



Investigating the Impact of Stock Price Index on Credit Risk of Banks Listed in the Stock Exchange Market

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ARTICLE INFO	ABSTRACT
<p><i>Received: 10 February 2022</i></p> <p><i>Reviewed: 28 February 2022</i></p> <p><i>Revised: 09 April 2022</i></p> <p><i>Accept: 14 April 2022</i></p>	<p>Purpose: Full employment has a mysterious meaning; full employment certainly does not mean employment of any member of the active population of the society who is of working age. One reason is that there are probably always people who find themselves unemployed due to various disabilities. Another reason is that at any time you can find workers who want to change jobs and remain unemployed during the job change period.</p> <p>Methodology: The method of descriptive correlation research was used and in terms of purpose, type of research it is applied and the library method is used to complete the literature and research background and the field data is collected through the archives and documents of the Central Bank website and the data of the Stock Exchange and Securities Organization to facilitate the analysis of data from Excel spreadsheet and regression method and Eviews statistical software are used to test research.</p> <p>Findings: The results show that the effect of stock index on variable risk and software use and comprehensive statistics of our research includes all banks and credit institutions listed on the stock exchange.</p> <p>Originality/Value: The available statistics show that the developed stock exchanges are located in developed countries and in these countries, more than anything, investment security is provided for the entry of domestic and foreign investors in the stock exchange. Market security is affected by various factors such as political, economic, and social and others. But in this study we intend to analyze macroeconomic variables.</p>
<p>Keywords: <i>Capital Market, Stock Index, Credit Risk, Economy</i></p>	

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1. Introduction

One of the most important economic sectors of countries is the capital market, the importance of which is not hidden from anyone. The capital market is closely related to the structure of the country and its strengths and weaknesses can indicate the economic situation of the country the development of the capital market can play an important role in the growth of the national income of the country and the general welfare of the society. The available statistics show that the developed stock exchanges are located in developed countries and in these countries, more than anything, investment security is provided for the entry of domestic and foreign investors in the stock exchange. Market security is affected by various factors such as political, economic, social and etc. But in this study we intend to analyze macroeconomic variables. The variable addressed in this study is the stock price index [1].

Basically, every economic activity is associated with a degree of risk. The profitability or survival of an enterprise depends on several factors, some of which are under the control and others outside the control of the enterprise. A manufacturing firm can control the size of the firm, the number of employees, the amount of production, and the like, but has little control over other factors such as future prices, exchange rates, political conditions, and the activities of competing firms. Therefore, risk can never be completely eliminated and the only possible way is risk management [2]. Proper communication between financial and production systems in each country is one of the most important factors of economic growth and development. Countries that have an efficient model of allocating capital to different economic sectors often have economic progress and consequently higher social welfare. Equipping and allocating investment resources to economic activities is done through the financial market, of which the bank credit market is part.

Hence, the role of the banking system in the process of economic growth and development of countries in order to equip resources and finance for the implementation of projects, working capital of production units, granting mortgage loans and meeting the basic needs of the population and preventing deepening activity. Economics, investment and employment are so important that maintaining the financial soundness of banks should be considered as one of the first priorities of economic policy in the national economy [3]. Many countries have faced a crisis in the last two decades, as a result of which a significant number of institutions operating in those countries have been forced to cease operations or restructure. World Bank studies show that the occurrence of these crises has led to the analysis of a significant amount of financial resources of countries. These crises highlight the importance of explaining the relationship between economic conditions and the health of the banking system. Because during the crises, the level of claims increases sharply, a significant amount of banking resources is depleted [4]. Explaining the above relationship, which is more important during the financial crises, leads to identifying the strength of the banking system, especially from the point of view of default of payment facilities in times of banking crises. In addition to the above, it is necessary to pay attention to the fact that one of the most important challenges facing the country's banking system in recent years has been the growing number of overdue receivables, much of the country's liquidity has become a national challenge [5].

