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Investigation of Conditional Relationship between Risks and Expected Stock Returns in Different Industries Listed in Tehran Stock Exchange

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Abstract

This study aims at investigating relationship between conditional risks with expected stock returns. It is of library and analytical – causal study type and it is based on panel data analysis. Financial data for 98 companies listed in Tehran Stock Exchange during 2006-2011 was investigated. SPSS 20, Eviews 7 and Minitab 16 software were used to test research hypotheses and they were analyzed using descriptive and inferential statistics such as Pearson correlation analysis as well as conditional ARCH and GARCH models. Results suggest there is significant direct relationship between expected return and stock price volatility and between stock rate and stock exchange volatility.

Keywords: Risk, return, volatility, conditional ARCH and GARCH models.

Introduction

Investigation of relationship between risk and return is an important issue for investors in financial assets, thus many authors have addressed it. It is natural for the investor to commit high investment risk for reward by risk-aversion so that he reaches to a high return rate. Studies on different types of stock markets have had contradictory results denoting that such relationship is not valid in all stock markets. According to the latest studies based on new hypotheses, risk aversion of logical investors may be related to stages of business cycles, that is economic growth and recession.

Considering relationship between risk and return, Capital Asset Pricing Model estimated expected return of stakeholders through the risk existing in the market. Thus, due to criticisms to this model, some authors in management and economics fields attempted to develop it. Pettengill, Sundaram, and Mathur[1] studied relationship between risk and return in conditions of boom and recession of the market and found evaluation of relationship between Beta and return requires adjustment, since real stock return was used in traditional test instead of expected return; while according assumptions of CAPM model, relationship between expected return with Beta should be investigated. Thus, they developed a kind of conditional relationship between return and Beta in which relationship between Beta and return was dependent on negative or positive excess return (risk premium) of market. Returns periodic correlation properties depend on level and volatilities of macro risk aversion in the economy. These economic mechanisms are labeled with risk aversion level effect and risk aversion volatilities effect. In order to understand effect of risk aversion level consider a complex with discrete dividend. A positive dividend shock stocks, which means that the stock price will increase and return will be waited. When consumption declines, investors sell stocks or market portfolio with minimum risk to opposite investors with higher risk. During this period of exchange, stocks fall so that demand by investors with high risk aversion is stimulated. Hence, they will obtain high expected return when they keep their stocks. Thus total risk aversion is a common factor in pricing assets which increases in cases prices fall or when investors purchase in high risk volatilities. Conditional volatilities and conditional volatilities from exchanges will increase by fall of prices.

Barberis et al.[2] argued relationship between risk and return is not positive in all markets and in all periods. It is negative in periods when market return is negative and it is positive when market return is positive. Conditional relationship between risk and return is not strong in markets where there is random walk and price full freedom. However, in the controlled markets or those which are not too old in comparison with advanced countries or suffer from inside information on the market or confront with limitations of capital control, conditional Beta works better than other types of risk and return relationship. Aim of the current study is investigating conditional relationship between conditional risk and stock return in different industries listed in Tehran Stock Exchange. Following an introduction on the research topic, research background, research goals and model are described. Then methodology, hypotheses, statistical population and research sampling method are explained and finally research hypotheses are tested and the results are described.

Review of Literature: One of the initial studies in conditional relationship between Beta and return was carried out by Pettengill et al. and Fama et al.[3] who developed a kind of conditional relationship between return and Beta where Beta and return relationship is dependent on positive or negative

