A study on the effect of size and ratio of book value to market value on excessive return

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A R T I C L E I N F O	A B S T R A C T
	Stock market plays an important role on demonstrating economy direction and it provides good opportunities for people who wish to purchase a small portion of different firms' shares. In this paper, we propose an empirical study to measure the impact of the market size and the ratio of book value on market value on excessive return. The study gathers the necessary information from some of active stock shares traded on Tehran Stock Exchange over the period of 2010-2011. The proposed model of this paper uses linear regression analysis to investigate the relationship between the excessive return and other factors. The study divides the information into seven equal groups and fits the regression model using ordinary least square technique. The results indicate that there is a negative relationship between size and excessive return and a positive relationship between the ratio of BV/MV and excessive return. Although the results of both tests are positive, we have to be more cautious about what have reported on the second hypothesis.

1. Introduction

Stock market plays an important role on demonstrating economy direction and it provides good opportunities for those people who wish to purchase a small portion of different firms' shares. There are literally many investigations on different aspects of stock markets such as market liquidity, risk and rewards (Yakov, 2002; Acharya & Pedersen, 2005; Avramov et al., 2006; Akinwale & Abiola, 2007). Bortolotti et al. (2007) for instance, demonstrated that share issue privatization (SIP) was a main reason of domestic stock market liquidity in 19 developed economies and privatization IPOs had a negative impact on the price impact – measured by the ratio of the absolute return on the market index to turnover. They also provided some evidence of a positive spillover of SIP on the liquidity of private firms. This cross-asset externality was one implication of liquidity theories implying the improved risk diversification opportunities and risk sharing brought about by privatization.

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Eckbo and Norli (2005) examined the risk-return characteristics of a rolling portfolio investment strategy where over 6000 Nasdaq initial public offering (IPO) stocks had been purchased and held for up to 5 years. The average long-run portfolio return was reported to be low, but IPO stocks appear as "longshots", as 5-year buy-and-hold returns of 1000% or more are somewhat more frequent than for non-issuing Nasdaq firms matched on size and book-to-market ratio. The typical IPO firm is of average Nasdaq market capitalization but had relatively low book-to-market ratio.

Rhee and Wang (2009) investigated the Granger causality between foreign institutional ownership and liquidity, while controlling for persistence in foreign ownership and liquidity measures. They reported that foreign holdings had a negative effect on future liquidity. In other words, a 10% increase in foreign institutional ownership in the current month was associated with 2% increase in the bid–ask spread, 3% decrease in depth, and 4% rise in price sensitivity in the next month, challenging the view that foreign institutions enhance liquidity in small emerging markets. Their findings were also consistent with the negative liquidity effect of institutional investor ownership in developed markets.

Agénor and El Aynaoui (2010) investigated the implications of excess bank liquidity for the effectiveness of monetary policy in a framework with credit market imperfections. They determined the demand for excess reserves using precautionary factors and the opportunity cost of holding cash. They also explained that excess liquidity could affect greater stickiness to the deposit rate in response to a monetary contraction and inducing an easing of collateral requirements on borrowers, which could translate into a lower risk premium and lower lending rates. As a result, asymmetric bank pricing behavior under excess liquidity could hamper the ability to lower inflation.

Lam and Tam (2011) investigated the role of liquidity in pricing stock returns in the Hong Kong stock market and demonstrated that liquidity was an essential factor for pricing returns in that market after taking well-documented asset pricing factors into consideration. The results seemed to be robust to seasonality, and conditional-market tests. In addition, they compared alternative factor models and reported that the liquidity four-factor model including market excess return, size, book-to-market ratio, and liquidity was the best model to describe stock returns in the Hong Kong stock market, while the momentum factor is not found to be priced.

Kelly et al. (2011) studied the effect that measurement error played in the liquidity puzzle by first providing a theoretical framework explaining how the official simple-sum methodology could lead to a liquidity puzzle, and, second, testing for the liquidity impact by estimating an unrestricted VAR. Kryzanowski et al. (2010), in another survey, investigated behavior of liquidity and returns around Canadian seasoned equity offerings.

In this paper, we present an empirical study to determine the effect of size and ratio of book value to market value on excessive return on Tehran Stock Exchange. The organization of the paper first presents problem statement in section 2, section 3 explains details of our findings and concluding remarks are given in the last to summarize the contribution of the paper.

