

## **Assessment of the Impact of the Liquidity Growth Rate on the Bank Reserves Listed in the Tehran Stock Exchange**

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**Abstract:** The aim of this study was to evaluate the liquidity growth rate of bank reserves listed in the Tehran Stock Exchange. Accordingly, based on the Kashyap and Stein models and Levinthal, “bank reserves” are defined as the dependent variable, rate of return on assets as the independent variable, facilities rate, bank size, growth opportunities and profitvolatilitycontrol variables. The population of this research consisted of commercial banks listed on the Tehran Stock Exchange and among which sixteen banks were selected as sample size banks using systematic elimination. The results show the direct relationship between liquidity volatility with bank reserves as a measure of deposits of different clients in banks as the dependent variable. In addition, the interpretation of gradient in control variables of estimation relationship indicated that there was a reversed relationship between the facilities rate and the size of banks with bank reserves and also a direct relationship between growth opportunities and earnings volatility with bank reserves or customer' deposits. Student-t test and Fisher test for the estimated coefficients and the total estimated relationship supported 95% of relationships between variables. The coefficient of determination showed that between 5/83 to 5/87 of changes between the independent variables and control was represented by bank reserves by the estimated relationship and the estimated relationship between the variables has had relatively full explanatory power.

**Key words:** Bank reserves, liquidity growth rate, facilities, bank size, growth opportunities, profit volatility

### **INTRODUCTION**

Commercial banks with appropriate liquidity growth adopted more risky policies in facility and liquidity allocation while the banks with slow or negative accelerated liquidity growth act more cautious. Although this was not one-sided impact and hasten in attracting deposits and improved bank reserves rate can play a role as catalyst in accelerating the growth or liquidity banks. Liquidity growth can be defined as comparison of changed cash holdings and bank cash equivalents.

So, the growth of liquidity in banks can increase risk taking of banks through easy granting of facilities such as the allocation of credit for high demands clients and consequently deferred facilities for banks. Affected by economic liberalization, the companies inevitably to make policy in areas such as risk management, reduced costs and more favorable allocation of resources. In a sense, opening up the economy to foreign investment needs to increased efficiency and more competitiveactivities in domestic markets. Based on similar research by increased economic growth by raising interest rates has been realized which in turn leads to intensified competition and better allocation of financial resources. Thus, the economic liberalization leads to increased investments, more efficient allocation of financial resources and

economies. Therefore in recent years, the assessment of banks has been of particular importance. Performance in the banking system can be assessed from different angles. A number of studies have been carried out based on the evaluation of processes and review or audits and the procedures. The second category of these studies evaluated the quantitative performance of banks. Research based on performance quantitative assessment has been divided into criteria as profitability, efficiency, effectiveness, risk, productivity, liquidity and similar cases. The other division for quantitative assessment is based on an approach used in assessing the explained performance. In performance index, two or more inputs are combined to define the bank's profitability and liquidity ratios and compare the performance of different banks or branches with each other or with their past expected performance. Based on econometric approach, a generally linear parametric is defined between the accounting or operational performance metrics with other accounting variables. Based on mathematical modeling approach, they estimated the optimal situation and judged the estimates and the actual performance of banks (Levintal, 2015). Due to the special circumstances that prevailed in the banking system and their central role after the agreements for resolving of economic sanctions on the country, this study investigated the performance of banks

listed in the Iran exchange with liquidity standard based on Leventhal (2015) and an econometric approach. This study was conducted to answer to these basic questions: What is the effect of liquidity growth rate on reserves of banks listed in the Tehran Stock Exchange?

### **Theoretical principles of study**

**Bank deposits:** Savings are separated in both voluntary and compulsory in terms of willingness to do savings. Voluntary saving is defined as the personal act of households and individuals. The voluntary saving is the best way to finance because it indicates that society has not consumed its earnings based on the present and future preferences. In a developed country with relatively efficient financial markets, these savings flow to the securities market and the banking system and provide significant financial resources to expand the economic system. In compulsory savings resulting from group decisions or government, consumers are forced to ignore purchasing some goods. This is equivalent to compulsory savings. What is more emphasized is the inflation created by printing money which is more beneficial for the government. Money creation leads to inflation which in fact is realized by increasing aggregate demand and increases the profit and share of profits in national income. This means that inflation changes income distribution with low saving level for classes with high saving and this increases saving. Thus, the saving that is created in this way is often called compulsory saving (Tafazoli, 1997).

