STOCK RETURN ANOMALIES: EVIDENCE FROM BORSA İSTANBUL

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Abstract

This paper investigates the presence of six well-documented anomalies in global equity markets for the Borsa İstanbul, covering the period from July 2001 to June 2012. Anomalies used in this study are firm size, book-to-market equity ratio, momentum, accruals, asset growth and profitability and Fama-MacBeth cross sectional regression approach was used as a method. The results of Fama-MacBeth cross sectional regression approach show that the highest significant anomaly is momentum and firm size and book-to-market equity ratio are also significant anomalies for the Borsa İstanbul. But accruals, asset growth and profitability anomalies are found insignifiant. After partitioning stocks into three size categories (micro, small and big), we find that momentum anomaly is effective in all size categories; book to market ratio, firm size and profitability anomaly is effective in micro and small size categories.

Keywords: Anomalies, Stock Returns, Borsa İstanbul.

1. Introduction

According to EMH developed by Fama (1970), in an efficient market share prices fully reflect all available information. Therefore, no investor in the market will not get abnormal returns by using this information. However some studies on the EMH have shown that there are some manners that enable investors to get abnormal returns. The inefficiency of market or insufficiency of CAPM used in efficiency test is shown as the source of these structures called anomaly. Thus the anomalies occurring against the EMH and CAPM are started to be analysed in the finance literature especially in developed markets. Within this scope Banz (1981) (about firm size), Stattman (1980), with Rosenberg, Reid and Lanstein (1985) (about book to market ratio) , Jegadeesh and Titman (1993) (about momentum), Sloan (1996) (about accruals), Haugen and Baker (1996), with Cohen, Gompers, and Vuolteenaho (2002) (about profitability), Fairfield, Whisenant, and Yohn (2003), with Cooper, Gulen and Schill (2008) (about asset growth) has conducted studies that point the existence of anomalies.

In this study, six anomalies that are well documented in developed markets and present the insufficiency of CAPM has been researced in Turkey which is an emerging market. Mentioned anomalies are firm size, book to market ratio, momentum, accruals, asset growth and profitability.

Firm Size: This anomaly, first documented by Banz (1981), claims that stocks of firms that are smaller in terms of market value have higher returns than the stocks of bigger firms. About the existence of this anomaly Banz mentioned that firm size anomaly could be the evidence of the misspecification of the CAPM. With his statement about the mismeasurement of the risks of small firms in the previous studies Roll (1981), supported the idea of Banz (1981). In addition to this, Barry and Brown (1984), pointed out that this effect occured in an effort to fulfil the rarity of current knowledge about the stocks of small firms. Also Herrera and Lockwood (1994), claimed that CAPM is deficient as it ignore the impact of the firm size.

Book to Market Ratio (B/M): This anomaly, first documented by Statman (1980) and, Rosenberg, Reid and Lanstein (1985) states that firms with higher B/M ratio yield higher stock returns than the firms with lower B/M ratio. Also, while Lakonishok, Shleifer and Vishny (1994) are pointing to the mistakes of investors excpectations, Fama and French (1996), shows the mismeasurement of the risks of firms with high B/M ratio as the reason of this anomaly.

Momentum: Jegadeesh and Titman (1993), show that the stock that were winners (losers) in previous 3-12 mothly period are prone to win (lose) in the following 3-12 monthly period and a strategy that simultaneously buys past winners and sells past losers generates significant abnormal returns over holding periods of 3 to 12 months. The positive effect of momentum anomaly on stock returns have been proven in different markets and in different periods and no conscensus is reached what causes momentum anomaly. Within this framework various studies have been carried out in which momentum abnormal returns are

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referred to macroeconomic factors (Chordia and Shivakumar, 2002); the effect of firm size (Hong et al, 2000); trading volume (Lee and Swaminathan, 2000); momentum effect on the industry (Moskowitz and Grinblatt, 1999; Grundy and Martin, 2001; Safieddine and Sonti, 2007); transaction cost (Korajczyk and Sadka, 2004) and market state (Cooper et al, 2004) (Ansari and Khan, 2012). Apart from these momentum anomaly is claimed to derive from lack of CAPM by Fama ve French (1996) and the lower reactions of investors to the news of the firms by Barberis, Shliefer and Vishny (1998).