The economy of each country is composed of different sectors that determine the relationship between these sectors, the direction of that country. One of the most important economic sectors of the country is the capital market, the importance of which is not hidden from anyone. The capital market is closely related to the economic structure of the country and its strength and weaknesses can indicate the economic situation of the country [6].

In order to create security in the market in order to attract more capital, it is necessary to examine the macro factors affecting investment, including economic, political, social, cultural and technological each of these macro factors can be broken down into smaller components. That include [7]:

1. Economic growth rate
2. Inflation rate
3. Money volume
4. Stock price index
5. Exchange rate

The present study focuses on the relationship between stock price index variables and credit risk of banks listed on Tehran Stock Exchange. Has been exploited because in addition to macroeconomic factors, specific banking variables should also be considered in the research because it can be an indicator or factor of risky lending [8]. In this study, the effect of stock index on the credit risk of banks listed on Tehran stock exchange is analyzed and predicted. Therefore, the research variables can be divided into two independent and dependent groups, which are the independent variable stock price index and credit risk of banks listed on Tehran Stock Exchange, which are dependent variables.

Banks and financial institutions, like any other business, are at risk. The nature of financial activities and dealing with concepts such as credit, payment systems and different rates exposes such institutions to special risks, and on the other hand, the rapid development of financial activities, technical and complex innovations. The wetting of financial systems has made the principles of risk management an inevitable part of any financial institution. Credit risk, market risk and operational risk are the three main areas of risk that banks face. The present article examines the issue of credit risk. Due to the development and dynamics of the credit industry, today this industry has found an important role in the economics of countries. The globalization of the economy and the introduction of new service channels such as the internet it has lost credibility for its customers. That is why lending institutions have tended to expand their operations to other countries around the world.

Although the increase in demand for credit, increasing competition and the emergence of new channels in the new economic environment, has created new opportunities for lending institutions, but on the other hand, they also need new tools and methods. This has led these institutions to revise, empower, and incorporate new technologies into their credit management processes [9]. The present study focuses on the relationship between stock price index variable and credit risk of banks listed on Tehran Stock Exchange taken. Because in addition to stock price index, specific banking variables should also be considered in the present study because they can be an indicator or factor of a risk, taking facility. The existing literature indicates that the main factor influencing credit risk is a variable in in the stock price index. For example, Keaton and Morris, researching 2400 commercial banks from 1979 to 1985, showed that economic conditions are the main variable affecting the non-flow of facilities in the banking system [10].

Researchers such as Muller, Andersen, and Sanderson have also shown that there is a direct relationship between rising credit risk levels and deteriorating macroeconomic conditions. By looking at the macroeconomic structure of each country and the different markets in each economy, we can get one of the most basic markets in any capital market economy. The stock market is an organized and official market for buying and selling stocks of companies under special rules and regulations. One of the tasks of this market is to help equity the price of securities and speed up transactions. The size and liquidity

of the private, sector to finance long-term investment projects. This market is one of the most important markets of any economy.

The indicators of this market are affected by several factors, the most important of which is the variable stock price index. On the other hand, banks as one of the most important institutions in the country play a key role in promoting they have economic developments. Banks play an important role in the economy of any country and in Iran, banks are one of the most important investors in the financial market. It is very important to study the factors affecting the stock prices of banks [11].

2. Literature Review

In the second chapter, a set of theoretical and empirical principles expressed about macroeconomic policies, macroeconomic factors, credit risk of banks listed on Tehran Stock Exchange and the impact of each macroeconomic variable on the credit risk of accepted banks in Tehran Stock Exchange, as well as a brief description of Tehran stock exchange, and in the continuation of Persian and English research and their results in this field will be examined.

2.1. Concepts of Macroeconomic Factors

The main role of the government in economic affairs until recently was to create an environment in which private market forces could allocate production resources to different and competing uses and distribute the final result of production among the various factors contributing to production, politics, then was the establishment and maintenance of laws and institutions that allowed market forces to operate effectively or more efficiently. But less attention was paid to the direct manipulation of these forces. Macroeconomic policy, or macroeconomic policy for short, is how economic agents are responsible for applying a policy that can affect specific collective and general economic variables, and in particular their levels. it is desirable to lead to a pre determined level, the achievement of which is considered to increase the welfare of the national economy. Macroeconomic policy can be considered as an attempt by decision – makers to achieve specific goals for macroeconomic variables.

