

The Impact of Liquidity on Iranian Bank Profitability

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Abstract

This paper analyzes the impact of liquid asset holdings on bank profitability for a sample of Iranian banks. Using the Generalized Method of Moment (GMM), this study analyzes the profitability of listed banks using unbalanced panel data over the period of 2002-2009. We use the liquidity asset and liquidity asset-ratio square for estimating liquid asset and profitability relationship. The estimated relationship between liquid assets and bank profitability is as expected. Coefficients for the liquid assets ratio, its square, business cycle, regulation and its product are all statistically significant. As expected, we found evidence of a non-linear relationship between profitability and liquid asset holdings. An important finding of this study is that the business cycle significantly affects bank profits. The coefficient of business cycle has a positive and statistically significant impact on bank profitability in results of the model; this suggests that profitability exhibits pro-cyclical behavior. The coefficient of regulation is negative and significant. Therefore, if regulators reduce the constraints imposed on banks, banks can make profits.

Keywords: *Liquid asset, Profitability, Financial institutions, Business cycle, Dynamic panel.*

JEL classification: *G21, G32, G33*

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1. Introduction

The emphasis of the determinants of profitability for the banking sector of a specific country is underscored by good measure that most countries have a bank-based financial system. The empirical literature on determinants of bank profitability is broad. However, little is known about the banking system of Iran. There are approximately 17 commercial banks in Iran. Among these banks, eleven of them are state-owned and six of them are privately owned. All of these banks have to follow the principles of Islamic banking whereby usury is not allowed. Profit rates depend on deposits and expected rates of profit on facilities set on loans. Some policies have been introduced to change the structure of financial market by privatizing Iran's banks. The Central Bank of Islamic Republic of Iran (CBI) was set up in 1960, and is in charge of formulating and implementing fiscal and credit policies.

In Iran, following to the completion of landmark reforms in the financial sector, banking sector has witnessed large changes with the elimination of bureaucratic controls, encouragement to foreign private and private investment and integrating the Iran's banking systems with the international economy. The entry of new foreign banks and private banks constitute a challenge to the public sector bank leadership in Iran (Gharoie Ahangar, 2009).

The Government of Iran guides the Central Bank to use specific monetary policies in support of their current affairs and fiscal policy. Thus, the Central Bank controls money supply.

The mix of private and state banking in Iran may be considered as a structural problem. At the moment the market share of private banks is 22% of the whole market. Their performance and productivity are significantly higher than those of the state banks. Nevertheless, they are constantly subject to anti-competitive interference in their affairs by the government and the Central Bank to prevent their fast market share growth. Additionally, state owned banks can slash the private-owned banks' profitability, since they tend to care less about profits (Dehghan Nejad, 2010).

Besides, they receive a large number of unfair benefits from the Central Bank (Naghshineh-Pour, 2009). Based on international standards, Iran does not have an adequate number of private banks compared to the number of state-run

banks. There are fewer private banks in Iran than that of developed countries because of the loss of a competitive state of affairs in the country (Naghshineh Pour, 2009).

