

## Artículo de investigación

## Investigating the effect of information asymmetry on financial variables affecting the securities

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Investigando o efeito da assimetria de informação nas variáveis financeiras que afetam os títulos

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### Abstract

In this study, a comprehensive analysis was conducted to study the effect of information asymmetry on financial variables affecting the securities in companies operating in the Tehran Stock Exchange during 2013 to 2017. The main objective of this research is to identify the various aspects of information asymmetry on financial variables affecting the securities of companies listed on Tehran Stock Exchange and secondary objectives provide a new approach for the development of financial variables affecting the information asymmetry of companies, evaluate the effective financial variables and determine the most important information asymmetry indices among companies in the Stock Exchange. The present research is practical in terms of the purpose, and methodology of the research is descriptive and correlational type. This study is comprised of three hypotheses. To test the hypotheses, the econometric model using panel data has been used for model estimation and hypotheses testing. At first, the Chow test has been used to determine the type of model used in combined data. According to the results, the estimation method of fixed effects for the first and second models and estimation method of random effects for the third model were adopted. Then, the fixed effects in first model and random effects in second model were chosen by using the Hausman test between the fixed effects and random effects models in the first and second models, and the multiple linear regression test has been used in combination form (year-company). The results of this study showed that there is negative and significant relationship between information asymmetry and the rate of

### Resumen

En este estudio, se realizó un análisis exhaustivo para estudiar el efecto de la asimetría de información sobre las variables financieras que afectan a los valores en compañías que operan en la Bolsa de Teherán durante 2013 a 2017. El objetivo principal de esta investigación es identificar los diversos aspectos de la asimetría de información sobre variables financieras que afectan los valores de compañías cotizadas en la Bolsa de Teherán y objetivos secundarios proporcionan un nuevo enfoque para el desarrollo de variables financieras que afectan la asimetría de información de las empresas, evalúan las variables financieras efectivas y determinan los índices de asimetría de información más importantes entre las empresas en el Bolsa. La presente investigación es práctica en términos del propósito, y la metodología de la investigación es descriptiva y de tipo correlacional. Este estudio se compone de tres hipótesis. Para probar las hipótesis, el modelo econométrico que utiliza datos de panel se ha utilizado para la estimación del modelo y la prueba de hipótesis. Al principio, la prueba de Chow se ha utilizado para determinar el tipo de modelo utilizado en los datos combinados. De acuerdo con los resultados, se adoptó el método de estimación de efectos fijos para el primer y segundo modelo y el método de estimación de efectos aleatorios para el tercer modelo. Luego, los efectos fijos en el primer modelo y los efectos aleatorios en el segundo modelo se eligieron usando la prueba Hausman entre los modelos de efectos fijos y de efectos aleatorios en el primer y segundo modelo, y la prueba de regresión lineal múltiple se usó en forma combinada (año -

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return on assets, the ratio of price to earnings per share, and stock price change. The obtained results still remain valid through controlling the variables of control. Ultimately, the results of research hypotheses led to the confirmation of first, second and third hypotheses.

**Key words:** Return on assets (ROA), Daily average of trading volume, Stock prices, Information asymmetry

empresa). Los resultados de este estudio mostraron que existe una relación negativa y significativa entre la asimetría de la información y la tasa de rendimiento de los activos, la relación entre el precio y las ganancias por acción y el cambio en los precios de las acciones. Los resultados obtenidos siguen siendo válidos mediante el control de las variables de control. En última instancia, los resultados de las hipótesis de investigación condujeron a la confirmación de la primera, segunda y tercera hipótesis.

**Palabras clave:** Rentabilidad de los activos (ROA), Promedio diario del volumen de negociación, Precios de las acciones, Asimetría de la información.

## Resumo

Neste estudo, foi realizada uma análise abrangente para estudar o efeito da assimetria de informação nas variáveis financeiras que afetam os valores mobiliários nas empresas que operam na Bolsa de Valores de Teerã no período de 2013 a 2017. O objetivo principal desta pesquisa é identificar os diversos aspectos da assimetria informacional sobre variáveis financeiras que afetam os valores mobiliários de empresas listadas na Bolsa de Valores de Teerã e objetivos secundários fornecem uma nova abordagem para o desenvolvimento de variáveis financeiras que afetam a assimetria de informação das empresas, avaliam as variáveis financeiras efetivas e determinam os índices de assimetria de informação mais importantes entre as empresas. Bolsa de Valores. A presente pesquisa é prática em termos de finalidade e a metodologia da pesquisa é do tipo descritivo e correlacional. Este estudo é composto por três hipóteses. Para testar as hipóteses, o modelo econométrico usando dados em painel foi usado para estimativa de modelo e teste de hipóteses. Inicialmente, o teste de Chow foi usado para determinar o tipo de modelo usado nos dados combinados. De acordo com os resultados, adotou-se o método de estimação de efeitos fixos para o primeiro e segundo modelos e o método de estimação de efeitos aleatórios para o terceiro modelo. Então, os efeitos fixos no primeiro modelo e efeitos aleatórios no segundo modelo foram escolhidos usando o teste de Hausman entre os modelos de efeitos fixos e de efeitos aleatórios no primeiro e segundo modelos, e o teste de regressão linear múltipla foi usado em combinação -company). Os resultados deste estudo mostraram que existe uma relação negativa e significativa entre a assimetria de informação e a taxa de retorno dos ativos, a relação preço / lucro por ação e a variação do preço das ações. Os resultados obtidos ainda permanecem válidos através do controle das variáveis de controle. Por fim, os resultados das hipóteses de pesquisa levaram à confirmação da primeira, segunda e terceira hipóteses.

**Palavras-chave:** Retorno sobre os ativos (ROA), Média diária do volume negociado, Cotação das ações, Assimetria informacional.

