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The effect of micro economic factors on cash flows of listed companies in Tehran stock market

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Abstract

The main purpose of this research is to investigate the effect of the micro economic factors on cash flows of listed companies in Tehran stock market. In this research power of the market , adequacy of capital, provision of loan losses and credits of the mature and the age of banks, size of the bank were independent variables and their effect on cash flow of the banks was examined. Statistical population includes all the accepted companies in the Tehran stock market between 2009 to 2015. The final sample is 113 banks (78 bank-years). Current research is correlational in term of method and nature. This research is also posted facto and semi0 experimental. This research is inductive in terms of methodology and this means librarian methodology, web sites, articles in the inductive framework and data collection was used in the review of related literature in order to confirm or reject the hypothesis in the induction framework. In this research panel data with fixed effects were used, data analysis using multi-variant regression with the confidence of 95% showed that power of market and adequacy of capital have a positive straight effect on the cash flow of banks. Result also indicates the provision of loan losses and credit of the previous maturity has a reverse (negative) effect on the cash flow o banks.

Key words: Power of bank market, microeconomics variables, cash flow of banks.

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Introduction:

Financial institutes and banks when having an accurate planning in attracting deposits can be successful in their plans. On the other hand, an accurate planning requires correct information about the situation of banks and the factors can impact on the increasing financial performance and the accurate model of the behavior of the system. Typically, for performing appropriate policy, banks must use methods and models for forecasting and identifying effective factors of banks financial performance [1].

One of the main features of the competitive situation of banks is changing and arising new challenges the social economic systems. Institutes which optimally use facilities and operate new resources for producing goods, providing the best service and quality have a suitable situation. The competitive situations can guarantee the durability of the institutes. Providing a competitive situation for institutes is a long-term trend and needs a long-term planning on the activities of the organizations [2]. On the other hand, deposit and making a fund are the keywords of the process of economic development of each country, and the process of making a foundation and capital in each country needs the participation of the majority of peoples [3]. The participation of people in the economics for increasing the deposits must be done by bank deposits, take stock, bonds, insurance, retirement plans and participating in investments projects. The current deposit resources in banks are one of the valuable and best of resources. According to the importance of the deposits and saving in the economics of the country and the undeniable role of banks in the attracting fund, the bank activities are one of the major and main organization of the economics [4]. Banks can improve their success when having an accurate planning in the attracting funds, and it depends on the having appropriate information about the situation of banking. In fact, banks need accurate methods and models for forecasting the effective factors on the credit rating of commercial banks [1]. In the recent years, the banking in Iran faced with several problems, which increase the bankruptcy possibility, and this shows inefficiency of the banks. Moreover, it causes corruption and economic depression, and then, banks reduce their risks, therefore it causes more downturns in the economics of the country.

In the recent years, banks allocate huge financial resources, yet, the majority of banks faced with financial losses and bankruptcy, which this problem is caused by risks, variations in interest rates, and inflation. These problems make supervisory and executive organizations to emphasize more on the risk management of the banks. On the other hand, money supply management is one of the main challenges of the banking, because the main financial resources of the banks are short-term investment deposit. In addition, the majority resources of banks are non-cash assets which cannot use as a cash money [5]. Consequently, evaluating the impact of economic variables on the money supply in banks is really important.

Increasing money resources in banks show lack of investigating causes of delay and information of effective factors on the economics of the country. In Iran, due to the competitive atmosphere of the banks, the profit margin of banks is always reducing, then losses of non-repayment loans make several problems in banks. Therefore, increasing non-repayment loans represents a weak bank managements in the country. In these situations, banks pay a deposit of people, who cannot activity in the investments, to persons and organizations which wants these resources. But, lack of refund these deposits can reduce financial resources of banks. Then, it can reduce the financial resources in the main parts of the economics of the country [6].