Figure1: capital ratio state and private banks

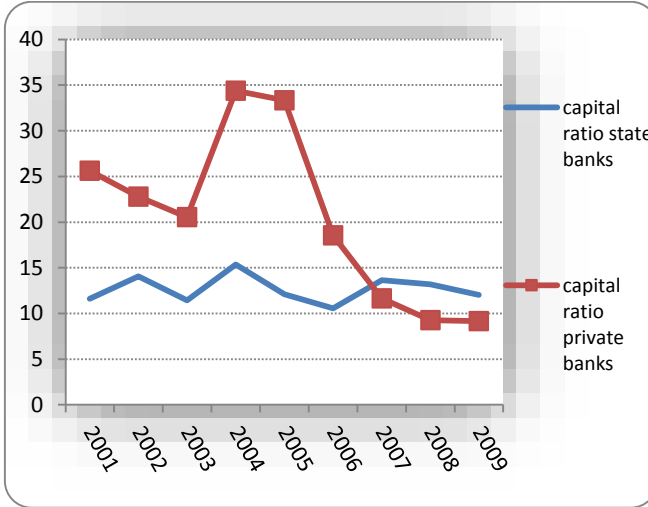


Figure2: liquid asset ratio state and private banks

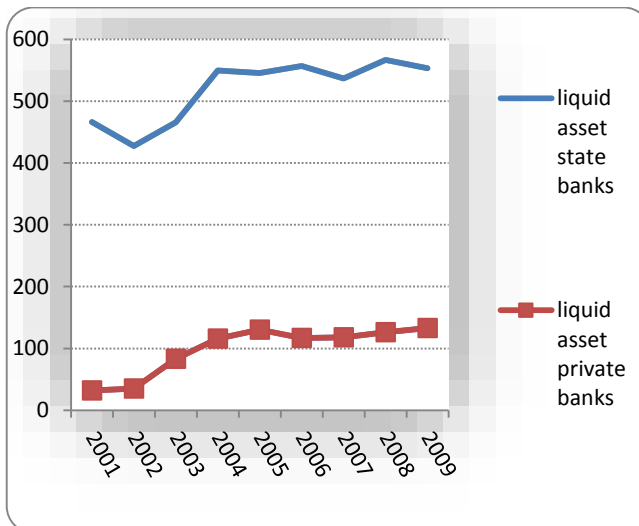
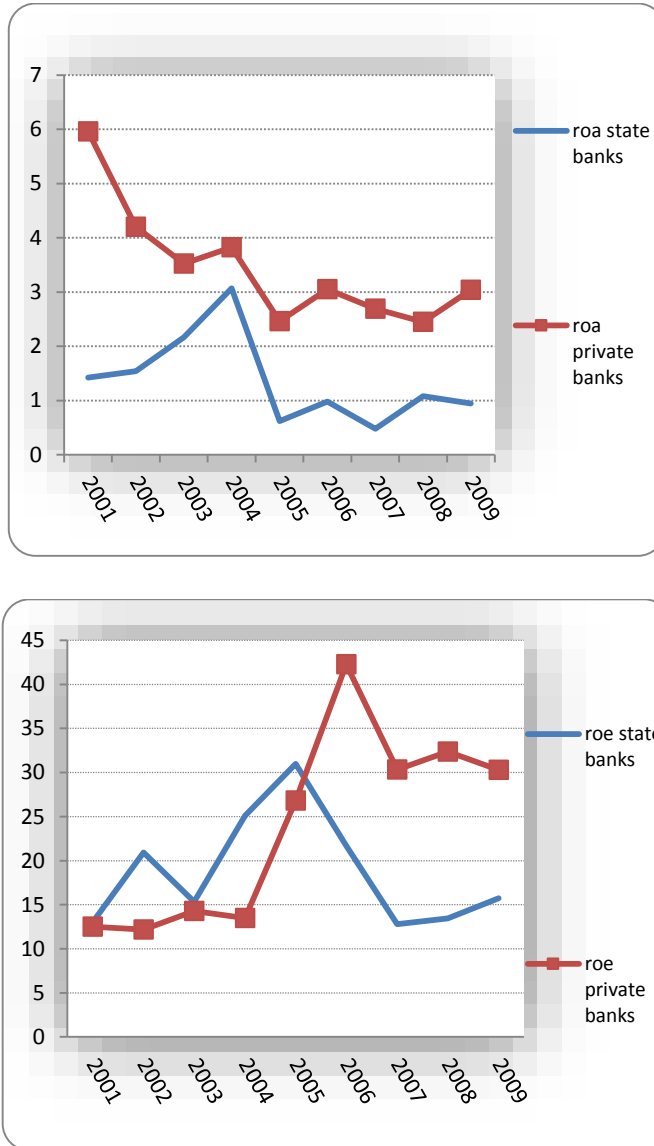


Figure 3: Return on asset and return on Equity in private and state banks



In the comparison of private and state banks in Iran, return on equity of private banks was higher than return on equity of state banks during 2005-2009. Also return on asset in private banks is more than state banks. The higher return

on asset of private banks means that the private banks are more efficient in using its assets.

