

Accounting Variables, Market Variables and Stock Return in Emerging Markets : Case of Iran

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ABSTRACT

It is of great significance to identify the variables affecting stock return and its price in the emerging markets. According to CAPM, Beta (β) is the only variable capable of predicting the return. The recent studies demonstrate that there exist other variables which outperform stock return predictability potential of the Beta. Included among such variables are the size, debt-to-equity, book-to-market, earnings-to-price and sale-to-price ratios. The present research was aimed at testing the above variables and Beta for the prediction of stock return in order to recognize the variables which are better capable of predicting the stock return in Tehran Stock Exchange (TSE).

Independent variables were tested against the dependant variable (return) on an annual basis for the years 1997- 2003. Further, multi-variable models were tested, both annually and pooled cross-sectionally. In single variable tests, a significant relationship was observed between the stock return and sale-to-price ratio, earnings-to-price ratio and size (stock market value) in 4 consecutive years. The book-to-market ratio demonstrated great dispersion in results. However, since the results of different years varied greatly, no stable relationship was observed between Beta and stock return as predicted in the CAPM model. Further, no relation was observed between debt-to-equity ratio and the stock return. Considering the potential effect of statistical models on the

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findings, complementary tests were carried out in portfolio level based on Beta and book-to-market ratio variables. Three portfolios were formed taking into consideration the magnitude of each variable. The findings of these tests substantiated that, in the years 2000, 2002 and 2003, portfolios with higher Beta proved to have higher return compared to the ones with lower Beta. With respect to the portfolios formed on the basis of book-to-market ratio, the findings proved compatible with the regression models.

This study will contribute and add to the sum of accounting and financial knowledge in two ways: (1) the theories formulated and the models applied in developed countries are capable of application in the emerging markets as well; and (2) the accounting information prepared in conformity with the national standards will prove useful.

Key Terms: stock return, accounting variables, market variables, fundamental analysis, Beta

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Introduction

The models most-frequently applied for prediction of the stock return include the Capital Assets Pricing Model, the so-called CAPM, Market Model, Arbitrage Pricing Model, and the Factor Model. The empirical studies carried out on the factors and variables affecting the stock return demonstrate that there exist numerous variables capable of predicting the stock return with greater precision. Included among such variables are Price-to-Earning (P/E) ratio, Size of the Company, Debt-to-Equity (D/E) ratio, Book-Value-to-Market-Value (BV/MV) and Sale-to-Price (S/P) ratio. This study was aimed at identifying the variables affecting the stock return in Tehran Stock Exchange (TSE).

Review of the Literature

Basu (1977) formed five portfolios based on P/E ratio using the data applicable to a 14-year period of 1957-1971. Portfolio A proved to have the greatest P/E while portfolio E had the lowest P/E. The results demonstrated that portfolio E which had the lowest P/E ratio, had a higher return of 16.3%, while portfolio A with the greatest P/E ratio had a lower return of 9.3%. Further, portfolio A with its greatest P/E ratio and lowest return had a greater systematic risk, while portfolio E with its lowest P/E ratio and the greatest return had a lower systematic risk.

Basu demonstrated that the difference in Beta cannot justify and explain the difference in stock return. In another research, Basu (1983) shown that the effect of P/E ratio was not visible with respect to small capital stocks only. Another study by Jaffe et al (1989) confirmed the findings by Basu (1983) and further showed that the effect of P/E ratio in January which was pointed out by certain researchers was not the case. Hence, the effect of P/E ratio is in direct contradiction with CAPM Model.

Fama and French (1992) observed that the positive relationship established earlier to be existing between Beta and the average stock return, was the product of the negative correlation between Size and Beta. However, when this correlation was taken into consideration, the relationship between Beta and stock return disappeared. With respect to other variables, Fama and French concluded that there existed the greatest

relationship between BV/MV ratio and size. Under such circumstances, when these two variables were introduced, the prediction power of other variables reduced to a great extent, and the cross-sectional stock return average may simply be explained by these two variables.

Barber and Lyon (1997) undertook another study based on the research findings by Fama and French (1992). They studied a sample return of the financial institutes excluded from analysis by Fama and French (1992). The evidence collected by Barber and Lyon showed that the Size and BV/MV ratio significantly explained the cross-sectional variations in the stock return.

