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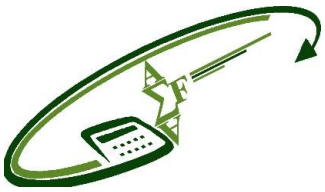

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# Ambiguity Theory and Asset Pricing: Empirical Evidence from Tehran Stock Exchange

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**ABSTRACT**

The main goal of investors to invest in the stock market to make a reasonable return. This is from two parts of the price change and dividend. The impact of any new information on the market is immediately reflected in the stock price of the companies. Based on evidences, there are uncertain conditions is called "ambiguity". First, ambiguity is estimated by the means of three-variable and main component method, trading volume, ask-bid spread, error of earnings forecast and afterwards, it has been used to examine the interaction between risk, ambiguity and return. Current research method is correlative descriptive and statistical sample consisted of 120 corporates accepted in Tehran Stock Exchange during 2012-2017. To test the hypotheses, regression analysis has been utilized. Results revealed the existence of ambiguity in Tehran Stock Exchange, which affects the asset pricing negatively.

## 1 Introduction

allant [1] observed major purpose of investors in relation to investments in stock market is to achieve reasonable return and return can be obtained by two parts: stock price changes and dividends. Investors and financial analysts should be able to predict the stock price and return by investment models. Traditional financial theory states that the stock price shows the fundamental stock value and reflects value of future cash flows. Sadka [2] referred the securities price demonstrates all the information available in market and it is expected that impact of new information in market is promptly reflected in corporates stock price. Accordingly, investors have rational behavior and seek to maximize the expected return. Thus, stock price changes are related to systematic variations in fundamental corporate values and non-rational behavior of investor has no impact on return. But evidence suggests that there is a positive relationship between investor emotional tendencies and stock return which has higher mental evaluation. Knight [3] confirmed More information enables an accurate evaluation and encourages investors to keep the corporate stock. As well, ambiguity exists in corporates, which leads to incorrect reaction of stockholders and beneficiaries toward the existing situation. Few studies on how to measure ambiguity and its impact on asset pricing has been conducted. We believe that a missing factor that determines the expected excess return is *ambiguity* (the so called *Knightian uncertainty*) and the attitude towards it. Modern portfolio theory, until recently, has practically ignored the

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Knightian distinction between risk and uncertainty. Based on Izhakian[4]survey, these papers, however, focus on estimation risk, how to correct for it, and how to incorporate it in portfolio selection or how it may affect capital market equilibrium. They did not deal with ambiguity and how it may affect asset prices and the relationship between ambiguity and return. Though there is an abundance of research on various aspects of ambiguity and ambiguity aversion, there is almost no empirical work providing a measure of ambiguity and incorporating such a measure in tests of the relationship between risk and return.

Ambiguity existence in making decisions put arise the question "how do people react to encounter ambiguity?" As a result, based on ambiguity, behavioral condition of stock market activists has to be investigated. In other words, except fundamental elements, effects of investors' behavioral and emotional elements on stock price should be regarded. Since in addition to accounting variables such as assets return, sale return, assets book to market value, earnings per share, and corporate size, other variables including bid-ask spread, trading volume and error of earnings forecast can be of impact on stock return and price.

## 2 Literature Review

March [5] investigated, How the investors react to the received information plays a critical role in determining the efficiency rate of securities market. If their reaction is correct and quick, the securities market tends to efficiency; otherwise, the efficient market will be far away due to delay or disturbance in the reaction of investors. In reality, investors are not able to react appropriately because of exposing to emotional conditions so that particular behavioral moods have been reported after releasing new news in the research. Uygur [6] showed, more information enables accurate valuation and encourages investors to maintain the corporate stock. In the corporates, there are ambiguities resulting in incorrect reaction of stockholders and beneficiaries towards the available status. Few studies have been performed concerning ambiguity measurement and its impact on asset pricing. Ambiguity existence in decision making proposes the question how people react to encounter ambiguity. Executives accompanied with a group of experienced managers lead the decision making in the corporate involving the decisions related to ambiguity. Such elements as bid-ask spread, trading volume and error of earnings forecast indicate ambiguity in the corporate. Trading volume, bid-ask spread and error of earnings forecast are regarded as corporate uncertainty, information asymmetry and access to corporate information indices. Neamtiu [7] confirmed, increased corporate transparency contributes to the decreased ambiguity. Trading volume investigates price accuracy and stability and studies that do not consider trading volume besides price do not pay attention to price accuracy. This variable is one of basic criteria in technical analysis, which can portray a picture of market trend to analysts in addition to price. Friberg [8] observed, regarding price trend free from trading volume changes which specify the market atmosphere may lead to wrong conclusions and price changes are meaningful if they are accompanied with significant volume changes.