excess return (premium risk) of the market. Their works indicated there is positive relation between Beta and return when the market return is positive. The relation is negative when the market return is negative. Crombez and Vennet[4] performed a study on risk/return relationship conditional on market movements on the Brussels stock exchange aiming at finding an answer for this question: Do the principles of advanced markets work also in small capital markets? Campbell[5] studied on conditional Beta and maintained conditional Beta is calculated for periods when market average return is negative and below market return average. Wang et al[6] measured conditional relationship between risk and return using conditional Beta and correlation coefficient. Their work was done within time period 1964-1999 on *NASDAQ* stock. Thus they selected stocks used since 1973 in this index as their statistical population. They focused their studies on 48 portfolios according to industrial classification by Fama and Mac Bech[7] Their final results indicated stocks with very low correlation with average market return create more expected return compared to stocks with positive correlation with average market return. It is true in periods when market return is declining or negative. Cheung and Wong[8] studies relationship between return and different risk statistical criteria in Hong Kong market and found CAPM power is weak in this market for describing return of assets. Similar to Cheung and Wong, Chui and Wei[9] performed a similar study in 5 emerging markets (in Asia including Hong Kong, Korea, Malaysia, Taiwan and Thailand). They found there is weak relationship between Beta and average return. In addition, they found more stock return is related with the size and ratio of book value to market value.

Haugen and Baker[10] investigated properties of relationship between risk and return for 1,000 companies with highest capital among American companies within 1972-1989 and concluded stock with low risk unusually has higher return which is in contrast with approved Beta and return relationship in CAPM. The most general model developed in the literature for recording and analysis of clustering volatility is of ARCH family models. Auto Regressive Conditional Hetero skedasticity (*ARCH*) model was proposed by Engle for the first time in Engle Robert F[11]. In this model, an auto-correlated structure was given for conditional variance equation which allowed volatility shocks to be long-standing over the time and do not disappear rapidly. Then this model was generalized by Bollerslev[12] which also included delay in conditional variances. Ability of ARCH models generalized for identification of clustering volatility patterns led to their wide application for stock market return in developed markets and for developing markets in lesser scope. Although existing theories in modeling stock market pricing are not perfect, there are experimental models obtained from econometric methods which are used in analysis of financial phenomenon generally and in analysis of stock market's volatility specifically. By propose ARCH model by Engle heteroskedasticity of conditional variance could be modeled. Generalizing Engle's model, Bollerslev proposed Generalized Autoregressive Conditional Heteroskedasticity. Girard et al.[13] studied relationship between market premium risk in 19 markets and found significant relationship between premium risk and conditional variance.

Research Significance and Goal: Significance of the study can be summarized as follows: Investigation of conditional relationship between expected return and stock price volatility in Tehran Stock Exchange over economic growth and recession periods. Investigation of relationship between stock rate and stock exchange volatility over economic growth and recession periods. Helping decision making by managers of investment and portfolio for selecting stock portfolio according to market conditions (ascending or descending market).

Research Model: Autoregressive conditional model includes two equations. Conditional motion means equation and conditional volatility equation. Conditional motion mean equation is generally an ARMA model. Conditional volatilities models are described in the following. A second order ARCH (2) model based on ARMA model is as follows:

ARMA (1,1):$r^t = \alpha_0 + \alpha_1 r_{t-1} + \varepsilon_t - m_1 \varepsilon_{t-1}$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2$$

r^t: *Portfolio Return Index,* σ_t^2: Conditional error variance (estimated error up to period t considering available information for time t-1)

For having positive variance: $\alpha_0 \succ 0, \alpha_1, \alpha_2, ... \alpha_p \geq 0$, GARCH model enables prediction of conditional volatilities based on previous error type. Conditional volatility model in GARCH is an auto-regressive process. GARCH (p,q) model is as follows:

$$r_t = \alpha_0 + \alpha_1 r_{t-1} + \varepsilon_t - m_1 \varepsilon t - 1$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_{t-2}^2 + ... + \alpha_p \varepsilon_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + ... + \beta_q \sigma_{t-q}^2$$

Conditional variance will be positive if $\alpha_0 \succ 0, \alpha_i \geq 0, \beta_i \geq 0$ and $\alpha_i + \beta_i \prec 1$ and GARCH-M investigates risk/return relationship. According to this mode, a relational direction is considered between risk and expected return. Considering high risk by investors, there should be also more reward. Thus, motion mean equation in average includes expected volatility as dependent variable which may be measured by standard deviation and variance. GARCH-M model is as follows:

$$r_t = \alpha_0 + \alpha_1 r_{t-1} + \varepsilon_t - m_1 \varepsilon_{t-1} + b_1 \sigma$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2 + ... + \alpha_p \varepsilon_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + ... + \beta_p \sigma_{t-q}^2$$