Mukherji et al (1997) studied fundamental variables including Beta, BV/MV ratio, debt-book-value to stock market value ratio, Earning per share to stock price ratio, and the stock Market value and sale per share to stock price ratio. Their findings demonstrated that the annual return in 1982-1993 had a positive relationship with BV to stock market value (MV), sale to stock price ratio and the debt to equity ratio, while the annual return had a negative correlation with the size. However, no significant correlation was observed between earning to price ratio and Beta. These findings are compatible with the recent research findings to the effect that the value stock outperformed growth stock in the long run in the majority of international markets.

Lam (2002) observed that Beta was not apparently capable of explaining the average stock return in Hong Kong Stock Exchange in the period of 1984-1997. This finding is compatible with the earlier research findings. However, it so seems that the three variables including the size, BV/MV and P/E ratio can explain the cross-sectional changes in the stock return average during the said period.

Lewllen (2004) studied the dividend yield, BV to MV ratio as well as P/E ratio in the companies listed in New York Stock Exchange. To calculate the stock return, he used the data applicable to the years 1946-2002, a period which was divided into two sub-periods of 1946-1972 and 1973-2000. He obtained some reliable evidences as for the prediction power of the dividend yield in the period of 1946-2000. However, the evidences he collected with respect to BV/MV as well as the P/E ratio were not reliable to some extent demonstrating that they generally had a limited prediction power.

Methodology

The present empirical study was aimed at describing the relationship between market and accounting variables with the stock return using the cross sectional-correlation. The statistical population studied in this research included the companies listed in Tehran Stock Exchange (TSE) within the period of 1997-2003. A sample of statistical population was selected out of the total companies listed in TSE on the basis of the following criteria:

1. The companies so selected should have been included among manufacturing ones.
2. The fiscal year of the companies should have ended at March 21.
3. The stock of the companies should have been traded in the entire period of study.

Hypotheses

The hypotheses were as follows:

Hypothesis 1: Utilization of accounting and market information including BV/MV, S/P, D/E, Size, E/P and Market Risk (β) may increase predictability of the stock return compared to single variable models.

$$R_{it} = \alpha_0 + \alpha_1 D_{t-1}/E + \alpha_2 S_{t-1}/P_t + \alpha_3 E/P + \alpha_4 BV_{t-1}/MV_t + \alpha_5 \text{Log MV} + \alpha_6 \beta$$
$$H_{0-1} : \alpha_1 = \alpha_2 = \dots = \alpha_6 = 0$$

Hypothesis 2: There is a relationship between Size and Stock Return.

$$R_i = \alpha_0 + \alpha_1 \text{Log MV}$$
$$H_{0-2} : \alpha_1 = 0$$

Hypothesis 3: There is a relationship between S/P and Stock Return.

$$R_i = \alpha_0 + \alpha_1 S_{t-1}/P_t$$
$$H_{0-3} : \alpha_1 = 0$$

Hypothesis 4: There is a relationship between BV/MV and Stock Return.

$$R_i = \alpha_0 + \alpha_1 \text{BV}_{t-1}/\text{MV}_t$$

$$H_{0.4} : \alpha_1 = 0$$

Hypothesis 5: There is a relationship between E/P and Stock Return.

$$R_i = \alpha_0 + \alpha_1 \text{E/P}$$

$$H_{0.5} : \alpha_1 = 0$$

Hypothesis 6: There is a relationship between D/E and Stock Return.

$$R_{it} = \alpha_0 + \alpha_1 \text{D/E}_{t-1}$$

$$H_{0.6} : \alpha_1 = 0$$

Hypothesis 7: There is a relationship between Market Risk (β) and Stock Return.

$$R_{it} = \alpha_0 + \alpha_1 \beta_i$$

$$H_{0.7} : \alpha_1 = 0$$

Variables Measurement Method

Stock Return (R_{it}): Taking into consideration the effect of capital increase, the stock return was calculated using the following formula:

$$R_{it} = \frac{P_t - P_{t-1} + (1 + X_{it}) D_t + X_{it} (P_{it} - M_{it})}{P_{t-1}}$$

Where:

R_{it} : the return of a stock in Period t.

M : the amount paid per each new share resulting from capital increase.

P_t : stock price in period t.

X_{it} : percent of capital increase.

D_t : dividend yield of each share to be included in the calculations provided that dividend yield applies to the stock resulting from capital increase.

