

# The Compare of Concentration and Efficiency in Banking Industry: Evidence from the OPEC Countries

Mehdi BEHNAME\*

## **Abstract**

*The purpose of this paper is studying that whether the profitability from banking industry comes from the market power or it is a result of their high efficiency level. For this act, we have exerted structuralism and Chicago models versus X-and scale efficiency. Our sample covers the banks in the OPEC countries in the period 1995-2009. The results for all countries in our sample show that X-and scale efficiency have the positive and significant effect on profitability but, concentration variable decreases profitability. Overall the results above support that the market power hypotheses are rejected for the OPEC countries, while efficiency gains appear to have a positive and significant impact on banking profitability.*

**Keywords:** Structure-Conduct-Performance, Efficiency Structure, Banking Industry, OPEC Countries; Profitability

**JEL Code Classification:** G21; D24

---

\*Ferdowsi University of Mashhad (FUM), Iran. E-mail: [mehdi\\_behname@yahoo.com](mailto:mehdi_behname@yahoo.com)

## 1. Introduction

The currency is as blood in the vein of economy. This blood transfers through the banking system, therefore the banking system exerts an essential role in investment, economic growth and economic development. Banking competition also affects macroeconomics' variables. A high degree of competition in the banking industry exerts a high level of welfare because banking competition decreases financial service prices and increases investment and economic growth. These benefits influence the economy in two ways. On the one hand, a high degree of competition leads to a lower monopolistic power; therefore, the banking service prices will decrease and on the other hand, a high degree of competition encourages the banks to decrease their costs (Hasan and Merton (2003), Fries and Taci (2005)).

For studying the effect of competition on efficiency or vice versa, there are many theories with opposite opinions. In theory, there is an argument that efficiency deters competition. We consider concentration as a proxy for competition; therefore, it is expected that there is a negative relationship between efficiency and concentration. On the other hand, an alternative theory shows an inverse relationship. Weill (2004) and Bikker and Haaf (2002) have found that banks have an imperfect competition structure because information is asymmetric between the banks and the borrowers. As theoretical issues present different discussions about the relationship between competition, efficiency and profitability, therefore, we study the empirical results of the banking industry and compare them with the theoretical bases. Our aim from this paper is to study the relationship between market power (banking structure), efficiency and profitability in banking in the OPEC zone. We investigate whether supernormal profits from the banking industry in this region are a result of their market power or as a result of their high efficiency level.

Lang (1996) for Western Germany's banks and Punt and Van Rooij (2003) for the European's banks have studied cost efficiency with a stochastic frontier approach. They have supported a positive relationship between cost efficiency and concentration. Berger (1995) has applied X-efficiency and scale efficiency for the banks in the USA and has found that the variables of market share and efficiency have a positive effect on firm profits. Casu and Girardone (2002) have applied the Lerner index for studying the market power effect on performance. Goddarad et al (2001) have surveyed the SCP model for the EU and found that the relationship between performance and structure is positive. Tajgardoon, Behname and Noormohamadi (2012) have shown that in Islamic banking, the efficient structure is an important element for profitability. Capital ratio and bank size are more important factors for the explanation of profits for the Islamic banking industry.

In the below sections, we study 2) theoretical bases: in this section we present the different theories about the relationship between structure and performance; 3) methodology and data: here we show our method and present the different data;

4) results: in this section we reveal the results form specification of our panel data model; 5) finally, we analyze our conclusion.

## 2. Theoretical Bases

Each market has three elements: performance, conduct and structure. Interaction manners between these elements determine market structure. Market structure mentions to the relationship between producers and consumers and determines pricing nature and competition in market. Structural variables are differential products, concentration and entry conditions. Producer concentration is determined in terms of sale, value added, assets and employment. Market concentration is determined by the degree of competition or monopoly. Differential products degree of rival firms influences producers' competition and their performance. Economic performance is a collection of results and impacts that come from economic activates. Purchase and sale of the goods and services market and the distance between price and marginal cost are certain dimensions of firms' performance. If the distance between price and marginal cost be a lot, economic activity will be more profitable. Economic performance has the following elements: 1) efficiency: scale efficiency and X-efficiency; 2) technical progress; 3) full employment.