Accruals: This anomaly that came up with the study of Sloan (1996), who claimed that stocks which have higher accruals produce abnormal returns has occured as a conclusion mistakes done by the investors about their current earnings. According to this anomaly, that the naive investors do not make a distinction about their earnings as accruals and cash flows causes overvaluation of firms having high accruals and later causes them to encounter with negative abnormal returns. There are two opinion about where the accruals anomaly derived from: first one, like Sloan mentioned in his studies, is that accruals proxy for market mispricing. Second one is that accruals is a risk factor that have to be added to assset pricing models (Hirshleifer, Hou and Teoh, 2012: 320-334).

Asset Growth: Cooper, Gulen and Schill (2008) had the most important findings about this anomaly which occured with the determination of situation that corporate events associated with asset expansion tend to be followed by periods of abnormally low returns, whereas events associated with asset contraction tend to be followed by periods of abnormally high returns. There are two prominent explanations for this anomaly: one is behavioral and the other is rational. The behavioral explanation (Titman, Wei and Xie, 2004; Cooper, Gulen and Schill, 2008) argues that the anomaly exists because investors are too slow to incorporate the information from firm investment into stock prices,which causes the mispricing. The rational explanation which is based on the q theory (Zhang, 2005; Xing, 2008; Li, Livdan and Zhang, 2009; Liu, Whited and Zhang, 2009; Chen, Novy-Marx and Zhang, 2010; Li and Zhang, 2010), argues that firms invest more when expected returns (i.e.,costs of capital) are lower and invest less when expected returns are higher, inducing the negative relation between investment and subsequent stock returns (Lam ve Wei, 2011: 128).

Profitability: This anomaly emerged when Haugen and Baker (1996), determined that the more profitable firms have higher average stock returns. Then, it was supported with the study of Cohen, Gompers and Vuolteenaho (2002). While Fama and French (2006), who searched the reasons of this anomaly, claimed that this anomaly resulted in valuation theory, Seghal, Subramaniam and Deisting (2012), claimed that the possible explanation for this could be that profits are the reward for growth and innovation, which exposes investors to greater risk thus resulting in higher returns.

This paper in which the most reamarkable anomalies for the investors were researched is organised as follows. In the next section we describe the data and metodology. Section 3 gives the findings and section 4 contains the conclusions.

2. Data and Methodology

The sample data consists of all stocks listed in Borsa İstanbul between July 2001-June 2012. All financial firms are excluded from the sample, which is a common practice in most anomaly studies. Also, the firms which have the negative book equity and couldn't reach the essential finacial table data are not included in the study for that year. Therefore, the number of firms have changed by years and aproximatley 166 firms data have been studied. In the study Fama and MacBeth (1973), cross sectional regression is used as a method and regressions were predicted monthly. Thus, the monthly returns of stocks were needed. Besides, in order to calculate the anomaly variables market capitalization and financial tables data were needed. Accordingly, monthly stock returns and market capitalisation data are obtained for each firm from Borsa İstanbul database. The accounting data is obtained from Borsa İstanbul data base and Public Disclosure Platform. The Borsa İstanbul (BİST) -100 index is used as the market as the market proxy. In the study, as the risk free rate of interest, Average Compounded Interest of the Discounted Ttreasury Auctions is used. These data is obtained from the information unit of Secretariat of Treasury.