Wei [9] entitled, Accounting and financial researchers present a significant relationship between information asymmetry which is measured by the difference between sale and purchase price offers and profit management level. Information asymmetry influences stock sale and purchase. With respect to information asymmetry, difference between sale and purchase price offers is more likely to be one of common criteria and sometimes, it is the only criterion applied by researchers. Antoniou [10] con-

firmed that, more information presented by financial reporting involves prediction of future operations. Prediction helps investors to improve the decision making process and may contain information which adversely affects the asset pricing trend. Predictions can be done without decisions but decisions cannot be made without predictions. Although these estimates potentially improve the financial information relevance through transferring future information to investors, financial information quality is exposed to be invalid due to objective difficulties and misuse of estimates to manipulate the information. The reason to focus on the mentioned variables is that they can be reflective of management predictions on future corporate perspective and are confirmable and quantitative.

This research is the first experimental study in terms of ambiguity, which has been conducted using stock market data and hybrid model of ambiguity and risk. Modern portfolio theory has mainly ignored the distinction between risk and ambiguity. However, the articles focused on how to estimate, correct and combine risk in portfolio selection and its impact on capital market balance. But these researchers have not regarded ambiguity and its effect on asset pricing and its relation to return. How can ambiguity be measured? Can risk and attitude toward risk be separated from ambiguity and attitude toward ambiguity and its impact on asset pricing? In this article, it has been tried to respond the above questions according to shadow theory indicating how ambiguity affects asset pricing.

Jewitt [11] stated, rational expectations theory is based on the assumption that people behave rationally and do the best task. On the other hand, rational expectations theory does not believe that people make no mistakes but it states when the information is provided to correct the mistakes, the mistakes are not repeated yearly. According to the theory, stock prices manifest present information and future expectations and the factor leading to price changes is new information which is able to be accompanied with ambiguity. Real investor behavior often indicates ambiguity avoidance. The most obvious situation is investor's uncertainty in relation to return distribution of financial tools. As a prerequisite for investment, individuals claim more return rate in uncertain circumstances as compared to more certainty in investment return and risk. Researchers indicated that if investors encounter ambiguity concerning stock return, more risk premium is imagined in response to ambiguity in possible distribution. Financial theorists believe that assets price react against different events and this view is supported by experiences. But there is no convincing theory based on which can specify relationships between financial markets and macroeconomics in one direction. Though, stock price shows reaction to a variety of elements. [10] Confirmed, based on expectations theory, stock price usually manifests stockholders and investors' expectations in securities market so that every decision and event contrary to investors' expectations happening in the corporate influence stock price. If information is positive more than what stockholder expects, the price increases and if it is negative, the price will negatively be affected. People's expectations depend on their predictions that sometimes have inefficiencies. Understand the source of these inefficiencies, could have important applications to study in the field of investors' rationality and market efficiency. Accordingly, it could be argued that the investors' reaction is relative and depends largely on the amount of information that they receive. Eibakabadi [12] investigated In securities markets, people are more looking for simple understanding and new information with immediate implications and don't pay attention to the information that have long-term consequences and less extractable results. Shanta et al, [13] in a research know ambiguity theory as an inappropriate selection in representative process. They reported the change of motivational relationship nature in the asymmetric information framework by ambiguity and believed that common principles could not distinguish uncertainty and ambiguity because both of them address probability of events. Irma [14] found out that investors encountered ambiguity and inappropriate quality and be-