Higher capital adequacy requirements for banking sector have resulted in better quality balance sheets. The capital ratio in Iran banking system is shown in figure (1). Capital ratio in private banks was more than the capital ratio in state banks but capital ratio in private banks decreased after 2006. This can be explained by the fact that public banks are larger and that their size increased after the mergers with development banks. Moreover, they are often supported by the authorities. Figure (1) shows that the average capital ratio of private banks in Iran was 24 percent (in the beginning of activity) which decline to 9 percent in 2008. The average capital ratio of state banks was 13 percent during (2001-2009).

The objective of this paper is to examine the non- linear relationship between liquid asset and banking profitability. We adopt the panel data to determine the impact of liquid asset on profitability. Meanwhile, when studying the relationship between profitability and liquid asset, the impact of regulation and business cycle will be investigated.

The research uses Dynamic panel data approach and is organized as follows: Section 3 focuses on the empirical literature. Section 4 deals with data and methodology while section 5 discusses the empirical results. Lastly, the conclusion will be given in section 6.

2. Bank Liquidity and its Measuring

Bank for International Settlements (BIS, 2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Liquidity risk can rise on both sides of the balance sheet, if either the liquidity generated from selling or the liquidity available from various funding sources is insufficient to meet obligations as they fall due. In most cases a triggering event such as the crystallization of the market, credit or operational losses in the bank, damages the bank's reputation or market-wide liquidity stress, meets already existing vulnerability in a bank's balance sheet and causes an adverse liquidity outcome (Matz and Neu, 2007).

Liquidity risk includes two types of risk as Funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both *expected* and unexpected current and future cash flows and collateral needs without affecting either daily operations or the financial conditions. Market liquidity risk is the risk that a bank cannot easily face a position at the market price. Market liquidity risk and funding liquidity risk tend to reinforce each other: disruptions can easily spread from funding liquidity to market liquidity or vice versa (Baranyai, 2008).

BIS (2008) recommends banks to identify alternative sources of funding that strengthen their capacity to withstand a variety of severe yet plausible institution specific and market-wide liquidity shocks. Depending on the nature, severity and duration of the liquidity shock, potential sources of funding include the deposit growth; the lengthening of maturities of liabilities; new issues of short- and long-term debt instruments; intra-group fund transfers, new capital issues, the sale of subsidiaries or lines of business; asset securitization; the sale of highly liquid assets; drawing-down committed facilities and borrowing from the central bank's marginal lending facilities. Bank management should regularly review and test its fund-raising options to evaluate their effectiveness at providing liquidity.

Liquidity risk can be measured by two main methods: liquidity gap and liquidity ratios. The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit (Bessis, 2009). Liquidity ratios are various balance sheet ratios that should identify main liquidity trends. These ratios reflect the point that bank should be sure that appropriate, low-cost funding is available in a short time. This might include holding a portfolio of assets which can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions. The measure of liquidity risk is liquid asset ratio which is the share of liquid assets on total assets. This ratio should give us information about the liquidity shock absorption capacity of a bank. As a general rule, the higher the ratio, the higher the capacity to absorb liquidity shock, given that market

liquidity is the same for all banks in the sample. Nevertheless, high value of this ratio may be also interpreted as inefficiency. Keeping liquid assets lowers income and increases opportunity costs for the bank liquid assets. Therefore, it is necessary to optimize the relation between liquidity and profitability. Moore (2010) indicates that the liquid asset ratio has also its short-comings: it ignores the flow of funds from repayments, increases liabilities and the demand for bank funds. The share of liquid assets on deposits and short term borrowing – this ratio is more focused on the bank's sensitivity to selected types of funding deposits of households, enterprises, banks and other financial institutions and funds from debt securities issued by the bank; it should therefore capture the bank's vulnerability related to these funding sources. The higher is the value of the ratio, the higher is the capacity to absorb liquidity shock.