The six anomaly variables which are used to predict the monthly returns forJuly of year t + 1 to June of year t+ 1, are defined and constructed as:

- Firm Size (Market Capitalization): The natural log of price times shares outstanding at the end of June of year t.
- Book to Market Ratio (B/M): The natural log of the ratio of book value for the fiscal year-end t-1 divided by market value in December of year t-1.
- Momentum: The cumulated continuously compounded stock return from month j−12 to month j−2, where j is the month of the forecasted return.
- Accruals: The change in operating working capital per split-adjusted share from t−2 to t−1 divided by book equity per split-adjusted share at t−1.
- Asset Growth: The natural log of total assets in year t-1 divided by total assets in year t− 2.

- Profitability (ROE): Income before extraordinary minus dividends on preferred, if available, plus income statement deferred taxes, if available, in t−1 divided by book equityfor t−1.

Also as a base set of these determinants of the cross sections of returns we will use the market beta (BETA) obtained from Finnet Portfolio Advisor Programme.

In this study, FM cross sectional reggression approach has used in order to understand whether the anomalies have any impact on the explanation of cross sectional variation in stock returns or not. FM cross sectional regressions impose a functional form on the relation between anomaly variables and returns. Thus, they enable to estimate the marginal effects of anomaly variables directly. The most important advantage of these regressions is that in an equation there could be more then one variables and potential relationships could be analyzed simultaneously. The reason why this approach followed in CAPM anomalies literature is used widely is that it enables the change of coefficients about the explanatory variables in the model (Nair, Sarkar ve Ramanathan, 2009: 193). However, one of the most important disadvantages of FM cross sectional regressions is that the regressions estimated on all stocks can be dominated by micro stocks. Fama and French (2008), partition stocks into different size groups (60% of total number of stocks are micro, 20% of stocks are small and 20% of stocks are big). Because they argue that, regressions estimated on all stocks can be dominated by micro stocks because they are so plentiful and because they tend to have more extreme values of the explanatory variables and more extreme returns (Fama and French, 2008: 1654). To attack this potential problem, in line with the Fama and French (2008), we create micro, small and big stock categories. We follow Gray and Johnson (2011), approach for the partititon by using the ranking of stocks in terms of market capitalization. Accordingly, micro stocks are defined as those stocks making up the first 3% of total market capitalisation, small stock are those stocks making up the next 7% with big stocks making up the remaining 90% of overall market capitalisation.

To examine the presence and pervasiveness of six well-documented stock market anomalies together in Borsa İstanbul, a linear model is set and for each month in the sampling period coefficients are estimated. Then by averaging the time series of monthly coefficients the final FM cross sectional regression table is formed. The regressions are estimated monthly that's way the returns are updated monthly but most of the explanatory variables are updated once a year. Thus, we explain the cross-section of monthly returns from July of year t to June of t+1 using anomaly variables observed in June of t or earlier. The exception to this rule is the momentum variable, which we update monthly.

We will run the following regression model to calculate the monthly estimates for the coefficients:

$$R_{ij} - R_{ft} = \gamma_{ot} + \gamma_{1j}\beta_{ij} + \gamma_{2j}FS_{ij} + \gamma_{3j}\left(\frac{B}{M}\right)_{ij} + \gamma_{4j}MOM_{ij} + \gamma_{5j}ACC_{ij} + \gamma_{6j}AG_{ij} + \gamma_{7j}ROE_{ij} + \epsilon_{ij} \tag{1}$$

$$i=1,2,…,Nj, \quad j=1,2,…,J,$$

where R_{ij} is thereturn on stock i in month j, R_{fj} is the risk free rate of return, β_{ij} is the beta, FS is firm size (market capitalization), B/M is book to market ratio, MOM is momentum, ACC is accruals, AG is asset growth, ROE is return of equity, Nj is the total number of stocks in month j, which may vary from year to year, j is the total number of month in the sample. Also, the γ_{kj} values (k=0,1,2,3,4,5,6,7) in equation symbolize the estimated coefficients as a result of cross sectional regressions.