For having positive conditional volatility variance:

$\alpha_0 \succ 0, \alpha_i \geq 0, \beta_i \geq 0$ و $\alpha_i + \beta_i \prec 1$

EGARCH, PARCH and G-GARCH models are models developed for considering effect of asymmetric shocks on

return. EGARCH model could consider asymmetric effect of new events on a series of negative information with the same severity on series positive information, which identifies high volatility increase. EGARCH model is as follows:

$$Y_t = \alpha_0 + \alpha_1 r_{t-1} + \varepsilon_t - m_1 \varepsilon_{t-1}$$

$$\ln \sigma_t^2 = \alpha_0 + \alpha_1 \left| \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} \right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \beta_1 \ln \sigma_{t-1}^2$$

Asymmetric volatility is denoted by parameter γ_1. If this parameter is statistically significant, there would be an asymmetric volatility reaction based on new information in the market. Hence, we want to estimate asymmetric information effect when there is relation between expected return and conditional variance. Consider EGARCH model provides following option:

$$Y_t = \alpha_0 + \alpha_1 r_{t-1} + \varepsilon_t - m_1 \varepsilon_{t-1} + b_1 \sigma_t$$

$$\ln \sigma_t^2 = \alpha_0 + \alpha_1 \left| \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} \right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \beta_1 \ln \sigma_{t-1}^2$$

Since models EGARCH-M and EGARCH have conditional volatility in the form of logarithm as dependent variable, they should face a positive value of this parameter without more requirements, if b1 is significant statistically, it may be said there is a relationship between volatility and return.

Also, if b1 is statistically significant, volatility may be considered as asymmetric. GARCH is another asymmetric model from Glosten et al. which is as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \gamma_1 S_{t-1}^- \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

Where S_{t-1}^- is a dummy variable whose value is 1 when $\varepsilon_{t-1} \leq 0$. Also $\alpha_1 + \beta_1 + \frac{1}{2}\gamma_1 \langle 1$, $\alpha_0 \rangle 0, \alpha_1 \geq 0, \beta_1 \geq 0$, and $\alpha_1 + \gamma_1 \geq 0$.

When $\gamma_1 \langle 0$, conditional variance is more after a negative shock in time t ($\varepsilon_{t-1} \langle 0$).

r^t =asset return in time t, $r_t = \ln p_t - \ln p_{t-1}$, p^t = portfolio price index in time t, p^{t-1} = portfolio price index in time t-1, $\alpha_0 \rangle 0, \alpha_i \geq 0, \beta_i \geq 0$

In order to estimate conditional volatility, Engle used normal distribution. Bolleslev provided standardized t student distribution and Nelson offered generalized error distribution.

Most econometric models are of multi types. In other words, dependent variable is influenced by different independent variables, thus its equation was known as Multiple Regression. Also, research dependent variables include expected stock return and properties of return rates and independent variables include stock volatility and stock exchange volatility.

Methodology

Current work is of library and analytical – causal type. Descriptive statistics related to model variables were summarized using SPSS 20 software and then normalization test for research variables was used which is of assumptions of ordinary least squares model and Kolmogorov - Smirnov (KS) was run. Considering the fact that distribution of model variables was not normal which is necessary condition for regression models, Johnson Transformation was used and data were analyzed using Minitab 16 software. Also, linearity of independent variables was done by Pearson correlation coefficient and finally Chow test (for panel method - combined method) and the Hausman test (for using a random effect - fixed effect method) and obtained results from classic regression assumptions were stated for research models.

Research Hypotheses: There is significant relationship between expected return and stock price volatility in economic growth and recession periods. There is significant relationship between stock rate and stock exchange volatility in economic growth and recession periods.

