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The effect of investment diversification on return and risk of private banks in the implementation on monetary policy

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ABSTRACT

Objective: The present study evaluates the effect of investment diversification on the return on investment and risk as long as the central bank's monetary policy factors will affect how banks investment. **Methodology:** This study has a descriptive-correlation nature that has analyzed financial information of 10 active bank in Tehran stock exchange in the period of 1388 to 1392 using the SPSS version 21. In this study Hirschman-Herfindhl index (HHI) was used to evaluate the investment diversification level of banks in various economic parts. The normality of research data, the kolmogroph – esmirnoph test has been used and the Durbin Watson test was used for investigating the independency among errors. **Results:** The (anova) variance analysis test has been used for investigating the meaningfulness of regression. Results showed that the investment diversification has a negative and inverse effect on investment return and risk. **Conclusion:** Also any of control variable and interfere has no effect on investment return and bank risk.

1. Introduction

Banks undertake a considerable role for growth and development of economical systems; in such way that economical growth, increase of welfare, and improvement of living level in each country depend on the range of investment which are actually collected and saved by millions of people via bank's system; while other millions of people don't have the power and possibility of investment due to different reasons. Today, in the competitive banking space of Iran, we observe the establishment of many banks which have been also accepted in the exchange or etc, and multiple stockholders have spent their money For buying their stocks. the managers of banks, regarding the significance of profitability for stockholders, are always faced with this matter that how they can create a stable and continues income for their bank and also for the stockholders (Ahmadi & Rahimi, 1391). Investment is considered as one of the modern debates in financial management. correct selection of properties, where in the investors invest, need to have information, talent, power of analysis and etc … in order to make the investor be able to reach his purpose which is to obtain the maximum yield in an acceptable level of risk (Shahmirzadi, 1388). the thing, which should be considered by investors such as real or legal persons, is the debate of selecting the optimal investment basket; for this purpose, the best investment basket regarding its rate of risk and yield. usually, it is supposed that the investors don't like risk are elusive against it and they always want to invest in some figures of properties which have the highest yield and lowest risk (Abzari et al., 1384). Investment is a two – dimensional process, risk and yield. an investment project cannot be selected only on the basis of high yield and without regarding to its risk; in other words, function of investment is evaluated through two principles "risk" and "yield", and obtaining the maximum yield, regarding and explicit level of risk, is a suitable standard for investment (Raei, & Saeedi, 1385). one of the ways for decreasing risk is to diversify the investment the banks decrease their investment by investing in multiple and various properties. the banks, as one of the most important financial intermediates, undertake the role of transferring the capital from owners of resources (all groups of society) toward the consumers (Abdashman. 1391). Today. the distress of many managers of investment is the accuracy for estimating risk and also management of risk in order to decrease it to a possible minimum extent. accuracy in estimating risk is such important that making mistake in estimating it causes terrible losses to be made. concept of risk has been always considered by investors. diversification is one of The strategies, which the investors use, in order to be secure against risk. the significance of diversifying the investment is also considered by creating portfolios of investments along with risk and reliable yield. but, we can not rely on them in all special conditions in the modern market due to the complexities (Rostami & Nikniya, 1392).

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1.1 Literature Review

1.1.1 Diversification of Investment

dividing the amounts of investment among different investments with risk, yield and different correlation, in the way that it causes the non-systematic risk to be minimized (Tehrani & Noorbakhsh, 1389).

1.1.2 Purpose of Diversification

The main purpose of diversification is that the net profit is not effected by intensive fluctuation while there is a change or economical shock. in diversification, the important point is that diversification cannot be considered as a mistake with risk – fence because, in the risk fence, the risks are tried to be accepted that they compensate their effect on each other; while, in diversification, the risk are not correlation with each other (Sayas-Mohammadi, 1391).

1.1.3 The Significance of Diversification

This significance investigated from two viewpoints "decreasing the change of profit margin.

1.1.4 Decreasing the Risk

Risk means "the probability of the expectation not to be accomplished". The effect of risk is decreased by diversifying the activities ;in such as way that the cash variance of different activities is decreased regarding the medium limit and decreases the risk.

1.1.5 Decreasing the changes of profits margin

Profit s margin is obtained from dividing net profit on the yield of property; on the other hand, the new theory of financial management expresses that diversification is effective when the yield correlation among properties forming diversification is low. in such this condition, the risk of missing yield, due to the decrease of a properties price, is compensated with a reverse movement of another property. so, despite the decrease of investment risk, the expected level of yield becomes constant (Mardani, 1390).

