

The Determinants of Banks' Capital Structure: The case of Iran

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Abstract

The capital structure and regulation of financial intermediary firms are important topics for regulators and academic researchers. In general, theory predicts that firms choose their capital structures by balancing the benefits of debt against its costs. The purpose of this paper is to analyze capital structure as a function of bank's specific variable factors. It examines the relationship between banks' capital ratio and the determinants of capital structure in the Iranian banking industry. This paper uses a dynamic panel data during the period 2000 to 2009. The main results suggest that z-score, return on equity and business cycle are positively correlated with capital ratio. But size of bank, cost ratio and deposits ratio are negatively correlated with capital ratio. The excess capital held by Iranian banks seems to be explained by their profitability, the high stability and soundness of banking system. Z-score, regulation, liquid asset and product of regulation and business cycle are positively correlated with capital ratio, but size, profitability, loan-asset ratio and deposits ratio are negatively correlated with capital ratio.

Keywords: Capital Ratio, Soundness Banking, Capital Determinants, Dynamic Panel Data

JEL classification: G21, G32, G28, C23.

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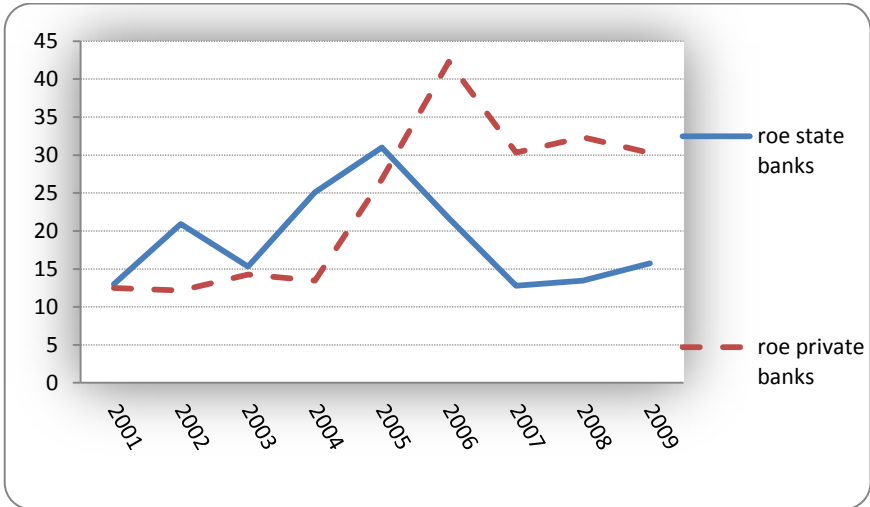
1. Introduction

The determinant of capital structure is more essential because determinants of capital structure in banking system differ from non-financial institutions. Banks generally hold more capital than the minimum capital ratios required by capital regulations that banks are obliged to meet. In general, this explains why banks tend to operate in a prudential manner against possible shocks. However, recent studies show that factors that determine the capital ratio are not only limited to legal liabilities, but variables specific to banks are also important in determining the level of capital. For banks, which constitute the largest portion of financial institutions in Iran, liabilities relating to legal capital regulations are the most important factors determining the capital structure.

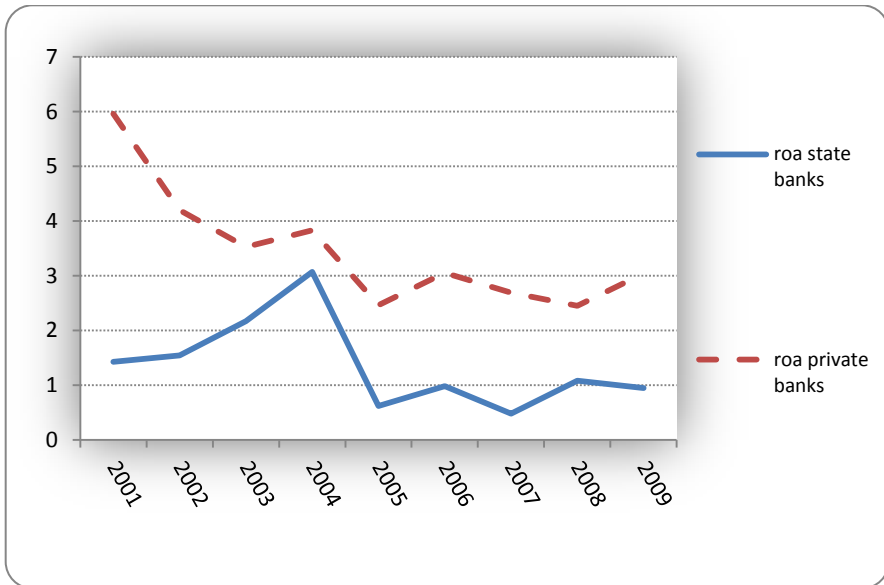
There are 17 commercial banks in Iran¹. Among these banks, eleven are state-owned and six others are privately owned. All of these banks have to follow the principles of Islamic banking whereby usury is not allowed. Profit rates depend on deposits and expected rates of profit on facilities are set on 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 the fiscal and credit policies. In line with the common economic policy of the country, four main goals of central bank of Iran are: (1) Preserving the value of national currency; (2) Preserving the stability of the balance of payments; (3) Smoothing the path of trade related transactions; and (4) Developing the potential expansion of the country (CBI, 2009).