In firm conduct, we survey the policies of production, price and cooperation with other firms. Here, whether the direction of changes is from structure to performance or inverse. There are various opinions in this case, the structuralism school (SCP) believe that direction of causality is from structure to conduct and then to performance. They discuss that firm conduct is affected by market structure.

$$P = f(S, C, F)$$

where P is performance, S stand for structure, C is conduct, F sands for extern and intern conditions (Kashi F.K (2011). The Relative Market Power (RMP) hypothesis emphasizes that large market-share and well - differential products lead to more efficiency and can bring a supernormal profit. More efficient firms are able increase their market-share and this augmentation lead to more concentration. In this hypothesis firm's market share is considered as a proxy for market power (Shepherd 1982, 1986). Berger (1995) has shown that in the RMP models should review market performance and the different between X-efficiency ESX, scale efficiency ESS. Berger (1995) has found that may be the RMP models in empirical studies present the wrong results, because of the lack of essential variables. The ESX variable shows that firms through superior management or high technology exert a lower cost therefore, they have a large profit. The ESS variable emphasizes that firm produces in scale efficiency with low unit cost and high profit. The Quiet life hypothesis from Hicks (1935) considers a special case from the RMP model and deal with that intensive market decrease competitive pressure as the management

hasn't any motivation for maximization of efficiency. Therefore, competition affects efficiency positively.

The Chicago school believes that the causality direction is from performance to conduct and structure.

$$S = f(P, C, F)$$

where P is performance, S stands for structure, C is conduct, F is extern and intern conditions (Kashi F.K (2011)). More efficient firms have the lower costs therefore, they have the higher profit. Demsetz (1973) discuss that the best – managed firms have the lower costs then they have the larger market share. This high share lead to higher concentration, this means the relationship between performance and competition is inverse in terms of the SCP model.

With regard to two above schools, merger and trust policies have the different justification. If we accept performance structure, market concentration is a motivation for addition consumer and producer surplus. But the RMP model discuss that the motivation of merger and trust is monopolistic pricing.

### 3. Methodology and Data

Following Berger (1995) and Chortareas, Garza-Garcia and Girardone (2010) we apply the below model for the banks in the OPEC countries:

$$ROA_{it} = \alpha_i + \beta_1 HHI_{it} + \beta_2 MS_{it} + \beta_3 ESX_{it} + \beta_4 ESS_{it} + \lambda X + \delta Y + \varepsilon_{it}$$

where ROA is the ratio of profitability (net income to total assets). The HHI (Herfindahl-Hirschman Index) is a measure for market structure. This variable is accounted with sum of squared market shares in assets

$$HHI = \sum_{i=1}^n (MS_{assets})^2$$

market . The MS shows bank i's share from assets at time t. The ESX represents a measure for marginal cost efficiency; it means that the firms with the higher management level have the lower costs thus, they have the higher profit. The ESS is a measure for scale efficiency and indicates that the firms which have equal technology and management relative to other firms but, their output is more efficient than ones. The X represents a vector for control variables in microeconomics such as firm size FS (natural logarithm of total assets), measure of liquidity risk LR (the ratio of loans to assets), degree of capitalization CAP (the ratio of equity to assets) and finally Y is a vector for control variables in macroeconomics such as average annual exchange rate ER, consumer price index CPI, gross domestic product GDP and market interest rate INT.

#### 3.1. Data

Our data cover the period 1995 – 2009 for the OPEC countries. The countries are: Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Algeria, Libya, Nigeria,

Venezuela. We have chosen these countries because of the similarity of economic structure. These countries depend on oil extraction. The limitation of date and countries come from the lack of data for certain countries. The sources for the data are BankScope database, WDI and UNdata.