haved in a way that the worst quality is their assessment. Therefore, their reaction to bad news was considerably stronger than good ones. Furthermore, they were not satisfied with the assets with low quality information, especially when primary basics are of poor quality. In addition, information shock resulted by ambiguity has a negative stable effect on price. Bryant [15] reported different results and introduced uncertainty and ambiguity in standard investment. But investors are aware of their own investment return resulted by a known public distribution concerning uncertainty; they are not aware of distribution in terms of ambiguity. Anderson [16] assessed stock market participation, cash quality and ambiguity as well as prediction dispersion of analysts concerning total market return and reported that ambiguity was negatively and significantly related to cash flow. Theoretical portfolio selection model forecasts that investors tendency to investment in stock is reduced when ambiguity is increased in market. Brenner [17] investigated investors' attitude towards uncertain investment return and cash asset and found that managers reduced cash assets in a specific period when they understood that the investors encountered ambiguity. Ju et al, [18] assessed the sensitivity to profit announcement premium in response to corporate ambiguity. In this paper, variance risk premium as the ambiguity assessment criterion is positively related to abnormal accumulated return. In fact, corporates with high level of information ambiguity have higher profit announcement premium (more market return) as compared to those with lower ambiguity level. Investors react to good and bad news asymmetrically and this asymmetry is reduced with ambiguity level change. Breuer [19] believed that there have been no accurate definitions of uncertainty and ambiguity. Uncertainty refers to the outputs which are unknown but ambiguity is of outputs which are known and their number is more than one. These definitions' direct relationship with real world is difficult and sometimes impossible. Definitions presented by Girard [ 20] and Chordia [21] have been concentrated and research result has been reported as follows:

If historical data and models are available for investors, they will be able to make decisions even in difficult circumstances. But in ambiguity conditions, making decisions is really tough since they believe that another person may have better information or can influence some elements resulting in arbitrage. According to research done by [4], the ability of making decisions in game theory is incomplete and misinterpreted that is resulted by accounting information system. March investigated the individuals psychologically under ambiguity conditions and concluded that traditional market theory cannot be updated by new environmental elements caused by ambiguity. Thus, individuals are inevitable to make non-rational decisions. Epstein [22] sought to find a difference between risk, ambiguity and Knightian uncertainty or shadow theory and present a theoretical and executive basis to assess ambiguity; three levels have been considered:
First, an experimental model has been given. Second, a decision making model was developed to extract ambiguity criterion indicating the difference between beliefs, preferences, risk and ambiguity. Third, an ambiguity model different from risk has been proposed and the difference can be examined experimentally. To assess ambiguity, loss variance of corporates as the sample was used. As a consequence, a negative significant relationship was observed between ambiguity and asset pricing and a positive significant relationship was seen between risk and asset pricing. Ellsberg [23] utilized cross-grid structure modelling to display ambiguity conditions and normal ones. When an individual with lots of information may affect stocks of other people, his/her own stock risk rate can be reduced. Furthermore, the increased welfare through making rational decisions is in priority under ambiguity conditions. this study was conducted on the outcomes of false financial reporting caused by ambiguity

and indicated that productivity and financial statement reliance are more likely to affect the decisions. Accounting system information causes overinvestment and underinvestment in large and small corporates (showing productivity and reliance), respectively. Research results are indicative of financial statement reliance affectability by market to book value and corporate size. However, [21] studied the relationship between stock return and risk as well as asset return using ask-bid spread of sale and purchase offers and stated that stock return was an increasing function of ask-bid spread of sale and purchase offers. Mcinish [24] suggested that the relationship between return and ask-bid spread of stock sale and purchase offers is sensitive to estimate method. Using their own model, they concluded that there was no clear relationship between ask-bid spread of stock sale and purchase offers and adjusted stock return based on CAPM risk model. Research results indicated that in stock market, trading costs partially affect the expected stock return. Results reported by Chakravarty [25] have shown a positive relationship between return and ask-bid spread of sale and purchase offers only in January. Bhattacharya [26] referred to a negative relationship between return and ask-bid spread of sale and purchase offers. Using estimated market depth and interdisciplinary data as stock liquidity criteria, a negative relationship was found between stock return and liquidity. Khani [27] stated Investors in the market investing in a portfolio, the only risk that they accept and the market rewards those risks, is a systematic risk. Zhang [28] found out a positive correlation between trading volume and price changes' absolute value. And [20] conducted a study on the relationship between trading volume and stock price. Research results have demonstrated that trading volume changes the prices and are heavy in booming markets but light in stagnant ones. Therefore, it has been reported that absolute value and correlation rate concerning price changes are more for ascending price trend as compared to the descending one. Also, the relationship exists in the interval of one day. Ehteshami [29] referred, an important issue that researchers and scholars in decision-making and forecasting fields have challenge with is choosing effective variables on decision output and forecasting. So if stock return is can be predicted by good variables and some models can be providing, in fact, more insured condition is provided in capital market which help investment development in financial markets. In this paper, two issues are regarded: First, we measure ambiguity in the company with three components, and then we examine the relationship between the ambiguity and asset pricing.