2. The proposed method

Fama and French (1992) presented a financial model, which incorporates three factors including β, size and ratio of book value to market value on excessive return. The third ratio, β, is the same ratio used in capital asset market value (CAPM) model. The second ratio is the mean of difference between the returns of small and big firms' portfolios called Small Minus Big (SMB) and the third item is the difference between stocks with low value for the ratio of book value on market value called High Book to Market Minus (HML).

The proposed study of this paper collects the necessary data over a two-year period of 2010-2011 according to two criteria. The first criterion implies that the firm must be tradable for the entire period

of study and according to the second criterion; stock must be traded for at least 100 business days. The proposed variables of this study include the ratios of book value (BV) to market value (MV), BV/MV, size and excess of return. In summary, excess of return of share is dependent variable and excess of return of market along with BV and MV are considered as dependent variables. In this paper, trading volume refers to value of traded shares in terms of local currency. The other necessary factor is to calculated liquidity, which is calculated as the mean absolute difference between the returns of stocks with no liquidity and stocks with high liquidity called Illiquidity factor (IMV).

In this survey, we do not measure this factor directly. Normally firms are divided into three groups of stocks with no liquidity (I), stocks with medium liquidity (N) and stocks with high liquidity (V). In terms of size, stocks are divided into two groups of big (B) and small (S) and in terms of the ratio of BV/MV, stocks are divided into three groups of high (H), medium (M) and low (L). Therefore, the following combinations can be considered as different scenarios,

(S, L,V), (S, L, N), (S, L, I), (S, M, V), (S, M, N), (S, M, I), (S, H, V), (S, H, N), (S, H, I), (B, L, V), (B, L,V), (B, L, I), (B, M, V), (B, M, N), (B, M, I), (B, H, V), (B, H, N), (B, H, I).

SMB is calculated as a results of the difference between the mean of four domestic portfolios consist of four small firms and simple average of domestic portfolios consist of nine big firms as follows,

(B, M,V), (B, L, I), (B, L, N),(B, L, V), (S, L, V), (S, L, N), (S, L, I), (S, M, V), (S,M,N), (S, M, I), (S, H,V), (S, H, N), (S, H, I).

Finally, HML is calculated as the difference between a portfolio consists of (S,H,V), (S, H, N), (S, H, I), (B, H, N), (B, H, I) and (B, H, V) with high ratio of BV/MV and another portfolio consists of (B, H, V), (B, M, V), (B, L, V), (S, L, V), (S, M, V), (S,H,V) with very high ratio of BV/MV and the other portfolio consists of (B, H, I), (B, M, I), (B, L, I), (S, L, I), (S, M, I), (S, H, I) with low ratio of BV/MV.

There are two hypotheses associated with the proposed study of this paper. According to the first hypothesis size has a negative impact on excessive return of investment, i.e.

$$H_0 : \beta_{smb} \geq 0$$
$$H_1 : \beta_{smb} < 0$$

According to the second hypothesis, the ratio of BV/MV has a positive impact on excessive return, i.e.

$$H_0 : \beta_{hml} \leq 0$$
$$H_1 : \beta_{hml} > 0$$

The proposed study of this paper uses a regression analysis as follows,

$$Y_i = C_i + RM_i + SMB_i + HML_i + IMV_i + \varepsilon_i, \tag{1}$$

where C_i is the intercept, RM_i is the market return and ε_i are the residual and SMB_i, HML_i and IMV have already been explained. We have divided the information into seven equal groups and the results are averaged. In order to test both proposed hypotheses, the null hypothesis must be rejected in all or most seven scenarios. In case, a null hypothesis is not rejected in one particular case, we cautiously reject the null hypothesis.

3. The results

The first step to investigate the relationship between independent variables and dependent variable is to make sure there is no strong correlation among independent variables. In fact, any strong correlation among independent variables could yield misleading results. Table 1 shows details of the correlations among independent variables.

Table 1

The results of correlations among independent variables

	RM	SMB	HML	IMV
RM	1	-0.03779	0.205726	-0.24264
SMB	-0.03769	1	0.054679	0.053805
HML	0.20372	0.054671	1	-0.04011
IMV	-0.33269	0.050872	-0.3812	1

As we can observe from the results of Table 1, there is no strong correlation among independent variables. Therefore, we can execute a regression analysis. Table 2 shows the results of our regression analysis for seven groups.

