

Evaluating the Relationship between Concentration Indicators and Profitability of Banking Industry in Iran

Mohammad Nabi SHAHIKI TASH

University of Sistan and Baluchestan, Department of Economics, mohammad_tash@eco.usb.ac.ir

Mosayeb PAHLAVANI

University of Sistan and Baluchestan, Department of Economics, pahlavani@eco.usb.ac.ir

Kamran BARGHANDAN

*Corresponding Author, University of Sistan and Baluchestan, Department of Economics,
kbarghandan@gmail.com*

Abstract

Determining the structure of a market plays an important role for policy makers to adopt efficient policies to enhance social welfare of their societies. This welfare is happened in a competitive framework. This study first attempt to measure the concentration level of banking industry and then examines its relationship with profitability measure according to the calculated values. The findings estimated indicate that the Herfindhal-Herishman index has a positive and significant effect on the profitability of the industry. The results also demonstrate that the trend of concentration indicators, except for year 2006, has not declined considerably during the study period. Such that the concentration ratio for the largest four banks, all the 4 banks are active in the governmental sector, is near 0.57. Additionally, this reality in the Iranian industry is confirmed under the Herfindhal- Herishman indicator during the period. Therefore, we can conclude that the governmental sector is the dominant part of banking system in Iran and private sector does not play a crucial role.

Keywords: Market Structure, Profitability, Banking Industry.

JEL Classification Codes: C33, L11, L21.

İran'da Bankacılık Sektörünün Karlılığı ve Yoğunlaşma Göstergeleri Arasındaki İlişkinin Değerlendirilmesi*

Öz

Toplumlarının refah seviyesini artırmaya yönelik etkin politikalar belirlemek amacıyla piyasa yapısının tespit edilmesi, politika yapıcıları için önemli rol oynamaktadır. Bu refah oldukça rekabetçi bir ortamda meydana gelir. Öncelikli olarak bu çalışma, bankacılık sektöründe yoğunlaşma seviyesinin ölçülmesini, daha sonra ise hesaplanan değerlere göre karlılık ölçümüyle olan ilişkiyi incelemeyi amaçlamaktadır. Tahmin edilen bulgular, Herfindhal-Herishman indeksine göre sektörün karlılığı üzerinde pozitif ve önemli etkiye sahip olduğunu göstermektedir. 2006 yılı hariç olmak üzere analiz edilen tüm yıllardan ortaya çıkan sonuçlar, çalışmayı destekler niteliktedir. Kamu sektöründe faaliyet gösteren en büyük 4 banka üzerinde yapılan çalışmada ortaya çıkan yoğunlaşma seviyesi yaklaşık 0.57'dir. Buna ilaveten bu sonuçlar, İran sektöründe, analiz kapsamındaki dönemler için Herfindhal-Herishman indeksi kullanılarak teyit edilmiştir. Bundan dolayı, sonuç olarak İran'da bankacılık sektörünün baskın bir parçasının devlet olduğu, özel sektörün kritik bir rol oynadığını söylemek mümkün değildir.

Anahtar Kelimeler: Piyasa Yapısı, Kar, Bankacılık Sektörü.

JEL Sınıflandırma Kodları: C33, L11, L21.

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1. Introduction

In recent decades, the financial and economic crisis has shown the crucial role of banks; Such that the banks can create credits, maintaining the financial stability and settle the payments. According to the importance of the banking system, we are going to examine the structure of this industry in Iran (Bikker et al., 2009).

Market structure in a specific industry is one of the important concepts in the industrial organization subject that includes an extensive spectrum of conditions, form perfect Monopoly toward perfect competition. Accordingly, it is possible to measure this structure through calculating the concentration intensity and recognize the level of imperfectness in that market. The concentration subject generally has two different concepts that can be classified into absolute and relative concentration indices (Cited in Pajoyan & Shafiei, 2008). These concentration indices are showed in the following table:

