

Investigating internal and external factors influencing profitability of banking industry

Hadi Noori^{a*} and Mehdi Taghavi^b

^aM.Sc. of Economic, Market Risk analyzer of Mellat bank, Iran

^bProfessor and Faculty member, Department of Economic, University of Allame Tabatabaee, Tehran, Iran

ARTICLE INFO

Article history:

Received March 25, 2012
Received in revised format
25 September 2012
Accepted 8 October 2012
Available online
October 11 2012

Keywords:

Return on assets
Banking profitability
Time series analysis

ABSTRACT

This paper presents an empirical investigation to learn the impact of some internal and external factors on profitability in banking system. The proposed model of this paper introduces three econometrics methods to study the behavior of internal, external and a combination of both factors on return on assets. The proposed study of this paper uses Vector Auto- Regressive (VAR) and Vector Error Correction Model (VECM) to provide estimation of the proposed model and we use historical data over the period of 1989-2010. The results of the first model for internal factors, we consider some independent variables including ratio of total revenue on total assets (TR) and ratio of total equities on total assets (TE). The second model considers the effects of external variables on ROA such as growth domestic product (GDP) and market share (MS) and the last model includes a combination of both internal and external factors. The results indicates that there is a positive and meaningful relationship between logarithm of growth domestic product and return on equities, which means as we expect one unit increase in LGDP, there is an increase of 0.012 on ROA. In addition, when the market share increase by one percent, there will be an increase 0.025% increase on ROA and an increase of one percent in the ratio of TR will yield to an increase of one percent in ROA.

© 2012 Growing Science Ltd. All rights reserved.

1. Introduction

During the past few years, there have been tremendous efforts on measuring the impacts of various factors on profitability of banking systems. Khodaei Valahzagh et al. (2012) used some regression analysis on some banking systems and reported that there was no relationship between the inflation rate, employment rate, unemployment rate, the dollar, the euro, with import growth of credit risk in the banking system in Iran. They concluded that the credit risk in the banking system in Iran under the effect of variables was not mentioned. In addition, positive and significant relationship between stock index and credit risk in the banking system in Iran had increased.

* Corresponding author. Tel: +98-912-5146114
E-mail addresses: h.nori@bankmellat.ir (H. Noori)

Khodaei Valahzaghari and Salehi (2012) studied corporate governance and ownership impacts on earning quality in Iranian private banks. They implemented the information of 12 private banks over the period of 2005-2010 using regression analysis based on panel data. Among various factors, the effect of big five shareholder were considered to be significant and positive on earning quality. In addition, the impact of one variable regression test revealed that institutional ownership had positive influence on earning quality. However, the effects of other variables including percentage of ownership concentration, the size of board of directors, reliance on debt, logarithm of sum of assets, return of assets, logarithm of operating cash flow on earning quality were not meaningful. They explained that institutional ownership plays an important impact on earning quality simply because institutions normally have the access on professionals to control management.

Corporate governance is described as the system in which companies are directed and controlled and it includes regulatory and market mechanisms (Ball & Shivakumar, 2008). Bozec and Laurin (2008) investigated that the largest publicly traded companies throughout the world had concentrated ownership especially the ones in countries like Canada where voting rights are concentrated in the hands of large shareholders, mostly wealthy families. Such concentrated ownership structures generates specific agency problems, such as large shareholders expropriating wealth from minority shareholders. They made an assessment on the effect of separation on different performance metrics while controlling for situations when the large shareholder had the chance to expropriate and the incentive to expropriate.

Cain et al. (2009) did a survey on the implementation of income-decreasing special items to manage earnings. They explained that low-quality special items could violate the concept of a transitory item, as they were related to future operating cash flows, while high-quality special items could not. They reported that low-quality special items could forecast accounting restatements, while high-quality special items do not.

Baboucek and Jancar (2005), based on some monthly data for the Czech Banking Sector (1993 to 2005), investigated the proportion of delayed loans to the whole of facilities as an indicator of the quality of loans. Based on the results of the fitted model, the strong relationship between quality of loans and some economic variables for the immediate reaction was confirmed. They reported that unemployment, consumer price index (CPI), inflation and credit risk shocks increase the real exchange rate. They also explained that the stress-test considering the impact of such shocks to the economy of the Czech banking sector fragility measure could be used to further analyzing the results..

