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Information Efficiency and Default Risk of TSE Llisted Companies; Mediation of Institutional Blockholders

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ABSTRACT

The main objective of this study is to explain the links between information efficiency and default risk of companies listed on Tehran Stock Exchange, with an emphasis on the mediating role of institutional blockholders. A review of the theoretical foundations and literature (background) of the study shows that information efficiency can affect the default risk of companies through instiiutional blockholders. In the present study, using empirical data related to the TSE listed companies, the association between information efficiency and default risk was first examined, and then the mediating role of institutional blockholders was tested using parametric methods. We applied Baron and Kenny's (1986) model for mediation. The present study is applied in terms of purpose and is classified as descriptive-correlative research. The statistical population is comprised of TSE listed companies from 2016 to 2023, and the final sample was selected as 181 companies after the systematic (targeted) elimination of population. In order to examine the relationship between perceived research variables, multivariate regression analysis model by means of the Generalized Least Squares (GLS) weights was used in Eviews software. The research findings show that there is a negative and economically as well as statistically significant relationship between information efficiency and default risk of sample companies. Furthermore, the Baron and Kenny's (1986) analysis revealed that information asymmetry makes it difficult for institutional blockholders to enter the deals and/or encourages threats to exit, both of which increase the risk of default. The results can afford observable signals based on market authenticities in order to enlarge and improve default risk assessment and prediction models, and lead to more flexible contracts with suppliers, customers, and other partners and stakeholders of the organization. It can also lead enterprise managers to better mitigate business risks.

Keywords: Information Efficiency, Information Asymmetry, Default Risk, Institutional Blockholders, Tehran Stock Exchange

1. Introduction

Financial markets are considered one of the most important and infrastructural markets of any country and society, and their functioning has a significant impact on other various parts of an economy. Researchers, experts, and analysts always consider the mobility, dynamism, and even prosperity of the capital market as one of the main factors in the health and dynamism of the countries' economies (Yen & Lee, 2023). One of the largest and most diverse parts of the financial market is the capital market, in which the Tehran Stock Exchange plays a role as the main source of financing and, in fact, the beating heart of the Iranian economy. The main task and mission of the TSE is to collect, attract, and allocate unsecured savings of the private and government sectors to industries and economic productive units; in a way that, while accelerating the economic activities of the society, also intensifies its mobility and dynamism (Latif, et.al., 2024). In order to work well and perform their task of attracting and allocating financial resources efficiently, they must improve their allocative, operational, and informational efficiency. The efficiency of financial markets, especially in its informational dimensions, requires the rapid and complete reflection of data about the price of financial assets, which is called information symmetry (Dimson & Marsh, 2023). Information symmetry provides the basis for fair determination of securities prices and optimal allocation of capital in a desirable manner, and allocates capital as the most important production input, both at the company level and at the level of various industries in an optimal manner (Tsvetkov, 2014).

In the financial markets of developed countries, the existence of information asymmetry between the actors and stakeholders of financial markets is one of the most important factors affecting the volatility of returns (Gaulatyi, 2022). Information asymmetry is a situation or condition in which one of the parties to the transaction or a group of financial market actors, who are often traders, has more information or better and higher quality information than another group. The imbalance of information between these two groups of people leads to information asymmetry and causes failure in the market structure, Moral Hazard and Adverse Selection (Papla & Siedlecki, 2024). In a serious case, information asymmetry can lead to failure in the entire market; meaning that the mechanism governing the market is generally destroyed and supply and demand give way to other factors. In general, information asymmetry has been defined as one of the main factors of increasing turbulence and volatility in financial markets, which is more applicable to developing markets. Understanding information asymmetry, its dimensions and components is a useful strategy for predicting it (Brouty & Garcin, 2023). The category of information asymmetry plays an undeniable role in the process of modeling and predicting financial risks, as well as managing and controlling these risks (Aslam, et. al. 2023).

Risk means the possibility of not achieving expected results and a kind of uncertainty about the future, which in the field of financial management is usually reflected in the form of profit and loss. In order to reduce losses and adverse events and maintain financial balance and operational efficiency in institutions, it can be controlled and managed as much as possible by using risk management methods (Lee & Choi, 2023). According to the classification of the Bazel Committee, credit risk, market risk, and operational risk are the three main sources of risk, among which credit risk is one of the most important factors in generating risk in banks and financial companies. Default risk is also one of the most important components of credit risk, which has gained special importance today; because default is a destructive event in the life cycle of companies that causes a decrease in productivity and an increase in administrative costs through interruptions in the supply chain (Azzam, et.al., 2024). Information efficiency is also a continuous factor in the market structure, which plays a fundamental role in the decision-making of current and potential investors to buy and sell stocks. One of the most unfortunate events that can occur in a company's life cycle is bankruptcy. By disrupting a company's supply chain and attrition of its employees, bankruptcy negatively impacts a company's productivity, increases its administrative and legal costs, and ultimately makes it difficult to retain customers. Bankruptcy occurs when a company's cash flows are insufficient to repay the principal and interest on its commercial and non-commercial debts, accounts payable, and notes. The risk of bankruptcy increases when a company's cash flows are below average or when their volatility increases (Liu, et.al. 2023).

In financial markets with a high degree of information efficiency, investors have the opportunity to trade their desired stocks at the fastest speed and lowest cost. Information efficiency is one of the most important topics studied in the field of market infrastructure and is defined as the possibility of conducting transactions at high speed, at low cost, and without significantly affecting the price, which can affect the default risk of companies by facilitating the formation of shareholder blocks (Brogaard et al., 2017). Achieving an acceptable level of efficiency, especially in financial markets, is a constant concern of supervisory and enforcement institutions. Markets with appropriate information symmetry provide the

possibility of entering and exiting the market with the least disruption and the lowest transaction costs. Therefore, information efficiency can be considered as one of the important factors in the growth and development of markets (Zhao, et. al., 2024). Markets with low information asymmetry are better able to absorb systematic shocks and reduce their contagion to other components of the financial system; therefore, information symmetry prevents the adverse effects of price fluctuations from spreading to other components of the financial system and the macroeconomics. The question in this context is why and how does information efficiency affect the probability of a company defaulting on its principal and interest payments and other obligations?

Although different models have been presented in recent years to measure, evaluate and predict corporate default or credit risk, information asymmetry as a factor affecting corporate default risk has not received much attention. Information efficiency as a predictive variable can improve corporate credit risk measurement models and provide significant help to many researchers and scholars in this field. In Iran, research has been conducted on the relationship between information efficiency models and institutional ownership, portfolio liquidity, stock prices and asset liquidity; but one of the issues that has been neglected in empirical research is the concept of information asymmetry in relation to corporate default risk. Considering the role of information asymmetry in reducing transaction costs and the price discovery process, the relationship between these two categories can be of particular importance. This research can provide observable signals based on market realities that can be used to enhance, develop, and improve default risk models. Developing default risk assessment and prediction models allows suppliers, business partners, customers, and other stakeholders of organizations to better manage their business risks and conclude more flexible contracts. The main issue of this research is to examine the impact of capital market information efficiency on corporate default risk through institutional blocks. The following sections deal with the theoretical foundations, research methodology, and results of data analysis, respectively. The final section is devoted to conclusions and discussion.