Book-Value to Market-Value Ratio (BV/MV): Book value means the shareholders equity reported in the balance sheet at the end of the fiscal year. Market value means the number of the ordinary stock of the company at the end of the fiscal year multiplied by the last price of each stock at the end of the same fiscal year.

Systematic Risk (β): The ratio of stock yield and market yield covariance (index of Tehran Stock Exchange) to market yield variance.

Debt to Equity Ratio (D/E): As for the debt and shareholders equity, the total debt and the book value at the end of the period as put on the balance sheet were used respectively.

Earning to Price Ratio (E/P): As for the earning, the earning per share as declared for each fiscal year was used, and with respect to the price, the stock price at the end of the fiscal year was used.

Findings and Conclusions

1. Accounting and Market Variables and Stock Return: Results of the cross-sectional testing of Hypothesis 1, namely the relationship between the Stock Return and BV/MV, S/P, D/E, Size, E/P and Market Risk (β) are shown in Table 1.

Table 1: Relationship between Accounting and Market Variables and Stock Return

$$R_{it} = \alpha_0 + \alpha_1 D_{t-1}/E + \alpha_2 S_{t-1}/P_t + \alpha_3 E/P + \alpha_4 BV_{t-1}/MV_t + \alpha_5 \text{Log MV} + \alpha_6 \beta$$

Period	Observations Number	R ²	R ² Adjusted	F Statistic	Significance Level
1997-2001	450	0.056	0.043	4.371	0.001
Variables		Coefficient		P-Value	
β		-30.4		0.008	
MV		1.5e- 0.05		0.045	
S/P		25.5		0.001	

On the basis of F statistic, this model was significant and the hypothesis was confirmed. However, predictability of the model (R^2) measured 4.3% only. The coefficients of (β), Size (Market Value) and S/P were significant.

Hypothesis 1 was also tested for each and every one of the years of the period under study. (β) and S/P coefficients were significant respectively in 3 years and 2 years. The coefficient of E/B and D/E variable was significant in 1 year only. However, the model did not significant for the years 2000 and 2001.

2. Size (Market Value) and Return

The result of second hypothesis, as shown in Table 2, demonstrated that there existed a significant relationship between these 2 variables in the 4 years. Under the best case, the predictability of the model was 12.3% indicating a slight improvement compared to the other method of calculation of the Size, though it measured low in general. Based on the studies performed in this respect, Bagella et al (2000) found a negative relationship between the Size and Stock Return, while the ones done by Dechow et al (2001) and Lam (2002) demonstrated a positive relationship between the two variables.

Table2: Relationship between Size (Market Value) and Return

$$R_i = \alpha_0 + \alpha_1 \text{Log MV}$$

Period	1998	2001	2002	2003
Observations Number	96	95	101	106
R^2	0.065	0.065	0.111	0.123
R^2 Adjusted	0.055	0.055	0.102	0.115
F Statistic	**6.611	*6.524	*12.478	*14.719
Significance Level	0.0130	0.010	0.001	0.0001
Variable Coefficient	**0.255	**0.255	*0.333	*0.351

* significant at 1%.

** significant at 5%.

3. S/P and Stock Return

The results of third hypothesis shown in Table 3, demonstrated that there existed a significant relationship between these two variables. Under the best circumstances, the predictability of the model registered 13.5%. Out of the studies undertaken in this respect, Sheu et al (1998) and Mukherji et al (1997) established a positive relationship between S/P and the Stock Return. However, the results of the present study indicated that only in one year there existed a positive correlation between S/P and the Stock Return while in 4 years it proved negative, indicating that the findings of the research were not compatible with those of the ones mentioned above.

Table 3 : Relationship between S/P and Stock Return

$$R_i = \alpha_0 + \alpha_1 S_{t-1}/P_t$$

Period	1999	2000	2001	2002
Observations Number	102	99	95	98
R ²	0.112	0.058	0.057	0.135
R ² Adjusted	0.103	0.049	0.047	0.126
F Statistic	*12.751	*6.078	*5.675	*15.101
Significance Level	0.001	0.015	0.019	0.0001
Variable Coefficient	52.659	-14.174	-14.160	-1.523

* significant at 1%.