2. The proposed study

The proposed study of this paper uses econometrics method to study the behaviour of profitability, which has the following form,

$$ROA = F(Ta, TE, TC, TR, LGDP, LLIQ, LLR, MS), \quad (1)$$

where ROA is the return of asset, TE is capability of equity and it is calculated as a ratio of total equities on total assets, TL is total liquidity and it is calculated as a ratio of total payable cash on total assets, TR is calculated as a ratio of total revenue on total assets, LGDP is logarithm of growth domestic product, LLIQ is logarithm of existing liquidity in economy, LLR is logarithm of official registered rate and finally, MS is market share. The proposed study of this paper uses Vector Auto-Regressive (VAR) and Vector Error Correction Model (VECM) to provide estimation of the proposed model and we use historical data over the period of 1989-2010. The first step for the proposed model of this paper is to understand whether the data are stationary or not. Table 1 shows Dikki-Fuller ratios for all variables and their first order differences.

Table 1
Dikki-Fuller (DF) ratios for independent variables

Variable	Critical value	ADF	Difference	Critical value	ADF	Level of Significance
ROA	-3.79	0.71	dROA	-3.81	-3.9	1%
TR	-3.79	-0.67	dTR	-3.81	-5.03	1%
TL	-3.79	-2.87	dTL	-3.81	-4.06	1%
TC	-3.79	-1.13	dTC	-3.81	-4.98	1%
TE	-3.79	-1.54	dTE	-2.65	-2.69	10%
MS	-3.79	-3.09	dMS	-3.81	-5.32	1%
LLR	-3.79	-2.42	dLLR	-3.81	-4.32	1%
LGDP	-3.83	0.4	dLGDP	-3.03	-3.23	5%
LLIQ	-3.79	-0.67	dLLIQ	-2.65	-2.66	10%

As we can observe, when we take the first difference all adjusted DF (ADF) values become greater than critical values and the results of first difference, [I₁] are stationary.

3. The results

3.1. The effects of internal factors

We first process the the effects of internal factors using the following model,

$$ROA = F(TC, TR, TL, TE), \tag{2}$$

Table 2 summarizes the necessary tests associated with model (2)

Table 2

The results of Schwarz Information Criterion (SBC), Akaike Information Criterion (AIK), Logarithm of lag and Lag

LOGL	SBC	AIK	Lag
398.4296	-34.60043	-36.34296	0
428.0763	-36.06723	-38.30763	1
444.1203	-36.17377*	-38.91203*	2
451.7237	-35.43624	-38.67237	3

Impulse-Response Functions measure the effects of different impulse of residuals (ϵ_t) on independent variables in different time horizons and the results of this function are shown in Fig. 1.

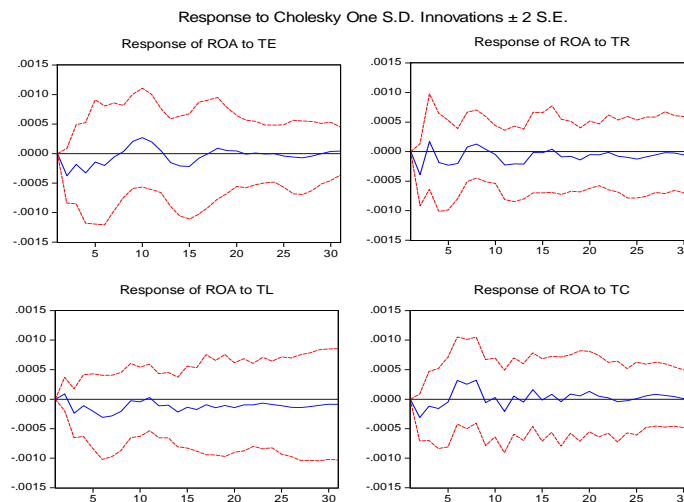


Fig. 1. Response to Cholesky One S.D. Innovations

Johansen and Juselius cointegration analysis (Johansen, 1988-91; Johansen & Juselius, 1994) is another useful method to determine co-integration (Bierens & Martins, 2010) and the number of relationships. The method uses trace and maximum eigenvalues to perform the test and Table 3 and Table 4 show the results of our survey.