Hypothesis Development

Default in Arabic means non-acceptance or rejection. In the Encyclopedia of International Finance and Banking, if a party to a contract fails to fulfill all or part of its obligations under a contract, whether voluntarily or involuntarily, it is said to have defaulted. The risk that arises from default is also known as credit risk (Nguyen & Nghiem, 2015). Historically, this risk usually occurred in the case of bonds, as lenders were concerned about the repayment of the loan they had given to the borrower. For this reason, credit risk is also called default risk (Falah Shams et al., 2017). Default risk is considered one of the most important components of credit risk and is caused by the inability or unwillingness of the borrower to pay its obligations to the lender on time. This risk is one of the oldest and most important risks and affects most financial and monetary institutions, because the default of a small number of customers can expose an organization to irreparable losses (Saeed & Izzeldin, 2016). Credit risk sources from the fact that a party to a contract is unable or unwilling to fulfill its contractual obligations. More generally, credit risk can be defined as the potential loss that occurs as a result of a credit event. A credit event becomes real when the ability of the party to the contract to fulfill its obligations changes. Credit risk is one of the most important risk factors in banks and financial companies (Ebrahimi Kordlor & Mohammadi Shad, 2014). This risk arises from the fact that recipients of facilities may not be able to repay their debt installments. Default risk increases when a company's cash flows are lower than normal (average) or their volatility increases (Brogaard et al., 2017). Before a default occurs, there is no way to distinguish companies that will default from other companies, and at best, only estimates of the probability of default can be obtained. The probability of default is the value of assets being less than the value of liabilities and occurs when a company's average cash flows decrease or their volatility increases (Liu, et. al., 2024). This risk, which is considered a type of financial risk, is the loss of events resulting from borrower default or events that cause a decline in the credit quality of borrowers (Alvarez & Jermann, 2024).

In recent decades, the literature on forecasting returns has grown rapidly, along with the concepts of market efficiency. Finding ways to predict stock returns, along with theories of market efficiency, has led to the development of various theories and empirical tests. In the weak form of market efficiency, the set of information that is available and affects stock prices is solely related to information from past periods (Dimson & Marsh, 2023). In this case, it is assumed that security prices only reflect historical information. In the semi-strong form of efficiency, the set of available information includes all public information; while in the strong form of efficiency, which includes both the previous two forms, stock prices reflect all information, both public and confidential. In an efficient market, the basic assumption is that security prices reflect the effect of all information about current events or events that the market expects to occur in the future (Latif, et. al.,

2024). Information efficiency means that information affecting the value of assets is made available to all market players equally and at an appropriate speed, and that certain investors cannot achieve higher profits (abnormal returns) than their "risk-appropriate profits" through information rent (Azzam, et. al., 2023).

Free flow of information, timely and transparent information, lack of interference by investment institutions or legislative and executive institutions, etc. are among the most important requirements for achieving information efficiency (Nguyen & Nghiem, 2015). Information efficiency means that information affecting the value of assets is made available to all market players equally and at an appropriate speed, and that certain investors cannot achieve more profits (abnormal returns) than their "risk-appropriate profits" through information rent (Wilson, 1978). Basically, one of the duties of supervisory and legislative institutions is to ensure this issue. Laws that are passed to prevent trading based on confidential information or corporate governance laws and recommendations are to achieve information symmetry and not to lose the rights of various shareholders. It is worth noting that the Securities and Exchange Organization is not responsible for the increase or decrease in prices or indices, but rather for the transparency of information and the accuracy of transactions. It is worth noting that achieving and maintaining full efficiency is not possible even in theory, and many studies show that the Iranian capital market is not strongly-efficient (Salimifar et al., 2010; Rahnamae Roudposhti et al., 2021).

The efficient market hypothesis, based on the rational use of all available information by investors, claims that prices can accurately reflect all available information and that price changes in such a market are random and unpredictable over time (Liu, et.al. 2023). According to the efficient market hypothesis, the performance of any stock portfolio is independent of its past performance and that in situations where the market loses its efficiency relatively, it is possible to increase investment returns and achieve abnormal returns through appropriate investment strategies (Zhao, et. al., 2024). An efficient market is a market in which the information and facts available about the shares of companies affect the stock prices at a high speed and the prices adjust themselves according to this information. In fact, an efficient market provides investors with the assurance that they are all aware of the same information, so an efficient market is a market that reflects the information and facts available in the market and is a guide for investors (olikas & Topaloglou, 2017). The concept of efficient market is based on the assumption that investors consider all relevant information in stock prices in their buying and selling decisions and that stock prices are a good indicator of the value of a security (Chen et al., 2020). The discussion of market efficiency is generally examined in terms of two related hypotheses, namely random walk and efficient market. Random walk states that prices are completely random in nature; while according to the efficient market hypothesis, there are no opportunities for abnormal profits in excess of the risk borne in the market. One method of examining weak-level efficiency is to examine the random walk hypothesis (Yen & Lee, 2023). Information efficiency refers to the availability of accurate, timely, and relevant information about a company or market. In an efficient market, stock prices react quickly and accurately to new information, and this information is reflected in stock prices. This is important in several ways (Azzam, et. al., 2023):

- Information transparency: Companies that disclose their financial and non-financial information well help investors make better decisions.
- Analyticality: With access to better information, investors can conduct more accurate analyses, which increases confidence in the market.

When information is widely available, information asymmetry between buyers and sellers is reduced. This can lead to an increase in the number of transactions and, consequently, increased liquidity. With access to better information, investors can conduct more accurate analyses, which increases confidence in the market (Alvarez & Jermann, 2024). When information is widely available, information asymmetry between buyers and sellers is reduced. This can lead to an increase in the number of transactions and, consequently, increased liquidity. Investors who have access to accurate information are more likely to invest in the market, which helps increase the liquidity of stocks (Lee & Choi, 2023).Institutional shareholders typically include investment funds, insurance companies, and other financial institutions that hold a large amount of a company's stock. Information efficiency can influence the behavior of institutional shareholders (Azzam, et. al., 2023):

- Deeper analysis: These institutions usually have strong research teams that can use the information obtained for more detailed analysis and better decision-making.
- Risk management: Access to better information and analytics helps these institutions manage their investment risks more effectively.

Corporate governance refers to the ways in which companies set their goals, monitor the performance of managers, and control risks. Information efficiency also plays an important role in this context (Zhao, et.al. 2024):

- Better oversight: With access to transparent and accurate information, shareholders and boards of directors can better monitor managers' performance and decisions.
- Accountability: Information transparency can help increase managers' accountability and reduce potential corruption and abuse.