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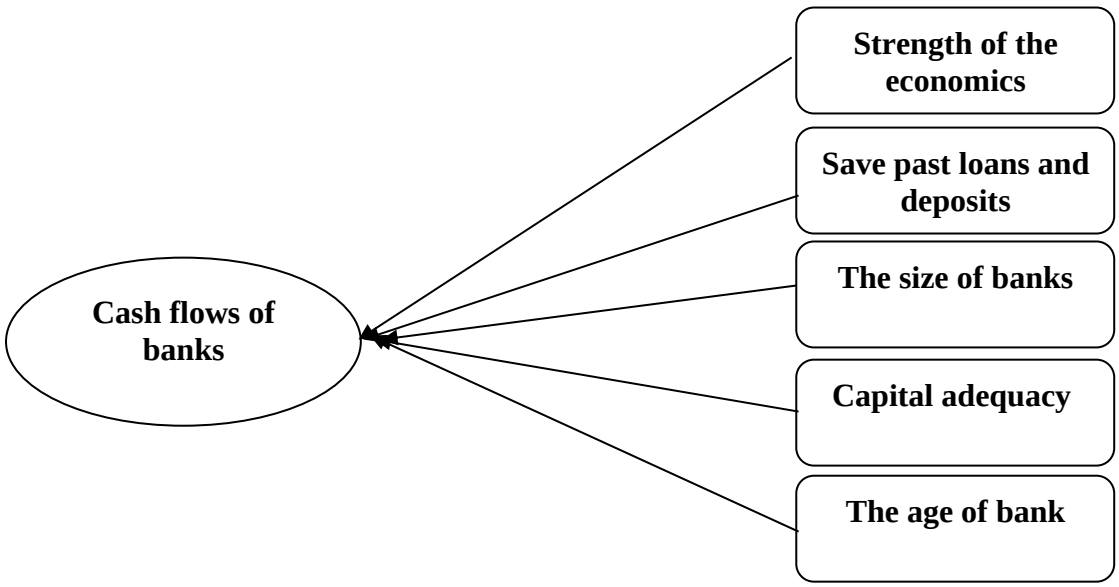
Consequently, the money supply problem is of the main concerns of the banking, and money supply management can increase investment opportunities, and refunding loans can increase efficiency and make it easier to face with the critical situations. The money supply management requires to optimize the balanced funds in banks according to the daily transactions, in addition, banks cannot reduce money supply to zero, but they can control it, and inject money supply to people for earning revenue. Hence, managing the gap of money supply must be done by estimating and forecasting cash flows of banks [7]. One of the main parameters which can impact on the money supply is micro and macroeconomics variables.

This paper examined the power of the market, adequacy of capital, provision of loan losses and credits of the mature and the age of banks, size of the bank were independent variables and their effect on cash flow of the banks. Statistical population includes all the accepted companies in the Tehran stock market between 2009 to 2015. The final sample is 113 banks (78 bank-years). Current research is correlational in term of method and nature. This research is also posted facto and semi0 experimental. This research is inductive in terms of methodology and this means librarian methodology, web sites, articles in the inductive framework and data collection was used in the review of related literature in order to confirm or reject the hypothesis in the induction framework. In this research panel data with fixed effects were used, data analysis using multi-variant regression with the confidence of 95% showed that power of market and adequacy of capital have a positive straight effect on the cash flow of banks. Result also indicates the provision of loan losses and credit of the previous maturity has a reverse (negative) effect on the cash flow of banks[15,16].

1. Model of research:

For beginning the research and evaluate on the banking and economics, a conventional model is essential. The conventional model for investigating the effect of variables of microeconomics on the cash flows of banks, the conventional model are as follows:



:According to this model, the regression model is as follows

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$$CF_{it} = \alpha + \beta_1 \text{Market Power}_{it} + \beta_2 LLP_{it} + \beta_3 Size_{it} + \beta_4 CAR_{it} + \beta_5 Age_{it} + \varepsilon_{it}$$