Table 3

The results of trace

Hypothotized No of CE(s)	Eigenvalue	Trace statistic	Critical Value (5%)	Prob
None *	0.940729	108.9202	69.81889	0.0000
At most 1*	0.766715	52.40763	47.85613	0.0176
At most 2	0.478196	23.29773	29.79707	0.2317

Table 4

The results of Eigenvalue

Hypothotized No of CE(s)	Eigenvalue	Max-Eigen Statistics	Critical Value (5%)	Prob
None *	0.940729	56.51260	33.87687	0.0000
At most 1*	0.766715	29.10991	27.58434	0.0316
At most 2	0.478196	13.00925	21.13162	0.4514

As we can observe from the results of Table 3 and Table 4, there are at most one CE for the proposed model of this paper. Now we can perform Vector Error Correction Model (VECM) to find the coefficients of the proposed model. Table 5 shows details of our findings,

Table 5

The results of the regression model

Variable	TE	TR	TL	TC	C	ECM(-1)
Coefficient	-0.009119	0.514637	-0.006029	-0.39123	0.001244	-0.653195
t-student	(4.86790)	(-17.8872)	(8.55360)	(10.5613)	(-3.98313)	(-2.04378)

As we can observe from the results of Table 5, all t-student values are statistically meaningful and we can conclude that return of assets (ROA) is a function of other independent variables as follows,

$$ROA = 0.514TR - 0.009TE - 0.006TL - 0.391TC + 0.001$$

In order to build a link between long term and short-term effects of variables we use ECM, which is equal to -0.653195. This value shows that the effects of short term effects are discounted over the long term with a value of -0.653195.

3.2. The effects of external variables

In this section, we repeat the same process for external variables. Fig. 2 shows response to Cholesky one S.D. Innovations. Again we have used Johansen and Juselius cointegration analysis to determine co-integration and the number of relationships and Table 6 and Table 7 show the results of our survey.

Table 6

The results of trace

Hypothotized No of CE(s)	Eigenvalue	Trace statistic	Critical Value (5%)	Prob
None *	0.847446	99.69506	69.81889	0.0000
At most 1*	0.817870	63.97056	47.85613	0.0008
At most 2*	0.629038	31.61289	29.79707	0.0306
At most 3	0.477597	12.77144	15.49471	0.1235

Table 7
The results of Eigenvalue

Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistics	Critical Value (5%)	Prob
None *	0.847446	35.72449	33.87687	0.0298
At most 1*	0.817870	32.35767	27.58434	0.0112
At most 2	0.629038	18.84145	21.13162	0.1015