1.1.6 Calculating Diversification

Theoretical and experimental studies have been done about the indexes "concentration" and "diversification" Which the basis of most of these studies is the index " Hirschman-Herfindhl concentration". the Hirschman-Herfindhl concentration index: this index has been used in decade 80 by the federal commission of America for classifying market. while, today the above index is used for measuring the effect of concentration validities, deposits, and properties on the bank's profitability; so that it is a basis for expressing the grade of diversification. in conditions which there isn't any statistical information and it s details, there is no any possibility for comparing for diversity grade among activities and this index cannot be used (A criticism which is considered for this index). in fact, this index gives value to each bank on the basis of that bank's share in the market (Teimet et al., 2011).

1.1.7 Ratio of holders salary (the structure of bank's capital)

The salary of stockholders defines the interests of shareholders and main owners of the company. The salary of stockholders show the rest of the company s owners, benefits in the properties of the Company which has been obtained after reducing that company s debts (Walter, 1956). this ratio shows the significance and role of shareholders in providing the total of company s properties. although low amount of this ratio shows the subtlety of management in providing its financial resources, but it increases the risk of company from the viewpoint of banks and creditors.

1.1.8 Monetary Policy

Monetary policy is a process by which the monetary authorities of one country control the supply of money with the purpose of adjusting the lending rate in order to have economical growth, relative stability and constancy of prices and decrease the unemployment (Sarwat, 2014). The operation of the monetary policy of the central bank affects financial markets and also it affects changes in financial markets which are caused by monetary policy and other economical policies and the behavior of financial institutes such as banks. so regarding the role of bank's in the economy, the quantitative investigation of monetary policy effects is effective on the operations and behavior of financial institutes; especially bank's (Taghavi, & Lotfi, 1385). monetary policies is a set of actions which central banks use them in order to control the economical activities of the society. monetary policies affects the money supply and interest rate; so that most of economical purpose such as increase of employment, price stability, solving the problem of depression and etc…. are affected in this way. If monetary policies cause money supply to be increased, they will have expansionary condition; on the country, they will have contraction condition. as a whole, monetary policy – makers follow the following purposes from their monetary policy performance:

1- accelerating economical growth
2- creating a complete employment
3- fixing the general level of price
4- creating balance in equalizing external payments

1.1.9 Challenges related to monetary policies

sometimes, monetary policies, which are performed by monetary authorities, doesn't consider the special condition of new – established banks. for instance, sorting out the legal deposit rates for visual deposits and saving in 1383 has imposed a large amount of expense to private banks. before, the deposit rate of the investment deposits Was lower than the deposit loans (current and saving), but through sorting out these two rates and increasing the rate related to investment deposits of resources existed in private banks which intensively. Is provided more than investment deposits, it was pressured .in this field, the minimum is that new rates belong to new deposits or private banks are permitted to distribute bonds equivalent to legal deposits (Vakili &

Faraji, 1385).

1.1.10 Return on Investment (ROI)

In financial affairs, the amount of (ROI) is the ratio of obtained money amount may be related to the net interest, net profit or net income. and, usually, it is expressed through percentage (Jorion, 2000).

1.1.11 Risk

Definition of risk: risk is the difference rate between the real return on investment and expected return on investment (Tehrani & Noorbakhsh, 1389). risk is the probability of happening a financial loss. the properties which have higher probability for being wasted, have the higher risk than properties which have lower probability for being wasted.

But, in more formal definitions, risk is as a synonym for mistrust and expresses the changeability of returns related to a property. so, as a whole, the lower changeability of a property s return, its risk also become lower (Nurush & Diyanati, 1383). the first time, Markowitz defined a numerical index for risk on the basis of the given quantitative definitions. He defined the risk as the multi-session standard deviation of a variable. for instance, the risk of exchange rate during 1371 -1381 is the standard deviation of exchange rate in these years. Other index are also calculated in this way; such as stock returns rate risk, price changes risk and profit rate risk. there is another viewpoint about the definition of risk which only consider the negative aspect of fluctuations. Also, the risk is defined as the probability of income decrease or loss of capital. therefore, two viewpoint can be given for defining risk: the first viewpoint: risk as the every kind of probable fluctuations of economical return in the future. the second viewpoint: risk as the negative probable fluctuations of economical return in the Future (Raei, & Saeedi, 1385). lack of accurate information about future happening locates as in the mistrust conditions which its measurement is not accurate or is not so important. on the country, risk has such this condition about future happenings due to the lack of accurate information; while it is related to the numerical index. so, if the mistrust conditions can be related to the numerical index, which is the probability of that event s occurrence, we will face a special amount of risk (Raei, & Saeedi, 1385). before defining the measurement method of risk by markowitz in 1952, no sensible method was existed for financial risk. therefore, markowitz findings can be considered as the foundation of modern financial debates and a beginning for measuring financial risk (Ahmadi & Rahimi, 1391).