**Bank reserves:** Today one of the tasks for central banks is the implementation of monetary policy. Monetary policy objectives can be summarized as the measures set by the money (central bank) for controlling of the economic activities and accelerating economic growth, full employment, stabilizing the general price level, balancing of external payments. For the implementation of monetary and credit policy, central banks and monetary authorities of countries utilize the leverage and the following tools (Noulas *et al.*, 2008):

- Deposits of legal reserves
- Facilitates of the re-discounting and its rate
- Open market operations
- Direct control of credit
- Determination of the liquidity ratio of banks

In the studies carried out by Keynes, Tobin and Baumol, distinction between demand and speculative trading is of particular importance. However, Friedman examined money demand in traditional micro-economic theories about the behavior of the consumer and

manufacturer demand for production factors. Since, the deposit is in fact a form of savings and many effective variables in the demand for money actually influence on the volume of deposits and the fact that Friedman's theory of money demand has regarded the return of money as the other alternative for assets, the study investigated the variables affecting the volume of deposits based on the above theory.

**Bank reserves ratio:** In many cases, banks are required to hold part of their deposits with the central bank. The ratio is called as legal reserve ratio and the blocked deposit with the central bank is also called legal deposit. The legal reserve of banks as one of the tools of monetary policy has many advantages compared to other instruments. For example, the effect of legal reserve ratio changes of commercial and private banks is reflected in all the country's banks. Assets of a bank are the bank's cost of funds. Thus asset management decision making in choosing between different types of investments and asset allocation can be categorized as the base for liquidity criteria (or return) in the banks. These assets are used in different areas to provide liquidity, generating income and raising funds to the market activity in the bank (Gertler and Kiyotaki, 2010). In the West's economy, the banking system consisted of central bank and various deposit institutions. In this system, depository institutions hold two types of reserves (Branson, 1994) as follows.

**Legal Reserves (RR):** By law, depository companies are required to set aside their part of their deposits to the central bank. These reserves are firstly kept in the banks for the prevention of the potential influx of depositors to bank; yet with the possibility of insuring deposits, the requirement was dropped and today legal reserves are held as instruments of monetary policy for the central bank.

**Excess Reserves (RE):** Deposit institutions prefer to hold extra reserves to make use of them if necessary. Decisions about the maintenance of excess reserves for a bank are similar to decisions to discretionary demand for money. Banks hold reserves in order to meet their demands for cash or payments to other banks. Therefore, the choice of excess reserves rate over legal reserve depends on three factors. These three factors are uncertainty for the bank's net deposit flows, discount rates, market interest rates. The bank will hold more excess reserves. As the discount rate increases, excess reserves are increased and while the market interest rates rises, the amount of reserve is also reduced.

**Liquidity at bank:** In a general definition we can say that money is regarded as converting illiquid assets into cash, without devaluation by individuals, businesses and institutions. Extending the concept of liquidity, liquidity is included earning cash through borrowing from external sources by financial institutions or others. Liquidity in depository institutions means the ability to earn a certain amount of funds to a certain price and in a certain period. Two aspects should be considered in liquidity: planned liquidity and supported liquidity. Planned liquidity is defined as anticipated cash needs and plan to meet the cash requirements by reducing assets or an increase in current liabilities. Supported liquidity is the ability to deal with unexpected cash needs. Unexpected needs are considered the cash equal to the net cash flows in the initial forecasts. These needs can be created for different reasons. In some cases, cash is needed to use the favorable investment opportunities. If cash cannot be provided, profits on this investment will be lost. Because of the general uncertainty related to cash flow, financial managers usually hold large liquidity.

These managers usually predict necessary credit funding more than the expected needs. In addition, the exchangeable securities are held as precautionary reserves. In all cases, the desired level of circulating capital has largely been influenced by the specific characteristics of firms and financial institutions. Management of a financial institution can be determined through careful planning and estimation of deposit cash and loan control. Therefore, the financial administrators should identify trade-off between liquidity and profitability. Management may thus minimize liquidity of the funds obtained from the sale of liquidated assets and invest in long-term securities to earn more returns yet it will be high-risk and result in inadequate liquidity, risk, credit risk and perhaps rate of return. In contrast, it is possible that financial managers minimize liquidity risk by maintaining a high level of liquid assets. But it will incur less income and profit. In order to achieve the main objective of the research, the following main hypotheses have been proposed and tested:

- $H_1$ : by increased the liquidity growth rate, the bank reserves rate listed in the Tehran Stock Exchange is increased.

