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Internet Banking as Determinant of Pakistan Banking Sector Profitability: ROA & ROE Model

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Abstract

Information and Communication Technology (ICT) has challenged a new infrastructure for the world economy to be truly competitive in this world of globalization, efficiency and accuracy. Internet or online banking system is one of those challenges given by ICT which has become fundamental technology compelled revolution in piloting financial transactions. However, banks have invested huge resources in this direction along with the validation to accept it by users as a useful way. Although, the purpose of this study is to investigate the waves of internet banking transactions on profitability as ROE and ROA of Pakistan banking sector by smearing regression analysis on quarterly collected financial data obtained from statistics department of State Bank of Pakistan for the period of 2004 to 2013. The results demonstrate a positive and significant impact of internet banking on ROE and ROA of Pakistan banking sector overall for the long run.

Keywords: Internet Banking, ROE, ROA, Pakistan

1. Introduction and Research Objective:

21st century and information technology have remained together on the same direction toward enhancing a number of challenges toward redefining the business models especially for financial services industry. Banks and other financial institutes are encountering these challenges by expanding their outreach in the niche markets, adopting new channels of delivery and developing new products though they have augmented their productivity, efficiency and penetration. It's resulted in a win-win situation for both customers and banks as customers are benefitted with easy, fast and efficient modes of financial transactions while hefty profits have been generating for shareholder of banks (Jain & Popli, 2012).

Pakistan is not behind in the race of communication and information technology as technology driven network are increasing day by day along with the usage of ATMs, Credit Cards, Mobile Banking, Debit Cards, Phone Banking, Internet Banking and other products of E-Banking rapidly. The objective of this research is to explore the linkage between performance of banking sector under the umbrella of E-Banking system especially internet banking. Cost saving is a substantial argument for enhancing the profitability and indeed internet or online banking is an appropriate way for moving toward cost saving policy. For example, as per saying of Ameriacan Education E-Payment, there is a decline in payment via cheques from 85% to 59% over the period of 1979 to 2002 in US banking industry along with 41% growth in electronic payments which leaded toward reduction in cost for both sides (customers and Banks). Though by developing an integrated mathematical model to find the impact of internet banking on profitability of banks in form of ROE and ROA, this study will provide a base of motivation and confidence for all banks not only in Pakistan but also other developing countries for adopting the transformation from paper based transaction to electronic on especially internet one. This study will also enhance the confidence of banks' shareholders not only in their existing investments but also for future one. It will be a unique contribution in the literature of Pakistan banking sector, as per the best knowledge of researchers, there is no study till the end of 2013 related to this era and indeed it is expanded topic by itself which can assist the researchers to continue as taking it a base for their work. This paper is structured to be as follows: based on the previous related work, a theory has been developed in section 2. Section 3 enlightens methodology, data descriptions along with identification of variables and conceptual framework. Data analysis and results with discussion are described in section 4 although discussion has been termed in section 5.

2. Related Work and Conceptual Framework

From the year 2006 to onward, number of transactions through internet banking are growing in Pakistan which has been demonstrated in figure 1 (State Bank of Pakistan, 2013).

Therefore, following the aspiration of Pakistan banking sector under the supervision of state Bank of Pakistan to invest heavy resources for introducing internet banking which in itself incorporates risks such as strategic risk, reputational risk, legal risk and operational risk because banks let the external world to in its system, there is need to investigate the return on this investment as each investment has returns in any form whether financial or no financial. Hence in our study, we will find the trend in profitability of Pakistan banking sector contributed by the internet banking transactions. From previous literature, we will bring ROA, ROE in our consideration to measure the performance of banking sector in term of profitability. Birch (1997) has used ROE as measure of profitability as per the availability of data while he preferred ROA. Siam (2006) has argued for ROA. Hernando (2007) have contended in favor of ROE as ROA can be differ among industries due to the presence of an optimum borrowing level while ROE remains same among the industries. Because of this conflict, in our work, we incorporate both ROE and ROA. On the other hand, internet banking or online banking assists customers to accomplish financial transactions through safe website functioned by any bank or other entity (Demoulin, 2013). Such banks will provide this service to all its customers who owned accounts but it's up to the choice of customer to avail it or not (Lili Tao, 2013). In Pakistan, these services are provided in two forms such as "View only" and "transactional only". As in the first one, the customer cannot communicate with the banks in the sense of conducting any transaction but in the second one, it can be possible.