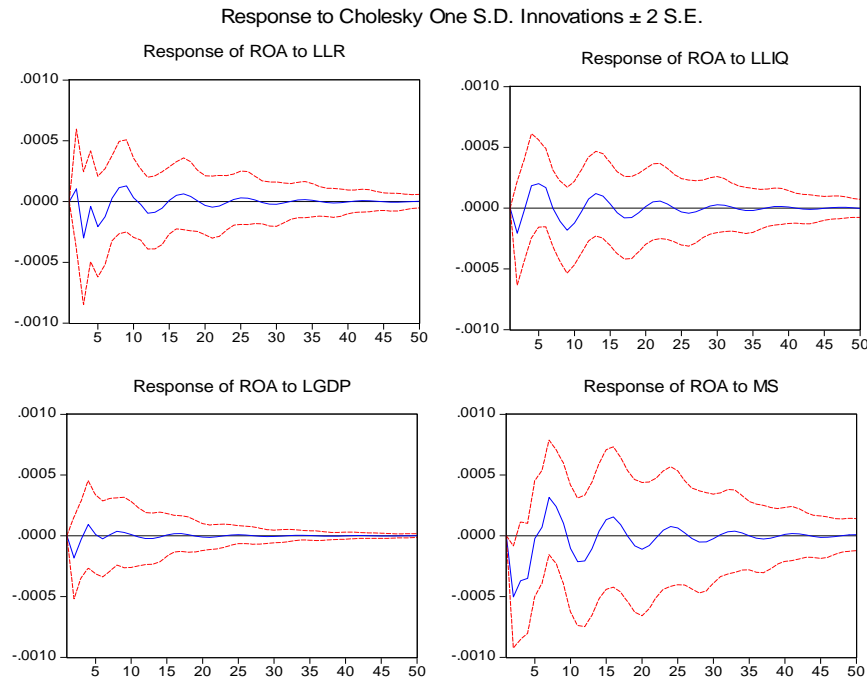


Fig. 2. Response to Cholesky One S.D. Innovations

Once the number of CE(s) becomes clear we can perform Vector Error Correction Model (VECM) to find the coefficients of the proposed model. Table 8 shows details of our findings,

Table 8
The results of the regression model

Variable	LLR	LLIQ	LGDP	MS	C	ECM(-1)
Coefficient	-0.060667	-0.103998	0.300519	-0.266383	-2.728964	-0.052021
t-student	(-5.71020)	(6.66645)	(-7.66401)	(2.71489)	(-3.9831)	(-2.03000)

As we can observe from the results of Table 8, all t-student values are statistically meaningful and we can conclude that return of assets (ROA) is a function of other independent variables as follows,

$$ROA = 0.061 LLR - 0.104 LLIQ + 0.301 LGDP - 0.267 MS - 2.729$$

3.3. The short and long term effects

We now use the following model to consider short and long term relationships,

$$ROA = F(LGDP, TR, MS, TC). \tag{3}$$

Table 9 shows details of the necessary tests including Schwarz Information Criterion (SBC), Akaike Information Criterion (AIK), Logarithm of lag and Lag

Table 9
The results of SBC, AIK, Logarithm of lag and Lag

LOGK	SBC	AIK	LAG
399.0126	-37.35221	-39.05384	0
424.4318	-38.32324*	-40.48987	1
440.3584	-38.29506	-41.03572*	2
449.6781	-37.5714	-40.95238	3

Impulse-Response Functions measure the effects of different impulse of residuals (ε_t) on independent variables in different time horizons and the results of this function are shown in Fig. 3.

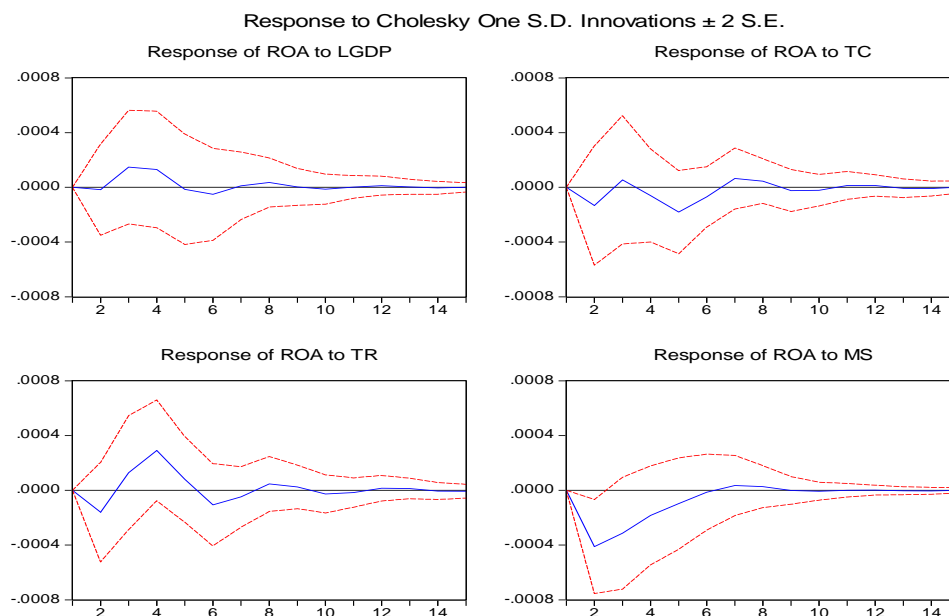


Fig. 3. Response to Cholesky One S.D. Innovations

Again we have used Johansen and Juselius cointegration analysis to determine co-integration and the number of relationships and Table 10 and Table 11 show the results of our survey.

