Iran. Econ. Rev. Vol.18, No.3, 2014.

The Survey of the Causal Relationship between Banking Concentration and Economic Growth

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Received: 2014/10/01 Accepted: 2014/12/19

Abstract

This paper examines the causality between concentration in banking industry and economic growth by using data across 15 countries named in "Iran outlook in 2025", over the period 2004-2011. Our aim is to assess whether the economy grows more or less rapidly in areas where the banking sector is more concentrated. The topic is motivated by the fact that the causality between concentration in banking industry and economic growth has not been examined in Iran and the countries named in Iran Outlook 2025. In order to investigate the relationship, the standard Granger causality test and Hsiao's version of Granger causality test are employed in this paper. The results show that banking concentration is negatively associated with economic growth. Besides, the evidence suggests that economic growth has a positive effect on bank monopoly power.

Keywords: Banking Structure, Economic Growth, Countries of Iran's Prospective District

1- Introduction

Recently, there has been a growing stream of studies which aims to study the relationship between financial development and economic growth. As regards to these, more financial development leads to higher economic growth, depending on the institutional characteristics of the country.

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However, minor attention has been devoted to the role of competition in the financial sector, especially the banking market structure. Evidence shows this factor may significantly influence efficiency, innovation and quality of the offered services. Since, in the last decades, the domestic banking industry plays a crucial role in the development of financial market, it is definitely worth exploring.

In order to clarify the mechanisms through which financial development enhance economic growth, Rajan and Zingales (1998) explore the capacity of the financial sector to provide lendable funds to the different sectors of economy based on their external financial dependence. A large body of the theoretical research argues that the financial markets and banking institutions mitigate the problems of adverse selection and moral hazards, thus reducing the cost of finance. Hence, financial development may help those firms or sectors in which the problems of moral hazard and asymmetrical information are present to obtain funds (Besanko and Thakor, 1993, Petersen and Rajan, 1994, 1995, Caminal and Matutes, 1993). Rajan and Zingales (1998) propose a test to verify the hypothesis, assuming that the sectors most dependent on external financing will grow faster the more developed are the financial markets to which they have access.

In the test, they analyze whether *ex-ante* financial development facilitates accessing to the financial funds, and therefore enhances *ex-post* growth in more financially dependent sectors. *By* providing a robust test of causality, correcting for country and industry characteristics, this approach has the advantage of explaining *the mechanism* through which the financial sector affects growth.

Although market power may lead to higher costs of financing, in the literature, there is no consensus over its effects on the supply of lendable funds. It is often said where market power exists, banks are encouraged to invest in the acquisition of soft information. As the stages of the mentioned process, establishing close relationship with borrowers over time (*relationship banking*) facilitates the availability of credit and consequently reduces firms' financial constraints (Dell´Ariccia and Marquez, 2004). In this scenario, bank obtains market power from the private information it obtains about the firm during the course of lending relationship. therefor the banks make their investments profitable in the relationships with clients in the long term as a consequence of an information monopoly (Rajan, 1992;

Petersen and Rajan, 1995). Furthermore, as argued by Boot (2000), even though a firm runs the risk of paying higher interest rates in the context of non-competitive banking markets, it could benefit from a greater availability of finance.

Particularly, the elimination of restrictions on capital flows between countries has pushed banks to search for more efficient organizational solutions, so that a strong consolidation process occurred, with a significant decrease in the number of banks, and therefore an upward change of their average market shares. Given the decisive function of banks in contributing to employment and output expansion through the credit market, a careful consideration of the effects of concentration course must be undertaken. On one side, as long as less concentrated banking markets more competitive environments for banks, they may ease the provision of financing to firms due to less cost of loans. On the other side, it can be admitted that some market power -associated with larger banks and related to the need of coping with information asymmetries- increases financial stability, and thus helps economic growth in the long-run.

This study focuses on the exploration of the role of banking concentration on economic growth at a local level, considering the countries name in Iran Outlook 2025[1]. Actually, it seems that there is a general consensus on the idea that banking concentration and macroeconomic performance are strongly linked. While academics and policy-makers accept that competitive conditions among banks improve economic growth, a few attentions have been devoted to the causality runs from economic performance to banking concentration.