## Introduction

One of the negative phenomena that typically occurs in the securities markets is information asymmetry that leads to the poor economic decisions by investors. Existence of the symmetric information does not create a necessity for raising the economy of information. Because in fact the people in a particular market have no the same information to the desired issue, so people are faced with information asymmetry and the possibility of deviation from the optimal portfolio will be easily possible in this regard. According to the theory of information

asymmetry, company executives enjoy the advantage of final information from within the company (Heydari and Mehrani, 2016). With the full knowledge of the company's financial situation and having more awareness to users of financial statements, executives, as responsible for preparing the financial statements, potentially trying to portray a favorable image of the entity. It is also possible that assets and capital of business unit to be reported higher than the normal. The overall result of this operation such would be that the picture of business unit seems better than the real situation and investment motivation in business unit increases among

people outside the organization. In this case, an information gap arises between internal and external users that so-called information asymmetry (Khaleqi, 2010). Some users including individuals within an organization such as executives, their analysts and institutions that receive information from these individuals have access to confidential communications (Easley and Ohara, 2004). The more confidential information, the scope difference of offered price of buying and selling stocks among investor's increases and thus the return of investors who do not access to this information reduces (Rafond and Watts, 2012). Also, one of the fundamental preconditions to ensure investors and creditors in the economic productive activities is preparing and presenting information that will be useful in making financial and economic decisions. As the financial decisions should perform based on risk and return, attention to a specified level of risk and return is important. One of the factors affecting the risk and liquidity is shares. Because the liquidity of shares is effective on the decisions of investors in forming the investment portfolio. In other words, rational investors demand a higher risk premium for stocks which have less liquidity (Forouqi and Qojavand, 2017). One of the factors affecting the financial variables is information asymmetry. So, investigate the relationship between financial variables and information asymmetry is felt over and over and can assist investors in making the optimal decisions.

### Research literature

In recent decades, one of the issues which is expanding in the field of economy is information economy. Major discussions in this economy are concerned with the issue of asymmetric information. In conventional or classical microeconomics issues, the basic assumption which implicitly considered in all theories and economic rules is the assumption of perfect information. This means that there is complete information between economic actors whether on the supply side or on the demand side in a competitive market. But, the above principle has been questioned via raising the theory of Lemmon markets by Akerlof in 1970 that there is asymmetric information between buyers and sellers in the real world and foundation of many microeconomics topics in competitive market was faltered. One of the markets which is strongly influenced by the asymmetry of information is the capital market. The main role

of the capital market and the stock exchange as one of the components of this market is attracting and channeling the liquidity in economy to finance in a way that leads to the optimal allocation of scarce financial resources. Achieving to this depends on the existence of an efficient and transparent mechanism through the creation of competitive conditions in the capital market. To create transparency in the capital market, the availability of information is the most important factor. The greater information related to the capital market as transparent which commonly called symmetric information, the effectiveness of this market on economic growth and development will be greater. Attempt to allow equal access to information and information transparency and sovereignty of competition is considered as a step to create the efficiency and resource allocation in the capital market. The use of financial variables affecting the capital market is among the proposed solutions to create information transparency. Based on the above explanation, the aim of this study is to investigate the effects of information asymmetry on financial variables affecting the securities.

When traders are aware of the existence of boards on the market, increase the level of information asymmetry is shown in this case through expanding bid ask spread between buying and selling shares. The bid ask spread of buying and selling shares represents the existing gap between "bid price to buy stock" and "ask price to sell stock". The bid price to buy stock is a price that investor or market maker offer for buying a particular stock. The ask price to sell stock is a price that a seller or market maker offer for selling that stock. Due to increasing the transaction costs, the transaction based on the final information increases the bid-ask spread. This price difference reflects the immediate and direct price and is an index of the trading cost and lack of the market liquidity. The bid-ask spread of stocks is rooted in unusual supply and demand flow which arises from the existence of confidential information in turn. When there is bad confidential news, the supply of stock increases and ask price reduces. On the contrary, when there is good confidential news, the demand and bid price increase (Qaemi and Vatanparast, 2005).

### Background of the research

Jacobson and Accra (2013) comparatively examined the "information asymmetry between





the capital markets of Japan and America". Their research results showed that Japan's capital markets reflect information related to future profitability earlier than the America's stock market in stock price. Because of the corporates ownership structure and the widespread presence of institutional shareholders, the Japanese shareholders are better aware of the future prospects of companies compared to Americans ones. By using a simple model, Bollen and Whaley (2004) showed that the bid-ask spread results from slight changes in the stock price, order costs, maintenance costs, incorrect selection and competitive conditions. They expanded a model of the bid-ask spread of market makers and came to this conclusion that the inventory costs have more important than the costs of incorrect selection.

Hughes et al (2005) showed that the high information asymmetry leads to a high risk premium and thus will lead to a higher capital cost.

Lambert et al (2006) examined the relationship between the asymmetry of information, accuracy of information and cost of capital. They suggested that the accuracy of information and information asymmetry distinctly and separately effects on the cost of capital. In an imperfect competition market, information asymmetry affects the willingness to provide liquidity by the market that it affects the companies' cost of capital.

Jing and Kim (2007) examined the "effects of information asymmetry between managers and shareholders in relation to the profitability in terms of timing and amount of". According to the aforementioned study, the level of institutional ownership in Japanese company's increases, the less information asymmetry between managers and other related parties on the market will be available. So, companies that have more inter-company ownership, the market price of stocks encompasses information related to the company's future profitability faster than companies that have less inter-company ownership.

Chang et al (2007) have examined the impact of corporate governance on market liquidity. In this regard, 24 characteristics of corporate governance were considered and the effect of corporate governance on information asymmetry has been estimated with respect to the possibility index of transactions based

information and price effects by using the OLS estimate. The results show that companies with better corporate governance have the possibility of transactions based on lower information and the lower price effects and thus, the lower information asymmetry.

Kanagaretnam et al (2007) have examined the relationship between quality of corporate governance and changes in information asymmetry in the capital market. They have used two variables of bid-ask prices gap and depth of the market as index of information asymmetry, and have examined the effect of three mechanisms of corporate governance (board independence, board activities and structure of the board) on these two indicators. Estimation results that have used the ordinary least squares method imply that companies with more independent and more active board have a less increasing in price differences around the seasonal announcements of earnings. In addition, there is a positive and significant relationship between market depth difference, the structure of the board and the board's activities, which suggests that high levels of board structure and greater activity are associated with reducing the information asymmetry.

Byun et al (2012) in a study titled the concept of capital cost of common stock and corporate governance examined the relationship between capital cost of common stock and corporate governance during 2001-2004 in South Korea. Their research findings showed that there is a negative relationship between capital cost of common stock and corporate governance. Protection of investor rights has the greatest impact on reducing the capital cost of common stock. Board of directors and disclosure policy are also important in reducing the capital cost of common stock.