## 3 Proposed Research Methodology

This research is an applied correlative one from perspective of purpose and nature. Results can be useful for a wide range of investors and analysts. In this paper, The research is an applied and correlative one in terms of goal and nature. Results can be useful for a wide range of investors and analysts.
Two main hypotheses are considered in this paper:
$H_1$: Ambiguity has a significant relationship with asset pricing
$H_2$: Risk positively affects asset pricing.

In current research, to test hypotheses, multivariate regression model has been utilized. Sample involves the corporates accepted in Tehran Stock Exchange during 2012-2017 with such features as the end of fiscal year in March without any changes in their fiscal year, with trades in Tehran Stock Exchange during 2012-2017 and not being member in financial intermediation industries, investment institutions and banks. Number of corporates was 120 corporates. To estimate research variables, the

required data were taken from Tadbirpardaz database. To perform computations and prepare data as well as analyses, Excel and Eviews software (version 10) were used.

### 3.1 Basic Model

Basic model of data analysis according [17]:

$$E[R_{it}] - r_f = \gamma(\sigma_m^2) + \eta(\Omega^2) \quad (1)$$

$E\{r_m\}$: Expected market portfolio return (asset pricing measurement index)

$\sigma_m^2$ : Market portfolio risk

$\Omega^2$ : Ambiguity measurement criterion

### 3.2 Research Variables Measurement

### 3.2.1 Dependent Variables

$E\{r_m\}$: Expected market portfolio return

$r_f$: Market portfolio return (asset pricing measurement index)

Expected market return is given as follows:

*Where*

$$E\,(Ret_{im}) = B_{1i}\,(Ret_{market,\,m} - Ret_{risk\text{-}free,\,m}) + B_{2i}SB_m + B_{3i}\,HL_m + B_{4i}\,MO_m\,(Ret_{market,\,m} - Ret_{risk\text{-}free,\,m})\ is\ the\ risk\text{-}free \quad (2)$$

Where

*Ret $_{market,\,m}$: Market return*

$$R_{mt}\frac{TEDPIX_{t+1} - TEDPIX_t}{TEDPIX_t} \quad (3)$$

*TEDPIXt: Price and cash index*

Ret $_{risk\text{-}free,}$m :*Risk free return*

Risk free return rate is considered as one-year investment deposit account interest in banks, which is introduced in the reports related to economic indicator in banking journals and researches. To compute monthly risk free return rate, annual risk free return rate is divided by 12.

*$SB_m$ : Size factor*

*$HL_m$: Value factor*

*$MO_M$ : Momentum factor*

Firstly, size (natural log of sum of corporate assets), value (market to book value) and momentum (stock cumulative return (last month) subtracted by stock cumulative return of 9 months ago) data are achieved. Secondly, value, size and momentum are put in order from the biggest to smallest amounts. Corporates are classified into two groups involving small (S) and big (B) based on size factor and three groups including high value corporates (H: 30% and more), average value (M: 40%) and low value (L: 30% and less) based on value. Based on momentum, they are classified into three groups as winning corporate (W: 30% and more), losing (L: 30% and less) and neutral ones (N: 40%).