2- Literature Review

Regional and national economic growth is undoubtedly influenced by the activity of banks. Banks, indeed, act as intermediaries between the supply of savings and the demand for loans. Notice that, the latter comes from those who will turn them into productive capital. A widely accepted corollary to this statement is that competitive financial markets would improve the

1- Iran, Islamic Rep, Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Jordan, Kuwait, Kazakhstan, Saudi Arabia, Turkey, Qatar, Yemen, Rep., Pakistan, Oman

intermediation process and help economic growth. In other words, banks would pay higher returns on deposits and ask for lower loan rates, inducing an increase of both savings and investments. As a result, those economies would experience higher rates of economic growth (Valverde, Humphrey, & Fernandez, 2003, p. 228; Cetorelli & Gambera, 2001, pp. 620–621). This also explains why governments and international organizations pay a special attention to promoting a higher degree of efficiency and competitiveness in financial markets.

Coccorese(2007) explores the causality between concentration in the banking industry and economic growth. Two empirical tests are performed for Italy over the period 1991–2001. The results show that while in the short-run economic growth is predominantly caused by banking consolidation, in the long-run a reverse causality direction emerges. Hence, economic expansions tend to reduce market shares and support a stronger competition in the industry. At the same time, there are some other studies prove that, in presence of monopoly power, banks are better motivated to establish lending relationships with firms, facilitating the access to credit lines (Mayer,1988, Mayer, 1990 and Petersen and Rajan, 1995). In this regard, by analyzing credit availability for a cross-section of U.S. small businesses in markets where different degrees of bank concentration exist, Petersen and Rajan (1995) find that firms are less credit constrained in more concentrated banking markets, and younger firms are charged lower loan rates.

Cetorelli and Gambera (1999) provide evidence that bank concentration promotes the growth of those industrial sectors that are more in need of external finance by facilitating credit access to younger firms. Levine, Loayza, and Beck (2000) and Beck, Levine, and Loayza (2000) employ a panel of 74 countries and averaged data-calculated over each of the seven five-year periods between 1961 and 1995. Using dynamic panel methodology proposed by Arellano and Bond (1991), they find out that financial intermediation is positively and robustly associated with economic growth.

Using an extension of the Rajan and Zingales dataset, considering both cross-industry and cross-country characteristics, Cetorelli and Gambera (2001) study whether, for a given size, the market structure of the banking sector has empirical impact on economic growth. They find that the concentration in the banking sector determines a general deadweight loss which depresses growth, impacting all sectors and all firms indiscriminately.

Through studying Egypt's financial structure and its relation to total factor productivity, Bolbol, Fatheldin, and Omran (2005) suggest that bank-based financial development indicators has a positive effect on growth only when associated with higher per capita income. Consider that per capita income is usually associated with better investment culture and more efficiency in financial intermediation.

Fernández and Maudos (2007) analyze the effect of banking competition on industrial economic growth using both structural measures of competition and measures based on the new empirical industrial organization perspective. The evidence obtained in the period 1993-2003 for a sample of 53 sectors in 21 countries indicates that the financial development promotes economic growth. The results also show that bank monopoly power has an inverted U-shaped effect on economic growth. This suggests that banking market power has its highest growth effect at intermediate values. Among the papers which specifically study the impact of the banking market structure on growth, Pagano (1993) shows that imperfect competition in credit markets introduces inefficiencies that could limit firms' access to credit which hinders economic growth. Black and Strahan (2002) discover a negative relationship between banking concentration and the number of new firms in the U.S. However, Patti and Dell'Ariccia (2004), show that firms operating in informationally ambiguous sectors grow more when banking markets are more concentrated.

Mitchener and Wheelock (2011) use a dataset on manufacturing industry-level growth rates and banking market concentration for U.S. states during 1899-1929. They show that banking market concentration generally had a *positive* impact on manufacturing sector growth in the early twentieth century In The United States. The impact had been stronger on industries with lower rates of incorporation and less reliance on bond markets - and, hence, relatively more reliance on banks. At the same time, contrasting results, coming from cross-sectional U.S. data, are offered by Shaffer (1998), who shows that household income grows faster in markets with a higher number of banks.

Taghipour (2008) investigates the relationship between banking development and economic growth in Iran using time series methodologies. The main policy message of the paper is that the banking system development matters for investment and economic growth in Iran.