Fu et al (2012) assessed the impact of financial reporting frequency on information asymmetry and capital cost by using the information of companies. The results showed that the more frequency of reporting has been led to a reduction of information asymmetry and capital cost. Also when the mandatory changes were established in reporting frequency, the results did not differ.

Hillier et al (2012) examined the role of corporate governance profile in reducing the information asymmetry during the period from 2000 to 2005. In their study, transactions of

companies' internal members as indicator of information asymmetry, and combination of variables of board size, board independence, duality of the role of director, gender of board members, and transactional power of board and life of company as indicators of corporate governance have been used. The test results show that the information asymmetry and thus the cost of capital reduce by increasing the positive features in variables of corporate governance.

Lio (2010) studied the effect of some mechanisms of corporate governance on information asymmetry during 2005 at relation to 500 companies in pharmaceutical, electronics and software industries. He has used a combine's scale consisting of six corporate governance mechanisms including board size, board independence, board ownership, the duality of the role of director, the number of board meetings and institutional ownership and given value 1 for a strong corporate governance and value 0 for weak corporate governance. The bid-ask prices gaps and trading volumes have been used as indicators of asymmetry of information in Lio's research, and the relationship between corporate governance on the information asymmetry has been estimated by regression method. The results show a negative and significant relationship between corporate governance index and the bid-ask price gap, and a positive and significant relationship with trading volumes. In other words, the information asymmetry is lower in companies with strong corporate governance.

Cormier et al (2010) examined the relationship between corporate governance and information asymmetry for 131 Canadian companies in 2005. In this research, they have used the volatility of Tobin's Q as information asymmetry indicator and tested the impact of board independence, board size, the size of the audit committee and rule disclosure as mechanisms of corporate governance on information asymmetry by using the system of stock prices and simultaneous equations. The results show that monitoring variables of corporate governance have a significant impact on information asymmetry indices and act to reduce it.

Rezazadeh and Azad (2012), with investigating the relationship between the scope of the bid-ask price as an indicator for information asymmetry with conservative

(standard Basu) through the regression estimate during the period 2002-2006 show that information asymmetry among investors leads to apply the more conservatism in financial reporting. Conservatism in turn reduces the incentive and the ability of managers to manipulate the accounting information and thus reduces the information asymmetry. Nourosh and Ebrahimi Kordlar (2012) in a study examined "the relationship between the composition of shareholders with information asymmetry and usefulness of accounting measures of performance". Findings of this research showed that companies which have greater institutional ownership cover more the stock prices of profit information for future compared with companies that have fewer institutional ownership. This finding corresponds with comparative advantage of institutional shareholders in collecting and processing information. Nourosh and Ebrahimi Kordlar (2013) examined "The role of corporate investors to reduce the information asymmetry in the Tehran Stock Exchange". In this research, investment companies and other commercial establishments were defined as corporate investors. Findings of this research revealed that companies with a high percentage of shareholders have reported additional information with respect to future earnings than the companies with low percentage of corporate investors and thus the greater information asymmetry has been observed in companies with less corporate ownership, and the general results of research show a significant relationship between institutional ownership and corporate information asymmetry.

Rahimiyan et al (2013) have examined the relationship between some mechanisms of corporate governance and information asymmetry during the period 2004-2007 with respect to the index of bid-ask price gap proposed in companies listed on the Tehran Stock Exchange through correlation tests that this research encompasses the ratio of non-executive directors, percentage of institutional investment ownership and internal audit unit, mechanisms of corporate governance. Their results do not show a significant relationship between the ratio of nonexecutive directors and internal audit unit with asymmetry of information, but it shows a negative relationship between the percentage of institutional investment ownership and information asymmetry.







Qaemi et al (2010) examined the relationship between the seasonal earnings announcements and information asymmetry of markets. The results of their study showed that information asymmetry has not a significant decrease after the announcement of seasonal earnings. Khodami pour and Ghadiri (2010) examined the relationship between accruals and information asymmetry among investors. The results showed that there is a positive and significant relationship between abnormal accruals and information asymmetry, so that with an increase in abnormal accruals, the information asymmetry also increases. Also, there is a negative and significant relationship between stock liquidity, company size, and the proportion of institutional ownership with information asymmetry.

By examining "the relationship between some mechanisms of corporate governance and information asymmetry in companies listed on Tehran Stock Exchange", Rahimiyan and Salehnejad (2010) found that there is no significant relationship between internal audit unit and the proportion of nonexecutive directors of board and measures of information asymmetry. But there is a significant negative relationship between the percentage of institutional investment ownership and information asymmetry. Also, by comparing the bid ask spread of shares after and before the earnings announcement by using the average test to compare the two ratings was concluded that the level of information asymmetry after the earnings announcement is more than the before one.

Kazemi and Mohammadnejad (2017) in a study "examined the impact of ownership structure on information asymmetry and financial performance of companies". Their research findings indicate that there is a negative and significant relationship between institutional ownership and information asymmetry, such that the level of institutional ownership increases, providing the information by company's managers to relevant people in the market increases as well. In other words, increasing the institutional ownership reduces the information asymmetry which this will lead to efficiency of market in terms of information. Also in aforementioned research, the relationship between ownership of institutional shareholders and a return on shareholders equity has been confirmed and has a positive relationship with the company's financial performance.

## Conceptual and operational definition of research variables

### 1- Dependent variable

The dependent variables are financial variables in this study that are calculated as follows:

**Return rate of assets:** is the ratio of net income to the total assets of company (Rezazadeh, D. and Naser Azad, 2012).

$$(1) \quad ROA = \frac{\text{net income}}{\text{total asset}}$$

**The ratio of price to the earnings per share:** is the ratio of price per share to the earnings per share (Rezazadeh, D. and Naser Azad, 2012).

**Stock price changes:** is the difference between end period of price and first period of shares (Rezazadeh, D. and Naser Azad, 2012).

### 2. Independent variable:

The independent variable is information asymmetry in this study in which the criteria of growth opportunities has been used based on researches of Aerts et al (2007), Klarkson et al (2007) and Macciyan and Raeisi (2017).