According to CBI (2009), the financial institutions in Iran include the following: (1) Government and non-government banks; (2) The credit organizations which get the license from Central Bank of Iran; (3) Money dealers which are accredited, as well as charitable lending funds; and (4) Cooperative funds and cooperative credit firms. In the guideline of Central Bank of Iran for banking sector, it is stated that Central Bank of Iran has the

1. Bank Melli Iran, Bank Mellat, Tosse Saderat Bank, Bank of Industry and Mine, Bank Sepah, Bank Maskan, Bank Saderat Iran, Bank Keshavarzi, Post Bank, Saman Bank, Bank Pasargad, Refah Bank, Sarmayeh Bank, Eghtesad Novin Bank, Karafarin Bank, Parsian Bank, Tejarat Bank.

Figure 1: Return on equity of private and state banks in Iran

* This figure is based on research database

Figure 2: Return on asset of private and state banks in Iran

* This figure is based on research database

The average Z score in Iran was 13.5 for state banks and 15.4 for private banks during 2001-2009. The lower z-score of Iranian banks is driven by their higher standard deviation of returns. During the full sample period (2001-2009), both the ROA and capitalization in Iran are low. At the beginning of entry of private banks in Iranian banking system z-score and stability of private banks have been higher than state banks but this trend does not run on.

State banks have, on average, higher loan to asset ratios compared to private banks. But loan to asset ratio of private banks increased in 2008-2009. This higher ratio indicates that a bank has extended too much loan and its liquidity is low. The higher ratio, the more risky a bank may be to higher defaults and accommodate with decrease in z-score of private banks in 2008-2009.

Figure 3: Comparison of Z-score in private and state banks

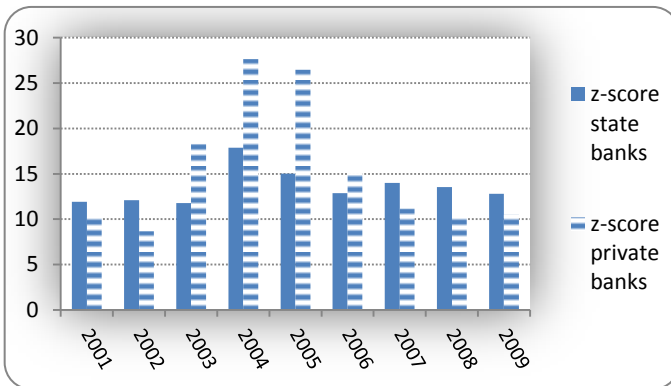
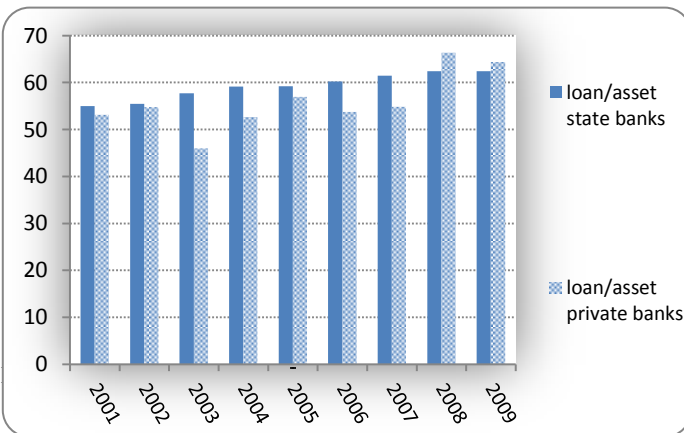


Figure 4: Loan-asset ratio in private and state banks



The main share of deposits of Iran banking system belongs to state banks. The state banks in Iran have 95 percent of total deposits of banking system. However share of deposits of state banks declined with entry of private banks and share of deposit in private banks is increasing. The average growth of deposit of state banks was 21 percent during 2005-2009 while the average growth of deposit in private banks was 66 percent in the same time. However private banks captured 20 percent of total deposits in Iran banking system.