Although, there are many studies have been conducted in this era of research as Carvalho and Siegel (2002) explored in the return of investment for online banking. It was an analysis of financial account aggregation in which the return has been evaluated through using EBIT (Earnings before Interest and Taxes) and NPV (Net Present Value). The sample of this study covered three banks sized according to their number of customer online accounts over the five consecutive years. The results demonstrated that Account Aggregation Services will result in losses for financial institutes particularly banks if it will work without cross-selling especially in long term when it will converted into a commodity. Hernando and Nieto (2007) endeavored to identify and estimate the adoption of transactional website on financial performance of commercial banks. The sample of study covered 72 commercial banks operating in Spain for the period of 1944 to 2002. The results indicated that its take time to appear the impact on performance. The acceptance of the Internet as a distribution passage contains a gradual decrease in overhead expenditures (chiefly for staff, marketing and IT). This effect is statistically significant over one and a half years after adoption. The cost lessening decodes into an enhancement in banks' profitability, which signifies after one and a half years in relations to ROA and after three years in footings of ROE. Onay, Ozsoz and Helvacioglu (2008) studied about impact of internet banking on banks' profitability in form of ROE and ROA by using bank specific as well macroeconomics control variables. The sample of this study includes 13 banks which adopting online banking in Turkey for the period 1996 to 2005. Results demonstrated a positive contribution to ROE from internet banking with a time lag of 2 years which is confirming the findings of Hernando and Nieto (2007). As per the best knowledge of researchers, our study is unique on the basis of following characteristics:

- As it is the first effort to develop the integrated mathematical model to search out the relation between profitability of Pakistan banking sector and internet banking. In the literature, there is no single study is till 2013, which has explored this relation ever which is as a separate topic by itself
- It is accompanied with the future directions of research as well as a motivation for all financial institutes who have to or are in process of transforming from paper based to internet based transactions with customers, that this investment has a positive and significant impact on their profitability along with efficiency, customer satisfaction, speed in services delivery, convenience and many more.

3. Data Description & Methodology

3.1. Population of Study

Population of this study has included all the banks operating in banking industry of Pakistan during the period under consideration. Total 46 banks have been listed as per their categories at June 30, 2013 by State Bank of Pakistan (Figure 2)

3.2. Sample of Study

To make the results more representative and comprehensive, Total 46 banks along with all Islamic bank branches operating by conventional banks are incorporated in the sample. Indeed 14 conventional banks are running out and out Islamic banking.

3.3 Time period of Study:

The study is conducting over the time period of December 2004 to June 2013. Hence to fetch the most appropriate results, data for internet banking and all other variables has been collected quarterly.

3.4. Data Collection:

As per the side of practical exposure, assistance from PSD (Payments Systems Department) of SBP (State Bank of Pakistan) has been seeking to get the data on all transactions through internet banking with the support of banks while for measuring the bank's performance, quarterly data issued by the statistics department with the collaboration of "Off-site Supervision & Enforcement Department, SBP has been taken into consideration.

3.5 Model Specification:

Internet is the root cause of success for globalization, its impact on life is obvious same as in banking sector. In our study, efforts are centered on finding the impact of internet banking on profitability of banking sector in Pakistan. Commonly the measures for profitability are

- ROA (Return on Assets),
- ROE (Return on Equity),
- Gross profit margin
- Dividend payout ratio

Hence in this study, we follow a pragmatic model based on prior works by Demirguc and Huizinga (1999), Athanasoglou (2008) and Aburime (2008) in which ROA & ROE used a measure of performance in banking sector. On the bases of that model, following regression equation has been derived:

$$Y_t = \beta_0 + X_1\beta_1 + X_2\beta_2 \dots\dots\dots X_t\beta_t + \varepsilon_t$$

Wherein:

- Y_t = ROA & ROE
- β_0 = X-intercept
- X_t = Independent variables
- $\beta_1, \beta_2, \beta_3 \dots \beta_t$ are incorporated as beta values
- ε_t = Error term
- t = Time period.

Following equations have been derived from the above equation as the short codes and signs have been defined in table 1:

$$ROA = \beta_0 + \text{INTB}\beta_1 + \text{CR}\beta_2 + \text{SD}\beta_3 + \text{OP}\beta_4 + \text{LR}\beta_5 + \text{NPLADV}\beta_6 + \text{INTRCST}\beta_7 + \varepsilon_t \quad (1)$$

$$ROE = \beta_0 + \text{INTB}\beta_1 + \text{CR}\beta_2 + \text{SD}\beta_3 + \text{OP}\beta_4 + \text{LR}\beta_5 + \text{INTRCST}\beta_6 + \varepsilon_t \quad (2)$$

3.6. Identification of variables and framework

ROA and ROE are the dependent variables while the remaining (Operating Performance, Credit Risk, Spread, Lending Rate, Internet Banking Transactions, Non-performing loans to advances and intermediation cost are independent variables which have been calculated from the financial statements of all banks as consolidated included in sample. While non-financial factors as customer satisfaction, efficiency, reputation, efficiency are taken as control variables. The frame work has been defined through figure 3.