Thirdly, research variables are computed as follows:

a- SB: Size

$$SB = \left(\frac{\frac{S}{L} + \frac{S}{M} + \frac{S}{H}}{3}\right) - \left(\frac{\frac{B}{L} + \frac{B}{M} + \frac{B}{H}}{3}\right) \tag{4}$$

*S/L: refers to corporates which are small and M/B value is low.*

*S/M: refers to corporates which are small and M/B value is average.*

*S/H: refers to corporates which are small and M/B value is high.*

*B/L: refers to corporates which are big and M/B value is low.*

*B/M: refers to corporates which are big and M/B value is average.*

*B/H: refers to corporates which are big and M/B value is high.*

*b- HL: Value*

$$HL = \left(\frac{\frac{S}{H} + \frac{B}{H}}{2}\right) - \left(\frac{\frac{S}{L} + \frac{B}{L}}{2}\right) \tag{5}$$

*C- $MO_M$: Momentum*

$$MO = \left(\frac{\frac{S}{W} + \frac{B}{W}}{2}\right) - \left(\frac{\frac{S}{L} + \frac{B}{L}}{2}\right) \tag{6}$$

*S/W: refers to small corporates with high momentum*

*B/W: refers to big corporates with high momentum*

*S/L: refers to small corporates with low momentum*

*B/L: refers to big corporates with low momentum*

### 3.2.2 Independent Variables

$\sigma_m^2$ : Market portfolio risk

Market portfolio risk or specific fluctuations in stock return as standard deviation remaining from Fama and French three-factor model is estimated concerning monthly return in one year as follows:

$$R_{it} - r_f = \alpha_i + \beta_i(Rmt - rf) + \gamma_i SMB_t + \phi_i HML_t + uit \quad (7)$$

$R_{it-rf}$ : Stock return subtracted by risk free return

Actual stock return for the corporates in Tehran Stock Exchange will be achieved by Rahavard software. The software has been used to compute daily stock returns [9]

$$R_{it} = \frac{(1+\alpha)P_{t+1} D - P_t}{P_t}$$

*α: Increased capital percent*

*$P_{t+1}$: Price at time t+1*

*$P_t$: Price at time t*

*D: Paid cash interest*

*Rm-Rf: Market risk premium*

*SMB: Size*

*HML: Value*

$\Omega^2$: Ambiguity measurement

According to [6], ambiguity can be estimated by trading volume (volume), ask-bid spread (spread) and error of profit forecast (forecast error):

$$\Omega^2 = \beta_1 \times \text{Volume} + \beta_2 \times \text{Spread} + \beta_3 \times \text{Forecast Error} \quad (8)$$

Trading volume: refers to Rial or stock quantity, which is traded in a specific period; in other words, it is stock volume whose ownership is changed in a specific period.

Ask-bid spread (spread):

$$\text{Spread}_{it} = \frac{(AP-BP)\times 100}{(AP-BP)/2} \quad (9)$$

t*: Studied year*

*Spread: Ask-bid spread*

*BP: Average purchase price bid of stock i in the period t*

*AP: Average sale price bid of stock i in the period t*

Error of profit forecast (forecast):

$$FE = \frac{At - Ft}{Ft} \times 100 \quad (10)$$

*At: Actual corporate profit at the time t*

*Ft: Predicted corporate profit at the time t*

After estimating the mentioned factors using basic component analysis method based on three mentioned factors, a combined index is computed concerning ambiguity. The basic component analysis method reduces the dimensions of all observations based on the combination index and the classification of observations. In this method, variables in a multi-state space are summed up to a set of non-correlated components, each of which is a linear combination of the main variables. The non-correlated components obtained are the main components of the pc that are derived from the special vectors of the covariance matrix or the correlation matrix of the main variables. In general, the major application of the basic components analysis method is to reduce the number of variables and find the structure of the relationship between variables, which is in fact the same category of variables. The main advantage of using this method in the econometric model is to eliminate the coexistence of models due to the large number of variables that are effective in the model.

## 4 Research Findings

Before testing the research hypotheses, the variables are summarized in Table 1.