: Where CF is cash flows of banking, and market power is calculated by HHI)2014(

$$HHI = \sum_{i=1}^{n} (\frac{P_i}{P} * 100)^2$$

Where HHI is market power in the period of t, P_i is the sum of long and short-term deposits of the bank, P is the sum of all long and short-term deposits of Iranian banks. LLP is the percentage of losses on loans and credit, Size is the size of the bank which can calculate by natural logarithm, and CAR is capital adequacy ratio. CAR is the ratio of base capital to risk-adjusted assets, CAR can be calculated by the balance sheet, which uses the property list. The base capital is calculated by the base and additional capital, and the ratio of it to the sum of property, CAR is calculated. This ratio shows health and stability performance of banks. Banks must have enough funds for covering the risk of economic activities, thus, banks reserve 8 percent of their properties, this value evaluated by the central bank of the country and all banks must perform it. Age is the differences between establishing year and the current year of banks. ε_{it} is the random error of banks in the year of t.

Methodology:

This paper presents the impact of micro economics variables on the money supply of banks, and because the relation between studies is a correlation, the multiple regression is used to evaluate the effectiveness of independent variables on the dependent variables. The steps of this study are as follows:

1. Firstly, sample organizations are selected, and the models are made by information about them.
2. Then, the essential criteria for evaluating of them are evaluated.
3. The model parameters are estimated by regression.
4. The results of the regression will be compared with the expected results, and then the status of the hypothesis will identify.
5. Finally, the reasons for this error are evaluated.

In the correlation studies, the relation between variables is evaluated according to the goal and reasons of study. In these studies, if the aim was forecasting dependent variables according to the independent variables, the dependent and independent variables are base and forecast variables. Hence, the aims are divided into three different sections :[8]

1. Two-variable correlation: the aim is evaluating the relation and coordination between variables. In most of researches, the two-variable correlation uses the distance scale with the presumption of normal distribution and Pearson correlation coefficient calculation.
2. Regression: In the regression, the aim is forecasting one or multiple base variables by forecast variables, and for evaluating one base variable, simple regression can be used, and for ,evaluating multiple base variables, multiple regression can be used. On the other hand .multivariate regression is used for evaluating simultaneous several base model
3. Covariance: In the majority of studies, the aim is evaluating a set of two-variable correlation .in the covariance tables, which can be performed by statistics software

Resources for data:

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In situations, which aim is evaluating of the relation between a dependent variable with independent variables, the historical data are used to estimate parameters for models, and also, data in the models :can be divided into three different models

1. Time Series Data: The values of a variable inc.onsecutive time points are measured
2. Cross Section Data: The values of a variable inc onsecutive time points and several .measurement units are measured
3. .Pooling Data: The data are obtained by mixing time series and cross-section data

:Statistical hypothesis testing

1. Multiple regression

The multiple regression can be used for mixing and evaluating forecast variables. In this method, a multiple regression can summarize the values of all variable in a single formula. The weighting factors can be determined according to the importance of each variable . The multiple regression is as follow]9[:

$$Y_i = \alpha + \beta_1 X_{1,i} + \beta_2 X_{2,i} + \ldots + \beta_n X_{n,i} + \varepsilon_{n,i}$$

,Where Y_i is ith observation of dependent variableα is a constant value, $X_{n,I}$ is ith observation for independent variable, β is Independent variable coefficient, ε is a Disruptive component. In this model, the assumptions are as follows:

1. The relation between independent variables is nonlinear
2. The expected value of errors is zero and variance of them is constant
3. The distribution of errors is normal
4. There is no correlation between errors of the model
5. Dependent variables have a normal distribution

Corrected Coefficient of Determination:

The coefficient of Determination is one of the main criteria which can determine the relation between independent and dependent variables. The value of this coefficient shows the percentages of explanatory of dependent variables by independent variables. The value of R^2 can be determined by:

$$R^2 = 1 - \frac{\sum (y_i - \hat{y}_i)^2}{\sum (y_i - \bar{y}_i)^2} = 1 - \frac{SSE}{SST}$$