Most studies and research in the fields of finance and economics examine the two assumptions of the rational economic man and perfect markets. In the perfect economic man hypothesis, the main claim is that humans play a role as the main actor in financial markets and their behavior in these markets is accompanied by biases (Dimson & Marsh, 2023). In the perfect market hypothesis, financial markets are also considered as the result of investors' decisions. Based on these two assumptions, in an efficient market, price behavior is random and does not follow a specific trend. In economics and contract theory, information asymmetry examines transactions in which one party to a transaction has more or better information than the other. This phenomenon creates a type of power imbalance in transactions that can sometimes ruin transactions, or in the worst case, lead to market failure (Saeed & Izzeldin, 2016). Examples of this problem include selection bias (lateral selection), clerical bias, and information monopoly. In an efficient market, the basic assumption is that security prices reflect the effect of all information about current events or events that the market expects to occur in the future. The opposite of the efficient market hypothesis is information asymmetry. Information asymmetry among financial market players prevents shareholders from gaining a proper understanding of the macroeconomic situation, the industry, and the strategies of investable companies (Papla & Siedlecki, 2024). As the market moves toward information asymmetry, access to and trust in capital market information becomes challenging, and investment decisions made under these conditions are subject to high risk, which increases the volatility of returns in financial markets (Brouty & Garcin, 2023).

Subrahmanian and Titman (2001) showed that information efficiency smooths the flow of transactions by creating incentives for conversant and information-based transactions. Managers also pay special attention to information obtained through financial markets because it is easy and inexpensive to access (Dow and Gorton, 1997). As a result, managers use stock price information to guide and direct the investment decisions of companies (Leo, 2005; Chen et al., 2007; Bakke and Whited, 2010), which affects the cash flows of companies and subsequently the ability of companies to repay debts and obligations. Therefore, we can hypothesize that information efficiency weakens the risk of default of companies. Mag (1998) examined and modeled the incentive of major shareholders to monitor the activities of companies. He believed that information efficiency strengthens and makes corporate governance more effective in situations where monitoring is associated with high costs. Ometti and Federer (2009) also examined the threat of exit as a strong alternative to corporate governance. Their research results show that information efficiency can strengthen corporate governance. Edmans and Manso (2011) showed that information efficiency increases the effectiveness of shareholders blocks in implementing corporate governance through regular transactions, and as a result, creates excellent management. Information efficiency facilitates the creation of shareholder blokcs and leads to strengthening corporate governance by encouraging transactions or exit positions. Information efficiency augments shareholder blokcs and these shareholders monitor investment opportunities and cash flows of companies, which, as a result, reduces the risk of default of companies (Brouty & Garcin, 2023).

In general, the relationship between information asymmetry and default risk can be examined through the channel of institutional blockholdrs. Higher information efficiency can lead to improved firm performance (Wilson, 1978). Information asymmetry allows informed shareholders to benefit more from their personal information, thereby encouraging investors to learn more about stocks and trade based on that information (Brogaard et al., 2017). This leads to information-based pricing of stocks (Holden and Subrahmanian, 1992; Holmstrom and Tirol, 1993; Subrahmanian and Titman, 2001). Corporate managers also use stock prices to direct the firm's investments (Leo, 2005; Chen et al., 2007; Buckley and Whitted, 2010). As a result, managers make better decisions and generate more cash flows for the company. This leads to a reduction in the volatility of the company's cash flows and, consequently, a reduction in the risk of default. In general, studies show that the higher the level of information asymmetry, the more distorted the stock prices and the higher the risk of default (Hu and Moskowitz, 2005). High information efficiency facilitates the sale of shares, especially for shareholder blocks, and this can act as a governance mechanism named threat to exit (Admeti and Federer, 2009; Edmans, 2009; Edmans and Manso, 2011). Good corporate governance provides discipline to company managers and regularizes investment decisions (Harford, 2012). In other words, strong corporate governance forces managers to invest in opportunities with positive net present value and reduces managers' opportunistic behaviors; therefore, corporate governance can potentially reduce the probability of default. In general, the greater the governance

supervision, the lower the probability of default risk (). Studies have shown that the information efficiency of companies' stock prices has a higher explanatory power than the role of corporate governance to explain the relationship between stock liquidity and companies' default risk (Brogaard et al., 2017). Therefore, we can hypothesize that information efficiency, through strengthening block (institutional) shareholding, weakens the default risk of firms. Figure 1 depicts the conceptual framework of the research:

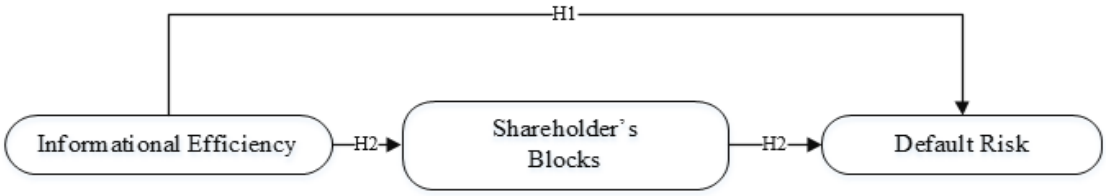

Figure 1: Conceptual model

Methods and Design

The design of this research is applied-developmental in terms of its purpose. In terms of the methodology used in data analysis, this research is classified as descriptive-correlational research; because it seeks to achieve a more complete and better understanding of the relationships and their current status by studying the past behavior of the research variables. The reasoning of this research is of the type of deductive reasoning (from the whole to the part). Considering the nature of the "correlation" of the research subject and the possibility of measuring and operationalizing the variables, the best method for conducting this research is to use the quantitative research method. Since the relationship between the research variables is examined among the member companies of the Tehran Stock Exchange and these variables are extracted from existing records and documents, the strategy of this research is also of the type of archival study. The time scope of this research is from 2016 to 2023. The statistical population of this research consists of all companies listed on the Tehran Stock Exchange in the period from 2016 to 2023. In this study, purposive sampling (systematic elimination) was used for sampling. For this purpose, all companies that met the following conditions were selected as sapmle:

- In order to make the information comparable, the companies' fiscal year ends at the end of March.
- The fiscal year has not changed in the years under study.
- The companies are not classified as investment, financial services, insurance, and financial intermediation companies due to the different nature of their activities and classification of their financial statements and the existence of some unique legal requirements (such as contingent reserves, legal deposits, etc.).
- In order to ensure the existence of sufficient and reliable data to calculate the information efficiency index, stocks with less than 9 months of trading history per year are not included in the calculations.