### 3.2. Estimation of Bank Efficiency

Efficiency is calculated usually in two ways: parametric and non parametric. We calculate efficiency on non parametric method (Data Envelopment Analysis). First Charnes et al (1978) applied DEA method. Nowadays, DEA is vastly applied for calculation of banks efficiency.

Efficiency scale is the ratio of constant returns to scale CRS to variable returns to scale VRS then:

$$ESS = CRS/VRS \quad \text{where} \quad 0 \leq ESS \leq 1$$

More particularly, our VRS linear programming model is defined as follows:

$$\min \theta, \lambda$$

st.

$$y_i + Y\lambda \geq 0$$

$$\theta x_i - X\lambda \geq 0$$

$$N1\lambda = 1$$

$$\lambda \geq 0$$

where  $\theta$  is a scalar,  $\lambda$  is a N times 1 vector of constants,  $y_i$  is the output vector for the i-th DMU, Y is the matrix of outputs of the other DMUs and the number of DMUs ranges from  $i=1 \dots n$ ;  $x_i$  is a vector of input of the i-th DMU and X is the matrix of input of the other DMUs. The value of  $\theta$  will be the efficiency score for the i-th DMU where  $0 \leq \theta \leq 1$ , if  $\theta$  is equal to 1, then the DMU lies on the efficient frontier and thus the observation is fully (i.e. 100%) efficient. When the convexity constraint  $N1 \lambda = 1$  is omitted from our equation we obtain the CRS based efficiency scores. The estimated DEA efficiency scores are then used as regressors in a second-stage model in order to observe the relationship between efficiency and profitability. (This method has been directly extracted from Chortareas, Garza-Garcia and Girardone (2010)).

### 4. Results

In Table 1 we have estimated our model on panel data for the banks in the OPEC countries. Hausman (1978) test shows that we should apply the random effects model. Following Farrel (1957) we have estimated our model in two approaches: deterministic methods and stochastic techniques. Aigner and Chu (1968)

deterministic frontier is estimated by minimizing the sum of the residuals. In the stochastic method technique, random shocks are incorporated that account for some of the deviations from the production frontier.

**Table 1: Market Power and Efficient Structure: A Panel Data Model**

Variables	Deterministic frontier	Stochastic frontier
Constant	8.20** (2.21)	2.03* (1.89)
HHI	-0.01** (-2.01)	-0.02** (-2.18)
ESX	0.37** (2.31)	0.87* (1.87)
ESS	0.99** (2.30)	1.01** (2.22)
Microeconomics' control variables		
FS	-0.63 (-0.18)	0.98** (2.31)
LR	-0.04** (-2.24)	-0.03** (-1.99)
CAP	0.02* (1.88)	0.03** (2.34)
Macroeconomics' control variables		
ER	0.03** (2.11)	0.01** (2.12)
CPI	-0.02* (-1.89)	-0.37** (-2.18)
GDP	0.26** (2.21)	0.09** (2.27)
INT	-0.21* (-1.88)	-0.13** (-2.06)
R <sup>2</sup>	0.43	

Note: t-statistics are provided in parentheses. \*, \*\* and\*\*\* represent significance at the 10%, 5% and 1% respectively.

The results in Table 1 reveal that concentration variable (HHI) has a negative impact on profitability (profitability is dependent variable; it is net income to total assets). The variable of HHI shows market structure, it means that if the market structure goes to monopoly, profitability will decrease. According to Goddard et al. (2001), a negative value in the market share variable could signal an average of smaller banks being more profitable than larger ones. Garcia-Herrera, A.(1997), Chortareas et al (2010) and Tajardo, Behname and Noormohamadi (2012) have shown the same results in their researches. The ESS and the ESX show efficiency effect on profitability. These variables show that higher efficiency lead to larger profitability. A high efficiency cause decreasing cost therefore, the profit will increase. In our model ESS is more important than ESX. This encourages the banks to search for more efficient organizational solutions, larger variety of the presented services and stronger management of scale economies. Molyneux and Thornton, (1992), Peristianni, S. (1997), Chortareas et al (2010) and Tajardo, Behname and Noormohamadi (2012) have achieved the same results.