In this section, we examine some of the issues associated with the concepts of full employment, price stability, external balance, and the appropriate rate of economic growth.

2.1.1. The purpose of employment

Full employment has a mysterious meaning; full employment certainly does not mean employment of any member of the active population of the society who is of working age. one reason is that there are probably always people who find themselves unemployed due to various disabilities. Another reason is that at any time you can find workers who want to change jobs and remain unemployed during the job change period.

2.1.2. The purpose of stabilizing prices

What is meant by inflation? Inflation may be described as a steady increase in general price levels, as measured by the price index. The degree of importance of that product (or service) is in the budget of consumers.

2.1.3. Balance of payments

The balance of payments of a country is: the systematic recording of economic transactions during a certain period, between people living in the country and people living in the rest of the world. Thus, the balance of payments is formed on the basis of bilateral or double book keeping. Achieving foreign

equilibrium as a goal is to eliminate any tendency towards excess or deficit of the balance of payments, i.e. to achieve zero changes in their reserves (regardless of claims from foreign monetary institutions or their claims on the country)

2.1.4. The goal of economic growth

Typically, growth is thought of as expanding production capacity. economic growth should be distinguished from short – term fluctuations related to the optimization of existing production capacity largely due to demand, for example, when shifting from high – level employment to full-time employment, which is driven by a policy of increasing demand. Production growth in the short run can be much higher than the growth trend in the Long run [12]. Institutional and individual capitalists in Tehran Stock Exchange. Periodically measure the movement and direction of the market with this criterion.

2.1.5. Price index and cash return

The price index and cash return or the total income index is indicated by the symbol TEDPIX. it has been calculated and published in Tehran Stock Exchange since April 1998. changes in this index indicate the total return on the stock market and are affected by changes in price and cash returns paid. This index includes all companies listed on the stock exchange and the method of weighing and calculating it is the same as the total price index, and the only difference between the two is in the way they are adjusted, so that this index is also adjusted when paying cash dividends. In other words, this index represents the total return on investment, while the previous return shoes only the return on price changes with capital gains.

2.2. Cash return index

Cash return index, which is indicated by the symbol TEDPIX, indicates the general level of cash return (profit) paid by companies and is obtained by dividing the total price. Index is a statistical measure that shows. The change of movement and direction of an economy with a stock market. Companies listed on Tehran Stock Exchange are classified in different industries. This classification, which is based on the ISIC method, leads to segregation. 36 industries have been listed on Tehran stock exchange until May 2005. Tehran Stock Exchange calculates the price index for each industry, all of which are calculated with the same formula as the total price index. in a more general division, the companies listed on Tehran Stock Exchange are divided into two groups: industry and finance. The financial group includes companies of the financial intermediation industry and the industry group includes all listed companies except financial intermediation. Tehran stock exchange also calculates the price index for these two general groups, which is published under the name of industry index, and both of them follow the criteria of the total price. Index in designing the calculation and adjustment. The total index shows the general trend of the total price of stock exchange companies and shows the changes in the general level of prices compared to the date of origin. The total index was defined as 100 units on September 1, 1990. The total index of Tehran Stock Exchange reached 26, 930 units on Monday, September 6, 2011. This number was unprecedented in the history of the stock exchange.

An index is a statistical measure that shows the change in direction and direction of an economy with a stock market. In financial markets, it is essentially an index of a hypothetical portfolio of securities that includes the entire relevant market as part of it. This index includes a portfolio of securities, not necessarily all of them. For example, the total index of Tehran Stock Exchange is a hypothetical portfolio of all accepted stocks, while the financial index includes a hypothetical portfolio of investment

and holding companies. Each index has a special computational methodology that is usually expressed in terms of change from a base value. It does not have much information load. For example, if we know that the total index of Tehran Stock Exchange at the end of 1382 is 11379, no important information can be obtained from it, but if we know that the stock index has grown by 124 percent during 1382, we will probably find good performance in the above year. Win so the indicators alone do not contain a concept, but their comparison over many years can reveal concepts for us and determine the market movement.