Figure 5: The Share of Deposits in State and Private Banks

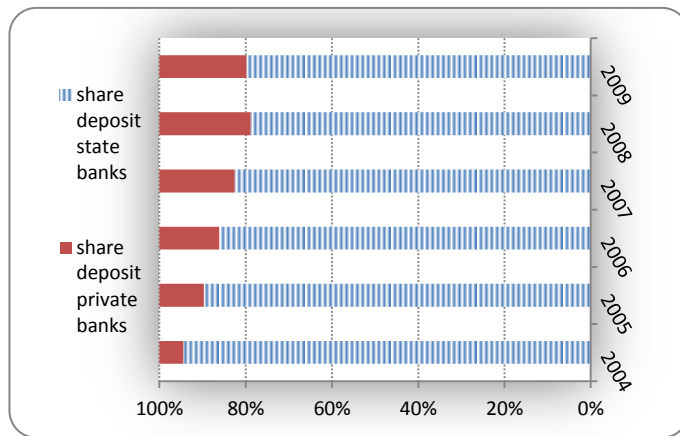
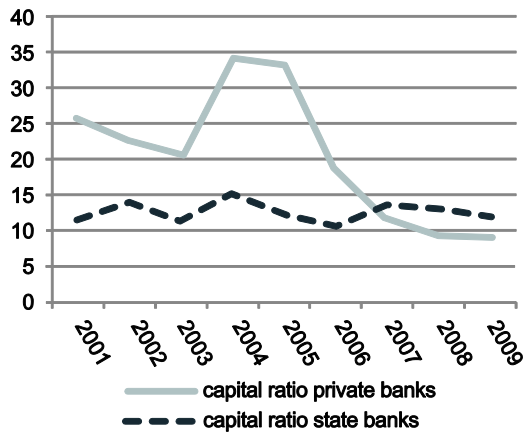


Figure 6: The Comparison of Capital Ratio in State and Private Banks



Note: Theses figure are based on research database

Higher capital adequacy requirements for banking sector have resulted in better quality balance sheets. The capital ratio in Iranian banking system is shown in figure (6). 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. The figure (6) shows that the average capital ratio of private banks in Iran was 24 percent (in the beginning of activity) which declined to 9 percent in 2008. The average capital ratio of state banks was 13 percent during 2001-2009.

This research analyzes the factors that determine the capital ratio in the Iranian banking sector. By using a panel data, this study will empirically study the determinants of the capital ratio. The main variables are level of asset size, deposit ratio, Z score, cost ratio, and business cycle in the economy of Iran.

This study is organized as follows. In the second section it will examine the concept of capital structure in banking. The third section reviews the literature on the determinants of capital ratio in banks. The fourth section will empirically analyze the determinants of capital ratio in the Iranian banking sector using regression analyses for the period 2000-2008. Finally we draw conclusions in the fifth section.

2. Banking Capital Structure

Two main alternative theories are identified in the financial theories which can explain the capital structure of non-financial and financial firms. The first is "Trade-off" theory, that firms' capital structure is determined by the trade-off between the benefits and costs of debt. The second theory- "Pecking Order theory"- says that the short-run costs of adjusting a firm's capital structure, exceeds the benefits of capital structure changes. Thus, firms rely first on retained earnings, and then they issue debt. They issue new equity to finance projects only if the marginal costs of issuing additional debt exceed the costs of issuing equity. Commercial banks for instance prefer first to retain earnings, then deposits, debt and finally new equity. The Pecking-order theory suggests

that as dividends provide good signals about a firm's future prospects, the firm will issue more equity as there is less information asymmetry in the equity market. Kohen and Santomero (1980) show that a regulation based only on the equity/assets ratio can not necessarily lead to the expected results. Marcus (1983) shows that there is a relationship between the readjustments of the capital of commercial banks and many variables such as interest rate, regulation, deposit growth, asset size, and revenue.

In the last two decades, several studies were carried out in order to explain the relationships between bank specific variables, regulation, macro-economic factors and financial characteristics of the banks' capital ratio. Osterberg and Thomson (1990) find that the capital structure of financial institutions differs from that of non-financial institutions and the impact of legal regulations on such a difference cannot be ignored.

Berger et al. (1995) indicate that the theory of capital structure of non-financial firms cannot be applied one-to-one to financial institutions due to regulations relating to their capital. They also show that capital structure of financial institutions affect the importance of external factors.

Diamond and Rajan (2000) emphasized on the theory of the banking capital and stated that greater bank capital reduces liquidity creation by the bank but enables the bank to survive more often and avoid distress. Baumann and Nier (2003) find that banks which disclose more information tend to have higher capital ratios and more protection against unexpected losses.