Therefore, policies that affect financial system are also likely to influence investment and economic growth.

Claessens and Laeven (2005) is the first to analyze the effect of banking competition on economic growth using a measure of competition based on the NEIO[1]. Specifically, Claessens and Laeven (2005) use the results of the previous study (Claessens and Laeven, 2004) in which they calculate the *H*-statistic in 20 countries. Their main conclusion is that the more competitive banking systems reduce *hold-up* problems and the costs of financial intermediation, favouring the access of firms to external finance. Furthermore, given the low degree of correlation between the *H*-statistic and market concentration, the indicators of concentration do not help forecasting sector growth.

Focusing on the market power differences in banking Maudos and Nagore (2005) indicate that market power depends on the business cycles. According to the study, GDP growth variables are statistically, but not economically significant.

Bikker, Spierdijk and Finnie (2007) find out that real growth of GDP as a proxy for the business cycle indicates that collusion markups are procyclical.

As already stated, this paper investigates the presence of a causality relationship between the observed level of banking concentration and economic growth in the countries named in Iran Outlook 2025. Our aim is to assess whether the economy grows more or less rapidly in areas where the banking sector is more concentrated. The topic is motivated by the fact that the causality between concentration in banking industry and economic growth has not been examined in Iran and the countries named in Iran Outlook 2025.

3- Data and Variables

In this paper, we use two main data sources. The first is the bank-level information to estimate bank concentration comes from Fitch-IBCA Ltd. BankScope Database. All data are expressed in US dollars, converted to constant 2000 dollars. The second is GDP growth data, obtained from the World Development Indicators (WDI) data base of the World Bank.

1- New Emprical Industrial Organization.

The panel data set is fairly extensive covering banks in 15 countries and spanning the years 2004 - 2011. The data set is balanced including all banks throughout the entire period.

4- Market structure variables

Bank concentration is measured by the Herfindahl- Hirshman index (HHI). For each country and year, concentration is computed using bank-level data from the Bank Scope database. Taking into account the concentration as a characteristic of the market, the HHI index is calculated as the sum of the squares of the market shares of all banks (commercial banks, savings banks, cooperative banks, etc) in a country. In order to check the robustness of the results, we use the CR4 variables alternatively- market share of the four largest banks in the country.

GDP growth

The rate of real per capita GDP growth is taken as a *GDP growth*. If investment opportunities in an economy are correlated with the business cycle, a positive relationship between business opportunities for banks and the growth rate of the economy may exist.

5- Methodology

In this paper, two variations of Granger causality test are used, namely the standard Granger causality test and Hsiao's version of Granger causality test. These tests are employed when there is no equilibrium relationship between the variables.

Testing for Granger casualty in a VAR framework can be written as:

$$Y_t = \alpha_1 + \sum_{j=1}^{m} \beta_{1j} Y_{t-j} + \sum_{j=1}^{m} \gamma_{1j} X_{t-1} + v_{1t} \quad (1)$$

$$X_t = \alpha + \sum_{j=1}^{m} \beta_{2j} Y_{t-j} + \sum_{j=1}^{m} \gamma_{2j} X_{t-1} + v_{2t} \quad (2)$$

α_i are the constant terms, m is the lag order, and ε_{it} are error terms and assumed to be serially uncorrelated with zero mean and finite covariance

matrix. In order to test causality from *x* to *y*, the null hypothesis (*H01*) is expressed as $\gamma_{1j} = 0$ (*j*=1, 2,…,*m*), and the alternative is at least one of (*j*=1, 2,…*m*) is significantly different from zero. Similarly, *H02* of testing the causality from *y* to *x* is $\gamma_{2j} = 0$ (*j*=1, 2…*m*) against at least one of γ_{2j} is not zero.