3. Research Methodology

The division of research in terms of collecting statistics and information and the method of analysis is different from the point of view of different authors of research method books. The division of research is done into two types of descriptive and analytical research. In this study, in order to test the hypotheses about the relationships between the variables of economic growth rate, inflation rate, money supply, stock price index and exchange rate (dollar) and measuring credit risk, the method of descriptive correlation research was used and in terms of purpose, type of research It is applied and the library method is used to complete the literature and research background and the field data is collected through the archives and documents of the Central Bank website and the data of the Stock Exchange and Securities Organization to facilitate the analysis of data from Excel spreadsheet and regression method and EViews statistical software are used to test research



Fig. 1. The proposed model

The researcher after most of the necessary studies on the subject and before starting work on most models Review and finally the following model is considered. Macroeconomic variables including economic growth rate, inflation rate, money supply, stock price index and exchange rate as independent variables and credit risk of banks listed on the stock exchange are considered as dependent variables in this study.

3.1. Hypothesis 1

H_0 : There is no relationship between stock price index and credit risk of banks listed on the stock exchange. $H_0 : B_0 = 0$

H_1 : There is a relationship between stock price index and credit risk of banks listed on the stock exchange. $H_0 : B_0 \neq 0$.

3.2. Model Hypotheses

Model 1) $LLP = B_0 + B_1 \text{ GDP} + \epsilon_0$

Model 2) $LLP = B_0 + B_1 \text{ IFN} + \epsilon_0$

Model 3) $LLP = B_0 + B_1 \text{ MN} + \epsilon_0$

3.3. Statistical Society

According to the spatial scope of the research, the statistical population includes all banks and credit institutions listed on the stock exchange, which are: Bank Saderat Iran, Parsian Bank, Sina Bank, New Economy Bank of the Middle East Bank, Karafarin Bank, Ansar Bank, Bank Tejarat, Bank Mellat, Pasargad Bank and Post Bank of Iran.

3.4. Statistical hypotheses of research

There is a relationship between the stock price index variable and the credit risk of banks listed on the stock exchange.

Hypothesis 1:

H₀: There is no relationship between the approved profits of economic associations and the credit risk of banks listed on the stock exchange. H₀: B₀ = 0

H₁: There is a relationship between the approved profits of the assemblies and the credit risk of the banks listed on the stock exchange. H₀: B₀ ≠ 0

Hypothesis 2:

H₀: There is no relationship between stock price-earnings and credit risk of banks listed on the stock exchange. H₀: B₀ = 0

H₁: There is a relationship between stock price-earnings and credit risk of banks listed on the stock exchange. H₁: B₀ ≠ 0

Hypothesis 3)

H₀: There is no difference between the size of the company and the credit risk of the banks listed on the stock exchange. H₀: B₀ = 0

H₁: There is a difference between the size of the company and the credit risk of the banks listed on the stock exchange. H₁: B₀ ≠ 0

3.5. Data Analysis Method

Using descriptive statistics and the methods used in it (frequency distribution table, central indices, and dispersion indices), data classification, summarization, description, interpretation, and communication of information have been made. In addition, Levin-Lin-Chu tests were used to test the significance of the variables, and Jack Bravo test was used to normalize the dependent variable and, also correlation method was used to analyze the relationship between the variables. The F-Limer test was used to determine the pattern of regression models. Data analysis was performed using EViews statistical software so that the percentage was calculated to describe qualitative traits, and univariate regression analysis was used to test the hypotheses.