Where, SSE is the variations of errors which cannot be determined by regression, and SST is all .variations in the value of dependent variable

Forcorrecting the deviation of the Coefficient of Determination, a corrected Coefficient of Determination can be used. This coefficient is Coefficient of Determination, but SSE and SST [10] have more freedom. This correction coefficient can be calculated as follows:

$$\bar{R}^2 = 1 - \left(\frac{\sum (y_i - \hat{y}_i)^2}{n-k} \Big/ \frac{\sum (y_i - \bar{y}_i)^2}{n-1} \right) = 1 - \frac{n-1}{n-k} \cdot \frac{SSE}{SST}$$

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By increasing the number of dependent variables, the value of Coefficient of Determination will increase, and it shows the unusable role of the regression function. The Coefficient of Determination can reduce this increasing.

The assumptions of linear regression:

The linear regression only can be used if:

1. The regression must be Autocorrelation or correlation between errors. In the regression, all errors are assumed as a random variable, or in other words:

$E\ (u_i u_j)_{i\neq j}=0$

$E\ (u_i, u_{i+h})_{h\neq 0}=0$

The covariance of the errors must be zero.

2. The fitted regression equation must be significant.
3. The errors in the equation have a normal distribution with an average of zero.
4. Lack of correlation between dependent variables of the regression model.

Testing independence of errors:

For evaluating of independency of errors, the Durbin-Watson test can be used. Typically, the Durbin-Watson test evaluates the correlation of regression errors and this change between 0 to 4. Lack of correlation between consecutive balances changes this value to 2. The value of zero shows positive correlation and 4 shows the negative correlation. Therefore, the acceptable value of Durbin-Watson test is between 1.5 to 2.5.

Testing befits of model:

For testing befits of estimated model, the model of variation cannot be assumed as significance testing model. Hence, if the error level of α becomes more than the table value, the variations of the testing model are suitable, or there is a significance relation between variables.

Multicollinearity testing:

The multicollinearity shows that an independent variable is a linear function of other independent variables. The large value of a multicollinearity in a regression equation shows a high correlation between independent variables and can reduce the validity of the model.

Tolerance and Variance Inflation Factor:

The low value of tolerance shows the low information about variables, and Variance Inflation Factor is the reverse of the tolerance. Also, increasing the Variance Inflation Factor can increase the variance of regression coefficients and make forecasting unsuitable. Hence, the Variance Inflation Factor for jth regression coefficients is:

$$VIF_j = (1-Rj^2)^{-1}$$

Where R_j^2 is multipleCoefficient of Determination. The X_i^2 has a linear relation with other regression variables, where R_j^2 become close to 1 and VIF_j will increase. If the tolerance and Variance Inflation becomes more than 5, a probable error exists, and if they become more than 10, there is a serious error. Tolerance represents the percentage of variance of a forecast variable, which cannot be determined by other forecast variables. Therefore, when tolerance reduces, correlation and standard deviation of regression will increase. Thus, the best tolerance value for variables of the model is between 0.1 and 0.2.

Significance testing of coefficients:

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For significance testing of coefficients, each estimated variables of regression are assumed as zero, and in other words, the independent variables cannot impact on the dependent variables. Which can be shown as:

$H_0: \beta = 0$

:On the other hand, independent variables can impact on the variations of dependent variables if

$H_1: \beta_i \neq 0$

For testing this assumption, the t student test can be used at the significance level of 5%. If the value of t, which obtained by tests, become more than of t, which obtained by the table, the H_0 assumption .will fail

1. Studying the Structure of Pooling Data and its Various Models

In this research, based on the type of data and methods of statistical analysis, pooling and cross section data are used to estimate the pattern parameters and survey the hypotheses test. The pooling data method, also known as "time series-cross section data" method, is carried out in various forms and has various models that one of them is used according to the research conditions.