1.1.12 Decreasing risk through diversification

For decreasing the risk of a portfolios, the best work to do is that the parts of portfolios are selected in the way that they have reverse or low direct correlation with each other. as a whole, the lower correlation between Returns to two properties, there is this potential probability that those properties the risk of portfolios. there is a combination for each pair of property which its risk is lower than each one of the properties (separately). this matter that how much risk is decreased in this portfolios combination depends on the correlation grade of returns of existed properties in that portfolios. so many potential combinations can be formed from different properties, but only one of them minimizes the risk. if the correlation" the lack of correlation "and" revers and complete correlation", the ability for decreasing portfolios risk is increased (Nurush & Diyanati, 1383).

1.1.13 Iftekhar (2001)

In fact, he is the first researcher in investigating the industrial diversification work, finance (property) diversification, and geographical diversification. he believes that there is an inefficient relation between risk and return for all banks in diversification; that is, the result of this diversification is to decrease return and to increase credit risk and inefficiency is effective on the Function of banks. even, in diversifying the properties of banks with high risk level, there is again a relation of inefficiency between risk and return. according to him, diversifying the geography country to the two previous diversifications, shows the efficiency increase of the return – risk relation for banks which are subject to risk. in the banks under study, diversification is along with the increase of return and decrease of credit risk and this increase of return and decrease of risk is reflected in the function. table no 2-3 shows the relation between the effect of industrial diversification, finance diversification and geographical diversification of risk and return in banks with modified risk and high risk.

Table 1. The effect of diversification on risk and return

	Diversified section	Adjustment risk	Banks risk
1	Industry	Risk ↓ return ↑	Risk ↓ return ↑
2	Section	Risk ↑ return ↑	Risk ↓ return ↑
3	geography	Risk ↓ return ↑	Risk ↓ return ↓

Leptit et al., (2008) showed, through investigating the income structure of bank and factors of risk, that banks with small scale are subject to bigger risks.

Bael et al., (2007), in his study under the title "investigating the role of stock market in diversifying the property of bank "showed that most of banks can decrease the unsystematic risks via diversification.

Stiroh (2006), in a study Under title: investigating diversification in helding institutes", showed that non – interest are along with many fluctuations and they increase the banks risk.

Iftekhar (2001), through investigating the effect of concentration and diversification on risk and return, showed that risk is decreased by diversifying facilities in banks.

2. Materials and methods

2.1 Research method

In this study, the research method is operational on the basis of purpose. the quiddity and present research method is classified in descriptive researches and, regarding the relation between variables, it is based on purpose of the research, approach of the research and correlation. the present is sectional and retrospective due to this matter that it has been done in a determined interval.

2.2 Society and statistical sample

2.2.1 Statistical society

The statistical society of the study includes 10 banks which are active in stock exchange: Iran post bank, Iran saderat bank, parsian bank, novin eghtesad bank, kar afarin bank, ansar bank, tejarat, mellat bank and pasargad bank.

2.2.2 Statistical sample

10 banks which have had considered criterions Were selected as a statistical sample. in the following, the considered criterions have been brought for selecting banks:

1. Banks under study should be established before 1388.
2. All of the necessary information should be available in the time – interval "5years" (1388-1392).

2.3 The data collection method

2.3.1 Library studies

To develop principles, definitions and theoretical concepts, the library resources, researching and scientific sites, library and informational resources of universities in Iran and all over the world, has been used. other resources used in collecting information have been from libraries of central bank, national bank, monetary and financial institute and the banking training supreme institute of Iran.

2.3.2 Methodology

Previous research works applied several commonly-used traditional diversification measures including Hirschman-Herfindhl (HHI) and the Shannon Entropy (SE). Some of the papers also use distance-based diversification measures to compare the differences between credit portfolio composition and a benchmark. In most of the cases, the industry composition of the economy's market portfolio is a benchmark for diversification. Distance-based diversification measures therefore take the differences in sizes of each sector into consideration. We choose Herfindhl-Hirschman Index as the basic measure of diversification, and also construct a new one based on it.