4. Data Analysis and Results

Table 2 summarized the characteristics of data, which included total 35 observations. Among them, ROE owned the highest mean, median, standard deviation and maximum value while INTB has Minimum value because the starting quarters of considered period owns zero values.

Table 3 describing the correlation among the independent and dependent variables as ROE and ROA are independent variables while the remaining are dependent variables.

Following equation has been derived by fitting the values of coefficient mentioned in table 4 into equation number 1 of regression analysis:

$$\text{ROA} = 1.73 + 0.26(\text{INTB}) - 0.063(\text{CR}) + 0.99(\text{SD}) + 0.025(\text{OP}) - 0.14(\text{LR}) + 0.06(\text{NPLADV}) - 1.5(\text{IMTRCST}) + \varepsilon_t$$

Table 4 summarized the overall results of constructed model as that R^2 (0.9251) and adjusted R^2 (0.900) mean that ROA of all banks in Pakistan as per sample will be effected by 93% and as per the adjustment by 90%, if any change (positive or negative) occurs in independent variables. F-Statistics (37.10) explains a linear relationship between all independent variables and ROA of Pakistan banking sector. Prob. (F-statistics) is zero which describes that overall results of the model are significant. Durbin - Watson is 1.4538 approximately 1.5 indicates that all the independent variables are not correlated to one another. The focus of interest in our study is the variable INTB (The transactions of bank done through the internet banking out of the total transactions. Total transactions included paper based as well electronic). In the table 4, the probability of INTB for ROA, is 0.0984 with a coefficient of 0.26 specify that INTB has positive and significant (At the level of 10%) impact on performance of Pakistan banking sector. The results are in accordance with the study by Onay, Ozsoz and Helvacioglu (2008) which investigated about the impact of internet banking on the profitability (Both in the form of ROA and ROE) of 13 banks in Turkey over the period of 1996 to 2005.

Following equation has been derived by fitting the values of coefficient mentioned in table 5 into equation number 2 of regression analysis:

$$ROA = 20.41 + 4.65(INTB) + 1.77(CR) + 13.27(SD) -0.11(OP) – 1.18(LR) – 27.02(IMTRCST) + \varepsilon_t$$

Table 5 summarized the results of regression analysis among ROA and above defined variables in equation 2. As R^2 (0.91) and adjusted R^2 (0.88) mean that ROE of all banks in Pakistan as per sample will be effected by 91% and as per the adjustment by 88%, if any change (positive or negative) occurs in independent variables. F-Statistics (36.02) explains a linear relationship between all independent variables and ROE of Pakistan banking sector. Prob. (F-statistics) is zero which describes that overall results of the model are significant. Durbin - Watson is 1.27 approximately nearest to 1.5 indicates that all the independent variables are not correlated to one another. The INTB (The transactions of bank done through the internet banking out of the total transactions. Total transactions included paper based as well electronic) is related to ROE positively with the probability of 0.0099 (Significant at level 1%) along with 4.65 coefficient. The results are in accordance with the study by Onay, Ozsoz and Helvacioglu (2008) which investigated about the impact of internet banking on the profitability (Both in the form of ROA and ROE) of 13 banks in Turkey over the period of 1996 to 2005.

5. Conclusion:

The purpose of this study has been circulated around a specific product of E-Banking such as internet banking because to find out the overall impact of E-banking on the performance of banks has not been clearly described in the literature. So in this study, linkage between internet banking and performance of Pakistan banking sector in term of ROA and ROE has been explored by using the regression analysis on quarterly collected financial data from statistics department of State Bank of Pakistan (SBP) over the period of 2004 to 2013. In the model, other variables are also incorporated such as spread, credit risk, weighted average lending rate, NPL to total advances, intermediation cost and operating performance to expand the area of study toward the internal factor of banks which can affect their profitability.