Alfon et al. (2005) show that high capital adequacy is a positive signal for financial markets. Asarkaya and Ozcan (2007) show that when economic growth is strong, banks make more profit, and some of this profit contributes to their capital. So they hold more capital and Basel I accord could not adequately explain a bank's capacity to compensate expected or unexpected losses. Certainly, the managers of commercial banks realize this reality. They have to guard themselves against the risks. Gropp and Heider (2007) find that more profitable banks tend to have more capital relative to their assets. Their finding is consistent with the prediction of the Pecking Order Theory of the capital structure: Firms rely on their retained earnings to fund new projects before looking for debt and issuing new equity.

Brewer et al. (2008) point out that the theories of capital determination under regulation suggest that banks' capital ratios are determined by the Trade-Off hypothesis or by the Pecking order hypothesis. The Trade-off hypothesis with binding regulation has a readily testable prediction. In instances where there is only one such minimum ratios, as is true in all countries, banks should generally be operating above the minimum capital ratio required by regulation.

Kleff and Weber (2008) find that the capital level is positively correlated with profitability. So, the accumulation of profit breeds capital growth.

The surveys of Ahmed et al. (2008) show that the relationship between capital and earnings is negative in Malaysian banks. According to these authors, this finding disagrees with the view that high earnings enable bank manager to have easy access to equity capital. They think that high earnings may cause bank management to reduce capital cushion accordingly.

According to studies in developed countries, the determinants of banks' capital structure are not only capital or liabilities and regulations, but also many other variables that are specific to commercial banks as well as macroeconomic variables. Consequently, financial institutions, unlike non-financial institutions, have significant differences in capital structure for safety net reasons or their legal capital requirements. The determinants of capital structure of banks are rather various and are the same in any country, but the main determinants are regulation, profitability, and cost of capital, risk, deposits and asset size.

It should be mentioned that there are no studies on Iran banking capital structure and most studies in Iran have focused on investigating the effects of capital on profitability and other variables.

3. Capital Structure Determinants

During the last decade, the number of studies of banking capital structure and its determinants increased; the determinants of capital adequacy ratios seem to receive more attention rather than the capital structures of banks in developing countries.

The majority of the studies have led to the realization that the main determinants of capital structure of the banks are regulation, profitability, and

cost of capital, risk, deposits and asset size. These same factors determine the capital adequacy ratio but they may affect the capital level differently across countries. Some other external factors are added: Economic growth rate, Market forces and Information.

The research will distinguish these two categories of factors of determinants of capital and introduce other specific factors that will be included in the model.

3.1. External Factors of Capital Ratio

3.1.1. Regulation

Regulation is one of the most important factors that affect the capital level of commercial banks. Berger et al. (1995) state that the impact of legal capital requirements on capital held by banks is very important. As it was affirmed by Berger et al. (1995) and recently by Brewer et al. (2008), a government can immediately affect the decisions relating to the level of the capital by varying the costs associated with the capital levels and by providing guarantees, e.g., explicit deposit insurance and implicit guarantees of deposits and other liabilities. They affirmed that the observed differences in capital ratios across countries may be in part explained by the public policy and regulatory structure.

3.1.2 Business cycle

The other factor to be considered in explaining the capital structure is business cycle. In periods of positive economic growth, banks and other sectors of the economy have positive expectations and risks are relatively low.

However, during recession, banks may face sudden capital losses as a result of possible risk realizations and banks generally tend to hold more capital in recession. Having more capital may reduce the negative effects of the economic environment by signaling a strong capital structure. It may also limit the negative effects of adjustment costs that tend to increase in these periods.

With a high economic growth rate during a long period, deposits and loans increase. Banks expectations are positive and predict improvement of their risk management and an expansion for all the sectors. They take more risks to receive more benefits and then they need more capital.

According to Asarkaya and Ozcan (2007) banks generally tend to work with more capital in periods when expectations on the economy turn to negative. Having more capital may reduce the negative effects of the economic environment by signaling a strong capital structure. It may also limit the negative effects of adjustment costs that tend to increase in these periods.

In order to consider the business cycle, the real output gap is used to isolate the business cycle from the economic trend. The BCC^l is computed by subtracting a non-linear trend from real GDP using the Hodrick-Prescott (HP) filter.

3.2. Banks' Specific Factors of Capital Ratio

3.2.1. Asset Size

Bank size may affect capital structure through several channels. First, if there are economies of scale, large banks should hold relatively less capital. Second, large banks may have better investment and diversified opportunities. Thus, they are subject to lower probability of a large negative shock to their capital and need to hold a lower capital. And finally, the 'too-big-to-fail' hypothesis' suggests that larger banks in financial distress are more likely to be bailed out because of potential systemic effects. Taking into account these considerations, we include size effects with an expected negative sign.