Statistical Population: Statistical population includes companies listed in Tehran Stock Exchange during 2006-2011 (N = 98).

Results and Discussion

Testing Hypotheses: Table-1 gives status of descriptive statistics for model variables after screening and elimination of outliers using SPSS 20 software.

Considering table-1, mean of expected stock return and rate of return for the sample companies is negative as -0.2378 and -0.0218, respectively, denoting abnormal distribution for this variable. According to descriptive statistics in table-1, stock price volatility and Beta coefficient of stock was positive as 1.6525 and 0.0598, respectively. Also, positive mean of performance of stock, price volatility, return of capital assets and Beta coefficient of stock on min and max basis are as follows: 0.1447, 0.4985, 0.0704, and 0.2875.

Normality of this variable's distribution should be tested. It is investigated through Kolmogorov-Smirnov (K-S) statistics. If significance level of the statistics is above 0.05 in this test (Prob>.05), normal distribution of the variable is accepted. Table-2 gives results for K-S test for expected stock return and return rate variables in the sample companies.

Considering K-S statistics' significance level is below 0.05 for expected stock return and rate of return variables, it suggests these variables lack normal distribution. Normality of dependent variables are necessary requirement for regression models. Thus it is necessary to normalize this variable before testing hypotheses. Johnson Transformation was used for data normalization. Table 3 gives results obtained from K-S test after data normalization process.

Considering table-3, since significance level of K-S statistics for dependent variables is above 0.05 after data normalization (0.827, 0.934), it suggests expected stock return and rate of return variables has normal distribution after normalization process. Also, relationship between research variables and their correlation was investigated using Pearson correlation coefficient. Correlation coefficient matrix between researches variables are given in table-4. According to results obtained from Pearson statistics, expected stock return shows positive and significant correlation with rate of return and stock exchange volatility. Also there is positive and significant correlation between rate of return and stock exchange volatility and Beta coefficient of stock. Performance of stock has negative and significant correlation with price volatility and return of capital assets. Price volatility shows negative and significant correlation with return of capital assets.

Table-1
Descriptive statistics of research variables

Variable	Observation No.	Mean	SD	Min.	Max.	Skewness	Strain
Expected stock return	588	-0/2378	1/7855	-5/2176	5/9473	-0/285	2/204
Rate of Return	588	-0/0218	0/3732	-2/5760	2/3073	-0/581	12/226
Stockvolatility	588	1/6525	4/8630	-18/3200	24/7000	0/608	3/974
Beta coefficient of stock	588	0/0598	2/0222	-8/3577	32/0313	8/024	117/728
Performance of stock	588	0/1447	0/1556	1/306	7/781	-0/4350	1/3310
Price volatility	588	0/4985	0/2655	0/0311	3/5936	4/427	44/013
Return of capital assets	588	0/0704	0/1951	-2/6498	0/8361	-4/696	64/561
Beta coefficient of stock	588	0/2875	0/3738	-1/6444	1/4478	0/144	1/250

Table-2
Results of normality test for research dependent variable

Variable	No.	K-S statistics	Sig
Expected stock return	588	4.397	0.00
Rate of Return	588	5.699	0.00

Table-3
Normality test results for dependent variables after normalization process

Variable	No.	K-S statistics	Sig
Expected stock return	588	0.538	0.934
Rate of Return	588	0.634	0.817