In the second section in Table 1 we have added microeconomics' control variables. Capitalization (calculated as equity/assets) and market size have positive effects on profitability. According Claeys and Vander Vennet (2003) larger proportions of free capital can push the banks to increase their portfolio of risky assets in the form of loans or securities. Moreover, the higher capital ratios can give the higher incentives to shareholders to monitor managers' operations and strategies thereby

indirectly encouraging profitability. A greater size shows that larger banks are more likely to manage at the most efficient scale and, larger banks can typically exert riskier investments which yield higher returns. Hughes, et al. (1999) and Chortareas et al (2010) confirm these results in their studies.

The LR is liquidity risk that has a negative effect on profitability. This is a microeconomics' control variable. This variable is concerned, the ratio of loans to total assets and always has the expected positive effect on profitability, and it is the most important bank-specific factor. Moreover, this variable is negative and significant. Chortareas et al (2010) have shown that this variable isn't significant for Latin American countries. Fillipaki and Staikouras (2005) have shown a positive sign for this variable. But Tajgardoon, Behname and Noormohamadi (2012) show that this effect is also negative for the Islamic banks.

In third section we have exerted macroeconomics' control variables. Economic growth and exchange rate have positive effect on firm profitability and performance. A great GDP growth shows high economy size and also reveals boom in economy therefore, we conclude that economic activities increase profitability. Schaeck and Čihák (2008) have found that GDP per capita augment profitability but exchange decrease profitability. But Chortareas et al (2010) have revealed that GDP and exchange rate increase profitability.

Other macroeconomics' control variables are interest rate and inflation that in our model are negative. Inflation decreases purchasing power consumer and bring a recession in economy therefore, firm activities will limit. The negative relationship with interest rate and profitability can be explained that may be the banking sector is dominated by few market players, and any adjustment in the market interest rate is automatically transferred to their consumers, reducing the amount of credits and other financial services. Tajgardoon, Behname and Noormohamadi (2012) and Chortareas et al (2010) present the same results but, Schaeck and Čihák (2008) show a positive sign for interest rate.

In Table 2 we present the same regression for all 8 countries. The results confirm our panel data model but, certain countries show the inverse results, for example in the UAE, Qatar and Libya the variable of HHI have a positive effect on profitability but in our panel it has a negative effect and it is the same for FS and LR in Nigeria and Saudi Arabia, ESS in Kuwait, CPI in UAE, and interest rate in Nigeria and Qatar. Altogether, the results are the same as panel data and also the same as Chortareas et al (2010).

**Table 2: Market Power and Efficient Structure: On the Base of Countries**

	Nigeria	Venezuela	Libya	the UAE	Algeria	Kuwait	Saudi Arabia	Qatar
HHI	-0.02*	-0.01*	0.02**	0.02*	-0.04*	-0.2**	-0.07*	0.08*
ESX	1.54**	1.21*	1.2*	0.8*	0.2*	-2.11	0.05*	-0.88
ESS	1.33*	2.14*	2.01*	0.97	-0.82	-0.91*	1.25	-2.34
Microeconomics' control variables								
FS	0.02*	-1.21*	-0.98*	-1.11	0.57*	-1.22*	0.13**	-2.10
LR	0.04*	-0.02*	-0.08*	-0.03*	0.01	-0.3*	0.04*	0.08*
CAP	0.33*	0.08**	0.24*	0.97	0.04*	-0.42	-0.48	0.49*
Macroeconomics' control variables								
ER	0.03	0.84*	0.32	0.74**	0.93*	0.84	0.01	0.09
CPI	-0.51**	-0.71**	-0.43*	0.09*	-0.77*	0.05	0.82*	-0.24
GDP	0.24*	0.84*	0.07*	0.22*	0.06*	0.63**	-0.7	-0.55
INT	0.01*	0.05	-0.12	0.12*	-0.34*	-0.04*	0.82	0.03*
R square	0.22	0.42	0.29	0.19	0.29	0.31	0.17	0.27

Note: \*, \*\* and\*\*\* represent significance at the 10%, 5% and 1% respectively.