For each month in the sampling period, regression model is analysed and coefficients are estimated in equation (1). To obtain the final estimates (, the time series means are considered as expected values, equation (2). These values are then divided by the coefficients standard deviation ($s((\gamma_1{}^k))$) to perform the Fama-Macbeth t statistic, equation (3). t-statistic used in Fama-Macbeth regressions is considered as the indication of significance and reliability.

$$\overline{\gamma_k} = \frac{1}{J}\sum_{j=1}^{J}\gamma_{kj} \tag{2}$$

$$t(\overline{\gamma_k}) = \frac{\overline{\gamma_k}}{\frac{s(\overline{\gamma_k})}{\sqrt{J}}} \tag{3}$$

3. Findings

In this study between July 2001- June 2012 regressions are estimated seperately for for market-wide, micro, small and big stocks via 132 monthly data. Table 1 demonstrates the average factor coefficients of monthly regressions for for market-wide, micro, small and big stocks and the t statistics.

Firstly, Table 1 shows that statistically firm size has a negative and significant effect (-0,004, t= -1,904) in predicting the stock returns according to the average market-wide regression coefficient. This value can be stems from micro (-0,005, t = -2,289) and small (-0,0066, t = 2,324) groups. Because micro and small groups have stronger negative effects than market-wide. Thus, firm size effect tested in market-wide gets

much of its strength from small and micro groups is a newly presented outcome. On the other hand, big group (-0,0026, t = -0,636) are thought not to have that significant effect in terms of firm size. In short, all the tests on size groups reveal that the most significant effect on firm size is of smal groups and micro groups.

The outcomes of B/M ratio effect has revealed that this variable has a significant effect in predicting stock return for market-wide group. B/M ratio effect with average regression coefficient of 0.004 has a positive exploratoriness on returns at %5 significance level. B/M ratio and stock returns may be thought to be on the same way. Stocks with a higher book value than market value are regarded as risky that's why the more B/M ratio rises the more expected returns increases. Moreover, positive and strong average regression coefficient is determined in micro group (0,006, t = 3,666) and small group (0,003, t = 1,889). But micro group t statistic is significance at %1 while small group t statistic is significance at %10. It's confirmed that the average coefficients and t statistics in results demonstrate that market-wide stocks are mostly affected by micro stocks. On the other hand big stocks (0,0025, t = 1,315) are thought to have no significance effect on stock returns according to t statistics.

Table 1: Average Slopes and *t*-statistics from Monthly Cross-SectionRegressions
July 2001–June 2012

		Int	Beta	FS	B/M	MOM	ACC	AG	ROE
Market	Average	0,046	0,003	-0,004	0,004	0,013	-0,001	-0,003	0,005
	t statistic	2,318**	0,356	-1,9041*	2,210**	3,050***	-0,404	-0,558	1,210
Micro	Average	0,068	0,001	-0,0049	0,006	0,012	-0,004	-0,005	0,015
	t statistic	1,676	0,070	-2,2894**	3,667***	1,999*	-0,959	-0,777	2,953*
Small	Average	0,299	-0,008	-0,0066	0,003	0,013	-0,001	0,002	0,016
	t statistic	2,441**	-0,607	-2,3241**	1,889*	2,027*	-0,148	0,350	2,131*
Big	Average	0,077	0,002	-0,0026	0,003	0,016	0,005	0,005	0,010
	t statistic	1,747	0,156	-0,636	1,315	2,584**	0,456	0,548	0,791

*Significance at %10; ** Significance at %5; *** Significance at %1

The most considerable result of FM cross sectional regression is that momentum anomaly is statistically significant in all size groups. As a result, momentum anomaly is a kind of anomaly that was seen in Borsa İstanbul between July 2001-June 2012. Regarding all the stocks in market momentum anomaly (0,013, t = 3,050) is the most significant variable in cross section stocks when compared to other variables in the model according to monthly average regression coefficients. This result points out that higher momentum value earns higher future returns. Furthermore the relationship between momentum anomaly and stock return is also observed between micro, small, and big groups. It's possible to say that the explanatoriness of momentum anomaly is stronger in big group than the other size groups when regression coefficients of momentum analysis are analyzed on the basis of small (0,013, t = 2,027), micro(0,012, t = 1,999), and big (0,016, t = 2,584) groups. t statistics demonstrate that the statistical significance of coefficients are significance at %5 in micro and small groups and %1 in big groups and it points out the strong positive relationship between returns and momentum.