Table 1: Different Concentration Indices

Index	Type of Index	Formula
Ratio of Concentration for n firm	absolute index	$CR_k = \sum_{i=1}^k S_i$ S_i is market share of firm i
<i>Herfindahl–Hirschman</i>	absolute index	$HHI = \sum_{i=1}^k S_i^2$
<i>Tideman-Hall</i>	absolute index	$HTI = 1 / (2 \sum_{i=1}^n is - I)$
<i>Rosen- bluth</i>	absolute index	$HTI = 1 / (2 \sum_{i=1}^n is - 0.5)$
Hannah and Kay	absolute index	$CKI = (\sum_{i=1}^k S_i^a)^{1/(1-a)} \quad a > 0, a \neq 1$
<i>Entropy</i>	absolute index	$E = - \sum_{i=1}^n s_i \log_2 s_i$
Variance	Relative index	$V = \frac{1}{n} \sum_{i=1}^n \log(S_i)^2 - \frac{1}{n^2} (\sum_{i=1}^n \log S_i)^2$
Gini Coefficient	Relative index	$G = 1 - 2 \int_0^1 F(x) d_x$
<i>Bain Index</i>	Relative index	$BI = \frac{TR - TVC - dep - rI}{I}$

Source: Bikker & Haaf (2003)

Competition of banking system can be measured by the Price-Cost margin directly Based on the theories of banking (Lerner, 1934). This is while; application of this measure due to the lack of data for marginal cost is difficult in practice. There are several techniques for measuring competition of the industry in the corresponding literature which is classified into structural and non-structural approaches (Bikker, 2004). The structural approach is based on the Structure-Conduct-Performance (SCP) Paradigm. The Structure-Conduct-Performance (SCP) Paradigm introduced by Mason (1949) made an outstanding evolution in the literature of industrial organization. In this approach, the performance of any industry (the industry successfully in making benefit for customers) is determined in conjunction with the behavior of sellers and buyers. This structure depends on technology and demand for the products. We can follow the SCP approach in two stages: 1- application of the performance measures through direct measurement and not through estimation and 2- employing the data of inter-industry in order to regress the adopted performance measure on the different indicators of market structure. Thus, this study tries to evaluate the relationship between the market structure and profitability for private and governmental banks in Iran.

Moreover, The former studies on the structure of market and profitability are extensive so that some of them include: Hossaini & Parme (2010), Molkan (2011), Sadraei Johari & Manochehri (2012), Li & Luo (2008), Janson (2007), Yildrin & Philippatos (2006), Akhighbe & Macnulty (2005), Wilson, Goddard & Tavakoli (2005), Jeonga & Masson (2003), Bahatar & Baloch (2000), Ebadi & Shahiki Tash (2000 & 2004), Khodadad Kashi (2000), Bhattacharya & Bloch (2002), Feeny & Rogers (1999), Claessens & Djankov (1999), Esposito & Esposito (1971), Khalilzadeh Shirazi (1976).

2. Research Methodology

2.1. The Relationship between Concentration and Profitability

The relationship between Concentration and Profitability can be examined using the profit equation. Total production in an industry is represented as:

$$Q = q_i + Q_i \quad (1)$$

Where, Q is amount of total production, q_i is amount of production for firm i and Q_i denotes amount of total production for remaining firms. By Taking derivative from both sides of the equation (1) relative to q_i , we obtain:

$$dQ / dq_i = 1 + dQ_i / dq_i \quad (2)$$

Where, dQ_i / dq_i is conjectural variation that represents the reaction of opponent for firm i relative to the production change of the firm.

Moreover, the marginal revenue of firm i is obtained as:

$$MR_i = \frac{\partial}{\partial q_i} (pq_i) \Rightarrow MR_i = p + q_i \frac{\partial p}{\partial Q} \frac{\partial Q}{\partial q_i} \quad (3)$$

It is possible to adjust the equation (3) as:

$$MR_i = p \left[1 + \left(\frac{q_i}{Q} \right) \left(\frac{dp}{dQ} \frac{Q}{p} \right) \left(\frac{dQ}{dq_i} \right) \right] \quad (4)$$

Where q_i is share of market index for firm i which is represented as an adverse negative sign of price elasticity of demand, $-\frac{1}{e}$. By replacing these changes to the main equation:

$$\frac{p - MR_i}{p} = \frac{S_i}{e} \left(1 + \frac{\partial Q_i}{\partial q_i} \right) \quad (5)$$

Given the equality of marginal revenue and marginal cost in the equilibrium point in addition to the accounting the weighted average form the equation (5), we obtain the equation (6) that represents Herfindal- Hersihman index (H) as:

$$\frac{p - MC}{p} = \frac{H}{e} (1 + \nu) \quad (6)$$

Where, ν is conjectural variations. This equation indicates that the profitability index usually is function of industrial concentraion in addition to the price ellasticity of demand and firms' interactions (ν).