The asset size of commercial banks must be taken into account as a determinant of bank capital structure. The tendency which emerges from all the previous studies is that the analysis also suggests that the bank size is an important determinant of capital structure at least and it is inversely related to the capital level. Larger banks have more difficult systems to use capital more efficiently and they are also able to access capital from financial markets at more favorable terms. Shrieves and Dahl (1992) find that asset-size is an important determinant of capital ratio in an inverse direction. Ahmed et al. (2008) find an inverse relationship between size and capital. Kleff and Weber (2008) find that the large banks maintain less capital ratio than small banks

because of their easy access to cover their funds requirements from external sources. Therefore, logarithm of asset size will be used as an independent variable for the regression analysis.

3.2.2. Profitability

Profitability has a positive impact on bank's capital. ROE seems to be the best indicator of profitability. Demirgüç-Kunt and Huizinga (2000) find that there is a relationship between profitability and capital ratio. Kuo and Lee (2003) find that in Taiwan, the capital ratio is positively related to profitability only for public banks but not for small private banks. Hutchison and Cox (2004) find that capital and ROE are positively related.

The return on equity (ROE) is used as a measure for the cost of capital and an explanatory variable in model and expects that its impact on capital ratio will be positive. Decreasing in ROE would indicate that bank is holding an excess of capital as a cost [(Ayuso et al. (2004)].

3.2.3. Banking Stability (Z-Score)

To measure a bank's financial soundness, the Z-score is used; the Z-score has combined the banks' profitability (μ), capital ratio (k) and return volatility (σ) in one single indicator. This ratio has become a measure of bank soundness in related empirical work on financial stability (Boyd and Runkle, 1993; De Nicolo et al., 2004; Uhde and Heimeshoff, (2009) and is denoted as:

$$Z = (\mu + k) / \sigma$$

Obviously, the Z-score will increase with the banks' profitability and capital ratio and decreases with increasing return volatility. From an economic viewpoint the Z-score initially measures the probability of a bank going insolvent when the value of assets becomes lower than the value of debt. Hence, a higher (lower) Z-score implies a lower (higher) probability of insolvency risk.

The Z-score became rather popular in the literature (Mercieca et al. 2007). The Z-score combines banks' buffers (capital and profits) with the risks they face (measured by the standard deviation of returns). It can be shown that the Z-score measures the number of standard deviations of return has to fall in order to reduce equity. A higher Z-score implies a lower probability of insolvency,

providing a direct measure of soundness. Z-score is used as an explanatory variable in this analysis for banking system.

3.2.4. Deposit /Asset Ratio

One of the factors determining the capital structure for the banks is the share of deposit in their assets. 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 creates cost of borrowed financing sources and high cost decrease the profitability of banks. Then, banks will be tending to increase capital ratio.

The expectation is that this ratio has a negative impact on the capital level, so it is used as a variable in the analysis.

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. Accordingly, lower (higher) future profits could mean increased (lower) pressure to extend buffer capital. As a consequence, we expect a negative relationship between the capital ratio and the bank deposit ratio (Kleff and Weber, 2008).

3.2.5. Intermediation Rate

The intermediation rate is the ratio of "total loans / total deposits". It represents the volume of financial intermediation which is the main activity of the deposit banks. When intermediation rate is high, banks are efficient and profitable. This ratio gives an idea about the degree of competition on the banking market. A high rate of intermediation means that the bank lends more loans. Its illiquidity risk and its loan losses may be high. The intermediation rate influences the capital ratio positively. To avoid multi-co-linearity with the variable liquidity, we will not retain this variable in the model.

3.2.6. Liquidity

Studies have considered that bank liquidity may have an effect on the capital.

Some studies show that “as the proportion of funds invested in cash or cash equivalents increases, a bank's liquidity risk declines, leading to lower liquidity premium in the net interest margins. Therefore, an increase in bank liquidity may have a positive impact on capital ratio.” Loan-asset ratio is the liquidity ratio and we will incorporate this variable in the 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 (has extended too much loan) and its liquidity is low. The higher the ratio, the more risky a bank may be to higher defaults.

4. Data and Empirical Estimation

We used bank data from the Iranian banking industry (private and state) for the period 2000- 2008. The data is obtained from financial statements published by banks and financial data for the Iranian banks were obtained from the Bank-scope Database of Bureau Van Dijk's company, and macroeconomic information from the Central bank of Iran Database. Private Banks started operation in 2003, and then this paper used unbalanced panel data.