Table-4
Pearson correlation coefficients matrix for research variables

	Expected stock return	**Rate of Return**	**Stock volatility**	**Stock exchange volatility**	**Performance of stock**	**Price volatility**	**Return of capital assets**	**Beta coefficient of stock**
Expected stock return $(P-Value)$	1	-	-	-	-	-	-	-
Rate of Return $(P-Value)$	0/526 (0/000)	1.	-	-	-	-	-	-
Stockvolatility $(P-Value)$	0/063 (0/125)	0/053 (0/199)	1	-	-	-	-	-
Stockexchange volatility $(P-Value)$	0/100 (0/015)	0/253 (0/000)	0/020 (0/627)	1	-	-	-	-
Performance of stock $(P-Value)$	-0/033 (0/419)	-0/006 (0/889)	0/012 (0/772)	0/015 (0/714)	1	-	-	-
Price volatility $(P-Value)$	0/032 (0/436)	0/020 (0/625)	0/011 (0/796)	-0/040 (0/333)	-0/090 (0/029)	1	-	-
Return of capital assets $(P-Value)$	0/011 (0/781)	0/021 (0/615)	-0/009 (0/819)	0/010 (0/809)	-0/111 (0/007)	-0/561 (0/000)	1	-
Beta coefficient of stock $(P-Value)$	0/032 (0/434)	0/093 (0/024)	-0/072 (0/082)	-0/009 (0/827)	-0/046 (0/264)	-0/043 (0/295)	0/021 (0/608)	1

As it is clear in table-4, stock volatility and stock exchange volatility has no considerable correlation. Thus, considering lack of co-linearity problem between these two variables, it was possible to enter simultaneously variables in the model, however, for better analysis it is necessary to investigate them in separate models. In relation with other variables, considering weak correlation it can be said there is no linearity problem and their simultaneous inclusion in the model doesn't lead to linearity problem.

Test Results for H1: H1. Estimation of relationship between expected stock return and stock volatility of the companies is done using panel data method by following model, and if β_1 coefficient is significant at confidence level95%, it will be confirmed.

$$ER_{it} = \alpha_0 + \alpha_1 \delta vs_{it} + m_1 S_{it} + \beta_1 (Lnp_{it} - Lnp_{it-1}) + \gamma_1 R_{it} + \lambda Beta + \varepsilon_{it}$$

In order to specify effectiveness of using panel data method for model estimation, Chow test or bound F and Hausman test is used. Results of the tests are given in table-5.

Considering results of Chow test and its P-Value (0.0000), panel data method can be used. Also given results of Hausman test and its P-Value (0.0388) below 0.05, fixed effects method can be used for estimation of the model.

Table-5
Results of Chow and Hausman tests for Model 1

Test	**P-Value**	**Degree of Freedom**	**Statistics Value**	**Statistics**	**No.**
Chow	0/0000	(485،97)	37/1350	F	588
Hausman	0/0388	5	9/5583	χ^2	588

Jarque-Beratest was used for testing normality of the error terms. Its results indicate residues resulting from the research model estimation are normally distributed at confidence level 95%, so that this test probability (0.3412) is larger than 0.05. *Breusch*–Pagan test was used for investigating similarity of variances. Considering significance level of this test which is smaller than 0.05 (0.0077), it can be said the model suffers from variance anisotropy. To overcome this problem in this study, generalized least squares (GLS) method was used. *Durbin-Watson (D-W) test was used for* testing no correlation of residues. Given initial results of model estimation by *Durbin-Watson test as 1.67*, and since it is between 1.5 and 2.5, it can be concluded residues are independent of each other. In

addition, Ramsey Statistics was used for testing linear or non-linear relationship in the model. Considering significance level of Ramsey Statistics (0.6543) larger than 0.05, model linearity is approved and model has no specification error. Summary of above tests' results are given in table-6.

Considering results for Chow and Hausman tests as well as test of classic regression statistical assumptions, Model 1 is estimated using panel data method as fixed effects way. Results of model estimation are given in table-7. Model estimated using*Eviews7* software will be as given in table-7.

$$ER_{it} = -0.1205 - 0.0137\delta vs_{it} + 0.1759 m_1 S_{it} + 0.1489$$
$$(Lnp_{it} - Lnp_{it-1}) + 0.1766\gamma_1 R_{it} + 0.1336\lambda Beta + \varepsilon_{it}$$

Considering F statistics probability smaller than 0.05 (0.0000), the whole model's significance is supported at confidence level 95%. Model's coefficient of determination suggests 88.38% of expected stock return is described by the variables included in the model. In investigation of significance of coefficients considering results in table-7, since t statistics probability for stock volatility variable coefficient is smaller than 0.05 (0.0001), thus significant relationship between stock volatility and expected stock return is supported at confidence level 95%. Therefore first hypothesis is supported, and by 95% confidence it can be stated there is significant relationship between expected stock return and stock price volatility. Positive coefficient for this variable (0.0137) suggests direct relationship between stock price volatility and expected stock return, so that by 1 unit increase in stock volatility, expected stock return also increases by 0.0137 units. Thus, research results concerning confirmation of H1 indicated there is significant direct relationship between expected stock return and stock price volatility in economic growth and recession periods.