### 3. Q Tobin

Is the ratio of total market value of equity and book value of debts to the book value of assets (Kordestani Gh.R and Habib Langeroudi, 2012).

$$(2) \quad \text{tobinQ} = \frac{(MV_{equity}^t + BV_{debt})}{BV_{asset}}$$

### 4. Control variables

**Company size:** is the natural logarithm of the total value of company assets (Kordestani Gh.R and Habib Langeroudi, 2012).

**Market value to book value:** is the ratio of market value to book value of equity (Kordestani Gh.R and Habib Langeroudi, 2012).

**Financial leverage:** is the ratio of total debts to total company assets (Kordestani Gh.R and Habib Langeroudi, 2012).

**Growth:** is the difference between total assets in the end period and total assets at the first period (Kordestani Gh.R and Habib Langeroudi, 2012).

## Research purposes

The main purpose of this study is to investigate the effect of information asymmetry on financial variables affecting the securities in companies operating on the Tehran Stock Exchange. Today, most of the markets can be considered as part of the markets with asymmetric information. In such markets which information is asymmetric, prices are not considered as a criterion for quality of goods. In these circumstances, some enterprises may take the market and attempt to discriminate of price among the market segments by using the difference in flow of information. Due to the asymmetric information in relation to what is exchanged, the costs are generated which have a major impact on economic activities (Douglas, 1998). In this case, imbalance of information in subsections of the market causes to the failure of market forces and thus market failure and the loss of desirable features of a competitive market including the optimal allocation and economic efficiency. Information asymmetry is a negative phenomenon that occurs normally in the securities market and arises when one side of the contract or transaction is aware of additional information, provided that the information has been effectively used during communication with the other hand (Clarkson et al., 2007).

So, specific objectives of this study are as follows:

### I- Research objectives

#### A- General objective

Study the effect of information asymmetry on financial variables

#### (B) Secondary objectives of the research

1. Determine the effect of information asymmetry on the rate of return on assets
2. Determine the effect of information asymmetry on the ratio of price to earnings per share
3. Determine the effect of information asymmetry on stock price changes

#### (C) Practical objective:

Different people and groups will be able to use of this research that the most important of them are:

\* Owners and corporate executives to make decisions about the effectiveness of information

asymmetry on financial variables affecting the securities.

\* Institutions and organizations regulating the market including the stock exchange.

\* Market analysts and organizations that work for economic studies.

\* All teachers, researchers, and students who intend to do scientific research in this area.

## Research questions

**First question:** Is there a negative and significant relationship between the information asymmetry and the rate of return on assets?

**Second question:** Is there a negative and significant relationship between the information asymmetry and the ratio of price to earnings per share?

**Third question:** Is there a negative and significant relationship between the information asymmetry and stock price change?

## Research hypotheses

Hypotheses of this research have been obtained from a theoretical structure. Thus at first, the domestic and foreign texts were studied prior to raise the hypotheses of this research. Then, variables were precisely determined to develop the secondary hypotheses. This research consists of two main hypotheses and six sub-hypotheses that each of these hypotheses has been designed to study the effect of information asymmetry on financial variables affecting the securities in companies operating on the Tehran Stock Exchange in line of assessing the purpose of research that provided as follows:

**First hypothesis:** There is a negative and significant relationship between the information asymmetry and the rate of return on assets.

**Second hypothesis:** There is a negative and significant relationship between the information asymmetry and the ratio of price to earnings per share.

**Third hypothesis:** There is a negative and significant relationship between the information asymmetry and stock price change.

## The period of test, population and statistical sample:

The period of testing the study is a five-year period of time according to financial statements from 2013 to 2017 among the selected companies. However, due to the fact that testing the research hypotheses needs to calculate the changes of year (t) compared to the year (t-1),





we also need to information in 2012 to calculate some variables.

Therefore, statistical population of this research is manufacturing companies listed on the Tehran Stock Exchange during the years 2013-2017 that have the following conditions:

ending in March and the study period should not be changed in financial year.

3) It should not be among the banks and financial institutions (investment companies, financial intermediation, holding and leasing companies).

4) Company should be listed on Tehran Stock Exchange until the end of 2012 and should not be excluded from the Tehran Stock Exchange during the years 2013 to 2016.

5) It should not be passive more than four months on the stock exchange during the time period of the research, because the calculation of the studied market-related variables in the case of aforementioned companies and use them in the research can cause to undesirable effects on the research results.

Thus, the number of companies that met the above-mentioned features was 104.

### Scope of the research

Any research should have a specified and defined scope, so that the researcher sufficiently surrounds on his work at all stages of the research and can extend the consequences of the sample to community. The scope of the research is as follows in terms of the subject matter, time and space:

**Subject scope:** Subject scope seeks to find the effect of information asymmetry on financial variables affecting the securities.

**Time scope:** The period of this research is just the years 2013-2016.

**Place scope:** The research is in the range of listed companies on the Tehran Stock Exchange.

### Data analysis and measurement model

Since the research ahead investigates the possible effect of information asymmetry on financial variables affecting the securities and as its results deal with to solving a particular problem or topic, it is practical in terms of purpose; and since it seeks to find the relationship between two variables, it is

1) Financial information of company should be available during the study period.

2) Company should not be losing during the study period and end of company financial year

correlation type in terms of nature and research method.

This study attempts to provide an integrated analysis of information asymmetry on financial variables affecting the securities. Therefore, we refer to three following relationships:

### Research models

$$(3) \quad ROA = \beta_0 + \beta_1 Qtobin + \beta_2 LEV + \beta_3 SIZE + \beta_4 \frac{MV}{BV} + \beta_5 Chg \text{ asset} + \epsilon$$

$$(4) \quad \frac{P}{Eps} = \beta_0 + \beta_1 Qtobin + \beta_2 LEV + \beta_3 SIZE + \beta_4 \frac{MV}{BV} + \beta_5 Chg \text{ asset} + \epsilon$$

$$(5) \quad Chg p = \beta_0 + \beta_1 Qtobin + \beta_2 LEV + \beta_3 SIZE + \beta_4 \frac{MV}{BV} + \beta_5 Chg \text{ asset} + \epsilon$$

### In mentioned models:

*ROA*: Return on assets; *Qtobin*: Opportunities for growth (a criteria of information asymmetry); *LEV*: Financial Leverage; *SIZE*: Company size;  $\frac{MV}{BV}$ : Market value to book value; *Chg asset*: Changes in assets (a criteria of growth);  $\frac{P}{Eps}$ : The ratio of price to earnings per share; *Chg p*: Changes in stock prices

### Research findings

In descriptive statistics section, initially the central and dispersion parameters are clearly identified prior to analyze the raw data that outlined in this section. Descriptive statistics is summarily called to the descriptions and explanations of the key features of data. In this section, various data was shown in tables and charts, and subsequently the various parameters are measured in this field. In this type of statistics, firstly data is summarized and presented as tables and then numerical measures are obtained to attain the representative value of data center and their dispersion values. As shown in Table I, the results of descriptive statistics of research variables have been shown.