Hirschman-Herfindhl Index (HHI) is a commonly used accepted measure of market concentration. It assumes perfect diversification as equal exposure to every sector.

Before we calculate the diversification measure, for each bank, relative exposure x_{it} of each sector i at time t is defined as its nominal exposure ex_{it} divided by the total exposure $\sum_{k=1}^{N} ex_{kt}$:

$$x_{it} = \frac{ex_{it}}{\sum_{k=1}^{N} ex_{kt}} \qquad (1)$$

HHI is the sum of the squares of the relative exposures. And thus for each individual bank, it is defined as:

$$HHI_t = \sum_{i=1}^{N} x_{it}^2 \qquad (2)$$

where N is the total number of sectors the banks provide their lending to.

2.4 Risk-adjusted HHI

Traditional HHI equals relative exposure of every sector; however, sector itself has different systematic risk as the whole economy moves up and down. Lessons learned from banking crises of the 1980s and early 1990s taught us that banks should not exposure too much to only few sectors. Subprime crisis was partly due to too much exposure to real estate industry which has especially high correlations with macro economy.

To adjust systematic risk of each sector, we extend our diversification measurement based on HHI by introducing sector betas as weights of relative exposures. We construct new diversification risk-adjusted HHI for each bank at time t as follows:

$$\text{risk-adjusted } HHI_t = \sum_{i=1}^{N} \beta_{it} x_{it}^2 \quad (3)$$

In Eq (3), β_{it} reflects systematic risk of each sector i at time t, defined as the covariance between market return and sector return cov(R_{mt}, R_{it}) divided by the variance of market return $\sigma^2_{R_{Mt}}$:

$$\beta_{it} = \frac{\text{cov}(R_{Mt}, R_{it})}{\sigma^2_{R_{Mt}}} \quad (4)$$

2.5 Other Control Variables

Monetary policy (interferer): Limiting investment banks to asset ratio of banks.
Equity ratio: equity divided by the total assets, reflecting the capital structure of the bank.

3. Discussion and results

3.1 Model

Index = β_0 + β_1 (Investment diversification) + β_2 (Equity ratio)+ β_3 (interferer)

3.2 Determining the validity of research tools

In the present research, the tools for collecting data were documents and evidences. sometimes, the researcher should use documents and existed evidences related to the subject under study for collecting information. if the documents are validity is hidden in it. the information which were used in this study has been extracted from balance sheets, cost and benefit files investment notes of Statistical society banks on the basis of central bank information of Islamic republic of Iran, and it narrates this matter. Chen et al., (2013) has investigated the effect of diversifying facilities by using Hirschman-Herfindhl index and it has been recognized that this index has the ability for measuring diversification. Also, Didar et al., (1393) have used this index for investigating the effect of diversifying marketing on the function of companies and the validity of this index has been confirmed by measuring diversification. Hayden et al., (2007) has used this index for investigating the effect of diversification on the function improvement of bank and they have confirmed the validity of this index.

3.3 The analysis method of data

In this study, regarding the types and purposes of study for reaching the considered result and analyzing data, the pass software; copy 21 has been used. regarding the data obtained and purpose of study for measuring the simultaneous relation of three independent variables with dependent variable, the multi-fold regression model has been used in order to be able to investigate the effect range of each one of the three variables for investigating. The normality of research data, the kolmogroph – esmirnoph test has been used and the Durbin Watson test was used for investigating the independency among errors. the (anova) variance analysis test has been used for investigating the meaningfulness of regression.

3.4 Investigating the normality of variables

Investigating the normality of variables: firstly, we should investigate the normality situation of variables in order to analyze data and select the kind of related tests. because, if the variables are normal, we can use parametric and non – parametric tests. if the meaningful level of this test is more than 0/05, the hypothesis "zero" is accepted based on the normality of data. so, the statistical hypothesis, in the following, is investigate:
hypothesis zero: distribution of data has a meaningful difference with normal distribution.
country hypothesis: distribution of data doesn't have a meaningful difference with normal distribution.

Table 2. Normality test data variables

variables	kolmogroph – esmirnoph	Sig	status
ROI	0/712	0/691	normal
Risk	0/772	0/590	normal
Investment diversification	0/772	0/590	normal
Equity ratio	1/404	0/059	normal
interferer	1/796	0/073	normal

Regarding the above table, the amounts of kolmogroph – esmirnoph test and sig amount have been brought for existed variables and hypothesis under study; So that it has been observed that sig amount of the variables under study is more than 0/05 and the "zero" hypothesis is not rejected; consequently, the data of variables under study are normal.