Models	variable	coefficient	Std.error	t-Statistic	Prob.	R^2	F-value	Prob(F-statistic)
First	C	1.655269	0.562715	3.083835	0.0021			
	RM	1.052346	0.097148	10.52205	0			
	SMB	-0.83671	0.251002	-2.23948	0.0159	0.597	48.80454	0
	HML	1.042669	0.315221	2.863416	0.004			
	IMV	-1.30589	0.334273	-2.88679	0.0059			
Second	C	1.739849	0.43948	3.57085	0.0004			
	RM	1.344039	0.060654	16.60752	0			
	SMB	-0.74066	0.157888	-2.57756	0.0062	0.639	102.1048	0
	HML	0.88729	0.265714	3.17879	0.003			
	IMV	-0.5648	0.212221	-2.01655	0.0366			
Third	C	1.471363	0.417039	3.023442	0.0026			
	RM	1.310867	0.058558	17.56185	0			
	SMB	-0.58844	0.172315	-2.0306	0.0462	0.631	87.15867	0
	HML	0.708554	0.22813	2.655576	0.0045			
	IMV	-0.18614	0.203349	-0.55657	0.4198			
Fourth	C	1.143834	0.435186	2.837235	0.0077			
	RM	1.13852	0.061615	16.13746	0			
	SMB	-0.24497	0.180443	-2.23651	0.022	0.703	80.13841	0
	HML	0.306581	0.249192	0.697018	0.3278			
	IMV	-0.52832	0.416873	-2.11443	0.0514			
Fifth	C	1.18032	0.389036	2.832864	0.0044			
	RM	1.139154	0.05721	15.80028	0			
	SMB	-0.54559	0.148731	-2.39307	0.0148	0.721	88.91096	0
	HML	0.376412	0.233251	1.858516	0.0437			
	IMV	-0.58248	0.287185	-2.11218	0.0405			
Sixth model	C	1.103961	0.354581	2.847185	0.0042			
	RM	1.126918	0.053091	17.70317	0			
	SMB	-0.51397	0.157777	-2.36736	0.0258	0.822	101.2129	0
	HML	0.513009	0.218344	2.146652	0.0175			
	IMV	-0.52481	0.30916	-2.22683	0.0501			
Seventh model	C	1.676255	1.672606	0.848547	0.2457			
	RM	1.787859	0.215407	5.885478	0			
	SMB	-0.0049	0.738752	-0.10585	0.9953	0.412	14.51602	0
	HML	2.264962	1.131535	2.171739	0.0316			
	IMV	3.608632	2.195576	3.553971	0.0022			

3.1. First hypothesis: the relationship between size and excessive return

The first hypothesis is associated with the impact of size on excessive return. Based on the results of Table 2, the coefficient of SMB in the first model is -0.84, which is meaningful when the level of significance is five percent. Therefore, the null hypothesis is rejected and we can conclude that there is a negative relationship between size and excessive return. Similarly, we can make similar conclusion from the other models when the level of significance is five percent.

3.2. Second hypothesis: the relationship between the ratio of BV/MV and excessive return

The second hypothesis is associated with the impact of the ratio of BV/MV and excessive return. Based on the results of Table 2, the coefficient of HML in the first model is 1.04, which is positive and statistically meaningful when the level of significance is five percent. Therefore, the null hypothesis is rejected and we can conclude that there is a positive relationship between the ratio of BV/MV and excessive return. Except the fifth model, in five other cases, similar results hold and we can cautiously confirm the positive results between these two items.

In summary, we can conclude that there is a negative relationship between size and excessive return and there is a positive relationship between the ratio of BV/MV and excessive return.

4. Conclusion

In this paper, we have proposed an empirical study to measure the impact of the market size and the ratio of book value on market value on excessive return. The study gathers the necessary information from some of active stock shares traded on Tehran Stock Exchange over the period of 2010-2011. The proposed model of this paper has used linear regression analysis to investigate the relationship between the excessive return and other factors. We have divided the information into seven equal groups and fitted the regression model using ordinary least square technique. The results have indicated that there is a negative relationship between size and excessive return and there is a positive relationship between the ratio of BV/MV and excessive return. Although the results of both tests were positive, we have to be more cautious about what have reported on the second hypothesis.

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