**Table I. Descriptive statistics**

Variable	Mean	Median	Maximum	Minimum	Standard deviation
Company size	13.651	13.508	18.455	10.031	1.401
Return on assets	0.056	0.044	0.474	-0.322	0.099
<i>Qtobin</i>	3.845	3.097	20.452	-10.924	4.229
P/EPS	9.507	7.613	83.154	-34.667	14.871
MV/BV	1.534	1.363	5.842	-4.903	1.585
Financial leverage	0.675	0.659	2.708	0.018	0.314
Changes in stock prices	318.5	-5	84683	-76280	6148.256
Growth	456342.2	45369	75080971	-34777168	4932785

In table above, central indexes of market value to book value including the mean and median are 13.651 and 13.508 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 18.455, 10.031, and 1.401 respectively.

Central indexes of return on assets including the mean and median are 0.056 and 0.044 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 0.474, -0.322, and 0.099 respectively.

Central indexes of *Qtobin* return including the mean and median are 3.845 and 3.097 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 20.452, -10.924, and 4.229 respectively.

Central indexes of P/EPS return including the mean and median are 9.507 and 7.613 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 83.154, -34.667, and 14.871 respectively.

Central indexes of MV/BV return including the mean and median are 1.534 and 1.363 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 5.842, -4.903, and 1.585 respectively.

Central indexes of financial leverage return including the mean and median are 0.675 and 0.659 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 2.70, 0.018, and 0.314, respectively.

Central indexes of changes in stock prices return including the mean and median are 318.5 and -5 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 84683, -76280, and 6148.256, respectively.

Central indexes of growth return including the mean and median are 456342.2 and 45369 respectively and its dispersion indexes including maximum, minimum, and standard deviation are 75080971, -34777168, and 4932758, respectively.

The quantitative results of descriptive statistics of research variables indicate that the average of return on assets is 0.056, i.e. an average 5 percent of company profits results from the assets. As well as, the growth opportunities average of sample companies has been 3.845. Also, the ratio of price to earnings per share has been the average 9.507. Also, debts comprise an average 67 percent of the company's capital structure. Also, the average of changes in stock prices has been on average 318.

### Testing the normality of data

The results of the regression model can only be valid when it used presuppositions to be established. One of these presuppositions is the normality of research variables. Kolmogorov-Smirnov Test (K-S) has been used to test the normality of data. The null hypothesis and opposite hypothesis are as follows:

H0: Data distribution is normal.

H1: Data distribution is not normal.



According to results of Kolmogorov-Smirnov (KS) on the obtained data, H0 hypothesis is rejected by comparing the meaningfulness level of initial data with 0.05 error; i.e. data distribution is not normal. In this model, the Ln (V) has been used instead of the initial data to normalize the data.

According to results of Kolmogorov-Smirnov (KS) on the obtained data (2), H0 hypothesis is rejected by comparing the meaningfulness level of initial data with 0.05 error; i.e. data distribution is not normal. In this model, the Ln (V) has been used instead of the initial data to normalize the data.

**Table2- Table of Kolmogorov-Smirnov (KS) normal test**

Year	Variable	Number	Central statistics		Normal distribution Statistics		Result
			Mean	Standard deviation	Z Statistics	Sig	
Cumulative	Company size	520	0.11	0.20	3.085	0.000	Not normal
Cumulative	Return on assets	520	0.59	0.43	1.449	0.000	Not normal
Cumulative	<i>Qtobin</i>	520	0.26	0.86	2.950	0.000	Not normal
Cumulative	P/EPS	520	0.20	0.69	2.919	0.000	Not normal
Cumulative	MV/BV	520	-2.14	1.13	2.098	0.000	Not normal
Cumulative	Financial leverage	520	-2.08	1.32	3.013	0.000	Not normal
Cumulative	Changes in stock prices	520	-4.44	19.98	2.336	0.000	Not normal
Cumulative	Growth	520	13.27	1.35	2.389	0.000	Not normal

With the implementation of the re-test and considering the results of Table 3, it is observed that meaningfulness level of initial data that natural logarithm (Ln (V)) was obtained of them is more than 0.05, therefore, H0 hypothesis is accepted with 0.95 reliability and data has the normal distribution.

**Table3- Table of Kolmogorov-Smirnov (KS) normal test**

Year	Variable	Number	Central statistics		Normal distribution Statistics		Result
			Mean	Standard deviation	Z Statistics	Sig	
Cumulative	Company size	520	0.2965	1.4473	0.919	0.746	Normal
Cumulative	Return on assets	520	1.8469	17.3256	1.001	0.517	Normal
Cumulative	<i>Qtobin</i>	520	0.7326	1.1195	0.682	0.618	Normal
Cumulative	P/EPS	520	0.216	1.021	0.663	0.914	Normal
Cumulative	MV/BV	520	0.456	1.579	2.833	0.214	Normal
Cumulative	Financial leverage	520	0.8550	0.0356	0.4593	0.649	Normal
Cumulative	Changes in stock prices	520	0.5266	0.22076	0.0545	0.0865	Normal
Cumulative	Growth	520	0.5213	0.5799	0.3459	0.1048	Normal

### Correlation between research variables

Correlation analysis is a statistical tool in which we can measure the degree to which a variable is associated to another variable as linear. Correlation is normally applied with the regression analysis. Correlation is a measure that used to determine the relationship between two variables.