3. Literature and Empirical Framework

The determinants of bank profitability have been broadly studied with the surveys being usually divided into two main categories. The first studies focused on a specific country (e.g. Berger et al., 1987; Berger, 1995b; Barajas et al., 1999; Naceur and Goaid, 2001; Naceur, 2003; Athanasoglou et al., 2005; Aburime, 2008a; and Aburime, 2008b). Second studies surveyed factors in different countries (e.g. Haslem, 1968; Short, 1979; Bourke, 1989; Molyneux and Thornton, 1992; Demirgüç- Kunt and Huizinga, 1999; Bashir, 2000; Demirgüç-Kunt and Huizinga, 2001; and Abreu and Mendes, 2002).

The determinants of banks' profitability are usually divided into internal and external factors. Internal factors focus on bank-specific and external factors consider both macroeconomic and industry characteristics. Demirguc-Kunt and Maksimovic (1998) and Akhavein et al. (1997) have found positive relationship between size and profitability. Havrylchyk et al. (2006) find a positive relationship between capital and profits of banks. Molyneux and Thornton (1992) find a positive relationship between efficiency and profitability. Efficient bank should have higher profit since it is able to capitalize on its net interest income. Finally, Miller and Noulas (1997) show a negative relationship between credit risk and profitability.

A liquid asset requirement, or ratio, show the requirement of commercial banks to maintain a predetermined percentage of total deposits and certain other liabilities in the form of liquid assets. In a number of countries this requirement is calculated as a percentage of short-term liabilities.

Industrial countries have almost eliminated the use of a binding liquid asset requirement for monetary and prudential purposes. In developing countries their use mainly reflects a mixture of monetary and prudential purposes. Recently, this requirement has been used in the context of currency board arrangements as a prudential instrument to help banks meet their systemic liquidity needs, given the limitations such arrangements set on the central bank's ability to act as a lender of the last resort. However, the reform with a view to improve banks' liquidity management is necessary. Reform has included lowering liquid asset ratios to the minimum level necessary to manage cash flows and facilitate interbank settlements, allowing for averaging of liquid asset balances and including among the list of eligible assets those that can be realized in a relatively short time without significant loss of principal (Bordeleau and Graham, 2010).

While a very limited number of studies appear to include liquidity as an explanatory variable for bank profitability, this relationship is not the focus of those papers and the empirical results are mixed. For example, Bourke (1989) finds some evidence of a positive relationship between liquid assets and bank profitability for 90 banks in Europe, North America and Australia from 1972 to 1981, while Molyneux and Thornton (1992) and Goddard, et al. (2004) find mixed evidence of a negative relationship between the two variables for European banks in the late 1980s and mid-1990s, respectively. Liquid assets are generally included as a control variable in these studies with very limited discussion around the estimated parameter.

Therefore, this survey uses macroeconomic factors such as business cycle and trend as control variables in our profit equation. This paper focuses on the liquidity index on Iran banking system and uses the square of liquidity index because we expect a nonlinear relationship between profitability and liquid asset ratio. The negative coefficient on the model indicates that profitability is maximized.

4. Data and Empirical Estimation

Financial data for the banks of Iran were obtained from the Bankscope Database of Bureau Van Dijk's company, macroeconomic information from the Central bank of Iran database. This model is estimated with an unbalanced panel data for 17 commercial banks (private and own state banks). The time period 2000-2009 was partly chosen by data availability. Descriptive statistics for the variables are displayed in table 1. The average of liquid asset in the sample is around 40 percent. The mean return on equity was 21.19 during the sample period. The share of deposit in total asset is 62.8 percent.

Table 1: Summary Statistic (billion Rials)

Variable	Mean	Std. Deviation
Return on equity (ROE)	21.19	16.13
Liquid asset	39.7	23.87
Business cycle (BC)	2548.8	30189.1
Herfindal	0.0084	0.0166
Regulation	5.4	0.87
Capital ratio	14.96	18.26
Loan asset ratio	58.49	13.4
Deposit ratio	62.67	21.75

Table 2 displays the correlation matrix of the variable used in the regression. Business cycle, loan-asset ratio, Herfindal index, deposit ratio and Regulation are positively correlated with return on equity. Capital ratio and liquid asset ratio is negatively correlated with profitability.