Also Table 1 shows that statistically, no significant relation is determined between accrual anomaly and excess returns. Although a negative relation is anticipated between accrual anomaly and excess return, a positive one for big (0,005, t = 0,456) group and a negative but insignificant one for market-wide (-0,001, t= -0,404), micro (-0,004, t= -0,959), and small (-0,001, t = -0,148) groups is determined. It reveals that in the sampling period there is no accrual anomaly in Borsa İstanbul.

Regression results in Table 1 reveals that there is no relation between asset growth anomaly and stock returns. Average regression coefficients of market-wide (-0,003, t = -0,558), micro (-0,0047, t = -0,777), small (0,002, t =0,350), and big (0,005, t = 0,548) groups are approved to be insignificant in terms of t statistics. As a result of FM regression approach it was determined that the asset growth anomaly can't be used in Borsa Istanbul for explaining the cross sectional variation in stock returns.

Finally, regression results in Table 1 reveals that there is a positive and significant relationship between profitability anomaly and stock returns in micro (0,015, t= 2,953) and small (0,016, t= 2,131) groups. Whereas stock returns in market-wide (0,005, t=1,210) and big (0,010, t= 0,791) groups are determined to have insignificant results in terms of profitability anomaly.

4.Conclusion

This paper investigates the existence of six well-documented anomalies in developed markets for the Borsa İstanbul. Within this framework in order to evaluate all anomaly variables together and to determine

the highest explanatory anomaly in stock returns FM cross sectional regression has been used. FM cross sectional regression results revealed that momentum anomaly has the highest explanatoriness among the anomalies being used within the research and this anomaly shows up in all size groups. In the market-wide evaluation after momentum anomaly it is determined that B/M ratio and firm size anomalies also have significant explanatoriness on returns whereas profitability, asset growth and accrual anomalies don't have significant results. When analyses in terms of size groups it is determined that firm size, B/M ratio, momentum and profitability anomalies are effective in micro and small group stock returns but accrual and asset growth anomalies are of no importance. On the other hand only momentum anomaly has an effect among the variables in the study in explaining the stock returns of big group. Another result of FM cross sectional regressions is that beta used as only risk factor in CAPM has significant results in no size groups.

REFERENCES

ANSARI, Valeed A. and KHAN, Soha (2012). "Momentum Anomaly: Evidence From India", *Managerial Finance*, Vol. 38, No. 2, p. 206-223.

BANZ, Rolf W. (1981). "The Relationship Between Return and Market Value of Common Stocks", *Journal of Financial Economics, Vol. 9*, No.1, p. 3–18.

BARBERIS, Nicholas; SHLEIFER, Andrei and VISHNY, Robert (1998)."A Model of Investor Sentiment", *The Journal of Financial Economics*, No. 49, p. 307-343.

BARRY, Christopher B., and BROWN, Stephen J. (1984). "Differential Information and the Small Firm Effect", *Journal of Financial Economics, No.* 13, p.283-294.

COHEN, Randolph B.; GOMPERS, Paul A. and VUOLTEENAHO, Tuomo (2002). " Who Underreacts to Cashflow News? Evidence from Trading between Individuals and Institutions", *Journal of Financial Economics, No.* 66,p. 409–462.

COOPER, Michael J.; GULEN, Huseyin and SCHILL, Michael J. (2008). "Asset Growth and the Cross-section of Stock Returns", *Journal of Finance,* No.63, p.1609–1651.