After applying the above filters, the final sample of 181 companies was selected and the required information was collected regarding each of the research variables. To collect information related to the research literature, sources such as books, magazines, theses and internet databases and document review were reviewed. The primary data of this study include stock trading information such as daily, weekly, monthly and annual information regarding buying and selling quotes, number, price and volume of transactions, stock returns, number and percentage of shareholder blocks, etc., as well as accounting and financial reporting information of the companies under study - required to measure variables - was collected using archival methods and, as the case may be, by referring to the codal.ir, the Rahavard Novin information software, the Securities and Exchange Organization Library and the Tehran Stock Exchange Technology Management Company database. The model in question for testing the first hypothesis is in the form of Equation 1.

(1)

$$EDF\ i,t = \alpha + \beta Efficiency_{i,t} + \gamma_1 Ln\ (Equity)_{i,t} + \gamma_2 Ln\ (Debt)_{i,t} + \gamma_3\ 1\ /\sigma E_{i,t} + \gamma_4\ Excess\ Return_{i,t} + \gamma_5\ Income\ /\ Asset\ s_{i,t} + Error_{i,t,}$$

To test the second hypothesis in wich the mediating role of institutional blocks is considered, the Baron and Kenny (1986) model was used. Based on the Baron and Kenny (1986) model, to evaluate the mediating role of institutional ownership, three models should be fitted. First of all, the effect of the independent variable (efficiency) on the mediating variable (blocks) must be reviewd. We test this using Equation 2:

(2)

Blocks i, t = α+ β*Efficiency* $_{i,\,t}$ + γ_1 *Ln* (*Equity*) $_{i,\,t}$ + γ_2 *Ln* (*Debt*) $_{i,\,t}$ + γ_3 1 /σ*E* $_{i,\,t-1}$ + γ_4 *Excess Return* $_{i,\,t}$ + γ_5 *Income* / *Assets* $_{i,\,t}$ + *Error* $_{i,\,t,}$

Then, the effect of the independent variable (efficiency) on the dependent variable (EDF) must be tested. We have already examined this issue in Equation 1 and use the same results. Finally, the simultaneously effect of independent and mediating variables on the dependent variable of the research must be measured in a model (Equation 3).

(3)

EDF $_{i,\,t}$ = α+ β1*Efficiency* $_{i,\,t}$ + β2*Blocks* $_{i,\,t}$+ γ_1 *Ln* (*Equity*) $_{i,\,t}$ + γ_2 *Ln* (*Debt*) $_{i,\,t}$ + γ_3 1 /σ*E* $_{i,\,t}$ + γ_4 *Excess Return* $_{i,\,t}$ + γ_5 *Income* / *Assets* $_{i,\,t}$ + *Error* $_{i,\,t,}$

The decision rule is that if, in the presence of the mediating variable (blocks), information efficiency has a significant effect on the default risk of companies, it can be concluded that institutional ownership has a partial mediating role; but if, by adding shareholder blocks into the model, information efficiency does not have a significant effect on the default risk (Equation 3), it can be concluded that institutional ownership has a complete mediating effect. The variables used in the models are as follows:

3.1. Defualt Risk by Expected Defualt Frequency

Expected Defualt Frequency index presented by Barth and Shamvy (2008) was used to measure default risk. This index is an abstract of the Distance to Default structural model introduced by Merton (1974). Merton's probability of default model provides cross-sectional and incessant probabilities for default. Barth and Shamvy (2008) showed that the expected default frequency can surprisingly predict bankruptcies even among companies outside the research sample. The inputs to this index are the same as those of Merton's distance to default model and have a similar structural form; however, Merton's model ignores residuals and does not consider repeated responses (Falahpour and Tadi, 2016); therefore, the basic index of this study for calculating default risk is EDF. EDF treats the equity of a company as a call option whose underlying asset valued as sum of the company's assets and the respected strike price is identical to the nominal value of the company's liabilities. In this model, a company defaults when the value of its assets is less than the nominal value of its liabilities. This model finally calculates the distance-to-default index of the company. The results obtained for this index are substituted into a cumulative standard normal distribution to calculate the probability that the value of the company's assets will be less than the nominal value of its liabilities. In accordance with Barth and Shamvy (2008) and Brogaard, et.al., (2018), this study will use the EDF index as shown in the Equation 4 to measure default risk.

(4)

$$DD_{i,t} = \frac{\log\left(\frac{equity_{i,t} + debt_{i,t}}{debt_{i,t}}\right) + (r_{i,t-1} - \frac{\sigma_{Vi,t}^2}{2}) \times T_{i,t}}{\sigma_{Vi,t} \times \sqrt{T_{i,t}}}$$

$$\sigma_{Vi,t} = \frac{equity_{i,t}}{equity_{i,t} + debt_{i,t}} \times \sigma_{Ei,t} + \frac{debt_{i,t}}{equity_{i,t} + debt_{i,t}} \times (0.05 + 0.25 \times \sigma_{Ei,t})$$

EDF i, t = N (−D D i, t)

Where*:*

- Equity i, t: The market value of a company's stock is obtained by multiplying the number of shares outstanding by the closing price in each year.
- Debt i, t: sum of current liabilities and half of long-term liabilities at the end of each year.
- $r_{i,t-1}$: annual return of stock i in the past year is obtained from the geometric mean of the monthly returns of the stock in the past year. The monthly return is obtained from the price change at the beginning and end of the month using the formula ln(p2/p1). According to the model of Afik et al. (2012), if MAX (rf, rt-1) is used instead of $r_{i,t-1}$ in the calculation of the DD index, the negative effect of historical returns is reduced and the predictive power of the model is significantly increased (Afik et al., 2012).
- $\sigma_{Ei,t}$: annual volatility of a company's stock returns is obtained from the standard deviation of the stock's monthly returns.
- $\sigma_{Vi,t}$: is the annual fluctuation in the (book) value of the assets of company i in year t.
- T i, t: considered as one year.
- N(...): standard normal cumulative distribution function

The above index (EDF) is calculated annually (based on year-end data of the sample member companies).

3.2. Information Efficiency

Information efficiency is considered using the difference between the bid-ask quated spreads namely effective spread, which is measured as a percentage of the relative difference between the bid-ask quouted prices. The higher the value of distance, the greater the difference between the bid and ask qouated prices, means information inefficiency or information

asymmetry (Brogaard et al., 2017). This index is defined and measured as twice the difference between the closing price and the average of the best bid-ask qouted divided by the average of the best bid-ask qouted prices. To express this index as a percentage, we multiply the result by 100 as shown in Equation 4: (4)

$$\text{Effective Spread} = 2 \times \left(\frac{\text{Close price} - \left(\frac{\text{best bid qouted price} + \text{best ask qouted price}}{2} \right)}{\frac{\text{best bid qouted price} + \text{best ask qouted price}}{2}} \right) \times 100$$

The higher the numerical value of the above relationship, the lower the level of information efficiency. Therefore, to facilitate the analysis of the coefficients, we multiply the above number by -1 to reflect information efficiency. We used intraday data for daily buy and sell quotes. First, the above index is calculated for every 5 minutes of the day for each stock. Then, using daily averages, it is used for each day and finally using daily averages for each year. The information required for intraday qoutas is received from the Information Technology Management of the Securities and Exchange Organization throght Order Management System called OMS (the history of quotes for each stock is received on an external hard drive). The infrastructure and internal information technology systems, the Wide Area Network (WAN) and data centers of the capital market, and the information systems and critical services of the capital market are all within the scope of activities and responsibilities of this Management.