2. Diagnostic Tests in Pooling Data

To determine the model used in the pooling data, several tests are used as follows:

Chaw Test

The Chaw test is used to determine the application of the constant effects model against the integration of the entire data [11](integrated model).

Hausman Test

Hausman test is used to determine the use of a constant effect model against the random effect. Hausman test is formed based on the existence or non-existence of correlation between estimated regression errors and independent variables of the model [12]. If there is such a relationship, the constant effect model, and if this relationship is not present, the random effect model will be used.

Evaluation Results:

In this chapter, the data needed to test the research hypotheses are collected and used as a source for analysis. For analyzing the collected data, descriptive statistics, inferential statistics and drawing tables have been used. Descriptive statistics have been used to summarize the collected information and to know more about the statistical population, because the purpose of the descriptive statistics is to describe, extract basic points and combine information with the help of numeric language. The aim of inferential statistics is generally to infer about the parameters of population by analyzing the information in the sample data and also measuring the uncertainty that exists in these inferences.

In this regard, in the initial implementation of the first model, using the Chaw and Hausman statistics, a suitable type of regression fitting (compilation data or panel with constant and random effects) is determined and used by statistics such Im, Pesaran, Shin and Levin, Lin, the reliability of variables has been investigated. Then, in the secondary implementation of the model, the classic regression assumptions including the normal distribution of variables, the independence of the distribution of errors, the normal distribution of errors, the heterogeneity of variances and the independence of independent variables have been examined. Finally, in the final implementation of the model, the final model extracted with regard to the significance of the whole model, as well as the significance of each coefficient.

1. Descriptive Statistics of Variables

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In Table (1), descriptive statistics show the variables of the research during the study period. The descriptive statistics of the research variables that were measured using the banks data during the test period (years 2010-2015), including the average, the median, the standard deviation, the minimum and maximum were presented.

Description of variables

Maximum	Minimum	Standard	Median	Average	Description of variables	
0.1498	0.0232	0.0371	0.0842	0.0879	Bank cash flow	CF
0.6509	0.1264	0.1548	0.3645	0.3763	Power of market	Market Power
0.0923	0.0117	0.0234	0.0555	0.0559	Losses of past loans	LLP
28.9198	16.0010	4.9259	18.0370	20.9039	Size of bank	Size
0.1124	0.0717	0.0130	0.0956	0.0931	Capital adequacy	CAR
64.0000	3.0000	15.6538	12.0000	18.1923	Age of bank	Age

3. Reliability Test of Variables

In this section, the stability or reliability of research variables were examined. In order to verify the reliability, the test of [13-14] was used. The results of this test are shown in Tables 2. According to the results of the SPI test (Table 2), since the value of P for all variables is less than 0.05, therefore, these research variables were in stable level during the research period. As a result, SPI test results show that the average and variance of variables over time and covariance of variables between different years have been constant. As a result, the use of these variables in the model does not result in false regression.

IPS test

p-value	W-stat	Variable	
□□□□□□ □	□□□□□□□	Bank cash flow	CF
□□□□□□	-□□□□□□□	Power of market	Market Power

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□□□□□□□	-□□□□□□□	Losses of past loans	LLP
□□□□□□□	-□□□□□□□	Size of bank	Size
□□□□□	-□□□□□□□	Capital adequacy	CAR
□□□□□□□	-□□□□□□□	Age of bank	Age

4. Determining the Appropriate Model for Estimating the Regression Model

In cases where the relationship between a dependent variable with one or more independent variables is considered and the objective of the researcher is to estimate the parameter (parameters) for the independent variable based on this relationship and using historical data, and to predict by presenting the model, the existed data and variables in a model can usually be in three different types:

1. Time Series Data: measures the values of a variable (multiple variables) at consecutive points in time. This sequence can be annual, seasonally, monthly, weekly or even continuous.
2. Cross Section Data: measures the values of a variable (multiple variables) over time and on multiple units, these units can be manufacturing units, industries, or different banks.
3. Pooling Data: in fact, represents cross section data over time, or in other words, these data are the result of combining of two series of time series and cross section data.