3.5 Hypothesis 1

The diversification variables of investment, equity ratios and the interferer have a meaningful effect on the return of investment.

3.5.1 The predicted regression model

ROI= β_0 + β_1 (Investment diversification) + β_2 (Equity ratio) + β_3 (interferer)

3.5.2 The meaningfulness test of the regression coefficients

Table 3. Standard and non – standard coefficients for independent variables in the regression model

Model	Non Standardized coefficients		Standardized coefficients	T amount	Meaningful
	estimated coefficient	Standard error	coefficient		
Constant amount	0/282	0/059	-	4/770	0/000
Investment Diversification	-0/352	0/154	-0/312	-2/114	0/041
Equity ratio	0/313	0/354	0/129	0/887	0/381
interferer	-0/615	0/598	-0/152	-1/028	0/310

The above table shows the amounts of regression coefficients of effective variables on the dependent variable that it is explicit regarding to t- statistics and meaningfulness level of this test. the variables, which their meaningfulness level is lower than 0/05, are located in the regression model (diversification of investment).

The regression model shows that the return of investment is 0/282 in a multi-fold regression model without being affected by independent variables. also, the alteration of a standard deviation of the investment diversification causes the alteration 0/352 standard deviation in the investment return variable. in the continuation, the investment diversification variable with standard deviation (-0/352) has a reverse and negative effect on the investment return variable.

Regarding the above table, the standard regression model can be written as the following investment return:

ROI= 0/282- 0/352 (Investment diversification)

3.6 Hypothesis 2

The diversification variables of investment, equity ratios and the interferer have a meaningful effect on the risk.

3.6.1 The predicted regression model

Risk= β_0 + β_1 (Investment diversification) + β_2 (Equity ratio) + β_3 (interferer)

3.6.2 The meaningfulness test of the regression coefficients

Table 4. Standard and non – standard coefficients for independent variables in the regression model

Model	Non Standardized coefficients		Standardized coefficients	T amount	Meaningful
	estimated coefficient	Standard error	coefficient		
Constant amount	0/345	0/058	-	5/4587	0/000
Investment Diversification	-0/327	0/135	-0/309	-1/467	0/030
Equity ratio	0/456	0/579	0/098	0/609	0/568
interferer	-0/587	0/234	-0/234	-1/690	0/109

The above table shows the amounts of regression coefficients of effective variables on the dependent variable that it is explicit regarding to t- statistics and meaningfulness level of this test. the variables, which their meaningfulness level is lower than %5, are located in the regression model (diversification of investment).

The regression model shows that the return of investment is 0/345 in a multi-fold regression model without being affected by independent variables. also, the alteration of a standard deviation of the investment diversification causes the alteration 0/327 standard deviation in the investment return variable. in the continuation, the investment diversification variable with standard deviation (-0/309) has a reverse and negative effect on the risk variable.

Regarding the above table, the standard regression model can be written as the following investment return:

Risk= 0/345- 0/327 (Investment diversification)

4. Conclusion

Multiple regression model of investment is without the effect of other independent 0/282 variables. The variation of standard deviation of diversification of investment causes 0/352 variation of the efficiency of investment. In the following, diversification variable of investment had negative and inverse effect (-0/352) on the investment efficiency variable.

The result of such model indicate that none of the control variables and interfering variable had no effect on the investment efficiency. The only variable which changes the investment efficiency is the diversification of investment which affect the efficiency in an inverse manner.

The regression model shows that in a regression multiple model the risk is 0/345 without the effect of independent variables. Variation of one standard deviation of diversification of investment changes the standard deviation of risk variable by 0/327. In the following, the variable of diversification of investment had negative and inverse effect effect on the risk variable (-0/309).

The diversification of bank investment reduces the risk with negative effect. Thus, the banks should develop diversification strategies to reduce the risk.

Diversification of investment has an inverse and negative effect on the investment efficiency index. The control and interfering variables couldn't change such effect. Success in maximizing the banks investment efficiency is under different causes in which the banks can improve the investment efficiency and profit by taking a proper guideline.

Risk reduction is one another effective causes of the success of banks. The findings suggest that the effect of diversification of investment is negative and negative. Thus, they are reduced by increasing the diversification of risk. Control and interfering variable have no effect on such relationship.

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