Table 2: Correlation Matrix for Dependent and Explanatory Variable

	Roe	Bcc	Liquid/ asset ratio	regulation	Herfindal index	Loan ratio	Deposit ratio	Capital ratio
Roe	1							
Bcc	0.1239	1						
Liquid/asset ratio	-0.233	-0.025	1					
Regulation	0.189	0.377	-0.0035	1				
Herfindal index	0.161	0.096	0.0721	-0.0843	1			
Loan ratio	0.0093	-0.089	0.2121	0.1646	-0.1014	1		
Deposit ratio	0.0666	0.018	0.207	0.1343	0.0159	0.337	1	
Capital ratio	-0.025	0.060	-0.338	-0.0442	-0.2509	0.479	-0.688	1

If the “expected bankruptcy cost hypothesis” is in fact correct, then holdings of liquid assets should exhibit a positive relationship with bank profits. At the same time, holding liquid assets imposes an opportunity cost on the bank given their low return relative to other assets, thereby having a negative effect on profitability. Thus, overall, we expect liquid assets to exhibit a non-linear relationship to bank profitability in which increasing liquid assets would improve a bank’s profitability through the “expected bankruptcy cost hypothesis”, as long as the marginal benefit of holding additional liquid assets outweighs the opportunity cost of their relative low return. Concurrently, the impact of liquid assets on profitability can be affected by other factors such as the bank’s business model, or exogenous economic conditions.

The general model to be estimated is of the following linear form:

$$\Pi_{i,t} = \alpha_0 + \alpha_1 \cdot \Pi_{i,t-1} + \sum \alpha_2 \cdot X_{i,t} + \sum \alpha_3 \cdot M_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $\Pi_{i,t}$ is the profitability of bank i at time t , with $i=1, \dots, N$, $t=1, \dots, T$, $X_{i,t}$ ’s are the bank-specific variables and $M_{i,t}$ ’s are macroeconomic variables.

Bank profits show a tendency to continue during the time depending on market competition and informational sensitivity to macroeconomic shocks. Therefore, this paper adopts a dynamic specification of the model by including a lagged dependent variable among the regressors. $\Pi_{i,t-1}$ is the one period lagged profitability and α_1 is the speed of adjustment to equilibrium. A α_1 value between 0 and 1 shows that profit and average level of profit obtained continue.

A value close to 0 means that the industry is quite competitive and there is quick adjustment, while a value close to 1 indicates less competitive structure.

The profitability variables are represented by return on asset and return on equity. Return on asset indicates the ability of a bank's management to generate profits from asset depended on off balance sheet activities. Return on equity indicates the return to shareholders on their equity.

Liquidity means availability of cash that how rapidly bank may convert its assets into cash to meet short term need. It is considered as the life of the banks. Higher amount of the liquid assets reflect the greater liquidity of the firm. Liquidity measures are used to measure the liquidity efficiency. Liquid Assets to Customer Deposits and Short Term Funds Ratio = Liquid Asset/Customer deposit and short term funds. It clears the position of deposits and short term funds which meets the requirements of sudden withdrawals. Higher ratio shows more liquidity which means that commercial banks are less financial danger. Liquid asset ratio and profitability may be expected to be nonlinear. Then this paper uses the liquid assets (la) and their square in order to capture this possible non-linear relationship. Therefore, the equation (1) is changed into this form:

$$\Pi_{i,t} = \alpha_0 + \alpha_1 \Pi_{i,t-1} + \alpha_2 la_{i,t} + \alpha_3 la_{i,t}^2 + \alpha_4 Bcc + \alpha_5 Bcc * regulation + \alpha_6 Loan + \alpha_7 Deposit$$

Loan-asset ratio is the liquidity ratio and we will incorporate this variable in model. The loan to assets ratio measures the total loans outstanding as a percentage of total assets. The higher this ratio indicates a bank is loaned up and its liquidity is low. The higher the ratio, the more risky a bank may be to higher defaults. A positive relationship between the ratio of bank loans to total assets, Loan, and profitability was also found from using international database (Demirguc-Kunt, Huizinga, 1997). Bank loans are expected to affect profits positively.