Table 1: Summary Statistics

variable	Mean	Std. Deviation
Capital ratio	14.3	17.1
Business cycle	4.18	22.8
Return on Equity	21.42	16.3
Loan-asset ratio	58.6	13.1
Regulation	5.52	0.83
Liquidity asset ratio	40.2	23.9
Deposit-asset ratio	62.8	21.4
Z-score	15.01	11.66
Size	8.7	3.24

Source: Author' Calculation.

Detailed statistics for the variables are displayed in table 1. The average of capital ratio in the sample is around 14 percent. The mean of return on equity was 21.42 during the sample period. The share of deposit in total asset is 62.8 percent. The average Z-score and banking soundness was around 15 in Iranian banking system.

Table 2 displays the correlation matrix of the variable used in the regression. Business cycle, return on equity, loan-asset ratio, liquidity asset, deposit ratio and size of banks are negatively correlated with capital ratio. Regulation and soundness of banking (z-score) are positively correlated with capital ratio.

Table 2: Correlation Matrix for Dependent and Explanatory Variables

	Capital ratio	Bcc	Roe	Loan ratio	Regulation	Liquid/asset ratio	Deposit ratio	z-score	size
Capital ratio	1								
Bcc	-0.061	1							
Roe	-0.0033	0.12	1						
Loan ratio	-0.43	-0.082	-0.005	1					
Regulation	0.02	0.35	0.18	0.176	1				
Liquid/asset ratio	-0.23	-0.031	-0.24	0.21	-0.027	1			
Deposit ratio	-0.69	0.02	0.05	0.33	0.145	0.22	1		
z-score	0.72	0.071	-0.24	-0.159	-0.067	-0.222	-0.455	1	
size	-0.32	-0.01	-0.0089	0.257	0.126	0.123	0.098	-0.269	1

Source: Author' Calculation.

Banks adjust capitals to achieve a favorite measure of capital. Kleff and Weber (2008) and Brewer et al. (2008) show how the adjustment is made.

$$\Delta \text{capital}_{i,t} = \alpha[\text{capital}_{i,t} - \text{capital}_{i,t-1}] + \varepsilon_{i,t} \tag{1}$$

$$\Delta \text{capital}_{i,t} = \text{capital}_{i,t} - \text{capital}_{i,t-1}$$

If the managers observe that capital in the last period ($\text{capital}_{i,t-1}$) falls below the target level ($\text{capital}_{i,t}$) they will increase the capital in the current period so that $\Delta \text{capital}_{i,t}$ is positive. The coefficient (α) measures the speed of adjustment. The high value of α , it means that managers respond strongly to difference from the preferred level of capital. Then:

$$\text{capital}_{i,t} = (1-\alpha) \text{capital}_{i,t} + \alpha \text{capital}_{i,t} + \varepsilon_{i,t} \quad (2)$$

Since the target level of capital is not observed, we use proxy variables for the unobserved variable capital*. This paper uses z-score, return on equity, business cycle, asset size, loan-asset ratio, and ratio of deposits in total asset as proxy variables for the target level of capital.

This paper specifies the target level of capital as:

$$\text{Capital}_{i,t} = \beta_0 + \beta_1. Z_{i,t} + \beta_2. \text{ROE}_{i,t} + \beta_3. \text{Deposit}_{i,t} + \beta_4. \text{Bcc} + \beta_5. \text{Loan}_{i,t} + \beta_6. \text{Size}_{i,t} + u_{i,t} \quad (3)$$

where capital is the capital ratio for bank i at time t , Z-score is the $Z = (\mu+k)/\sigma$ that defines μ as the return on average assets before taxes (ROA), k is the equity capital in percent of total assets and σ is the standard deviation (volatility) of the ROA. From an economic viewpoint the Z-score initially measures the probability of a bank going insolvent when the value of assets becomes lower than the value of debts. Hence, a higher (lower) Z-score implies a lower (higher) probability of insolvency risk. ROE is the return on equity, Deposit is the share of deposits in asset, Bcc is the business cycle, loan is the loan-asset ratio, and size is the logarithm of assets of banks. The data variable for regulation has come from economic freedom index of Fraser institute from 2000 to 2009. Regulation in economic freedom Index includes regulation of credit, labor, and business. We used Credit Market Regulations. 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 where 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.

The error term in the adjustment equation (Equation 1) is split into two parts. The first part is a bank specific component that is constant across time for a bank. The second part is a random term that varies across time and banks. With differencing out the bank fixed effect, the error term and the endogenous

explanatory variables are still correlated. Therefore, this estimation needs valid instruments for these variables. The explanatory variables, z-score, return on equity and the lagged value of the dependent variable are treated as potentially endogenous.