4. Results

4.1. Regression analysis

Regression analysis is a statistical technique that is used to examine and model the relationship between variables. The regression equation helps to estimate the variance of the dependent variable and does this task partly by estimating the participation of independent variables in this variance. In fact, regression allows us to identify variables when they are related to the dependent variable and to distinguish and differentiate the influence of each variable on the dependent variable. Between some points and their image on the regression line (Line y). There is a slight difference, which we refer to as the estimation error. This error may be due to errors in measurements, environmental conditions, natural differences and. Therefore, the initial regression equation is defined as follows

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \epsilon_0$$

The above equation is called the linear regression model usually to x , are independent variables (Regression) and to y , the dependent variable (Response) Called. Which is a random error that is considered to complete the model and show that there is some error. Regression Hypotheses: These three assumptions are necessary to build a model

1. *It is assumed that the errors cancel each other out, in other words the sum of the errors is zero.*
2. *It is also assumed that the error in one observation is not related to other errors*
3. *Finally, the differences between the errors are considered constant*

The variables used in this study to derive regression equations are credit risk (LLP) as a dependent variable, stock price (GP), Gains from stock prices, (IFN) Profits approved by the assemblies (MN). They are considered as independent variables. Using software EViews, the value of each of the independent variables is calculated and their effect is interpreted and analyzed in the regression model in the regression model to estimate the dependent variable.

4.2. Test the first hypothesis:

H_0 : There is no relationship between stock prices and banks' credit risk. $H_0: B_0 = 0$

H_1 : There is a relationship between stock prices and banks credit risks. $H_1: B_0 \neq 0$

According to the materials presented in the regression model selection stage, to test the first hypothesis, the panel regression model based on random effects and with 95% confidence has been used.

Table 1. Regression estimation results of the first hypothesis - LLP dependent variable

Regression model	$LLP = \beta_0 + \beta_1 GP + \epsilon_0$			
Variable names	coefficients β_1	Standard deviation	Statistics t	Prob.
β_0	$\beta_0 = 0.078$	0.031	2.471	0.015
GPD	$\beta_1 = 0.321$	0.229	1.362	0.176
Coefficient of determination R^2		0.021		
Adjusted coefficient of determination R^2_{Adj}		0.009		
Durbin Watson test(D-W)		1.994		
Statistics F-Statics		1.855		
Probability		0.176		

H_0 : There is no trade-off between stock prices and banks' credit risk. -0

H_1 : There is a relationship between stock prices and banks' credit risk. +0

$$\text{By: } B_0 \text{ LLP} = B_0 + B_1 \text{GP} + E_0$$

The findings of Table (1) show that for the F test the value of the corresponding probability level is equal to, 0.176 = Prob. Is. Therefore, this model is not significant in F statistic and in fact indicates that it is probably not linear regression. The calculated value of the Durbin-Watson statistic for the observations of the statistical sample is 1.994, which is between the numbers 1.5 to 2.5 and shows the lack of correlation between errors (error independence) in the first model. In this table, the coefficient of determination ($R^2 = 0.021$)

In Table (1), the adjusted coefficient of determination (adjusted $R^2 = 0.009$) also shows that approximately 1% of the variance of the dependent variable "credit risk" is explained by a linear combination of stock prices, which was a very small estimate. Also, the findings calculated in the table above show that the independent stock price variable with a coefficient of .31 is not significant in the model, because the amount Prob. =0.176 Calculated in it is more than 0.05. Therefore, we cannot reject the null hypothesis with 95% confidence and the research hypothesis is rejected. That is, there is no relationship between stock prices and credit risk in banks listed on the stock exchange.