The deposit ratio is defined as the ratio of all liabilities to customers to total assets. A decrease in share of deposit in total asset increases cost of borrowed financing sources and high cost decreases the profitability of banks. Bank deposits are a very attractive means to fund the bank, because of the relatively

lower interest rates to be paid compared to bonds or borrowing from banks. A decreasing bank deposit ratio makes banks' debt more expensive and reduces the current profit. This effect is controlled for by including profit into the equation. But a decreasing (increasing) deposit ratio may signal even lower (higher) net interest profits in future years.

For considering the business cycle, the real output gap used isolates the business cycle from the economic trend. The *Bcc* is computed by subtracting a non-linear trend from real GDP using the Hodrick-Prescott (HP) filter. This paper explores the relationship between bank profitability and the business cycle. There are several reasons why bank profitability may be pro-cyclical. Firstly, lending decreases during cyclical downswings, since periods are normally associated with increased risk. In a similar context, provisions held by banks will be higher due to the deterioration of the quality of loans, and capital could also have a pro-cyclical behavior, as equity tends to follow the phase of the cycle. Hence, in the absence of a business cycle variable, its effect on profitability could be partly captured by the relevant bank-specific variables. Secondly, demand for credit would be strengthened substantially during economic booms and the interest margin may widen. Therefore, revenues could grow faster than costs leading to increased profits, while the opposite may hold true during economic slowdowns (Athanasoglou, et al., 2008).

One of the most important characteristics that can affect profitability is regulation. If regulators reduce the constraints imposed on banks, banks may take on more risk. If banks taking on the higher degree of risk are profitable, then depositors and shareholders gain. On the other hand, the banks fail, depositors lose. To incorporate the impact of prudential surveillance and supervision, we use the regulations in credit market as proxies for financial regulation.

The data variable of regulation is derived from economic freedom index of Fraser institute from 2000 to 2009. Regulation in Economic Freedom Index is concluded as regulation in credit market, regulation in labor market and regulation in business. Subcomponents of credit market regulation provide evidence on the extent to which the banking industry is dominated by private firms and whether foreign banks are permitted to compete in the market and

indicate the extent that credit is supplied to the private sector and whether interest rate controls interfere with credit market operations. Countries with an open banking system and privately owned banks extend a larger share of the outstanding credit to private borrowers at interest rates determined by market forces; receive higher ratings for the credit market component of the regulatory area. We used the interaction of business cycle and regulation. It is the cross product of business cycle and the regulation.

We use the Herfindahl-Hirschman (H-H) Index. The H-H index is calculated as the sum square of market share of banks in Iran banks.

The usual approach today when facing heteroskedasticity of unknown forms is to use the Generalized Method of Moments (GMM) (Baum, Schaffer, 2003). The unobserved panel-level effects are correlated with the lagged dependent variables, making standard (fixed or random effects) estimators inconsistent. Arellano and Bond (1991) derived a consistent Generalized Method of Moments (GMM) estimator for this model. The Arellano and Bond estimator is designed for situations with 'small, large panels, and a single left hand- side variable that is dynamic, depending on its own past realizations. Generalized Method of Moments (GMM) considers first differences and using the lags of the explanatory variables as instruments.

In order to gauge the success of this procedure we use the Hansen test for the validity of the instruments. The estimation procedure then consists of finding the set of instruments that gives us the best Hansen test (checking that the coefficients are stable to different instrument specifications).

5. Results

Table 3 shows the empirical results of the estimation of model using return on asset (ROA) as the profitability variable. We use the liquidity asset and square of liquidity asset ratio for estimating liquid asset and profitability relationship. We use Loan-asset ratio and deposit ratio as bank specific variables. Also business cycle and regulation and their interactions are used as macroeconomic variables. Finally, the relevant specification tests for each estimated equation are presented. The model seems to fit the dynamic panel data well and have a

significant coefficient. The Sargan test shows no evidence of over-identifying restrictions. The results show that the negative first-order autocorrelation is present.