** significant at 5%.

4. BV/MV and Stock Return

The results of testing of this hypothesis are shown in Table 4. This variable proved highly significant in the earlier studies but it was very unexpected that the relationship between this variable and the stock return was unstable. Lewllen (1999), Allen and Cleary (1998), Mukherji et al (1997), Barber and Lyon (1997), Fama and French (1992), and Chan et al (1991) found a positive and remarkably great relationship between BV/MV and the Stock Return. Surprisingly the findings of the research did not confirm the existence of any positive relationship between the two variables.

Table 4: Relationship between BV/MV and Stock Return

$$R_i = \alpha_0 + \alpha_1 BV_{t-1}/MV_t$$

Period	1998	2001	2003
Observations Number	93	96	45
R ²	0.071	0.070	0.097
R ² Adjusted	0.061	0.061	0.077
F Statistic	7.003	7.202	4.734
Significance Level	*-26.002	*-47.917	** -43.842
Variable Coefficient	0.010	0.009	0.035

* significant at 1%.

** significant at 5%.

A complementary test of the hypothesis was carried out on the basis of formation of 3 portfolios and calculation of the Stock Return for each and every one of the portfolios, a procedure which would minimize the effect of the errors resulting from statistical models and distribution of the data. To this end, the BV/MV data were arranged in an ascending order and 3 portfolios were formed. Portfolio 1 had the lowest ratio of BV/MV while portfolio 3 had the greatest ratio.

Table 5 demonstrates the mean and the standard deviation of the Stock Return in the 3 portfolios. In the year 1997, with respect to the portfolio having a higher BV/MV ratio, when the value of this variable increased, the mean of stock return of the portfolio increased proportionally, indicating that there existed a positive correlation between this variable and the Stock Return. In the year 1998, the mean and the standard deviation did not prove stable. In the year 1999, when this variable increased, the mean and the standard deviation of the Stock Return increased as well, indicating that it was compatible with the sign of the variable coefficient. In the years 2000-2002, when this variable increased, the mean of the Stock Return decreased, indicating that it was compatible with the sign of the variable coefficient except for the year 2002.

**Table 5: Mean and Standard Deviation of Portfolio Return
(Based on BV/MV)**

Year	Portfolio					
	1		2		3	
	Return	S.D.	Return	S.D.	Return	S.D.
1997	4.2	19.3	5.2	32.4	5.6	43.4
1998	14.8	23.7	15.5	40.8	-4.6	25.5
1999	87.7	71.5	88.7	90.9	92.5	364.7
2000	67.6	70.2	63.4	69.7	13.8	44
2001	69	75.6	66.8	93.4	18.4	36.6
2002	50.3	78.9	35.3	46.9	3.7	33.5
2003	89.9	85.2	48.2	61.8	37	74.4

5. E/P and Stock Return

The research findings concerning this hypothesis are demonstrated in Table 6 below. Only in 1997 and 2002 did the relationship between these two variables prove significant. The predictability power of the model, under the best circumstances, measured 16.3% which exceeds that of other variables as stated in hypotheses 1 to 4. In view of the findings of the present research, there appears to be no significant relationship between E/P and Stock Return in Tehran Stock Exchange. One of the reasons why the research findings in this respect are so dispersed may be the fact that the relationship between Earning and Price includes two variables both of which are, one way or other, influenced by the market factors. The earning per share plays a major role in the decisions made by the investors. Hence, the majority of companies attempt to manage the accounting profit which proves feasible through exercising different accounting methods. On the other hand, the price may be affected by various factors including economic and political circumstances prevailing in the country.

The other studies carried out in this respect demonstrated dispersed findings in the relationship between E/P and the Stock Return: Lewllen, (2004) found a weak relationship between E/P and the Stock Return. Lam (2002), Rahimi (1995) and Basu (1997) established a positive relationship, while Bagella et al (2000) and Chan et al (1991) found a negative relationship, but Mukerji et al (1997) and Fama and French (1992) demonstrated that there existed no significant relationship between E/P and the Stock Return.

Table 6: Relationship between E/P and Stock Return

$$R_i = \alpha_0 + \alpha_1 E/P$$

Period	1997	2002
Observations Number	83	83
R ²	0.163	0.048
Adjusted R ²	0.153	0.037
F Statistic	*15.974	**4.174
Variable Coefficient	*81.005	** -66.741

* significant at 1%.