FAIRFIELD, Patricia M.; WHİSENANT, Scott and YOHN, Terry L. (2003). "Accrued Earnings and Growth: Implications for Future Profitability and Market Mispricing", *The Accounting Review, No.*78, p.353–371.

FAMA, Eugene F.(1970). "Efficient Capital Markets: A Review of Theory and Empirical Work", *Journal of Finance*, Vol. 25, No. 2, p.383-417.

FAMA, Eugene F. and MACBETH, James D. (1973). " Risk, Return and Equilibrium: Empirical Tests", *Journal of Political Economy*, Vol.81, No. 3, p.607-636.

FAMA, Eugene F. and FRENCH, Kenneth R. (1996). " Multifactor Explanations of Asset Pricing Anomalies", *The Journal of Finance*, Vol. 51, No.1, p.55-84.

FAMA, Eugene F. and FRENCH, Kenneth R. (2006). " Profitability, Investment and Average Returns", *Journal of Financial Economics*, No. 82, p. 491-518.

FAMA, Eugene F. and FRENCH, Kenneth R. (2008). "Dissecting Anomalies", *Journal of Finance,* **No.** 63, p.1653–1678.

GRAY, P., and JOHNSON, J. (2011). " The Relationship Between Asset Growth and the Cross-Section of Stock Returns", *Journal of Banking & Finance*, No. 35, p.670–680.

HAUGEN, Robert A. and BAKER, Nardin L. (1996). "Commonality in the Determinants of Expected Stock Returns", *Journal of Financial Economics, No.* 41, p.401–439.

HERRERA, Martin J. and LOCKWOOD, Larry J. (1994). "The Size Effect in the Mexican Stock Market", *Journal of Banking & Finance*, Vol. 18, No. 4, p.621-632.

HIRSHLEIFER, David; HOU, Kewei and TEOH, Siew H. (2012). "The Accrual Anomaly: Risk or Mispricing?", *Management Science*, Vol. 58, No.2, p.320-335.

JEGADEESH, Narasimhan and TITMAN, Sheridan (1993). "Returns to Buying Winners and Selling Losers:Implications for Stock Market Efficiency", *Journal of Finance, No.* 48, p.65–91.

LAKONISHOK, Josef; SHLEIFER, Andrei and VISHNY, Robert W. (1994). "Contrarian investment, extrapolation, and risk", *Journal of Finance, No.*49, p.1541–1578.

LAM, F.Y. Eric C., and WEI, K.C. John, (2011). "Limits-to-Arbitrage, Investment Frictions, and the Asset Growth Anomaly", *Journal of Financial Economics*, No.102, p.127-149.

NAIR, Abhilash; SARKAR , Abhijit ; RAMANATHAN, A. and SUBRAMANYAM, A. (2009). "Anomalies in CAPM: A Panel Data Analysis Under Indian Conditions", *International Research Journal of Finance and Economics*, No. 33, p.192-206.

ROLL, Richard (1981). "A Possible Explanation of the Small Firm Effect", *The Journal of Finance*, Vol. 36, No. 4, p.879-888.

ROSENBERG, Barr; REID, Kenneth and LANSTEIN, Ronald. (1985). " Persuasive Evidence of Market Inefficiency", *Journal of Portfolio Management, No.*11, p.9–17.

SEHGAL, Sanjay; SUBRAMANIAM, Srividya and DEISTING, Florent.(2012). "Accruals and Cash Flows Anomalies: Evidence From the Indian Stock Market", *Investment Management and Financial Innovations*, Vol. 9, No. 4,, p.49-59.

SLOAN, Richard G. (1996). "Do Stock Prices Fully Reflect İnformation in Accruals and Cash Flows about Future Earnings?", *The Accounting Review, No.* 71, p. 289–315.

STATTMAN, Dennis. (1980). " Book Values and Stock Returns", *The Chicago MBA: A Journal Of Selected Papers*, No.4, p.25-45.