According to Granger (1969), if the inclusion of past (lagged) values of *X* still significantly contributes to the explanation of *Y* in a regression of Y on its own past values and all other relevant information, then *X* is said to cause *Y*. Nevertheless, Granger's tests suffer from some shortcomings-most notably that results from causality tests are highly sensitive to the order of lags in the autoregressive process. Thus, an inadequate choice of lag length leads to inconsistent model estimates, making any inferences misleading. However, appropriate identification of lag order for each variable requires some care. Hsiao's (1981) approach—designed specifically to avoid imposing false or spurious restrictions on the model—responds to this concern by combining the Granger concept of causality with the Akaike final prediction error criterion.[1]

Hsiao's (1981) variant of Granger causality is illustrated by the subsequent example that tests Granger causality for two stationary variables, X_t and Y_t. The procedure first requires consideration of the following two models:

$$X_t = \alpha + \sum_{i=1}^{m} \beta_i X_{t-i} + u_t$$

$$X_t = \alpha + \sum_{i=1}^{m} \beta_i X_{t-i} + \sum_{j=1}^{n} \gamma_j Y_{t-1} + v_t$$

where α is a constant term, β and γ are coefficients of exogenous variables, and u_t and v_t are white noise error terms.

The procedure then unfolds as follows: (i) X_t is assumed to be a univariate autoregressive process as in (1), allowing its final prediction error criterion (FPE) to be computed with an order of lags *i* varying from 1 to *m*.

1- For a detailed discussion of Hsiao's version of the Granger causality method, see Hsiao (1981, 1982), Cheng and Lai (1997), and Bajo and Dolores (2002).

To arrive at the smallest FPE, the optimal lag *m** is selected, and the corresponding FPE is denoted as FPE*X* (*m**, 0) to yield the following:

$$FPE(m) = \frac{(T+m+1}{T-m-1} x \frac{SSE}{T}$$

where *T* denotes the number of observations in the regression and *SSE* is the sum of squared residuals.

The determination of causality takes the following form:

(ii) *Xt* is treated as a controlled variable with *m** lags, and the lags of *Yt* are added into (1) as in (2). FPEs are then computed with an order of lags *j* varying from 1 to *n*. To arrive at the smallest FPE, lag *n** is selected and the corresponding FPE denoted as FPE*X*(*m**, *n**) to yield

$$FPE(m^* + n) = \frac{(T+m^*+n+1}{T-m^*-n-1} x \frac{SSE(m^*,n)}{T}$$

(iii) FPE*X* (*m**, 0) is then compared with FPE*X* (*m**, *n**). If FPE*X* (*m**,0) > FPE*X* (*m**, *n**), *Yt* is said to Granger cause *Xt*, whereas if FPE*X* (*m**, 0) < FPE*X* (*m**, *n**) then *Xt* is not Granger caused by *Yt*.

Reverse causality (i.e., whether *Xt* Granger causes *Yt*) is determined by repeating steps (i) to (iii) with *Yt* as the dependent variable.

6- Empirical Results

Standard and Hsiao's Version of Granger Causality

In this paper there are two pairs of variables that are suited for running this test, namely CONC/GG, HHI/GG. Before doing the Granger causality tests, we determine the optimum lag order. Two methods are used separately to choose lag length: minimum information criterion approach and Hsiao's approach for unequal lag length VAR. We calculate MAIC and FPE for the model suggested by Granger (1969) and the result is reported in Table1.

Table 1: Optimal Lag Length That Suggested by Information Criteria in Standard Granger Causality Test

Variables	MAIC	FPE
CONC/GG	2/1	1/1
HHI/GG	2/1	1/1

Optimal Lag Length for two variables CONC and HHI are 2 using MAIC method and 1 using FPE method and Optimal Lag Length for GG is 1 using Two methods.

Full information estimation of equation (1) and (2) is made on each pair of variables. H01: $\gamma_{1j} = 0$ (j=1,2…m) and H02: $\gamma_{2j} = 0$ (j=1,2…m) are examined by using the Wald test. If the latter rejects the null, this indicates the existence of a causal linkage between the two variables. Table 5 presents the results of the *F*-statistics of the Granger causality tests.

Table 2: Standard Granger Causality Test

Null Hypothesis	F-Statistic	Chi-square
CONC $-/\rightarrow$ GG	3.83**	7.67**
GG $-/\rightarrow$ CONC	0.36	0.36
HHI $-/\rightarrow$ GG	4.34**	4.34**
GG $-/\rightarrow$ HHI	8.85***	17.71***

***, **, * Denotes significance at the 1%, 5% and 10% level respectively

The results of Wald test show that economic growth is affected by competition. An increase in banking industry`s concentration leads to a decrease in economic growth.