**Literature review:** Ho and Zhu (2004) in a study entitled as the evaluation of the performance of Bank of Taiwan examined 41 Taiwan's banks for the effectiveness and efficiency. In this study, they have used a two-stage data envelopment analysis model for the assessment. Firstly, the assets needed to generate income to evaluate the

efficiency are examined. Santomero and Watson (1977) in a study entitled as determination of the optimal standard capital for banking industry showed that by imposing strict rules for the capital market, banks reduced their credit and as a result downfallen produced investments. They argued that from the perspective of society, the optimal level of capital to the banking system should be determined through the point where the marginal returns of banks are exactly equal to marginal costs of bank capital. Reynolds *et al.* (2000) in a study entitled as bank financial structure in eight countries in East and Southeast Asia between 2007 and 2014 prior to the crisis concluded that profitability and loan priority of bank are directly related to the bank size but the bank's capital adequacy inversely associated with size has decreased.

Mpuga (2002) in a study entitled as banking crisis in Uganda: the role of new investment, after reviewing the performance of commercial banks during the crisis years of 2011-2012 showed that the new capital requirements have positive impact on the performance of commercial banks in an increased deposits, cash assets, paid in capital, the original capital and total capital and net earnings and concluded that the lack of minimum capital in accounting for portfolio risk control of banks can be one of the major factors for the bank's bankrupt. Ho and Hsu (2010) in a study entitled as leverage, performance and capital adequacy ratio in the banking industry in Taiwan examined the relationship between the financial structure of corporates and venture capital strategies in the Taiwan banking industry and showed that the limits of capital adequacy ratio are under the influence of venture capital company's strategies and corporate performance is directly associated to the size and financial leverage and financial costs. Frankli and Kocakulah (2009) in a study as activity based costing and asset management in the banking industry examined the relationship of banking services in America as the managed asset plan. Their results show that other factors must be considered as the main cost factors. As a result, the cost of providing services in the costing system should be allocated on the basis of other factors.

## **MATERIALS AND METHODS**

In order to collect data and theoretical background of the research, library research method has been used in this study. To illustrate some of the theoretical foundations of research and collecting and theoretical research, library website and publications, e-Books and articles have been employed as a complementary tool in the study. In order to achieve the required data for the calculation and statistical analysis inference in the form of

answers to the research questions of the study, documents have been provided according to information by the firm. In this context, financial statements and explanatory notes and financial documents related to the measured variables in the surveyed companies have been used.

The population of this research consisted of commercial banks listed on the Tehran Stock Exchange and the sample size was chosen based on the systematic elimination method:

- The bank should be based in Iran and its equity and capital should belong to natural or legal investors in Iran
- It should be operated under the supervision and licensed by the Central Bank of Iran
- Its fiscal year should be ended in 29/12 and in the 5 years period it should have not changed its fiscal period ending in 29/12/2014
- Prior to 2009, it should become a member of Tehran Stock Exchange
- Their performance data about the variables should be calculated or accessible

Due to the paucity of studied banks and also the number of dependent and independent variables in the regression estimates and ultimately cost considerations based on very limited sampling, random sampling was not used and therefore the sample size was consistent with statistical, i.e.,  $N = n$  and has been determined as five non-random sample of 16 banks.

**Evaluation of variables:** In this study based on similar or related literature, dependent independent or control variables have been measured or calculated as the followings.

**Bank reserves:** According to empirical study by Levintal (2015), this variable as a dependent variable has been obtained from division of deposits of natural or legal customers with banks by the total assets of the bank as a relative quantity and is expressed by multiplying by the hundred. The deposits have been deposited in banks in a variety of loan, short term, long term and current accounts.

**Liquidity fluctuation:** The Liquidity fluctuation has been defined as financial acceleration rate and has been measured based on the nature of the activity of banks in the measurement of liquidity growth of bank according to empirical research by Levintal (2015).

The Liquidity in banks has been defined as based on cash inventories and quasi-cash (bonds, etc.) and is divided by total assets and sometimes multiplied by the hundred in the form of a defined quantity percent. For this purpose, the bank liquidity rate in the current year minus liquidity rate in the previous year is divided by the liquidity rate in the previous year.

**Facility:** Facility is the first control variable in research and represents the bank's expanding or contracting policy in the allocation of credits to customers or entities. This variable is obtained based on the research by Sohrevardie and Aiinie by dividing the total facilities granted by banks to natural or legal customers by the total deposits of customers during the fiscal year.

The increased rate has been regarded as expansionary policy or bold strategy in the granting facilities and its decreased rate represents a conservative policy or risk aversion of banks and restrictive practices in granting facilities to customers

**Size:** Size has been defined as other control variable in different research based on number of employees, sale natural logarithms, turnover log, the total assets Logarithm or value Logarithm. In this study, based on the research by Monsef and Mansouri (2009), the size of each bank has been calculated based on the natural logarithm of total assets at the end of the period.

