly positive.

The findings in this paper have a few implications for three distinct areas: investment practice, portfolio performance measurement and cost of capital calculation. First, they

may be important for international investors who pursue factor strategies with regional focus. Second, the regional versions of factor models may be implemented to testing portfolio performance. Third, is seems reasonable to use the additional factors in investment and budgeting corporate decision, they appear to be valid determinants of cross-sectional variation in stock returns.

The further research should concentrate on four main issues. First, it should be tested, whether the factor based strategies withstand the application of transaction costs and liquidity constraints. Second, the sources of value, size, momentum and micro premiums in the CEE market could be examined. Third, it could focus on finding the reasons of anomalous reversed micro-cap momentum in the CEE market, which contradict the observations in the developed markets. Finally, it would be interesting, to explore further asset pricing anomalies, like for example the gross profitability effect by Novy-Marx [2014].

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