The main problem in empirical work is heteroskedasticity. Although the consistency of the instrumental variables coefficient estimates is not affected by the presence of heteroskedasticity, the standard instrumental variables estimates of the standard errors are inconsistent, preventing valid inference. The usual form of the diagnostic tests for endogeneity and over-identifying restrictions will also be invalid if heteroskedasticity is present. These problems can be partially addressed through the use of heteroskedasticity-consistent or robust standard errors and statistics. Although the conventional instrumental variable estimator, are consistent, however, are inefficient in the presence of heteroskedasticity (Hoffmann, 2010).

When facing heteroskedasticity of unknown forms the usual approach today is to use the Generalized Method of Moments (GMM). Since GMM consider the unobserved effect transforming the variables into first differences, we consider this technique as an efficient tool to deal with endogeneity problems.

When the unobserved effect is correlated with independent variables, pooled OLS regression produces estimations that are biased and inconsistent. This problem can be controlled by using the first difference or the fixed effect (within) estimators (Hansen, 1982). Nevertheless, whether the strict exogeneity of the independent variables' condition fails, either the first difference or the fixed effect estimators are inconsistent and have different probability limits. The general approach in this case is to use a transformation to eliminate the unobservable effects and instruments to deal with endogeneity (Nickell, 1981). Therefore, the econometric method considers the unobserved effect transforming the variables into first differences, and uses the GMM to deal with endogeneity problems. Tests of Hansen/Sargan are used to test the model specification validity. This test examines the lack of correlation between the instruments and the error term.

5. Results

For analysis of the results, this research is focused on the factors of determination of capital structure. To do so, this research used the dynamic panel data. In each coefficient estimation and t-statistic for significance and the Sargan test for instrument validity are reported. In dynamic panel data, we do not reject the validity of our instruments and do confirm both the absence of second-order serial correlation and validity of the instruments used to avoid the simultaneity problem.

The results of estimations for the model are reported in Table 1 from equation (3). Regarding the coefficient of lagged capital, the results show that at a point-estimate of near 0.28 (significant at 1% level) the dynamic model is a good choice in explaining structure of capital.

The cost of capital proxies by *ROE* has a negative impact (although insignificant) on the capital ratio. This would mean that banks in Iran prefer to decrease profits to increase capital. The efficiency-risk hypothesis suggests that more efficient firms tend to choose low capital ratios, as higher expected returns from the greater profit efficiency substitutes somehow for equity capital in protecting the firms (banks) against distress, default risk, or liquidation (Athanasoglou et al., 2005).

The share of deposits and asset size are negatively affected by the capital ratio. According to the Kleff and Weber (2008), 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. Accordingly, lower (higher) future profits could mean increased (decreased) pressure to extend buffer capital. The negative impact of asset size on capital is an evidence of larger banks holding less capital. This can be explained by the fact that larger banks have more sophisticated systems to use capital more efficiently. Large banks are also able to access capital from financial markets at more favorable terms. Larger banks could have an easier access to the capital market and could raise external capital more easily due to

lower transaction costs. Thus they may have a greater financial flexibility and may need less capital than smaller banks.

On the other hand, the capital ratio and the business cycle are negatively correlated with the capital ratio. The results show that it is better for banks to build up their capital during economic recession; the coefficient of business cycle in model is negative and significant. The negative sign of the coefficient of the share of deposits is also reasonable. Banks that have higher deposits ratios, have cheaper source of funds and are considered less risky, which in turn decreases their buffer capital.

For controlling combined effects of business cycles and the regulatory environments, this paper has used the cross product of BCC and regulation. This estimation explains that banks can ride the business and regulation cycles, which underscore the appropriateness of both a micro and macro-prudential "through-the-cycle" capital framework advocated in various current consultative proposals to strengthen the banking sector resilience. The coefficient of product of business cycle and regulation in model is positive and significant (column 4 in table1). The loan to assets ratio measures the total loans outstanding as a percentage of total assets. The higher ratio indicates a bank is loaned up and its liquidity is low. Liquidity is positively related with capital ratio. Then, the coefficient of loan asset ratio is negative in this model and then there is relationship between capital ratio and loan asset ratio.

Banks with high liquid assets have more liquidity. Liquidity is positively related with capital ratio. Then, indicating a positive sign on the variable but this coefficient is not significant in this model (Model 1).

Regulation is the factor that shows structure of banking system in Iran. The effect of entry of private banking can influence the capital structure. The results show a positive relationship between capital ratio and regulation in Iran. The positive coefficient of regulation can be explained regarding the circumstances of the Iranian banking sector after the regulation reform and after the establishment of private banks. During the sample period, the Iranian banking sector was expanding and banks had to finance investment and help firms to develop their activities.