**Growth opportunities:** Growth opportunities as a control variable provide increased prices of bank shares as opportunities for increased return on investment compared to other banks. Based on a survey by Kheirabadi (2014), growth opportunities are defined as the market value to book value per share at end period and in terms of order. Literature review shows that in fact in the companies with the index less than unity, it means that its stock price has been increased.

**Earnings volatility:** Earnings volatility is considered as other control variable. Based on a survey by Kheirabadi (2014) it represents a change in earning per share compared to the past. For calculation, the earning of per share during the period minus the bank's earning of per share in the prior period (change in earnings per share) is divided by earning per share in the previous period which usually is expressed as multiplied by a hundred as percent.

## RESULTS AND DISCUSSION

**Data analysis:** The relationship between dependent and independent variables was determined based on linear

regression analysis of panel data in by EViews Software ink and after the estimation of the regression equation parameters, its validation has been proved based on the coefficient of determination. Student's t and Fisher tests were used as the independent variables to determine the relationship between variables. Presuppositions have been evaluated based on the type of panel data.

**Determination of panel data analysis:** According to the model used in the study by Kashyap and Stein (2004) and adjusted variables by Levintal (2015) as well as restrictions on the sample size of Iranian Stock Exchange banks and the large number of variables in estimating equation, the use of cross-sectional regression did not significantly contribute for each year. To specify that relationships estimation has been conducted between variables by using panel data or integration methods, Chow test with F-Limer criteria has been used and test results are summarized in Table 1.

F Limer statistics in Chow test and its corresponding meaningful level was calculated as 0/0135. The likelihood or significance level obtained in this test tends to be zero and is <five%. Based on the significant level it can be stated that the test result was significant at 95% confidence level and it should be used for the estimation of the relationship between the variables based on linear regression estimation. After determining the constant intercept of the estimated regression equation, the fixed or random effects methods should be selected based on the relationship between the variables. For this purpose, Hausman test was used in similar or related researches and the results of these tests are summarized in Table 2.

Square K statistics for Hausman test in regression estimation is 58/0125 and its corresponding significant level tends to be almost zero and 0/0024, respectively. Considering the significance level of <5%, the result is significant at 95% confidence level. So in this study, 95% confidence level regression model using panel data analysis model to estimate the "fixed effects approach" is appropriate.

**The relationship analysis between variables**

**The main hypothesis results:** The aim of research hypothesis is the relationship between the liquidity

growth rate and bank reserves. Based on extensive testing and analysis, linear regression analysis using assumptions based composite panel data showed that the remaining variables had normal distribution, linear independence of the independent variables and errors in estimating the relationship was established as well as the stability between variances and the results of Chow and Hausman test. Thus the relationship between variables was estimated using linear regression based on an analysis of panel data with fixed pattern and the results are summarized in Table 3.

The logical relationship between variables or research model has been defined based on Kashyap and Stein (2004) patterns and modified variables based on the Levintal (2015)'s research in a parametric linear relationship defined as:

$$\text{Reservation} = 12/742 + 2/003 \text{ROAd} + 0/051/0\Delta\text{Cash}_t + 0/803 \text{Capitalist} - 197/0 \text{Facility} - 4/170 \text{Size} + 3/200 \text{MB}_t + 0/093/0\Delta\text{Earn}_t + \epsilon_t$$

Based on the mathematical relationship estimates, the coefficient of this variable is calculated as  $\beta_2$  equal to 0/051. "The positive estimated coefficient" for the volatile independent variable or rate of liquidity suggests a "direct relationship" between fluctuating liquidity with bank reserves in random sample of firms. Based on the coefficient estimates with an increase of 1% swing or rate of change of liquidity in the banks surveyed, the bank's deposits rate are also increased at a rate of 0/051. Thus, according to the analysis, we can conclude that there is a direct relationship between the bank reserves with volatility liquidity in the random sample. The coefficient of estimation is 0/875 and 0/835 in the adjusted condition and shows that the percentage of change between cash flows and bank reserves is expressed by the estimation relationship. Considering that the mentioned factor tends to be hundred, there was a relatively strong linear relationship between independent variables and the dependent variable of bank deposits, control of assets, fluctuating liquidity, capital adequacy ratio, facilities rates, bank size, growth opportunities and earning volatility, the estimated relationship between the variables had relatively full explanatory power.