The highly significant coefficient of lagged profitability variable proves the dynamic model. A value of α_1 (the speed of adjustment to equilibrium) approximately is 0.5 which means that Iran's banking structure moves to competitive market.

According to the table 3, the estimated relationship between liquid assets and bank profitability is as expected. Coefficients for the liquid assets ratio, its square, business cycle, regulation and the product of interaction business cycle and regulation are all statistically significant. As expected, we find evidence of a non-linear relationship between profitability and liquid asset holdings.

According to the results, profitability is improved for banks that hold some liquid assets, however, there is a point at which holding further liquid assets diminishes a banks' profitability.

This finding is consistent with the idea that funding markets reward banks for holding some liquid assets, but at some point this benefit is outweighed by the opportunity cost of holding such low-yielding assets.

The coefficient of the deposit ratio is positive and highly significant. A bank with a more deposit is able to have more profitability. The coefficient of loan asset ratio is positive and significant. This positive effect implies that banks with a high proportion of loan asset ratio have a higher profitability.

An important finding of this study is that the business cycle significantly affects bank profits. Business cycle is estimated to have a positive and statistically significant impact on bank profitability; this suggests that profitability exhibit pro-cyclical behavior.

The coefficient of regulation is negative and significant. Therefore, if regulators reduce the constraints imposed on banks, banks can make profits.

The empirical results show that concentration affects bank profitability negatively, but this effect is relatively insignificant. This study finds that the coefficient of H-H index is negative and significant. The Berger (1995) shows that concentration is usually negatively related to profitability.

Table 3: The Relation between Return on Asset and Liquidity Asset Ratio

Dependent variable:	Roa	Roa	Roa	Roa
Roa(-1)	0.513 (3.21)	0.643 (3.557)	0.431 (2.791)	0.4056 (2.96)
Roa(-2)	0.1165 (1.712)	0.2705 (1.62)	0.2215 (1.641)	0.143 (1.69)
Liquidity asset	0.315 (2.412)	0.4647 (3.691)	0.252 (1.859)	0.193 (1.718)
Liquidity asset-sqr	-0.0036 (-2.44)	-0.00517 (-3.699)	-0.0027 (-1.7688)	-0.002 (-1.601)
Loan-asset ratio	0.071 (4.102)	0.0732 (3.4674)	0.0572 (3.318)	0.0591 (3.813)
Bcc	0.000101 (1.731)	0.000135 (1.9256)	0.000128 (2.38)	0.000113 (2.415)
H-H	---	-3.11 (-1.85)	-3.32 (-1.96)	---
Deposit ratio	0.0163 (0.697)	0.0367 (1.1455)	0.0214 (0.838)	----
regulation	-1.1869 (-3.267)	-1.235 (-2.866)	-1.188 (-3.309)	-1.1959 (-3.829)
Regulation*Bcc	-----	-2.21E-04 (-1.964)	-1.98E-04 (-2.27)	-1.84E-04 (-2.464)
Regulation*liquidity asset	-0.0145 (-1.757)	-0.0159 (-1.814)	-0.0140 (-1.7449)	-0.0133 (-2.065)
AR(1)	-0.671 (-2.25)	-0.685 (-2.41)	-0.652 (-2.37)	-0.634 (-2.33)
J-static (rank)	36.45 (24)	42.1 (23)	38.5 (23)	37.56 (24)
p-value	0.05	0.01	0.25	0.05

In table 4, we use ROE as dependent variable. The liquidity asset, liquidity asset-square, loan-asset ratio and deposit ratio are used as bank specific variables. Also business cycle and regulation and their interactions are used as macroeconomic variable. The relevant specification tests for each estimated equation are presented. We test for the validity of our instruments (i.e.: uncorrelated with the error term) using the Sargan-Hansen test of over identifying restrictions (Sargan, 1958; Hansen 1982). P-values of our Hansen's J-Statistics indicate that we cannot reject the null hypothesis that the instruments are valid. The instruments that we use in estimation included capital ratio, business cycle, inflation rate, and regulation.