4.3. Test the second hypothesis

H_0 : There is no relationship between the approved profits of the assemblies and the credit risk of the banks. $H_0: B_0 = 0$

H_1 : There is a relationship between the approved profits of the assemblies and the credit risk of the banks. $H_1: B_0 \neq 0$

To test this hypothesis, like all hypotheses, a panel regression model based on random effects and with 95% confidence has been used. Table (2) shows the output results of Ivory software for the regression model

Table 2. The results of regression estimation of the second hypothesis model - LLP dependent variable

Regression model	$LLP = \beta_0 + \beta_1 IFN + \epsilon_0$			
Variable names	coefficients β_1	Standard deviation	Statistics t	Prob.
β_0	$\beta_0 = 0.119$	0.039	3.036	0.003
IFN	$\beta_1 = -0.160$	0.110	-1.451	0.150
Coefficient of determination R ²		0.023		
Adjusted coefficient of determination R ² Adj		0.012		
Durbin Watson test(D-W)		1.991		
Statistics F-Statics		22.106		
Probability		0.150		

The results of Table (2) indicated that for F-test, probability is 0.15 and less than 0.05. Hence this model is meaningless in F-test. Calculation of Durbin-Watson statistic for observed statistical sample is 1.991 that is between 1.5 and 2.5, and verify independence of errors in second model. In this table, coefficient of determination (R = 0.023) indicated that independent variable of comprehensive approved profit almost causes 2% change in banks credit risk. Also adjusted coefficient of determination (R_{adj} = 0.012), indicated that almost 1% of variance of credit risk” dependent variable is comprehensive approved profit that this estimation is negligible. According to results, since the probability is more than 0.05, independent variable of comprehensive approved profit with coefficient -0.16, is meaningless in model. Hence in 95 percent of cases, we can't reject the zero's hypothesis and research hypothesis is rejected. Therefor there isn't relation between the comprehensive approved profit and credit risk in accepted banks in securities exchange.

4.4. Third Hypothesis Test

H_0 : There isn't relation between profit caused by stock value and credit risk of banks.

$H_0 : B_0 = 0$

H_1 : There is relation between profit caused by stock value and credit risk of banks.

$H_1 : B_0 \neq 0$

Table 3. The results of regression estimation of the second hypothesis model - LLP dependent variable

Regression model	$LLP = \beta_0 + \beta_1 IFN + \epsilon_0$			
Variable names	coefficients β_1	Standard deviation	Statistics t	Prob.
β_0	$\beta_0 = 0.119$	0.026	4.122	0.000
IFN	$\beta_1 = -0.160$	0.014	-0.096	0.275
Coefficient of determination R ²		0.014		
Adjusted coefficient of determination R ² Adj		0.003		
Durbin Watson test(D-W)		1.587		
Statistics F-Statics		1.279		
Probability		0.261		

Table (3) show the results of EViews software output for regression model estimation:

- ✓ The calculation of Table 3 indicated that for F-test, probability is 0.261 and less than 0.05. Hence this model is meaningless in F-test.
- ✓ Calculation of Durbin-Watson statistic for observed statistical sample is 1.578 that is between 1.5 and 2.5, and verify independence of errors in second model.

Since the calculate probability (0.974) is more than 0.05, independent variable of comprehensive approved profit with coefficient -0.0001, is meaningless in model. Hence, we can't reject the zero's hypothesis and research hypothesis is rejected. Therefor there isn't relation between the comprehensive approved profit and credit risk in accepted banks in securities exchange.

5. Results

This paper presents a three hypothesis that the hypotheses were tested at 95% confidence level and with an error level of 0.5, then the results of each hypothesis test have been interpreted and some suggestions have been presented along with topic of paper. Generally, in this study, 11 banks of the Tehran securities and stock exchange were selected as the statistical sample for the 8 years from 2007 to 2014.

This study was conducted to investigate the relationship between stock value index variables (including stock value, comprehensive approved profit, and profit caused by stock value) and bank's credit risk. In the results of the statistical description of variables, calculated averages show that the average credit risk of Iranian securities and stock exchange member banks during the research period seems appropriate. In term of assembled data in depended variables, stock value is very low during the years 86 to 93. Also the profits of stock value, comprehensive approved profit, is fluctuated during the research period. The average independent variables are close together, and the standard deviation of independent variables weren't much different from each other. After applying transformation, distribution of credit risk data is normalized as a dependent variable. Also the results of the unit-root test, verified the stationary of all the research variables.

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