If the research variables are continuous ratio scale, the Pearson's correlation coefficient is used to evaluate the correlation between them. The Pearson correlation coefficient is always between +1 and -1. What this coefficient is closer to +1, it indicates a high and direct correlation between two variables, and if the Pearson correlation coefficient is closer to -1, there is a high and inverse correlation between them. Although there are no simple and quick rules to differentiate between high from low correlation, presence

of a rule can be useful for the interpretation of the different values of correlation coefficient. This rule has been proposed, but the proper precautions should be taken in its use.

According to Table 4, it can be seen that the correlation coefficient of research variables is logical that suggests a lack of correlation between research variables.

**Table 4- Correlation between research variables**

Variable	Company size	Return on assets	Growth opportunities	MV/BV	P/EPS	Financial leverage	Changes in stock prices	Growth
Company size	1							
Return on assets	0.08	1						
<i>Qtobin</i>	0.094	0.039	1					
MV/BV	-0.069	0.327	0.67	1				
P/EPS	-0.057	0.121	0.022	0.13	1			
Financial leverage	-0.049	-0.647	-0.037	-0.29	-0.219	1		
Changes in stock prices	-0.018	0.039	0.128	0.192	0.194	-0.009	1	
Growth	0.324	0.042		-0.025	-0.003	-0.013	-0.003	1

### Inferential statistics

The reliability of research variables has been examined before analyzing and testing the validity of hypotheses. The reliability of research variables means that the mean and variance of research variables have been constant between the different years. As a result, the use of these variables in the model does not produce the spurious regression. The results show that the error rate calculated for variables is less than 1 percent. So, the research variables have a necessary reliability. After collecting data by sampling of society, the general concepts and points about the community should be extracted through the information contained in the sample. These issues are in the range of inferential statistics that includes the techniques of statistical estimation and hypotheses testing. Attention of this kind of statistics is focused on numerical characteristics of population distribution, i.e. parameters such as mean and standard deviation of population distribution or other numerical measures of central tendency and variability.

As stated in previous sections, the aim of this study is to investigate the effect of information asymmetry on financial variables affecting the securities in the Tehran Stock Exchange.

**Table 5 Reliability of research variables**

Variables	The test statistic of Levin, Lin and Chu	Significance level
Growth	-28.49	0.0000
Changes in stock prices	-31.384	0.0000
Financial leverage	-45.461	0.0000
MV/BV	-24.408	0.0000
P/EPS	-54.538	0.0000
<i>Qtobin</i>	-14.664	0.0000
Return on assets	-21.625	0.0000
Company size	-8.284	0.0000

As it can be seen, research variables are reliable at confidence level of 95 percent. Thus, we can estimate the parameters without the worry of being false.

### Examine the quantitative results of the first research model estimation

As noted in the third chapter, the different models are used to test the hypotheses in combined data. These models include methods such as fixed effect model, random effect model, seemingly unrelated regression model and panel data model that there are various tests such as the Chow, Hausman, LM tests for using of each them. The above test results are provided below.



To estimate the first pattern of study, the bound Chow test has been firstly used within the framework of panel data during the period 2013- 2016. This test determines the use of Pooled model or fixed effects model. If the F statistic is significant at 5% error level, the H0 hypothesis (Pooled model) is rejected and fixed effects model will be accepted. Chow test results have been proposed in Table 6.

**Table 6 Chow test results (bound F)**

Description	F statistic	5% error level
Chow test for evaluating the model	5.336	0.0000

**Source: Research results**

As seen in table (6), the F-statistic is significant at 5% error level. Therefore, Chow test has strongly rejected the similarity of intercepts in all periods. Thus, the fixed effects model is accepted in this test. Then, the fixed effects method versus the random effects method is tested. Hausman test has been used for this work. If the statistic calculated is significant at 5% level error, the hypothesis of random effects is rejected and fixed effects model will be accepted. To evaluate the selection of estimation method, Hausmann test results have been proposed in Table (7):

**Table 7 Hausman test results**

Description	Test statistic	5% error level
Hausman test for evaluating the model	62.962	0.0000

According to the table (4-7), the statistic calculated of Hausman test is significant at 5% error level. Therefore, lack of correlation between individual effects and explanatory variables has been rejected. Hence, the fixed effects method will be used to estimate the model.

**The estimation results of the first research hypothesis**

Table 8 shows the results of the research model parameters. For this model, Durbin - Watson statistic is equal to 1,873 that the correlation of disturbing statement is rejected at 5% error level. Probability value related to F statistics is 0.000 to stipulate the model which is lower than 5%. Hence, the H0 hypothesis based on the error of stipulating the model is rejected. As a result, the significance of the model is accepted at confidence level of 95 percent. Coefficient of determination edited the model is equal to 0.874. This statistic indicates that about 87 percent of the dependent variable changes can be described by independent and control variables. Because of not rejecting the statistics of the model, the first hypothesis of the study is investigated.

**Table 8 The estimation results of the first research model**

Variable	Coefficient	Test statistic	Error probability
<i>Qtobin</i>	-0.002	-2.208	0.028
Company size	0.032	6.892	0.000
MV/BV	0.004	1.988	0.048
Financial leverage	-0.159	-10.693	0.000
Growth	0.000	1.894	0.059
intercepts	-0.272	-4.406	0.000
Coefficient of determination	0.900874	Adjusted coefficient of determination	0.874
F statistic	34.481	Probability of F statistics	0.000
Durbin-Watson	1.873		

**I - Test the first hypothesis**

The first research hypothesis is formulated as follows:

**There is a negative and significant relationship between information asymmetry and the rate of return on assets.**

According to the results presented in Table (4-8), the probability related to the H0 hypothesis based on the effect of information asymmetry on ROA is equal to 0.028, and the coefficient of variable is -0.002; thus, the H0 hypothesis is not rejected at 5% error level. As a result, the information asymmetry on ROA has a significant and reverse impact.

**The results in relation to the control variables**

Research results in relation to control variables show that the error level related to company size variables is 0.000, the error level related to size of financial leverage 0.0000, the error level related to the market value to the book value of equity 0.048, the error level related to growth 0.059 that is smaller than to 0.05; therefore, there is a significant relationship between the control variables mentioned and return on assets.