Test Results for H2: H2. Estimation of relationship between rate of return and stock exchange volatility of the companies is done using panel data method as follows, and if β_1 coefficient is significant at confidence level 95%, it will be confirmed.

Table-6
Results of tests for model statistical assumptions

Ramsey Statistics		**Durbin-Watson Statistics**	**Breusch-Pagan Statistics**		**Jarque-Bera Statistics**	
$P-Value$	F	D	$P-Value$	F	$P-Value$	χ^2
0/6543	0/4244	1/67	0/0077	1/1027	0/3412	1/8825

Table-7
Results for testing H1 using fixed effects method

Dependent variable: expected stock return Views: 588 Years - The Company				
Relationship	**P-Value**	**t Statistics**	**coefficient**	**variable**
Negative	0/0195	-2/3436	-0/1205	Constant
Negative	0/0001	4/0650	0/0137	Stockvolatility
Meaningless	0/1106	1/5985	0/1759	Performance of stock
Positive	0/0481	1/9814	0/1489	Price volatility
Meaningless	0/0864	1/7183	0/1766	Return of capital assets
Positive	0/0007	3/4124	0/1336	Beta coefficient of stock
0/8838	Model's coefficient of determination			
36/1684 (0/0000)	F Statistics $P-Value$			

$$ER_{it} * Cap_{it} = \alpha_0 + \alpha_1 \delta vs_{it} * Ex_{it} + m_1 S_{it} + \beta_1 (Lnp_{it} - Lnp_{it-1}) + \gamma_1 R_{it} + \lambda Beta + \varepsilon_{it}$$

Results of Chow and Hausman tests for model 2 are given in table-8.

Table-8
Results of Chow and Hausman tests for Model 2

Test	P-Value	Degree of Freedom	Statistics Value	Statistics
Chow	0.0000	458,97	34.3970	F
Hausman	0.0000	5	47.4125	χ^2

Considering results of Chow test and its P-Value (0.0000), panel data method can be used. Also given results of Hausman test and its P-Value (0.0000) below 0.05, fixed effects method can be used for estimation of the model. Jarque-Bera test's results indicate residues resulting from the research model estimation are normally distributed at confidence level 95%, so that this test probability (0.3214) is larger than 0.05. Breusch–*Pagan test* was used for investigating similarity of variances. Considering significance level of this test which is smaller than 0.05 (0.0027), it can be said the model suffers from variance anisotropy. To overcome this problem in this study, generalized least squares (GLS) method was used. *Durbin-Watson (D-W) test was used for* testing auto-correlation of model residues. Given initial results of model estimation by *Durbin-Watson test as 1.57*, and since it is between 1.5 and 2.5, it can be concluded residues are independent of each other. In addition, considering significance level of *Ramsey Statistics (0.1115) larger than 0.05, research zero hypothesis on* model linearity is approved and model has no specification error. Summary of above tests' results are given in table-9.

Considering results for Chow and Hausman tests as well as test of classic regression statistical assumptions, Model 2 is estimated using panel data method as fixed effects way. Results of model estimation are given in table-10.