3.3. Blockholders

We applied Blockholders as the mediator corporate governance mechanism. Following Brogaard et al. (2017) the mediting variable is operationalized as the ownership of block shareholders (Blocks). The required information was extracted from the Bourse View, TSETMC website, and Rahavard Novin software. Block is the sum of the percentage of shares held by institutional shareholders, each of whom solely owns at least five percent of the company's shares at the end of the fiscal year.

3.4. Controls

We also control the effects of ln (Equity), ln (Debt), inverse of annual stock return volatility (1 / σE), Excess Return over the annual market return (it draws our attention to the part of the return that is not explained by the overall market return.), Income/Assets (ratio of net profit to company assets in each year). After measuring, calculating, and classifying the research variables using an Excel spreadsheet, descriptive statistics were used to calculate central and dispersion indices for each of the research variables. In the inferential statistics section, in order to test the hypotheses regarding the existence of any relationship between information efficiency and default risk, Generalized Least Squares (GLS) multivariate regression was used along with controlling the assumptions related to the adequacy of the fitted model (such as autocorrelation of the disturbance component and variance heterogeneity) using Eviews software.

Empirical Findings

Table 1 reveals descriptive statistics of research variables.

The reliability of variables is one of the important assumptions in statistical analysis. To prevent spurious regression, variables must be stationary. To test the reliability of research variables, a unit root test combined with the Levine, Lin, and Chu technique was applied, and the fallouts (Table 2) display the research variables are stationary.

Table 1: Descriptive statistics

Variables	Mean	Standard Deviation	Minimum	Median	Maximum	Skewness	Kurtosis
EDF	0.1732	0.2102	0.0025	0.0908	0.6954	2.8661	4.3364
Efficiency	0.1225	0.1668	-0.1025	5.0368	0.8622	5.1820	5.0268
Block	0.5925	0.1659	0.1108	0.3965	0.8902	4.8966	4.0362
Ln (Equity)	13.2561	1.6589	9.1205	12.0081	18.9625	5.3674	3.0027
Ln (Debt)	14.3625	1.5862	10.6589	12.0852	17.6651	5.0081	4.0485
σE	0.5602	1.6581	0.0209	0.3589	1.4512	4.3301	3.6997
Excess Return	0.0089	0.0356	-0.0026	0.0034	0.08215	3.6604	2.6675
Income/Assets	0.2149	0.1677	-0.0253	0.1351	0.6985	4.2507	3.9912

Table 1: Unit root test

Variables	LLC	P. values	Results
EDF	5.2065	0.0000	Stationary
Efficiency	6.1255	0.0000	Stationary
Block	4.3250	0.0000	Stationary
Ln (Equity)	6.1275	0.0000	Stationary
Ln (Debt)	5.1236	0.0000	Stationary
σE	5.8992	0.0000	Stationary
Excess Return	6.3002	0.0000	Stationary
Income/Assets	4.0367	0.0000	Stationary

Before estimating a model using panel data, a decision must be made about the appropriate method for using such data in the approximation. The F-limer test statistic is used to make this final decision. The results of the F-limer test for the models testing the research hypotheses are presented in Table 3.

Based on the results, at a significance level of 5%, the P-value gotten is less than 5%, the H0 hypothesis is rejected; that is, there is no reason to assume the same intercept for different cross-sections in regression models, and the models should be fitted using a panel technique. Then, the Hausman test should be performed. The results of the Hausman test are summarized in Table 4.

Based on Table 4, the obtained significance level indicates the superiority of the fixed effects method over random effects. The estimation of the regression model parameters is significant and satisfactory when, in addition to the reliability of the research variables, the classical regression assumptions are also met. For this purpose, first, the models of equation 1, 2 and 3 were fitted using the OLS method and then the classical assumptions were checked. The fallouts of the classical assumptions presented that the research models lacked autocorrelation (Durbin-Watson coefficients remained 2.006, 2.142 and 2.039, respectively). Also, the results of the variance heterogeneity test displayed that the models have heterogeneity. To overcome this, we applied EGLS weights in the final fitting. Also, the VIF test revealed that there is no strong collinearity between the RHS variables. Therfore, we fitted the final models and the results were used to test hypothesises.

Table 3: F-limer test

Models	t-statistics	P. values	Results
Equation 1	5.3205	0.0000	H0 rejection
Equation 2	6.1404	0.0000	H0 rejection
Equation 3	5.3608	0.0000	H0 rejection

Table 4: Hausman test

Models	Chi-squared	P. values	Results
Equation 1	36.2350	0.0000	H0 rejection
Equation 2	39.4105	0.0000	H0 rejection
Equation 3	46.9807	0.0000	H0 rejection

4.1. First hypothesis

The first hypothesis examines the effect of information efficiency on the default risk of TSE listed companies. The results of estimating the regression model to test this hypothesis are designated in Table 5.

The result of hypotheses test is determined according to the coefficients and probabilities and using the P-value statistic. The judgment is that for each hypothesis to be accepted, the P-value statistic of the independent variable must be smaller than the significance level of 5%. If the corresponding significance level of the variable or variables is greater than the test significance level (5%), then the result is that the variable in question does not have an economically and statistically significant effect on the dependent variable of the study (EDF). First, the significance of the overall regression model should be examined using Fisher's F statistic. As can be seen, the significance level of Fisher's F statistic is less than 5% (close to zero). Therefore, with a confidence level of more than 99%, it can be thought that the model in question has the necessary adequacy and qualification and is considered an appropriate model for analysis. Another important indicator in regression analysis is the coefficient of determination. The coefficient of determination of a model is a number between 0 and 1, and the closer it is to one, the more powerful the model

is in explaining the dependent variable. In general, models with a coefficient of determination of more than 60% are considered to be strong or very strong models. The Equation 1 (first hypothesis) of the research examines the effect of information efficiency on the default risk of companies. As can be seen, the independent variable in this relationship is information efficiency, and since the significance level of this variable is less than 5% and its coefficient is also negative, it can be said with 95% confidence (economically and statistically), information efficiency significantly reduces the default risk of companies, and therefore the first hypothesis of the research is confirmed. It is observed that each one-unit increase in capital market information efficiency causes a reduction of approximately 21% in the probability of corporate default risk, which is economically and statistically significant. Also, the model in question has adequate power to estimate and explain the dependent variable. The explanatory variables of the model, taken together, are able to predict over 71% of the changes in the dependent variable of the study. Therefore, the above model is an appropriate estimation.