The Z coefficient is positive and significant (Model 3, 4). These results support the idea that more stability in banking system helps banks how to hold capital. On the other hand, banks may have reacted to decreasing asset risk, as higher capital levels reduce incentives for risk-taking and higher levels of risk lower the incentive for decreasing capital. This behavior would be reflected in asset risk having a negative effect on banks' capital.

Table 3: Model estimates

Variables	Model 1	Model 2	Model 3	Model 4
Capital_(t-1)	0.2899 (3.5002)	0.292 (3.568)	0.0629 (1.271)	0.0498 (1.0396)
Capital_(t-2)	-0.1129 (-1.557)	-0.11 (-1.56)	-0.0543 (-1.339)	-0.0438 (-1.117)
BCC	-0.000383 (-1.187)	-0.000363 (-1.194)	-9.25E-06 (-0.959)	-0.00055 (-3.376)
Roe	-0.0403 (-0.7749)	-0.0402 (-0.777)	-0.0588 (-2.077)	-0.0397 (-1.425)
Loan	-0.135 (-1.436)	-0.1348 (-1.44)	-0.1689 (-3.257)	-0.1459 (-2.889)
Regulation	2.589 (1.814)	2.524 (1.828)	1.177 (1.94)	2.7025 (3.635)
BCC regulation	6.08E-05 (1.187)	5.75E-05 (1.197)	-	8.63E-05 (3.325)
Size	-2.943 (-1.56)	-2.895 (-1.557)	-0.83 (-1.046)	-2.972 (-2.97)
Deposit	-0.3004 (-2.644)	-0.289 (-2.966)	-0.149 (-2.72)	-0.172 (-3.227)
Liquid asset	0.0475 (0.1905)	-	-	-
Z-Score	-	-	0.948 (12.156)	0.9699 (12.85)
J-stat	70	71.068	84.93	80
(Rank)	(26)	(27)	(27)	(26)

Source: Author's calculation.

6. Conclusion

In this study we have analyzed the relationship between capital and other variables in Iranian banking industry. The study involved basically three phases. First, we described the main hypotheses which explain the relation between the capital and the bank's variables. Second, we examined the suitable methodology which overcomes the classical econometric problems observed in this kind of studies, and finally we empirically tested our hypothesis. The paper seeks to explain the relationship between bank capital ratio and many internal factors specific to banks by estimating a dynamic panel data model of capital ratio for the Iranian banking industry.

Capital structure theories seek to explain why businesses choose different mixes of debt and equity to finance their operations. Banking firms represent a special case because of certain unique features in the industry, including a federal safety net and extensive regulation. The financial crisis provided another set of special circumstances in which banks needed to raise capital.

As in the majority of previous studies, the main variables that were employed in regression analysis are the liquid asset, asset size, profitability, the deposits ratio, regulation of banking sector and cross product of regulation and business cycle. Results show that most of these variables are significant in explaining why Iranian banks hold capital. According to the results, Z-score, regulation, liquid asset and cross product of regulation and business cycle are positively correlated with capital ratio, but size, profitability, loan-asset ratio and deposits ratio are negatively correlated with capital ratio. The business cycle in model shows that there is countercyclical relationship between Iranian banks' capital ratio and the business cycles. Moreover, these results show that it is better for banks to build up their capital during economic recession in order to avoid capital impairment in economic downturns. Therefore, capital ratio can be seen as a hedge against performance deterioration occurring in economic downturns. The results show a positive relationship between z-score and capital ratio. This finding supports that positive variations of bank's capital ratio increase its stability. The positive coefficient of regulation and cross product of regulation and business cycle can be explained by the circumstances of the Iran

banking sector after the regulation reform and after the establishment of private banks. During the sample period, the Iranian banking sector was expanding and banks had to finance investment and help firms to develop their activities.

Then, the factors determining the capital ratio is not only limited to legal liabilities, but variables specific to banks are important in determining the level of capital. Banks generally hold more capital than the minimum capital ratios required by capital regulations that banks are obliged to meet. In general, this is explained by the fact that banks tend to operate in a prudential manner against probable shocks.

The global financial crisis that began in 2007 shows weakness in the overall design and framework for the capital structure in banking. The level of capital requirements proved insufficient to absorb losses. In response to the crisis, Bank for International Settlements released the Basel III banking regulatory reform measures to begin in 2011. These guidelines aimed to reduce the cyclicity of market risk framework and increase the level of capital. Basel III redefines the quality, consistency, and transparency of required capital bases. The measures promote the buildup of capital in good times that can be drawn upon in periods of stress, thus reducing pro-cyclicality and promoting countercyclical buffers.

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