Table 10
The results of trace

Hypothesized No of CE(s)	Eigenvalue	Trace statistic	Critical Value (5%)	Prob
None *	0.880822	104.5683	76.97277	0.0001
At most 1*	0.799596	64.15262	54.07904	0.0049
At most 2	0.566574	33.61166	35.19275	0.0733

Table 11
The results of Eigenvalue

Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistics	Critical Value (5%)	Prob
None *	0.880822	40.41563	34.80587	0.0096
At most 1*	0.799596	30.54096	28.58808	0.0278
At most 2	0.566574	15.88464	22.29962	0.3065

Once the number of CE(s) becomes clear we can perform Vector Error Correction Model (VECM) to find the coefficients of the proposed model. Table 12 shows details of our findings,

Table 12

The results of the regression model

Variable	LGDP	TC	TR	MS	C	ECM(-1)
Coefficient	0.011656	-0.82058	0.5173	0.025455	-0.143907	-0.586215
t-student	(-7.30761)	(8.32174)	(-9.43849)	(-3.46711)	(7.65970)	(-1.66286)

As we can observe from the results of Table 12, all t-student values are statistically meaningful and we can conclude that return of assets (ROA) is a function of other independent variables as follows,

$$ROA = 0.012LGDP + 0.025MS + 0.517TR - 0.821TC - 0.144$$

As we can observe, the results indicates that there is a positive and meaningful relationship between logarithm of growth domestic product and return on equities, which means as we expect one unit increase in LGDP, there is an increase of 0.012 on ROA. In addition, when the market share increase by one percent, there will be an increase 0.025% increase on ROA and an increase of one percent in the ratio of TR will yield to an increase of one percent in ROA.

4. Conclusion

In this paper, we have presented an empirical investigation to learn the effect of some internal and external factors on profitability in banking system. The proposed model of this paper has implemented three econometrics methods to study the behavior of internal, external and a combination of both factors on return on assets. the results indicates that there is a positive and meaningful relationship between logarithm of growth domestic product and return on equities, which means as we expect one unit increase in LGDP, there is an increase of 0.012 on ROA. In addition, when the market share increase by one percent, there will be an increase 0.025% increase on ROA and an increase of one percent in the ratio of TR will yield to an increase of one percent in ROA.

Acknowledgment

This paper is financially assisted by Bank Mellat and the authors would like to thank the officials for their support.

References

- Ball, R., & Shivakumar, L. (2008). Earnings quality at initial public offerings. *Journal of Accounting and Economics*, 45,324-349.
- Bozec, Y., & Laurin, C. (2008). Large shareholder entrenchment and performance: Empirical evidence from Canada. *Journal of Finance & Accounting*, 35, 25-49.
- Bierens, H.J., & Martins, L. (2010). Time varying cointegration. *Econometric Theory*, 26, 1453–1490 .
- Cain, A. C., Kolev, K., & Mc Vay, S. (2009). *A comprehensive analysis of the use of special items to manage earnings*. Working Paper, Purdue University.
- Khodaei Valahzaghari, M., Kashfi, M., Alikhani, A., & Hosseini, S.E. (2012). The effect of macroeconomic factors on credit risk in the banking system of Iran. *Management Science Letters*, 2(5), 1747-1754.
- Khodaei Valahzaghari, M., & Salehi, A. (2012). Impact of the corporate governance characteristics and ownership on earnings quality of the Islamic private banks in Iran. *Management Science Letters*, 2(7), 2607-2614.

- Johansen, S. (1988). Statistical analysis of cointegrating vectors. *Journal of Economic Dynamics and Control*, 12, 231-254.
- Johansen, S. (1991). Estimation and hypothesis testing of cointegrating vectors in Gaussian Vector autoregressive models. *Econometrica*, 59, 1551-1580.
- Johansen, S. (1994). The role of the constant and linear terms in cointegration analysis of nonstationary variables. *Econometric Reviews*, 13(2).
- Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration, with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52, 169-210.