Table 5: First hypothesis (Equation 1)

Variables	Coefficient	Standard Errors	t-statistics	P. values
Efficiency	-21.399	6.006	-3.563	0.000
Ln (Equity)	-11.763	2.695	-4.365	0.000
Ln (Debt)	19.911	6.138	3.244	0.000
σE	0.130	0.045	2.892	0.001
Excess Return	-6.768	1.711	-3.956	0.000
Income/Assets	-29.618	7.399	-4.003	0.000
C	-24.356	4.805	-5.069	0.000
P-value of F	0.000			
R-squared	0.712			
DW	2.006			

4.2. second hypothesis

As explained in the third section, the Baron and Kenny model (1986) has been used to measure the mediating effects of the variable of shareholding blocks. In this case, three models must be fitted to examine the mediating role of the variable in question. In the previous section, the first model was fitted. Now, two other models must be fitted: one is the effect of the independent variable on the mediator (Equation 2) and other leaves us with the effect of the independent and mediator variables on the dependent variable (Equation 3), simultaneously. Table 6 shows the effect of the independent variable on the mediator.

The result of hypotheses test is determined according to the coefficients and probabilities and using the P-value statistic. The judgment is that for each hypothesis to be accepted, the P-value statistic of the independent variable must be smaller than the significance level of 5%. If the corresponding significance level of the variable or variables is greater than the test significance level (5%), then the result is that the variable in question does not have an economically and statistically significant effect on the dependent variable. First, the significance of the overall regression model should be examined using Fisher's F statistic. As can be seen, the significance level of Fisher's F statistic is less than 5% (close to zero). Therefore, with a confidence level of more than 99%, it can be thought that the model in question has the necessary adequacy and qualification and is considered an appropriate model for analysis. Another important indicator in regression analysis is the coefficient of determination. The coefficient of determination of a model is a number between 0 and 1, and the closer it is to one, the more powerful the model is in explaining the dependent variable. In general, models with a coefficient of determination of more than 60% are considered to be strong or very strong models. This model tests the effects of information efficiency on shareholder blocks formation. As can be seen, the corresponding significance level of the information efficiency variable is less than 5%, so with 95% confidence it can be supposed that information efficiency strengthens the shareholder blocks. The closer the buying and selling quotes, the easier the possibility of forming shareholder blocks, which means the governing role of information efficiency in the capital market. Based on Baron & Kenny (1986), now we must test the mediating role of shareholder blocks between information efficiency and EDF. Table 7 summarizes the estimation results.

Table 6: Second hypothesis (Equation 2)

Variables	Coefficients	Standard Errors	t-statistics	P. values
Efficiency	6.273	2.089	3.003	0.000
Ln (Equity)	0.245	0.069	3.556	0.000
Ln (Debt)	8.148	2.036	4.002	0.000
σE	-51.354	11.025	-4.658	0.000
Excess Return	6.221	6.005	1.036	0.176
Income/Assets	4.845	1.056	4.588	0.000
C	16.066	2.089	7.691	0.000
P-value of F	0.000			
R-squared	0.602			
DW	2.142			

Table 7: Second hypothesis (Equation 3)

Variables	Coefficients	Standard Errors	t-statistics	P. values
Efficiency	-1.539	1.445	-1.065	0.109
Blocks	-0.034	0.006	-5.620	0.000
Ln (Equity)	21.396	6.364	3.362	0.000
Ln (Debt)	0.390	0.097	4.023	0.000
σE	0.147	0.146	1.006	0.145
Excess Return	12.227	1.961	6.235	0.000
Income/Assets	6.708	1.662	4.036	0.000
C	21.389	2.665	8.026	0.000
P-value of F	0.000			
R-squared	0.656			
DW	2.039			

The result of hypotheses test is determined according to the coefficients and probabilities and using the P-value statistic. The judgment is that for each hypothesis to be accepted, the P-value statistic of the independent variable must be smaller than the significance level of 5%. If the corresponding significance level of the variable or variables is greater than the test significance level (5%), then the result is that the variable in question does not have an economically and statistically significant effect on the dependent variable of the study (EDF). First, the significance of the overall regression model should be examined using Fisher's F statistic. As can be seen, the significance level of Fisher's F statistic is less than 5% (close to zero). Therefore, with a confidence level of more than 99%, it can be thought that the model in question has the necessary adequacy and qualification and is considered an appropriate model for analysis. Another important indicator in regression analysis is the coefficient of determination. The coefficient of determination of a model is a number between 0 and 1, and the closer it is to one, the more powerful the model is in explaining the dependent variable. In general, models with a coefficient of determination of more than 60% are considered to be strong or very strong models. Based on what we know from the Baron and Kenny (1986) model, if in the presence of the mediating variable (Block), information efficiency has a significant effect on the default risk, it can be concluded that institutional block has a *partial mediating* role; but if by adding Blocks, information efficiency does not have a significant effect on the default risk, it can be concluded that institutional ownership has a *complete mediating* effect. Therefore, as can be seen from the accuracy in Table 7, the significance level of the information efficiency variable is greater than 5% and therefore has not a statistically and economically significant effect on the default risk of companies. Since the coefficient of the impact of the block shareholder variable on the default risk is negative and significant, we can point to the full mediating effects of this variable. Therefore, we conclude that information efficiency can have a significant effect on the default risk of companies, just by means of blockholding. Therefore, the second hypothesis of the research is confirmed and we can say that shareholder blocks fully mediate the relationship between information efficiency and the default risk of sample companies. We discussed the howness of this mediation in tne conclusion & discussion section.

4.3. Endogenity test

The relationship between information efficiency and default risk might be endogenous. We applies endogenity test to benefit from a robustness check using instrumental variables (IV) to mitigate concerns about reverse causality. In other words, the independent and control variables in regression models must all be exogenous, and the problem occurs when the explanatory variables of the model are endogenous. In general, in the econometric literature, an endogenous variable is a variable that has a strong correlation (collinearity) with the residual components of the model. Therefore, in this study, considering that multivariate regression has been used, the exogenousity test using the Durbin–Wu–Hausman method has been applied to examine the exogenousity of the explanatory variables and the absence of a reverse causality. In this method, the desired model is first fitted using the two-stage regression method (TSLS) or GMM, and then the exogenousity of the desired variables is examined by activating the HAC option and using each of the explanatory variables as an instrument. The null hypothesis in this test is exogenousity of the variable. If the significance level obtained for a variable is greater than 5%, there is no reason for its endogenous nature and the exogenousity will not be rejected. The results of this test are presented in Table 8.

The significance level obtained for all instrument variables is greater than 5%, so the instrument variables of the model are not endogenous and we ensure that the relationship between information efficiency and default risk might not to be endogenous.