**Table 1**: Descriptive statistics of studied variables

| | Asset pricing | Risk | Ambiguity |
|---|---|---|---|
| | $E[R_{it}]$-$r_f$ | $\gamma(\sigma_m^2)$ | $\eta(\Omega^2)$ |
| Mean | -0.002790 | 11.51187 | 0.240761 |
| Median | -0.016050 | 11.33249 | 0.229195 |
| Maximum | 0.073540 | 71.61167 | 0.849580 |
| Minimum | -0.039670 | 4.837500 | 0.112670 |
| Standard deviation | 0.040750 | 3.977507 | 0.070909 |
| Skewedness | 0.380907 | 10.34412 | 2.355298 |
| Elongation | 2.667561 | 149.1647 | 14.96571 |
| Jarque–Bera test | 5.095288 | 544803.0 | 4134.196 |
| Sig. level | 0.105430 | 0.000000 | 0.000000 |
| Observations | 600 | 600 | 600 |

### 4.1 Dependent Variable Normality

In this paper using Jack-Bra test, dependent variable normality has been examined. Since dependent variable normality leads to the remaining pattern normality, it is necessary to control its normality before pattern fit. Null and normality test hypotheses are as follows:

$H_0$: Data distribution is normal.

$H_1$: Data distribution is not normal.

According to the values presented in Table 1, since significance level of asset pricing is more than 5%, $H_0$ (variable normality) is confirmed. Thus, asset pricing is of normal distribution.

## 4.2 Research Variable Reliability Test

Here, variables reliability and tests are discussed concerning the combined data and the fact that variance, mean and self-correlation coefficients are constant. Totally, if the time origin of a variable is changed, variance, mean and covariance are not changed; consequently, the use of these variables in the model does not cause pseudo-regression. In this research, Levin-Lin test has been used. Levin and Lin indicated that for the combined data, the use of unit root test is of more power than every separate section.

**Table 2:** Unit Root Test Results

| Variables | | Levin, Lin and Chu test | Sig. level | Result |
|---|---|---|---|---|
| Asset pricing | $E[R_{it}]-r_f$ | -30.6292 | 0.0000 | I(0) |
| Risk | $\gamma(\sigma_m^2)$ | -15.5066 | 0.0000 | I(0) |
| Ambiguity | $\eta(\Omega^2)$ | -31.1380 | 0.0000 | I(0) |

As can be seen, the level of significance of the unit root test in all variables is less than 0.05 and shows that they are zero ($I_0$) and at the level of Stationary. This means that the mean and variance of variables over time and covariance of variables were constant between 2012 -2017
Hausman and F-Limer test results have been presented in Table 3.

**Table 3**: F-Limer and Hausman Test Results

| | F-Limer test | Sig. level | Result | Hausman test | Sig. level | Result |
|---|---|---|---|---|---|---|
| $H_1$ | 1.268612 | 0.0438 | Panel | 7.273779 | 0.0263 | Fixed effects |

After investigating the reliability, the variable is estimated. The research data are combined. But before estimating the models, it is necessary to determine the estimate method (integrated or panel). To do this, F-Limer test has been applied. Concerning observations with test probability more than 5% or test statistic less than Table statistic, integrated method is used. Concerning observations with test probability less than 5%, panel method is used. Panel method is implemented by two models involving random effects and fixed effects. To specify which model should be used, Hausman test has been utilized. Observations with test probability less than 5% apply fixed effects model and observations with test probability more than 5% apply random effects model.

As it has been seen, F-Limer test indicated that the observations with test probability more than 5% or test statistic less than Table statistic, integrated method is used. According to results, panel data method has been accepted for $H_1$, $H_2$ and $H_3$. Concerning observations with test probability less than 5%, panel method is used. Panel method is implemented by two models involving random effects and fixed effects. To specify which model should be used, Hausman test has been utilized. Observations with test probability less than 5% apply fixed effects model and observations with test probability more than 5% apply random effects model. According to $H_1$, and $H_2$, chi square test probability has been less than 5% so that fixed effects model has been applied to estimate and analyze $H_1$ and $H_2$.

## 4.3 Hypotheses Analyses Summary

$H_1$: $H_1$: Ambiguity has a significant relationship with asset pricing.
$H_0$: Ambiguity has no a significant relationship with asset pricing.
$H_2$: Risk positively affects asset pricing.