## 5. Conclusion

In this paper we investigate whether supernormal profits from the banking industry are as a result of their market power or as a result of their high efficiency level. For this act, we have exerted the SCP (structure, conduct and performance) and the RMP (relative Market Power) models versus X-and scale efficiency. Our sample covers the OPEC countries in the period 1995-2009. In this research following Chortareas et al (2010) we measure managerial and scale efficiency by non parametric DEA approach. Finally, we estimate the model of Berger (1995).

The results for all countries in our sample show that X-and scale efficiency have the positive and significant effect on profitability but, concentration variable decreases profitability. This result is the same as for separated regression on countries, except for the UAE, Qatar and Libya the variable of HHI have a positive effect on profitability but in our panel it has a negative effect and it is the same for FS and LR in Nigeria and Saudi Arabia, ESS in Kuwait, CPI in UAE, and interest rate in Nigeria and Qatar.

Overall the results above support that the market power hypotheses are rejected for the OPEC countries, while efficiency gains appear to have a positive and significant impact on banking profitability. The results seem to oppose our expectations of increased market power that could have possibly come from the banks and a parallel increase in the level of concentration.

Inflation decreases purchasing power consumer and bring a recession in economy therefore, firm activities will limit. The negative relationship with interest rate and profitability can be explained that may be the banking sector is dominated by few market players, and any adjustment in the market interest rate is automatically

transferred to their consumers, reducing the amount of credits and other financial services. Tajardo, Behname and Noormohamadi (2012) and Chortareas et al (2010) present the same results but, Schaeck and Čihák (2008) show a positive sign for interest rate.

Our findings have the policy implications, our findings suggest that despite the significant rise in takeovers from foreign banks and the increase in market concentration, banks profits do not seem to be explained by greater market power. In contrast, efficiency seems to be the main force of increased profitability for most OPEC countries. The key implication is that policies aimed at removing the remaining barriers to competition should be expected to benefit the banking industry without being harmful to consumers. On the contrary, intervention aimed at achieving de-concentration should be surveyed with scepticism.

## References

- Ahmad, Sheikh Mahmud, Economics of Islam. Lahore: Sh. Muhammad Ashraf, 1952.
- Aigner, D. J. and Chu, S. F., (1968), Estimating the industry production function, *American Economic Review*, 58, 826-39.
- Berger A. (1995). The Profit-Structure Relationship in Banking – Tests of Market-Power and Efficient Structure Hypotheses, *Journal of Money, Credit, and Banking* 27, 404-431.
- Bikker, J., and Haaf, K., (2002). Competition, Concentration and their Relationship: An Empirical Analysis of the Banking Industry, *Journal of Banking and Finance* 26, 2191-2214.
- Claeys, S. and Vander Vennet, R. (2003), Determinants of Bank Interest Margins in Central and Eastern Europe. Convergence to the West?" Working Papers of Faculty of Economics and Business Administration, No. 03/203, Ghent University, Belgium.
- Casu, B. and Girardone, C. (2002) A Comparative Study of the Cost Efficiency of Italian Bank Conglomerates. *Managerial Finance*, Vol. 28, pp. 3-23.
- Charnes, A., Cooper, W. and Rhodes, E. (1978) Measuring the Efficiency of Decision-Making Units. *European Journal of Operational Research*, Vol. 2, pp. 429-444.
- Chortareas Georgios E., Jesus Gustavo Garza-Garcia and Claudia Girardone (2010), Banking Sector Performance in Some Latin American Countries: Market Power versus Efficiency, Working Papers No 2010-20
- Demsetz, H. (1973) Industry Structure, Market Rivalry, and Public Policy. *Journal of Law and Economics*, No. 16, pp. 1-9.
- Farrell, M.J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society (A, general)*, 120: 253–281
- Fillipaki, N, K and Staikouras, C (2005), Competition and Concentration in the New European Banking Landscape, working paper 2005
- Fries, S., and Taci, A. (2005). 'Cost Efficiency of Banks in Transition: Evidence from 289 Banks in 15 Post-Communist Countries. *Journal of Banking and Finance* 29, 55-81.
- Hasan, I., and Merton, K. (2003) Development and Efficiency of the Banking Sector in a Transitional Economy. *Journal of Banking and Finance* 27, 12, 2249-2271.
- Hausman JA. Specification tests in econometrics. *Econometrica* (1978);46: 1251–71.