Table 8: endogenity test using IV

Instrumental Variables (IV)	Significance level
Efficiency	0.0565
Blocks	0.1203
Ln (Equity)	0.0684
Ln (Debt)	0.0739
σE	0.1193
Excess Return	0.1082
Income/Assets	0.0699

4.4. Robustness cheks

The paper uses the bid-ask spread as a proxy for information efficiency. While this is a widely accepted measure, it has some potential limitations. For example, the spectrum of ordering in the Tehran Stock Exchange is limited by the supervisory body (+_3% for instance), and therefore not every quote can be recorded. This can overshadow the quality of using quotes as an information efficiency variable. To overcome this limitation and ensure that the quality of the measurement of this variable did not affect the results, we used another proxy for information efficiency, the price impact, which has also been widely used as an indicator of information asymmetry. Information asymmetry occurs when one or more investors have private information about the value of a company. In markets with information asymmetry, investors or shareholders are concerned about trading with individuals and actors with information. Therefore, information asymmetry from an uninformed investor is considered a risk factor, and for this reason, uninformed investors tend to quickly remove stocks with private information from their portfolios (Chen et al., 2022). Based on theoretical analyses, information asymmetry is associated with a decrease in the number of traders, a decrease in trading volume, high transaction costs, a large difference between buy and sell quotes, and low liquidity of securities. Price impact is an expression used to describe the correlation between an incoming order and the change in the price of the asset involved caused by the trade. Following Fukker (2022), the price impact index is used to measure information asymmetry in this study. The price impact of stocks is obtained by dividing the absolute value of the rate of return by the rial volume of transactions. According to Amihood (2002), the price impact represents the percentage change in price resulting from each dollar of stock exchange. According to this indicator, the higher the price effect, the greater the information asymmetry, because information asymmetry causes transaction costs. In such a case, market makers provide less liquidity to stocks due to the potential hidden costs. To measure information efficiency using the price impact function, as well as for ease of analysis (alignment with the research hypothesis), we multiply the index by -1 so that the resulting number represents information efficiency (Equation 5).

(5)

$$\text{PIM (Efficiency)} = \frac{1}{D}\sum_{d=1}^{D_n}\frac{[r_{i,d,t}]}{V_{i,d,t}}\times -1$$

Where, PIM stands for average absolute value of the daily rate of return divided by the volume of daily stock transactions in Rials during the fiscal year of t (price impact of i firm during t year). The r_i, d, t stands for the stock return of i firm in day of d in year of t. Also V_i, d, t is the rial volume of stock transactions of firm i in day of d in year of t. Dn showes the number of trading days per year. Furthermore, we focused on institutional blockholders to consider corporate governance mediation, but other governance factors such as board independence, managerial ownership, or shareholder activism could also influence the relationship between information efficiency and default risk. To check the rigority and

robustness of results, we applied a proxy for corporate governance, the board independence index. This index is obtained by dividing the number of non-executive board members by the total members, and the higher it is, the stronger the corporate governance.

Use of alternative information efficiency index as well as governance mechanisms would enhance the credibility and impact of the study. Next, we readjusted and fitted all the models that we examined and tested in the previous section using the price impact and board independence variables. To avoid repetition and save content, we have only presented the summary of final results in Table 9. The first hypothesis examines the effect of information efficiency on the default risk. As can be seen in Table 9 (Model 1), the independent variable in this relationship is price impact (multiplied by -1), and since the correspondent significance level of this variable is less than 5% and its coefficient is also negative, it can be inferred that with 95% confidence (economically and statistically) interval, information efficiency significantly reduces the default risk of companies, and therefore the first hypothesis of the research is confirmed again.

As explained in the third section, the Baron and Kenny model (1986) has been used to measure the mediating effects of the variable of shareholding blocks. In this case, three models must be fitted to examine the mediating role of the variable in question. In the previous section, the first model was fitted. Now, two other models must be fitted: one is the effect of the independent variable on the mediator (Model 2) and other leaves us with the effect of the independent and mediator variables on the dependent variable (Model 3), simultaneously. Model 2 tests the effects of information efficiency on board independence. Table 9 (Model 2) unweils the corresponding significance level of the information efficiency proxy. Since the correspondent significance level is less than 5%, so with 95% confidence it can be supposed that information efficiency strengthens the board independence. This confirms the governing role of information efficiency in the capital market.

Based on Baron & Kenny (1986), now we must test the mediating role of board independence between information efficiency proxy and EDF. Table 9 (Model 3) summarizes the estimation results. Based on the Baron and Kenny (1986) model, if in the presence of the mediating variable (BINDEP), information efficiency has a significant effect on the default risk, it can be concluded that board independence has a ***partial mediating*** role; but if by adding board independence, information efficiency does not have a significant effect on the default risk, it can be concluded that board independence has a ***complete mediating*** effect. As can be seen in Table 9, the significance level of the information efficiency variable is greater than 5% and therefore has not a statistically and economically significant effect on the default risk of companies (it may be significant if weuse 90% confidence level). Since the coefficient of the impact of the board independence on the default risk is negative and significant, we can point to the full mediating effects of this variable. Therefore, we confirm that price impact might have a significant effect on the default risk of companies, just by means of board independence. Therefore, the second hypothesis of the research is confirmed and we can say that board independence fully (at 95% confidence interval) and partially (at 90% confidence interval) mediate the relationship between information efficiency and the default risk of sample companies.

Table 9: summary of robustness ckeck results

Variables	Model 1		Model 2		Model 3	
	Coefficients	**Sig.**	**Coefficients**	**Sig.**	**Coefficients**	**Sig.**
PIM	-1.055	0.000	5.019	0.000	-0.002	0.085
BINDEP	--	--	--	--	-11.296	0.044
Ln (Equity)	-0.034	0.000	0.001	0.001	-0.062	0.000
Ln (Debt)	5.750	0.000	0.024	0.030	0.113	0.002
σE	0.000	0.020	-14.831	0.000	0.000	0.000
Excess Return	-0.020	0.066	0.018	0.041	-0.035	0.000
Income/Assets	-8.554	0.000	0.014	0.000	-1.937	0.000
C	-0.070	0.000	4.640	0.000	-0.062	0.000
P-value of F	0.000		0.000		0.000	
R-squared	0.661		0.498		0.681	
DW	1.894		2.028		2.141	

Conclusions and Discussions

The aim of research is to reduce the probability of default by using the factors that constitute the market structure. Among these factors, information efficiency has always been one of the advantages of the capital market over competing markets, and market efficiency is used for calculation. Stock market is considered one of the important sources of financing for companies. Regarding the importance of market data and the assest value in the current situation of companies and expectations about the future of the company, it is necessary to use a model that uses current market information and does not rely only on historical and accounting data and can show the probability of default of companies. The study uses EDF model as an index for measuring the risk of default of companies and seeks to use this index to examine the why and how of the relationship between information efficiency and the risk of default of companies in the Tehran Stock Exchange, emphasizing the intermediary role of institutional blockhlders. In general, the results show that there is a negative and significant relationship between information efficiency and default risk of TSE listed. Increasing information efficiency, pacifies the probability of default of companies' obligations. Based on the findings, information efficiency strengthens the supervision of companies by facilitating the formation of institutional blockholders, rationalizes investment decisions and eventually multiplays cash flows. This supports the corporate governance theory of information efficiency of the capital market; because it strengthens the mediating role of blockholders. The results of negative association between information efficiency and default risk are in line of Afik, et al. (2015), Brogaard et al. (2015), Brogaard et al. (2017), David et.al. (2021) and Floris, et al. (2023).