Results also show that an increase in economic growth causes higher herfindal-hirshman index as a proxy of concentration. However the effect on the best banks (concentration ratio) is not statistically significant.

Table 3: Hsiao's Version of Granger Causality Test

Causality test from GG to CONC		**Causality test from CONC to GG**	
FPE(m^*)	FPE(m^*, n^*)	FPE(m^*)	FPE(m^*, n^*)
0.026	0.027	0.031	0.0324
FPE(m^*) < FPE(m^*, n^*)		FPE(m^*) < FPE(m^*, n^*)	
Null Hypothesis is rejected		Null Hypothesis is rejected	
Causality test from GG to HHI		**Causality test from HHI to GG**	
FPE(m^*)	FPE(m^*, n^*)	FPE(m^*)	FPE(m^*, n^*)
0.0464	0.0469	0.000257	0.000258
FPE(m^*) < FPE(m^*, n^*)		FPE(m^*) < FPE(m^*, n^*)	
Null Hypothesis is rejected		Null Hypothesis is rejected	

We also examine the causal linkage through Hsiao's vrsion of Granger causality test (Table3). The results indicate that there is causality running from concentration to GDP growth and vice versa.

7- Conclusions

This paper investigates the causality direction between banking concentration and economic growth in Iran and the countries named in Iran Outlook 2025. Since this relationship affects the economic performance, this may soundly influence the Central Bank's policy toward banks' merger. Degree of competition is an important aspect of financial sector development and, in turn, economic and external financially dependent sectors are grown faster in more-competitive banking systems.

More specifically, in order to study the causality between the level of concentration in the banking industry and economic growth in Iran, we employed granger-causality tests. The paper explores the tradeoff between the deadweight loss associated with imperfect competition and economic growth.

The impact of banking concentration on economic growth includes two effects. On the one hand, a reduction in banking concentration improves economic growth by enhancing economies of specialization. On the other hand, it causes higher duplication costs which are detrimental for growth. The resultant of those two effects determines how more concentrated banking market influences growth.

Granger causality test is done in both directions: from concentration ratio to economic growth and vice versa. However, the causality from economic growth to concentration ratio is rejected. The results also show that in Iran and the countries named in Iran Outlook 2025, there is a bilateral causality relationship that implies the important role of banking concentration on economic growth. Additionally, regarding Hsiao test, the causality relation from concentration to economic growth is confirmed and vice versa

Finally, considering all tests, results suggest that there is a deterministic, high probable relationship between economic growth and concentration in banking industry in mentioned countries.

Appendix

Causality between Concentration and GDP Growth

Dependent Variable HHI	Coefficients	T- statistics	Dependent Variable GG	Coefficients	T- statistics
C	57.7***	6.06	**C**	24.4***	3.57
CONC(-1)	0.39***	3.36	**CON(-1)**	-0.17***	-2.49
CONC(-2)	0.018	-0.86	**CONC(-2)**	-0.04	-0.6
GG(-1)	-0.02	-0.6	**GG(-1)**	0.15*	1.9
Weighted			**Weighted**		
R^2	0.94		**R^2**	0.80	
D-W	1.98		**D-W**	2.1	
F	93.57		**F**	17.57	
Unwighted			**Unwighted**		
R^2	0.92		**R^2**	0.60	
D-W	2.23		**D-W**	1.84	

*,**,*** indicates significance at the 10%, 5% and 1% levels

Causality between HHI and GDP growth

Dependent Variable HHI	Coefficients	T- statistics	Dependent Variable GG	Coefficients	T- statistics
C	-0.0068	-0.67	**C**	19.25***	5.85
HHI(-1)	0.91***	7.3	**HHI(-1)**	-45.9***	-3.37
HHI(-2)	0.01	0.82	**HHI(-2)**	-4.9	-0.36
GG(-1)	0.001**	2.08	**GG(-1)**	0.15**	2.9
			Weighted		
R^2	0.91		**R^2**	0.81	
D-W	83.1		**D-W**	2.29	
F	305		**F**	18.52	
			Unwighted		
			R^2	0.65	
			D-W	2.05	

*,**,*** indicates significance at the 10%, 5% and 1% level

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