Given the available literature and also the nature of research hypotheses in this study, pooling data has been used. In order to determine the appropriate model (compilation or panel with constant or random effects), Chaw and Hausman tests have been used to test the hypotheses.

A) Chaw Test

The results of the test *F* for the regression model of the present study are shown in Table 4. In the case of each model, according to the results of the Chaw test, if the level of significance of the Chaw statistic is less than 5%, the assumption of H_0 (compilation model) is not confirmed in the 95% significant level. In other words, there are individual or group effects and panel data method should be used to determine the regression model of the research, that subsequently, the Hausman test is used to determine the type of panel model (with random effects or constant effects). However, if the significance level of the Chaw statistic is more than 5%, the assumption of H_0 (compilation model) is confirmed in the 95% significant level. In other words, there is no individual or group effects and the compilation data method should be used to estimate the regression model of the research, so the Hausman test is not required.

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Chao test

Results		probabiltiy	F	Regression model
Panel model	Fail of zero assumption	0/0053	25/667	

B) Hausman Test

After determining that the y-intercept is not the same for different years, the used method to estimate the model (constant or random effects) should be determined and for this purpose, the Hausman test is used. Hausman test examines the H_0 assumption based on the compatibility of estimations of random effects against the H_1 assumption based on the incompatibility of estimations of random effects. If the significance level of the Hausman statistic is less than 1%, the assumption of H_0 (compilation model) is not confirmed in the 99% significant level. However, if the significance level of the Hausman statistic is more than 5%, the assumption of H_0 (compilation model) is confirmed in the 99% significant level.

Hausman test

Results		probabilti	F	Regression model
Panel with constant effects	Fail of zero assumption	0/0152	9/446	

5. Classic Regression Assumptions Test

As mentioned in Chapter 3, before regression models are fitted, the linear regression hypothesis is examined.

1. Testing the Normal Distribution of the Dependent Variable

The Kolmogorov-Smirnov test was used to examine the normal distribution of the dependent variable. The output table of the S-K test in SPSS software for this variable is described in Table 5. According to the above table and the Z-Kolmogorov-Smirnov statistic, since the significance level for the dependent variable is greater than 0.05, the H_0 assumption is confirmed, so with 95% significant level, it can be said that the dependent variable in the above model has a normal distribution.

K-S test

results	Signifinace level	K-SZ	Variable	
Normal distribution	□□1822	1□3321	Cash flow	CF

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2. Testing the Independence of Errors

The Watson Camera test examines the serial correlation between the remaining regression errors based on the below statistical zero assumption:

H_0: There is no autocorrelation between errors.

H_1: There is autocorrelation between errors.

The Watson camera statistic with critical values at a 5% error level, are described in Table 6. Given that the value of the Watson camera statistic has been calculated, the regression models of the present study are greater than the critical value at the error level of 0.05, therefore the no correlation of consecutive or serial residuals in regression models at a significant level of 0.05 is confirmed.

Durbin-*Watson test*

Durbin-Watson	Critical value		Regression model
	Dl	Du	
□□942	□□499	□□822	

3. Heteroscedasticity

One of the important issues we address in econometrics is the issue of heteroscedasticity. The heteroscedasticity means that the values of errors have unequal variances in estimating the regression model. White test was used to evaluate the heteroscedasticity in this research. The results of this test are presented in Table 7.

The results of the White test are presented in Table (7). The results indicate that the statistics of model F are not significant at the error level of 0.05. Therefore, the zero-assumption based on the existence of heteroscedasticity among the model data is rejected at the 0.05 error level. For this reason, we can use the regression model OLS.

Heteroscedasticity test

results	P-value	White test	Regression model
Lack of heterogeneity	□□□□□	□□□□□	

4. Testing of Multicollinearity of Dependent Variables

According to Table 8, the value of tolerance and the variance factor for all independent variables is greater than 0.2, and the variance inflation factor is also very close to 1 (less than 5), thus the hypothesis of the absence of multicollinearity between dependent variables is confirmed.