Although there is a consensus among the economists for positive relationship between the concentration and profitability, but this positive correlation has different interpretations. For instance, structures believe that this positive connection through the theory of market power is justifiable. They think that structure of some industries is somehow that they cooperate to one other and play a collusion game and finally capture the market. Accordingly, in one side the concentration level increases and on other hand they can enjoy more profit and rate of return. This is while; the Chicago school believes that this positive connection is stem from performance and efficiency of successful firms (Khodadad Kashi, 2001).

2.2. Measuring the Profitability Average in Industries

In order to measure the profitability average, we divide the profit of each firm by value of selling and then obtain their average in the industry as:

$$profit = ave \left(\sum_{i=1}^n \left(\frac{\pi_i}{q_i} \right) \right) \quad (7)$$

Where, n is number of firms in the industry, π_i is amount of profit and q_i value of selling for firm i .

2.3. Measuring the Minimum Efficient Scale

There are several techniques to measure the MES level including: analysis of profitability, residual approach, Dolphi approach, Commanor approach and econometric methods. This research uses the median of the firms as a proxy of the MES indicator in the model.

3. Findings and Discussion

Specifying the type of panel data model is the stage for the estimation purpose. Hence, according to the chow and Hausman tests we founded out that this set of banks have individual fixed effects. As well, since there are some indicators such as Herfindhal- Herishman and minimum economies of scale that affect the banks endogenously therefore we tested the *endogeneity* of the variables before to go on estimation. The test verified that most firms have this endogeneity. Accordingly, we applied two least square (2SLS) estimator with instrument variables to consider these effects. Accordingly, the profitability is the dependent variable and independent variables include MES index, Herfindhal- Herishman Index, Advertisement, proxy of scale (log of total assets).

The following table displays the results raised from market Share and HHI index for measuring the concentration level based on the loans and deposits facts and figures:

Table 2: Evaluating the Average Market Shares based on both Deposits and Loans in the Iranian Banks

Bank Name	Average market share (based on deposits)	Average market share (based on loans)
<i>Karafarin</i>	0.012353	0.022963
Melli	0.197322	0.374360
<i>Keshavarzi</i>	0.056528	0.109061
<i>Maskan</i>	0.064187	0.120470
Mellat	0.145521	0.265405
Novin	0.030975	0.051444
Parsian	0.072134	0.130139
Pasargad	0.024728	0.034898
Post	0.003440	0.005632
Refah	0.029755	0.058711
Saderat	0.132622	0.257809
Saman	0.015421	0.027799
<i>Sanat Va Madan</i>	0.005802	0.011640
Sarmaye	0.003843	0.004933
Sepah	0.080734	0.158856
Sina	0.012764	0.024052
Tejart	0.107094	0.198320
<i>Tose'e</i>	0.004775	0.008965

The above table indicates that based on the deposit indicator, banks of Melli, Mellat and Tejarat have had the highest share of market in the Industry while the Tose, Sarmaye, Sanat and Madan, and post which are the member of private sector have experienced the lowest share of the market. This market share is almost correct for the share indicator based on the loans in the governmental and private sectors.

Table 3: Trend of Concentration Indicators of Iranian Banks During the Period 2005-2009

Indicator	2005	2006	2007	2008	2009
HHi based on Deposits	0.126	0.112	0.11	0.105	0.107
HHi indicator based on Loans	0.113	0.110	0.106	0.10532	0.104
CR4 indicator based on deposits	0.627	0.567	0.579	0.565	0.572
CR4 indicator based on Loans	0.638	0.66	0.591	0.557	0.568

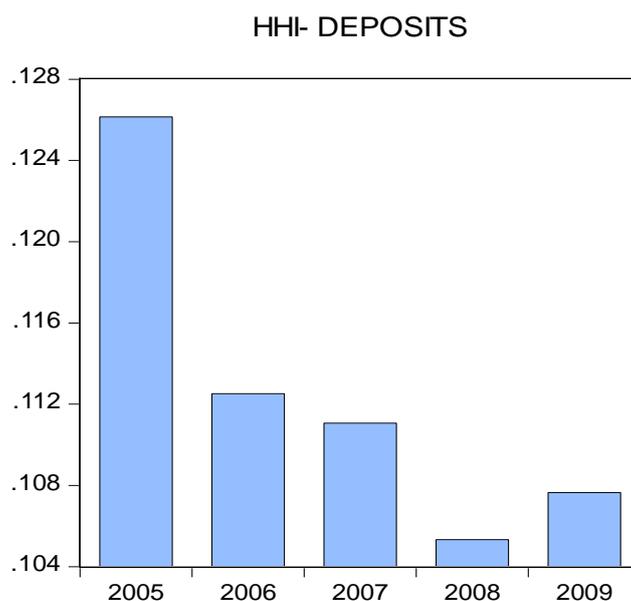


Figure 1: Trend of HH Indicator Based on Deposits

Given the values of figures 1 and 2 besides the values of table 2 we can say that the trend of concentration indicators, except for year 2006, has not declined considerably during the study period. Such that the concentration ratio for the largest four banks is near 0.57 during the period 2006- 2009. Additionally, this reality in the Iranian industry is confirmed under the Herfindhal- Herishman indicator during the period.