Table-9
Results of tests for model 2 statistical assumptions

Ramsey Statistics		Durbin-Watson Statistics	Breusch-Pagan Statistics		Jarque-Bera Statistics	
$P-Value$	F	D	$P-Value$	F	$P-Value$	χ^2
0/1115	4/5036	1/57	0/0027	1/8989	0/3214	1/7732

Table-10
Results for testing H2 using fixed effects method

Dependent variable: rate of return Views: 588 Years - The Company				
Relationship	**P-Value**	**t Statistics**	**Coefficient**	**Variable**
Meaningless	0/2925	-1/0538	-0/0412	Constant
Positive	0/0031	2/9731	0/0101	Stock volatility
Negative	0/0182	-2/3705	-0/1876	Performance of stock
Meaningless	0/0704	1/8136	0/1046	Price volatility
Meaningless	0/8053	-0/2466	-0/0188	Return of capital assets
Positive	0/0235	2/2719	0/0743	Beta coefficient of stock
0/8950	Model's coefficient of determination			
40/5362 (0/0000)	F Statistics $P-Value$			

Estimated model using *Eviews 7* software will be as follows.

$$ER_{it} * Cap_{it} = -0.0412 + 0.0101\delta vs_{it} * Ex_{it} - 0.1876S_{it} + 0.1046(Lnp_{it} - Lnp_{it-1}) - 0.0188\gamma_1 R_{it} + 0.0743\lambda Beta + \varepsilon_{it}$$

Considering F statistics probability smaller than 0.05 (0.0000), the whole model's significance is supported at confidence level 95%. Model's coefficient of determination suggests 89.50% of expected rate of return is described by the variables included in the model. In investigation of significance of coefficients considering results in above table, since t statistics probability for stock exchange volatility variable coefficient is smaller than 0.05 (0.0031), thus significant relationship between stock exchange volatility and rate of return is supported at confidence level 95%. Therefore second hypothesis is supported, and by 95% confidence it can be stated there is significant relationship between stock exchange volatility and rate of return. Positive coefficient for this variable (0.0101) suggests direct relationship between stock exchange volatility and rate of return, so that by 1 unit increase in stock exchange volatility, rate of return also increases by 0.0101 units. Thus, research results concerning confirmation of H2 indicated there is significant direct relationship between stock exchange volatility and rate of return in economic growth and recession periods.

Conclusion

Hypotheses 1: indicated there is significant direct relationship between expected stock return and stock price volatility in economic growth and recession periods. Result obtained from H1 in terms of relationship between dependent and independent variable is consistent with work by Berdot[14] and Kim et al.[15], however, in terms of type of relationship (direct or inverse) it is relevant with work by Engle[16] and in contrast with work by Hardin and Pagan[17].

Hypotheses 2: Indicated there is significant direct relationship between stock exchange volatility and rate of return in economic growth and recession periods. Results obtained from H2 are consistent with findings by Ding Z. et.al.[18] and they are in contrast with findings by Baillie and Degnnaro[19], Berdot and Theodossiou P., Lee U Theodossiou P., Relationship between volatility and expected returns across international stock markets[20].

Recommendations: Considering findings by the current work, Tehran Stock Exchange is able to publish more comprehensive information on expected rate of return and stock price volatility for stakeholders. Since increased stock return and reduced systematic risk of the company may have important effects on decision of investors. Managers are recommended to offer perfect and transparent information on estimated stock return and risk of the company. Tehran Stock Exchange is recommended to disclose comprehensive information on expected return and stock price volatility of the companies in economic growth and recession periods.

Recommendations for Future Works: In order to better utilization of research results as well as clarification of conditional relationship between conditional risk with expected stock return, following cases can be addressed in the future works: Investigation of industry type effect on relationship between conditional risk with expected stock return of the companies Using other variables for evaluating relationship between conditional risk and expected stock return such as volatilities of cash flows and non-systematic risk of the companies. Investigation of effect of macroeconomic variables such as inflation, oil prices and exchange rates on identifying conditional relationship between risk and expected stock return. Carrying out similar studies considering combined risk resulting from political issues and its impact on intrinsic value of the companies. Considering companies with financial agency activity were excluded in the research sample, it is suggested to perform a study in relation with relationship between conditional risk with expected stock return in such type of companies and findings are compared with findings in the current work.

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