** significant at 5%.

6. D/E and Stock Return

No significant relationship was observed between these two variables in the years under study in this research, hence the statistical results did not verify the relevant hypothesis. These findings are compatible with those of Fama and French (1992), while Mukherji et al (1997) and Masulis (1983) established that there existed a positive relationship between D/E and the Stock Return.

7. Market Risk (β) and Stock Return

The findings are shown in Table 7. In the seven years studied in this research, there existed a significant relationship between Market Risk (β) and the Stock Return only in three years. Under the best circumstances, the predictability power of the model measured 15.1% calculated on the basis of the changes in the stock return and this variable. It may be concluded that, as predicted in CAPM, there is no significant relationship between Market Risk (β) and the Stock Return in the Tehran Stock Exchange.

Table 7: Relationship between Market Risk (β) and Stock Return

$$R_{it} = \alpha_0 + \alpha_1 \beta_i$$

Period	1997	1999	2003
Observations Number	133	134	134
R²	0.151	0.077	0.178
R² Adjusted	0.144	0.070	0.172
F Statistic	*23.390	*11.040	*28.747
Variable Coefficient	*-16.126	*-71.776	*84.950

* significant at 1%.

** significant at 5%.

Compared to the studies carried out earlier in this respect, the findings of the researches by Lam (2002), Mukherji et al (1997) and Fama and French (1992) are similar to those of the present study. To ensure that the statistical models did not affect the findings, three portfolios were formed on the basis of this variable. To this end the whole data were ordered in an ascending order and the quartile were calculated. Portfolio 1 and three included the companies with the lowest and highest β respectively. Table 8 demonstrates the Return, Standard Deviation and β of each portfolio. It should be noted that portfolio return of the companies was calculated on the basis of Equally Weighted Portfolio. The findings indicate that in the years 2000, 2002 and 2003 with the increase in β , the average return increased as well. However, in 1998 the average return did not follow a stable trend among the portfolios. Upon comparison of Tables 7 and 8, it becomes known that the findings concerning the year 2003 are similar in both tests.

Table 8: Return of Portfolios Based on β (Systematic Risk)

Year	Portfolio								
	1			2			3		
	Return	Return S.D.	Portfolio β	Return	Return S.D.	Portfolio β	Return	Return S.D.	Portfolio β
1997	20.2	33.7	0.01	4.2	28.8	0.57	-9.6	28.2	1.31
1998	0.71	39.9	0.03	8.4	19.4	0.58	6.5	28.9	1.30
1999	92.7	318.5	0.07	71	68.8	0.57	69.2	83.2	1.30
2000	29.8	70	0.08	45.6	84.7	0.57	50.1	44	1.24
2001	29.4	60	0.10	55.2	73.2	0.57	53.03	92.7	1.23
2002	16.2	50	0.13	30.2	61.7	0.57	34.6	72.2	1.16
2003	5.5	28.7	0.16	34.8	56.4	0.43	116.8	143.5	0.75

Note: Portfolio 1 and 3 include the companies with the lowest and highest β respectively.

Conclusion

This research aimed at studying the relationship between accounting variables and market variables and the stock return on the basis of pooled cross-sectional data of a seven year period of 1997-2003 applying the multi-variable model. The model proved statistically significant with respect to (β), S/P and the Size (Market Value).

To test hypotheses 2-7, single variable model was applied. In no year was there a significant relationship between D/E and the Stock Return, while the relationship between the Size, E/P, S/P and the Stock Return proved more stable compared to other variables. Similar findings were observed during four years between the above variables and the Stock Return. The relationship between (β), BV/MV and the Stock Return was significant in three years, though the findings were dispersed. The predictability of single variable models, which registered 16.3% under the best circumstances with respect to the relationship between E/P and the Stock Return in 1997, measured less than that of multi-variable model.

The predictability of the yearly multi-variable models measured greater than that of multi-yearly cross-sectional models: one potential reason for this being the changes in macro circumstances affecting Iranian economy. Further, due to the instability in the relationship between each one of the variables and the Debt, one should not place great emphasis on some variables. The items put on the financial statements including Sale, Book Value, Equity and Earning may partially predict the Stock Return. Such findings may be justified on the basis of Behavioral Finance Theories.

Novice investors may affect the prices in the emerging markets and accordingly fluctuations in the Stock Return may partially be attributed to the behavior of such investors.

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