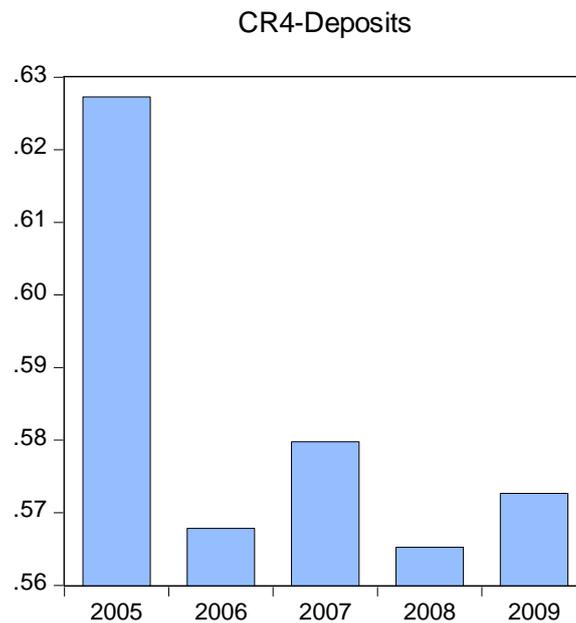


Figure 2: Trend of Concentration Ratio Coefficient for Largest 4 Banks

The following results are obtained from estimation of a model as:

$$Profit_{it} = \alpha + \delta MES_{it} + \lambda HHI_{it} + \psi ADV_{it} + \gamma TAssets_{it} \quad (8)$$

Where *Profit* is profitability, *MES* is minimum efficient scale, the symbol *HHI* stands for Herfindhal- Herishman Indicator, *ADV* is advertisement, and finally *TAssets* is total assets as a proxy for controlling the scale.

Table 4: the Result Estimated from the Main Model

Variable	Coefficient	t-Student	prob
Intercept	-8.158762	-6.669591	0.000
MES	0.170695	1.777340	0.0958
HH index	0.902986	6.763979	0.000
Scale proxy (log of Assets)	0.065351	3.173385	0.0063
F- statistic (Prob)			7.584553 (000)
Instruments	MES(-1), HHI(-1), HHI(-2), MES(-2)		
Hausman Test	Chi- Sq Statistic Value= 6.53 Prob Value = 0.0106		

The results show that the variables including Herfindhal- Herishman, Minimum Efficient Scale, and scale proxy have had positive and significant effect

statistically on the dependent variable, profitability. Such that for instance one percent decreases in the concentration level of the industry, we can expect near to 0.9 percent decrease in profitability and therefore payoff for the customers.

4. Conclusion

Competition of banking system can be measured by the Price-Cost margin directly Based on the theories of banking (Lerner, 1934). This is while; application of this measure due to the lack of data for marginal cost is difficult in practice. Generally, there are several techniques for measuring competition of an industry which they are classified into structural and non-structural approaches (Bikker, 2004). The structural approach is based on the Structure-Conduct-Performance (SCP) Paradigm. The Structure-Conduct-Performance (SCP) Paradigm introduced by Mason (1949) made an outstanding evolution in the literature of industrial organization. In this approach, the performance of any industry (the industry that makes benefit for customers successfully) is determined in conjunction with the behavior of sellers and buyers.

This study aimed to evaluate the relationship between the market structure and profitability for private and governmental banks in Iran. According to the results raised from estimation we founded that almost the structural variables had a significant effect on the profitability index that indicating verification of SCP theory. Accordingly, the official should adopt a policy to control this concentrated condition in order not to alleviate the social welfare.

Based on the indicators of market share which is shown in the table 2 we can conclude that the governmental sector is the dominant part of banking system in Iran and private sector does not play a crucial role in the market. These facts and figures imply that either the private sector has not attracted the customers in the market technically and therefore it should provide more attractive and trustable instruments or there are tough governmental barriers that they can compete with the state- based banks.

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