$H_0$: Risk has no positive effect on asset pricing.
To study $H_1$ and $H_2$, the following model is used:

$$E[R_{it}] - r_f = \gamma(\sigma_m^2) + \eta(\Omega^2) \quad (11)$$

**Table 4:** Summary of H1 pattern results using data panel method during 2013-2017

| | Variables | Coefficients | Standard error | t statistics | Sig. level | Effect type | |
|---|---|---|---|---|---|---|---|
| | $a_0$ | -0.164947 | 0.004055 | -40.67396 | 0.0000 | + | |
| Risk | $\gamma(\sigma_m^2)$ | 0.217416 | 0.013813 | 15.74016 | 0.0000 | - | |
| Ambiguity | $\eta(\Omega^2)$ | -0.001466 | 0.000310 | -4.734335 | 0.0000 | - | |
| Determination of coefficient | 0.477832 | | | F-statistics | 3.615000 | | |
| Adjusted determination of coefficient | 0.345652 | | | Sig. level | 0.000000 | | |
| Durbin-Watson | | | | 1.732298 | | | |

Because method was panel data, this formula has been used [1-((600-1)/ (600-122)) *(1-R2)] to obtain the adjusted coefficient of determination. Estimate results indicated that t statistics probability is less than 5% concerning fixed coefficient and risk and ambiguity variables in terms of asset pricing; therefore, the above relationship is statistically significant. Estimated coefficients concerning risk and ambiguity in terms of asset pricing significantly were positive and negative, respectively. Adjusted determination of coefficient in relation to independent variables explanatory power has shown that it is able to explain 35% dependent variable variations. F statistics probability indicates that the whole model is significant statistically. Based on the hypothesis, the estimated coefficients are significant and have positive and negative effects on asset pricing for risk and ambiguity, respectively. Thus, $H_0$ is rejected; in other words, ambiguity has a negative impact on asset pricing and risk has a positive impact on asset pricing. According to Table 4, a linear equation can be written as follows:

$$E[R_{it}] - r_f = 0.217416(\sigma_m^2) - 0.001466(\Omega^2) \quad (12)$$

## 4.4 Linear Test

Table 5 shows summary of assessment results. Numbers in Table indicate Pearson correlation coefficient. Elements in the mentioned correlation matrix equal one and matrix is symmetrical to main diameter in Table. Due to the symmetry, the elements above main diameter are

the same as those below the diameter so that they have not presented in Table 5. First number in matrix or estimated correlation coefficients measured the linear effects of independent variables on the basis of binary comparison; if these coefficients tend to zero, linear independence and dependent variables can be judged.Table 5 indicates that there is no linearity between independent variables when correlation coefficient is less than 0.5.

**Table 5:** Linear pattern results of $H_1$ and $H_2$

| | $E[R_{it}]-r_f$ | $\gamma(\sigma_m^2)$ | $\eta(\Omega^2)$ |
|---|---|---|---|
| $E[R_{it}]-r_f$ | 1 | | |
| $\gamma(\sigma_m^2)$ | 0.539755 | 1 | |
| $\eta(\Omega^2)$ | -0.103245 | 0.080031 | 1 |

## 5 Conclusions and Discussion

Mengxi [30] entitled, financial markets have focused on stock return and its price changes. Thus, discussions related to stock price changes and effective elements in stock return fluctuations have attracted the researchers' attention. Izhakian [31] studied, the basic tent in asset pricing is the relationship between risk, return and ambiguity, which has been tested a multitude of times using a variety of models and factors. Risk and uncertainty of financial information caused by accounting system have been concentrated. Few researchers regard the relationship between information uncertainty and stock return as a reverse one and suggest that there is a positive relationship between risk and stock return. Information uncertainty is related to unknown outputs but another point is needed to investigate the stock price; the point is ambiguity defined as known outputs. Here, ambiguity has been studied by three variables including trading volume, error of earnings forecast and ask-bid spread. Our principle hypothesis is that both of the factors affect the excess return. While, consistent with our asset pricing paradigm of risk aversion, we expect, that the measures of risk will be positively related to the excess return, we have no a-priori view of the effect of ambiguity. The results that we obtain are rather encouraging. The effect of ambiguity is negative and highly significant in all the tests that we employ. The effect of risk is generally positive, which is consistent with risk aversion but its significance depends on the risk measure that we use Results have suggested negative impact of ambiguity and positive impact of risk on asset pricing. Therefore, more ambiguity in financial information causes prices less than actual stock price and vice versa. Evidence is in conformity with the research results reported by [13,14,16,22,23] but not in accordance with those suggested by [15,19]. Researchers for future research can measure other aspects of ambiguity and test their impact on company liquidity, investment, and corporate profit declarations.

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