Table 1: Summary of the chow test (F-Limmer)

Relationship estimation	F statistic	Significance level	Test result
Relationship between bank reserves and facilities	242/2901	0/0135	The appropriateness of use of panel data

Table 2: Assessment the choice of fixed or random effects (Hausman test)

Relationship estimation	Chi-two statistic	Significance level	Test result
Relationship between bank reserves and facilities	58/0125	0/0024	The appropriateness of use of panel data

Table 3: Parameters of the relationship between bank reserves and facilities

Description	Symbol	Parameters	SD	t statistics	Significance level
Width from the origin	$\alpha$	12/742	3/796	3/406	0/001
Liquidity fluctuation	$\Delta$ Cash	0/051	0/041	2/257	0/016
Facilities	Facility	-0/197	0/405	-1/99	0/031
Size	Size	-4/170	1/425	-2/292	0/011
Growth opportunities	MB	3/200	0/246	2/225	0/017
Volatility earning	$\Delta$ Earn	0/093	0/051	1/810	0/045

Validation relationship; coefficient of determination: 0/875; adjusted coefficient of determination: 0/835; relationship generalizability; Fisher statistics: 6/937; Fisher significant level: 0/000

Table 4: Parameters of the relationship between bank reserves and facility

Description	Symbol	Parameters	SD	t-values	Significance level	Relationship
Facilities	Facility	-0/197	0/405	-1/99	0/031	Reversed
Size	Size	-4/170	1/425	-2/292	0/011	Reversed
Growth opportunities	MB	3/200	0/246	2/225	0/017	Reversed
Volatility earning	$\Delta$ Earn	0/093	0/051	1/810	0/045	Direct

Validation relationship; coefficient of determination: 0/875; adjusted coefficient of determination: 0/835; direct relationship generalizability Fisher statistics: 6/937; Fisher significance t level: 0/000

To generalize estimation of random sample, Student's t-test parameter  $\beta$  results are summarized in the above Table 3. Based on the t-statistic results, the rate of return on assets variable was equal to 2/257 and 0/016. Since, the calculated significance level was <0/05, there was a significant linear relationship between liquidity fluctuation and bank deposits among the banks listed in the Tehran Stock Exchange at 95%. So one can say with 95% confidence there is a direct linear relationship between liquidity fluctuation and bank reserves in exchange stock. The significance level in fisher test corresponding to F statistic tends to be zero and is supported by Student's t-test results. Based on interpretation, validation on generalized correlation coefficient and Student's t-test and fisher's based it can be concluded: "There is a direct relationship between the relatively strong liquidity fluctuation and bank reserves in the study".

**The relationship between other variables and bank reserves:** This section outlines the relationship between the control variables and the dependent variable in the bank reserves of the research. The results are summarized in the Table 4.

Based on Table 4, according to the negative coefficient of variables, the correlation between the facility rate and the size of banks with banking stocks has been reversed. "The positive estimated coefficient" suggests a "direct relationship" between growth opportunities with bank reserves. The significance level corresponding to the T statistics with control variables has been 0/031, 0/011, 0.017 and 0/045, respectively and in all cases was <5%. Thus at 95%, the significant relationship between the dependent variable and bank reserves can be accepted.

The coefficient of estimation is 0/875 and 0/835 in the adjusted condition and shows that the percentage of change between cash flows and bank reserves is expressed by the estimation relationship. Considering that the mentioned factor tends to be hundred, there was a relatively strong linear relationship between independent variables and the dependent variable of bank deposits, control of assets, fluctuating liquidity, capital adequacy ratio, facilities rates, bank size, growth opportunities and earning volatility, the estimated relationship between the variables had relatively full explanatory power.

## CONCLUSION

The results showed that the rate of growth of liquidity has a relatively strong positive effect in the reserves of banks listed on the Tehran Stock Exchange. Comparing our results with Kashyap and Stein (2004) and Levintal (2015) shows that the results of these two studies were consistent and in both studies there were positive and significant relationship between the rate of capital adequacy ratio (equity) as a measure of financial risk or financial structure and bank reserves or different rates on deposits to attract banking customers. Based on statistical analysis the relationship between the rate of growth of liquidity (cash flows) and the rate of bank reserves shows that the financial acceleration or growing process of financial or liquidity levels in the past leads to more liquidity level in the relevant banks. In other words, banks that are based on management goals for development activities compared to the past have followed a positive financial momentum and have been more successful in gaining a higher level of liquidity. The results showed that there is a direct relationship between the growth of liquidity in banks and attracting deposits of customers.

## RECOMMENDATIONS

In a sense, the banks with short-term liquidity had more agility and were more successful at attracting customers and deposits and reserves. Therefore, it is recommended to banks to increase liquidity by adopting appropriate management systems in optimum ways and the ability to attract more deposits. Investment advisors are also recommended to analyze banks as measures of profitability, growth, liquidity and capital adequacy so as to provide optimal investment decision-making.

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