The estimated relationship between liquid assets and bank profitability is as expected. Coefficients for the liquid assets ratio, its square are statistically significant. As expected, we find evidence of a non-linear relationship between profitability and liquid asset holdings.

Business cycle is estimated to have a positive and statistically significant impact on profitability.

The coefficient of regulation is negative and significant. Therefore, if regulators reduce the constraints imposed on banks, banks obtain more profit.

The results show that concentration affects bank profitability negatively, and this effect is significant.

This study aims to examine determinants of bank profitability during the crisis period. To investigate the impact of recent financial global crisis, this study uses time dummy variable during the crisis period (2007-2009). Findings of this study show that the interaction of crisis dummy and liquid asset ratio statistically significantly affects bank's profitability. Furthermore, crisis is arising to have significant impact on the effect of inflation toward bank profitability and decrease the bank profitability.

Table 4: The Relation between Return on Equity and Liquidity Asset Ratio

Dependent variable:	Roe	Roe	Roe	Roe	Roe	Roe
Roe(-1)	0.63 (4.99)	0.594 (4.188)	0.512 (3.77)	0.576 (4.21)	0.512 (3.77)	0.42 (2.67)
Roe(-2)	0.498 (5.56)	0.456 (4.387)	0.495 (5.58)	0.521 (5.48)	0.495 (5.57)	0.405 (3.98)
Liquidity asset	1.67 (2.33)	1.539 (2.04)	1.634 (2.39)	1.98 (2.7)	1.63 (2.39)	1.94 (2.54)
Liquidity asset-sqr	-0.0154 (-2.435)	-0.0146 (-2.187)	-0.0145 (-2.39)	-0.0181 (-2.789)	-0.0145 (-2.39)	-0.019 (-2.68)
Loan-asset ratio	-----	-----	-----	0.175 (1.63)	0.21 (1.793)	----
Bcc	0.00131 (2.48)	0.001192 (2.25)	0.0006 (1.78)	0.000146 (2.18)	0.00067 (1.77)	----
regulation	-----	-1.75 (-0.91)	-----	-----	-----	----
Regulation*Bcc	-0.000216 (-2.48)	-0.000194 (-2.23)	-----	-----	-----	----
Regulation*liquidity asset	-----	-0.191274 -2.015352	-----	-----	-----	----
H-H	-----	-----	-----	----	-4.37 (-2.21)	-4.51 (-2.36)
Crisis*liquidity asset	-----	-----	-0.193 (-2.94)	----	-0.193 (-2.95)	----
AR(1)	-0.467 (-3.99)	-0.426 (-3.16)	-0.461 (-3.75)	-0.468 (-3.82)	-0.46 (-3.75)	-0.348 (-2.37)
J-stat	30.22	32.3	32.47	28.5	29.9	29.5
(rank)	24	23	24	24	23	25
p-value	0.2	0.1	0.1	0.2	0.2	0.2

6. Conclusion

The estimated relationship between liquid assets and bank profitability is as expected. Coefficients for the liquid assets ratio, its square, business cycle, regulation and its product of interaction between business cycle and regulation are all statistically significant. As expected, we find evidence of a non-linear relationship between profitability and liquid asset holdings. Profitability is improved for banks that hold some liquid assets, however, there is a point at which holding further liquid assets diminishes a banks' profitability. The coefficient of the deposit ratio is positive and highly significant. A bank with a more deposit is able to gain more profit. The coefficient of loan asset ratio is positive and significant. This positive effect implies that banks with a high proportion of loan asset ratio have a higher profitability. An important finding of this study is that the business cycle significantly affects bank profits. The coefficient of Business cycle is estimated to have a positive and statistically significant impact on bank profitability; which suggests that profitability exhibit pro-cyclical behavior. The coefficient of regulation is negative and significant. Therefore, if regulators reduce the constraints imposed on banks, banks obtain profit. The empirical results show that concentration affects bank profitability negatively, but this effect is relatively insignificant. This study finds that the coefficient of H-H index is negative and significant. The Berger (1995) shows that concentration is usually negatively related to profitability.

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