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After studying the classical assumptions, the results of fitting of the regression models of the research, and consequently the research hypotheses, are examined in the next section.

Multicolinearity test

variance inflation	tolerance	Variable	
2/893	0/3456	Power of market	Market Power
□□□□□	□□□□□	Losses of past loans	LLP
3/243	0/3083	Size of bank	Size
1/974	0/5065	Capital adequacy	CAR
2/656	0/3765	Age of bank	Age

6. Results of Fitting of the Regression Model

$$CF_{it} = \alpha + \beta_1 \text{Market Power}_{it} + \beta_2 LLP_{it} + \beta_3 Size_{it} + \beta_4 CAR_{it} + \beta_5 Age_{it} + \varepsilon_{it}$$

After testing the assumptions of regression and ensuring their governing, the results of fitting of the regression equation is presented in Table 9. The value of F statistic (10/711) also indicates the significance of the whole regression model. As indicated in the bottom of Table 8, the coefficient of determination and the modified coefficient of determination of the above model are 43.8% and 40.7% respectively. Therefore, it can be concluded that in the regression equation, only about 40.7 percent of the cash flow alterations of studied banks are explained by independent variables and above control. In this tables, the positive (negative) numbers in the column of the amount of the coefficient, indicate the direct (reverse) effect of each variable on the cash flows of the banks. In this tables, the positive (negative) numbers in the column of the amount of the coefficient, indicate the direct (reverse) effect of each variable on the cash flows of the studied banks.

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Regression results

$CF_{it} = \alpha + \beta_1 Market\ Power_{it} + \beta_2 LLP_{it} + \beta_3 Size_{it} + \beta_4 CAR_{it} + \beta_5 Age_{it} + \varepsilon_{it}$					
Significance level	t	value	Coeffiecnt	Variable	
0/002	2/909	1/709	B0	Constant value	
0/043	2/302	0/567	β 1	Power of market	Market Power
0/019	-2/823	-0/452	β 2	Losses of past loans	LLP
0/277	1/297	0/311	β 3	Size of bank	Size
0/034	2/654	0/909	β 4	Capital adequacy	CAR
0/048	2/121	0/991	β 5	Age of bank	Age
13/675	F		0/438	Coefficient of Determination	
0/0015	P-Value		0/407	Corrected Coefficient of Determination	
1/942	Durbin-*Watson*				

Conclusion

One of the hallmarks of today's competitive world is the profound and rapid changes in technical science and the successive challenges of economic systems in the international competition. Companies in the field of competition will be in a position to be customer-centered, clean and flexible companies, using the best available facilities and proper utilization of new resources to produce goods and provide the right and most desirable services. Obtaining competitive advantage is not achieved by chance, but it requires long-term planning on various aspects of the organization's activities . On the other hand, savings and capital formation are the key words in the process of economic development of each country. The process of capital formation in each country requires the participation of the general public in investment and, the mobilization of saving in the course of social life should be sought in the public economic participation of investors. Considering the importance of depositing and savings in the economy of the country and the important role that banks play in attracting investments and monetary policies in any economy, the profitability of banking activities is one of the most important factors behind the existence of banks, and policies that help the superior management of the bank make important decisions, are decisions that makes the current health, well-

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being and progress of the bank and the future growth and improvement of the banks. The statistical population of the study is the banks accepted in the Tehran Stock Exchange between 2010 and 2015, and the final sample size is 13 banks (78 years-banks).

The methodology of this paper in terms of nature and content, is in the type of correlation, which is analyzing the correlation relationship using the secondary data extracted from the financial statements of the banks accepted in Tehran Stock Exchange. On the other hand, the present study is post-event (semi-experimental), which is based on the analysis of past and historical information (financial statements of banks). This research is also a library and analytical study based on the analysis of panel data. Research is considered to be a practical purpose and descriptive-correlation method.

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