As the market moves towards reducing the information asymmetry between managers and shareholders, access to and trust in capital market information becomes easier and managers will be more willing to use such information. This leads to the analysis of this information for investment decisions, and helps managers make better investment choices. Healthier investment decisions (investment opportunities with positive cash flows) lead to augmented cash flows for the company and abridged risk of default on debt and obligations. Information efficiency facilitates the speed and comfort of buying and selling stocks. In such circumstances, the formation of shareholder blocks is simplified because one of the hindrances to forming shareholder blocks, namely distorted or concealed information, is eliminated. Shareholder blocks are external governance institutions that, by taking buy and sell positions in company shares and the impact they have on the company's share price (market value), as well as by increasing oversight of investment decisions (such as exercising voting rights), lessen managers' opportunistic behaviors and guide managers to make optimal investment decisions (opportunities with positive cash flows) in line with shareholder goalmouths (not personal tastes).

The most important contribution of this research is the investigation and explanation of the mechanisms of influence of one of the important market indicators (i.e. information efficiency) on the risk of corporate default, which has not been studied before in Iran. The results of this study support the multidimensional concept of information efficiency theory; therefore, it can affect default risk trought a governance role. Efficiency reflects realities in stock prices. In such a situation, the stock price is a true reflection of the facts about the stock and encourages and accelerates informed trading. Information asymmetry is reduced and shareholders gain a better understanding of the macroeconomic situation, the industry, and the strategies of competing companies. The study presents an insightful and methodologically rigorous examination of the relationship between information efficiency and default risk in companies listed on the Tehran Stock Exchange (TSE), with a focus on the mediating role of institutional blockholders. The study contributes significantly to the field of corporate finance by offering empirical evidence on how market efficiency affects financial stability through governance mechanisms. The paper effectively articulates the importance of understanding the link between information efficiency and default risk, particularly in emerging markets like Iran, where market transparency and governance structures differ from developed markets. In methodological terms, we used the Baron and Kenny's (1986) mediation model to examine the role of institutional blockholders. The results indicate a statistically and economically significant negative relationship between information efficiency and default risk, reinforcing previous literature. The study demonstrates the complete mediating role of institutional blockholders, offering new insights into governance practices in emerging markets. The findings provide valuable insights for policymakers, investors, and corporate managers by emphasizing the role of market transparency and shareholder monitoring in mitigating default risks.

The study focuses exclusively on TSE-listed firms. It would be useful to compare the findings with other emerging or developed markets to assess whether the results hold across different institutional settings. As including comparisons with other stock exchanges in similar economic contexts could enhance the paper’s contribution, we went throught findings within a broader global perspective. Nguyen, D. N., & Nguyen,

C. P. (2022) tested uncertainty and corporate default risk association by novel evidence from emerging markets. This paper examines the relationship between market efficiency and default risk in emerging markets and shows that efficient markets help reduce default risk. Lee, M. J., & Choi, S. Y. (2023) compared market efficiency in developed, emerging, and frontier equity markets with a focus on multifractal detrended fluctuation analysis and presents different results in these two groups of countries. Jappelli, T., & Pagano, M. (2024) showed that information efficiency of capital markets can lead to a reduction in default risk in different countries. In general, the results of this study on the negative impact of information efficiency on corporate default risk are consistent with research conducted in developed and emerging markets; however, these studies do not mention the mediating role of institutional ownership. One of the current realities in financial markets in developing countries such as Iran is the rapid growth of institutional ownership and the unique structure of corporate governance. In recent years, we have witnessed the increasing growth of institutional ownership in the Iranian capital market. None of the studies conducted in foreign countries have mentioned the governance role of institutional ownership. The important contribution of this study can be considered the connection between corporate governance mechanisms (institutional ownership) and market mechanisms (information efficiency), and this innovation can be very insightful and respectable for future studies. Overall, this paper makes a valuable contribution to the finance literature by empirically demonstrating the impact of information efficiency on default risk through institutional blockholders. The contribution refers to new insights, theories, empirical findings, or methodologies that enhance our understanding of how information affects the likelihood of default in financial markets. This could involve refining existing models or proposing entirely new frameworks to better understand these dynamics. The results help us to review how different market participants respond to information and how these responses affect their risk assessments and decisions related to default.

It is suggested to policymakers in the stock exchange take the necessary trials to reinforce information efficiency and reduce information asymmetry. Increasing market transparency through the provision of transparent financial statements is also among the short- and medium-term projected solutions to surge information efficiency, reduce the probability of default risk for companies, and ultimately boost investment in the capital market. Improving information efficiency through regulatory interventions could provide actionable insights for market regulators. These interventions may include areas of *enhancing transparency*, *infrastructure* as well as *supervision* such as requiring companies to publish financial and non-financial information periodically and in a timely manner, investing in advanced IT systems to collect, analyze, and publish market data; and establishing independent supervisory bodies to review and evaluate information published by companies.It is also recommended to all suppliers and vendors of goods and services, customers, business associates, and other stakeholders to estimate the probability of default on debts and obligations before making transactions to better manage business risks and conclude more flexible contracts with organizations. One of the most important limitations of the present study is the existence of a price fluctuation range and the creation of order imbalances. The existence of a price fluctuation range causes prices to reach the market's desired price range more slowly. This may have affected the way in which market information efficiency is measured. Furthermore, the statistical generalization of the results of this study should be approached with caution because the sampling of this study was based on a purposive method and on the basis of an available sample, which may have caused survivorship biases. To address this issue and increase the validity and reliability of the data, an attempt was made to adjust this bias in sampling by feedind diversity into the community. Therfore, the selected sample was designated from all industries (except for financials) active in the Tehran Stock Exchange. Exploring how advancements in technology, such as the use of big data, machine learning, and artificial intelligence, improve information efficiency and thereby affect default risk assessments is suggested to intersted users. Analyzing the impact of regulatory changes on information efficiency and default risk, including how enhanced disclosure requirements or changes in capital adequacy standards influence market behavior and risk management practices is another research area.

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