**Examine the quantitative results of the second research model estimation**

To estimate the second pattern of study, the bound Chow test has been firstly used within the framework of panel data during the period 2013- 2016. This test determines the use of Pooled model or fixed effects model. If the F statistic is significant at 5% error level, the H0 hypothesis (Pooled model) is rejected and fixed effects model will be accepted. Chow test results have been proposed in Table 9.

**Table 9 Chow test results (bound F)**

Description	F statistic	5% error level
Chow test for evaluating the model	1.554	0.0000

**Source: Research results**

As seen in table (9), the F-statistic is significant at 5% error level. Therefore, Chow test has strongly rejected the similarity of intercepts in all periods. Thus, the fixed effects model is accepted in this test. Then, the fixed effects method versus the random effects method is tested. Hausman test has been used for this work. If the statistic calculated is significant at 5% level error, the hypothesis of random effects is rejected and fixed effects model will be accepted. To evaluate the selection of estimation method, Hausmann test results have been proposed in Table (10-4):

**Table 10 Hausman test results**

Description	Test statistic	5% error level
Hausman test for evaluating the model	8.485	0.131

**Source: Research results**

According to the table (10), the statistic calculated of Hausman test is not significant at 5% error level. Therefore, lack of relationship between individual effects and explanatory variables has been confirmed. Hence, the random effects method will be used to estimate the model.

**Test results of the first research hypothesis**

Table (11) shows the estimate results of the research model parameters. For this model, Durbin - Watson statistic is equal to 1.706 that the autocorrelation of disturbing statement is rejected at 5% error level. Probability value related to F statistics is 0.002 to stipulate the model which is lower than 5%. Hence, the H0 hypothesis based on the error of stipulating the model is rejected. As a result, the significance of the model is accepted at confidence level of 95 percent. Coefficient of determination edited the model is equal to 0.029. This statistic indicates that about 3 percent of the dependent variable changes can be described by independent and control variables. Because of not rejecting the statistics of the model, the second hypothesis of the study is investigated.





**Table 11 The estimation results of the second research model**

Variable	Coefficient	Test statistic	Error probability
<i>Qtobin</i>	-0.169	-2.363	0.019
Company size	-0.589	-0.958	0.339
MV/BV	0.99	2.45	0.015
Financial leverage	-8.234	-5.548	0.000
Growth	0.000	1.228	0.22
intercepts	22.07	2.583	0.01
Coefficient of determination	0.039	Adjusted coefficient of determination	0.029
F statistic	3.938	Probability of F statistics	0.002
Durbin-Watson	1.706		

## 2 - Test the second hypothesis:

The second research hypothesis is formulated as follows:

**There is a negative and significant relationship between asymmetry of information and the ratio of price to earnings per share.**

According to the results presented in Table (11), the probability related to the H0 hypothesis based on the effect of information asymmetry on the ratio of price to earnings per share is equal to 0.019, and the coefficient of variable is 0.169; thus, the H0 hypothesis is not rejected at 5% error level. As a result, the information asymmetry on the ratio of price to earnings per share has a significant and reverse impact.

### The results in relation to the control variables of research

Research results in relation to control variables show that the error level related to size of financial leverage variable is 0.0000 and the error level related to the market value to the book value of equity is 0.015 that is smaller than to 0.05; therefore, there is a significant relationship between the control variables mentioned and the ratio of price to earnings per share. But the research results do not show a significant relationship between company size and growth with the ratio of price to earnings per share.

### Examine the quantitative results of the third research model estimation

To estimate the third pattern of study, the bound Chow test has been firstly used within the framework of panel data during the period 2013- 2016. This test determines the use of Pooled model or fixed effects model. If the F statistic is significant at 5% error level, the H0 hypothesis (Pooled model) is rejected and fixed effects model will be accepted. Chow test results have been proposed in Table (12).

**Table 12 Chow test results (bound F)**

Description	F statistic	5% error level
Chow test for evaluating the model	0.1665	1.000

As seen in table (12), the F-statistic is not significant at 5% error level. Therefore, this test rejects the fixed effects method and confirms the use of the Pooled model. Thus, there is no need to perform the Hausman test.

### Estimation results of the second research hypothesis

Table (13) shows the estimate results of the research model parameters. For this model, Durbin - Watson statistic is equal to 1.974 that the autocorrelation of disturbing statement is rejected at 5% error level. Probability value related to F statistics is 0.000 to stipulate the model which is lower than 5%. Hence, the H0 hypothesis based on the error of stipulating the model is rejected. As a result, the significance of the model is accepted at confidence level of 95 percent. Coefficient of determination edited the model is

equal to 0.48. This statistic indicates that about 48 percent of the dependent variable changes can be described by independent and control variables. Because of not rejecting the statistics of the model, the third hypothesis of the study is investigated.

**Table 13 The estimation results of the third research model**

Variable	Coefficient	Test statistic	Error probability
<i>Qtobin</i>	-72.266	-10.633	0.000
Company size	49.797	0.992	0.322
MV/BV	806.837	7.831	0.000
Financial leverage	886.405	8.111	0.000
Growth	0.000	0.457	0.648
intercepts	-1824.417	-2.373	0.018
Coefficient of determination	0.485	Adjusted coefficient of determination	0.48
F statistic	91.332	Probability of F statistics	0.000
Durbin-Watson	1.971		

### 3 - Test the third hypothesis:

The third research hypothesis is formulated as follows:

**There is a negative and significant relationship between asymmetry of information and stock price change.**

According to the results presented in Table (13), the probability related to the H0 hypothesis based on the effect of information asymmetry on stock price change is equal to 0.000, and the coefficient of variable is -72.266; thus, the H0 hypothesis is not rejected at 5% error level. As a result, the information asymmetry on stock price change has a significant and reverse impact.

### The results in relation to the control variables of research

Research results in relation to control variables show that the error level related to size of financial leverage variable is 0.0000 and the error level related to the market value to the book value of equity is 0.015 that is smaller than to 0.05; therefore, there is a significant relationship between the control variables mentioned and stock price change. But the research results do not show a significant relationship between company size and growth with stock price change.

### Results of examining the research hypotheses

This study examines the effect of information asymmetry on financial variables affecting the securities of companies listed on the Tehran Stock Exchange. In this chapter, the information has been analyzed. At first descriptive statistics of research variables, then normalizing the research data, and eventually test research hypotheses have been discussed. In general, the following results have been obtained.