Hicks, I. (1935) The Theory of Monopoly. *Econometrica*, Vol. 2, pp. 1-20.

Koutsomanoli-Filippaki A., Margaritis D. and Staikouras C. (2009), Efficiency and productivity growth in the banking industry of Central and Eastern Europe, *Journal of Banking and Finance*, No. 33, pp. 557-567.

Hughes, J.P., W.W. Lang, L.J. Mester and C.G. Moon (1999). —The dollars and the senses of bank consolidation, *Journal of Banking and Finance*, 23, 291-324.

Garcia-Herrera, A. (1997) Banking Crises in Latin America in the 1990s: Lessons from Argentina, Paraguay, and Venezuela. IMF Working Paper, No. 140.

Goddard, J., Molyneux, P. and Wilson, J. (2001) *European Banking. Efficiency, Technology and Growth*, John Wiley and Sons, England.

Kashi F.K (2011), *Industrial Economics*, Samt, Iran

Lang, G. (1996). Efficiency, Profitability and Competition. *IFO Studien* 4, pp. 537-561.

Hughes, J.P., W.W. Lang, L.J. Mester and C.G. Moon (1999). —The dollars and the senses of bank consolidation, *Journal of Banking and Finance*, 23, 291-324

Molyneux, P. and Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking and Finance*, 16, 1173-1178.

Peristianni, S. (1997). Do mergers improve the X-efficiency and scale efficiency of US banks? Evidence from the 1980s. *Journal of Money, Credit and Banking*, 29, 326-337.

Punt, L., and Van Rooij, M. (2003). The Profit-Structure Relationship and Mergers in the European Banking Industry: An Empirical Assessment. *Kredit und Kapital* 36, 1, 1-29

Siddiqi, Naiem, *Islami Usul par Banking* (Banking according to Islamic principles). Paper in the Urdu monthly *Chiragh-e-Rah* (Karachi), Vol. 1, Nos. 11&12 (Nov.&Dec.) 1948. pp.24-28 and 60-64. Mentioned in Siddiqi (1988). Schaeck, K and Čihák, M (2008), How does competition affect efficiency and soundness in banking?, Working paper No 932. 2008

Shepherd, W.G. (1982) Economies of Scale and Monopoly Profits. in Craven, J.V. (Eds), *Industrial Organization, Antitrust, and Public Policy*, Kluwer Nijhoff, Boston, MA.

Shepherd, W.G. (1986) Tobin's q and the Structure Performance Relationship: Reply. *American Economic Review*, Vol. 76, pp. 1205-1210.

Tajgardoon, Gholamreza., Behname, Mehdi., Noormohamadi, Khosro., (2012), Is Profitability as a result of Market Power or Efficiency in Islamic Banking Industry?, *Economics and Finance Review*, Vol. 2(5) pp. 01 – 07

Weill, L. (2004). On the Relationship between Competition and Efficiency in the EU Banking Sectors, *Kredit und Kapital* 37, 3, 329-352.