Research findings show that there is a negative and significant relationship between information asymmetry and the rate of return on assets. The results also show that there is a negative and significant relationship between information asymmetry and the ratio of price to earnings per share. Also the results show that there is a negative and significant relationship between information asymmetry and stock price change. Results of this study are somewhat consistent with previous researches of Easley and Ohara (1992) [if information asymmetry increases, the trading volume will also increase], Bollen and Whaley (2004) [bid-ask price resulting from small changes in price stock, order costs, maintenance costs, incorrect selection and competitive conditions], Qaemi and Vatanparast (2005) [the information asymmetry affects on stock price, and the stock price has been fluctuated before the period of earning announcement]. Finally, the research results are contrast to researches of Ahmadpour and Rasaiyan (2007) [there is a positive relationship between bid-ask price stocks and volume of monetary transactions, changes in the stock price





and size of company assets], Qaemi et al (2010). After the announcement of seasonal profits, the information asymmetry has no significant decrease.

### Conclusion

The results show that information asymmetry has an effective relationship on financial variables affecting the securities. Results related to the probability of F statistic show that the model is overall significant and has no problem of autocorrelation given the Durbin-Watson statistic. Also it is seen that the F-statistic is significant at 5% error level. Therefore, Chow test has strongly rejected the similarity of intercepts in all periods. Thus, the fixed effects model is accepted in this test. Then, the fixed effects method versus the random effects method is tested. Hausman test has been used for this work. If the statistic calculated is significant at 5% level error, the hypothesis of random effects is rejected and fixed effects model will be accepted. Finally, the statistic calculated of Hausman test is significant at 5% error level. Therefore, lack of relationship between individual effects and explanatory variables has been rejected. Hence, the fixed effects method will be used to estimate the model. Also, the research results in relation to control variables show that the error level related to variables of company size, size of financial leverage, market value to the book value of equity, growth is smaller than 0.05; therefore, there is a significant relationship between the control variables mentioned and return on assets, the ratio of price to earnings per share, and stock price change.

**Table 14: The results of the research hypotheses based on overall test of models**

Hypothesis name	Hypothesis subject	Conclusion
First	There is negative and significant relationship between information asymmetry and the rate of return on assets.	Rejection of H0
Second	There is negative and significant relationship between information asymmetry and the ratio of price to earnings per share.	Rejection of H0
Third	There is negative and significant relationship between information asymmetry and stock price change.	Rejection of H0

### Research limitations

There are limitations in the implementation of this research which should be considered for the interpretation of research results and its generalization capability that are as follows:

As control and intervention variables have been identified by research and studies conducted, we tried to use the fitness of regression model in this study. But due to the presence of the other interfering factors including shareholders behavioral factors, inflation factor, and other micro and macro-economic factors in the companies and community that have not been used in the fitness of regression model due to lack of access to information, we can consider these factors among limitations of the study.

The use of factor analysis to convert the nominal variables to qualitative ones can be considered as the other limitation of this study.

The lack of adjustment of financial statement items due to presence of inflation and having the

different times of financial period end in business units.

### Research suggestions

#### Suggestions in line with research findings

#### Research suggestions

#### Practical suggestions

According to the results and reviewing the research literature, some recommendations are presented to company managers, organizations, and agents of the Tehran Stock Exchange as follows:

1- Investors: According to results of the research, it is suggested that the users of financial statement always consider variables such as the value created for shareholders as the tenure of audit Institute and expertise in audit Institute industry when analyzing for the purchase of companies shares.

2- Managers: Given that the purpose of managers is to provide confidence for company owners, it is suggested that they use of the specialized auditors in industry and high tenure.

3- Securities and Exchange Organization: It is suggested to Securities and Exchange

Organization that adopts rules and regulations to determine the real value of the companies, their information transparency and better understanding of their performance that the companies listed can as much as possible use the high quality auditors to audit the financial statements for many years. In addition, it is recommended that Securities and Exchange Organization considers the tenure and expertise in audit Institute industry in pricing the company's shares.

### **Suggestions in line with the research findings**

According to the findings of this study and the results of similar studies carried out in relation to existence of a significant impact between information asymmetry on the financial variables affecting the securities, and existence of a significant impact between financial leverage, company size, Tobin's Q, and growth as a control variable on information asymmetry, it is suggested to users of the financial statements especially investors that consider this issue prior to doing of any decision such investments.

### **Suggestions for future research**

- It is suggested that the present study should be separately examined about each industry and performed the comparison of results obtained in various industries

- Carrying out the present study by using the company's midterm financial information.

- The use of other control variables (profitability of the company, the number of years that the company's stock is traded on exchanges, ranks of the audit institutes according to income, experience of audit institute in accounting work and continuity of audit activity during the last two years of dealing in business unit) to examine the relationship between profit management and information asymmetry.

- It is suggested that the present study should be separately examined about each industry and performed the comparison of results obtained in various industries

- Repetition of this study by using the other quality measures of auditing such as audit fees for audit institutions.

- Study the effect of information asymmetry on financial variables affecting the securities with an emphasis on industry.

- Study the effect of information asymmetry on financial variables affecting the securities with an emphasis on company life cycle.

- Study the effect of information asymmetry on financial variables affecting the securities and the quality of auditing with earnings management.

- Compare the other variables related to information asymmetry and financial variables affecting the securities.

### **Thematic Suggestions for future research**

- Conducting the present study by using companies's midterm financial information.

- The use of other control variables (profitability of the company, the number of years that the company's stock is traded on exchanges, ranks of the audit institutes according to income, experience of audit institute in accounting work and continuity of audit activity during the last two years of dealing in business unit) to examine the relationship between profit management and information asymmetry.

- It is suggested that the present study should be separately examined about each industry and performed the comparison of results obtained in various industries

- Repetition of this study by using the other quality measures of auditing such as audit fees for audit institutions.

- Study the effect of audit quality on profit management with an emphasis on industry.

- Study the effect of audit quality on profit management with an emphasis on company life cycle.

- Study the relationship between corporate governance mechanisms and audit quality with profit management

- Compare the other variables related to profit management and corporate governance.

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