On the other hand, non-financial factors such as customer satisfaction, speed, efficiency etc. have been controlled in the model. The results of ordinary least square have proved that internet banking has a positive and significant impact on profitability of Pakistan banking sector for the period of 2004 to 2013. For future researchers, the same model can be applied on the other measures of performance like CAMELS or CAELS instead of ROA and ROE. Another for future research can be exploring impact of debit cards in linkage with currency demand for a country especially Pakistan. The future researchers can be encountered with some limitations as internet banking is an emerging area so to get data on it is difficult and if available it is consolidated for whole banking industry hence for individual entity to collect is difficult. On the other hand the relevant data on the topic and especially for E-banking in reference to Pakistan is not enough and easy available except the periodic reports of banks.

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Table 1. Signs, codes with description used in Equations 1 and 2

Signs	Short Code	Description
ROA	ROA	Net Income/ Total Assets
ROE	ROE	Net Income/ Shareholder's equity
INTB	INTB	Internet Banking as share of transactions through internet banking in total Transactions of banking sector in Pakistan
CR	CRDRSK	Credit risk (Loan loss provision/Total loan)
SD	SPREAD	Interest charged on advances-interest paid on deposits
OP	OPINAST	Operating Performance (Operating income/Total Assets)
LR	WALR	Weighted Average Lending Rate
NPLA	NPLADV	NPL to Advances Ratio
INTRCST	IC	Cost of intermediation
β0	β0	Constant Coefficient for the regression model
β1 to β7	β1 to β7	Constant Coefficient for Independent Variables

Table 2. Summary Statistics

Variables	Mean	Median	Standard Dev.	Count	Min	Max
ROA	1.45	1.38	0.36	35.00	0.90	2.13
ROE	16.36	15.10	5.61	35.00	8.73	28.32
CRDRSK	4.53	4.67	0.72	35.00	3.06	5.45
OPINAST	1.01	0.97	0.50	35.00	0.32	1.99
WALR	11.16	11.54	1.84	35.00	6.08	13.83
SPREAD	6.49	6.65	0.54	35.00	4.79	7.24
NPLADV	3.54	3.73	1.59	35.00	0.68	6.42
INTRCST	3.25	3.37	0.32	35.00	2.65	3.71
INTB	0.53	0.36	0.45	35.00	0.00	1.58

Table 3. Correlation among the Variables

	ROE	*ROA*	*CRDRSK*	*OPINAST*	*WALR*	*SPREAD*	*NPLADV*	*INTRCST*	*INTB*
ROE	1.00								
ROA	0.85	1.00							
CRDRSK	-0.51	-0.73	1.00						
OPINAST	0.13	0.10	0.02	1.00					
WALR	-0.74	-0.38	0.27	-0.10	1.00				
SPREAD	-0.39	-0.02	-0.04	-0.01	0.82	1.00			
NPLADV	-0.46	-0.52	0.82	-0.19	0.44	0.06	1.00		
INTRCST	-0.85	-0.63	0.52	-0.06	0.92	0.71	0.53	1.00	
INTB	-0.49	-0.37	0.46	-0.17	0.47	-0.02	0.71	0.43	1.00

Table 4. Ordinary Least Square: Regression Analysis of ROA and Internet Banking

Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.727189	0.701611	2.461749	0.0226
CRDRSK	-0.063476	0.098249	-0.646071	0.5252
SPREAD	0.994638	0.149998	6.630992	0.0000*
OPINAST	0.025268	0.051735	0.488406	0.6303
WALR	-0.142118	0.089773	-1.583093	0.1283
NPLADV	0.062983	0.043002	1.464665	0.1578
INTB	0.257688	0.148991	1.729549	0.0984**
INTRCST	-1.599790	0.364585	-4.387979	0.0003*
R^2			0.925183	
Adjusted R^2			0.900244	
F-statistic			37.09779	
Prob.(F-statistic)			0.000000	
Durbin-Watson stat			1.453812	

* Value is significant at 1% level

** Value is significant at 10% level

Table 5. Ordinary Least Square: Regression Analysis of ROE and Internet Banking

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.41552	8.924122	2.287679	0.0321
CRDRSK	1.775275	1.054836	1.682986	0.1065
SPREAD	13.26922	1.999314	6.636886	0.0000*
WALR	-1.181054	1.075531	-1.098113	0.2840
INTB	4.654297	1.648553	2.823261	0.0099*
OPINAST	-0.108669	0.696068	-0.156119	0.8774
INTRCST	-27.02155	4.127662	-6.546454	0.0000*
R^2				0.907610
Adjusted R^2				0.882413
F-statistic				36.02031
Prob.(F-statistic)				0.000000
Durbin-Watson stat				1.271328

* Value is significant at 1% level

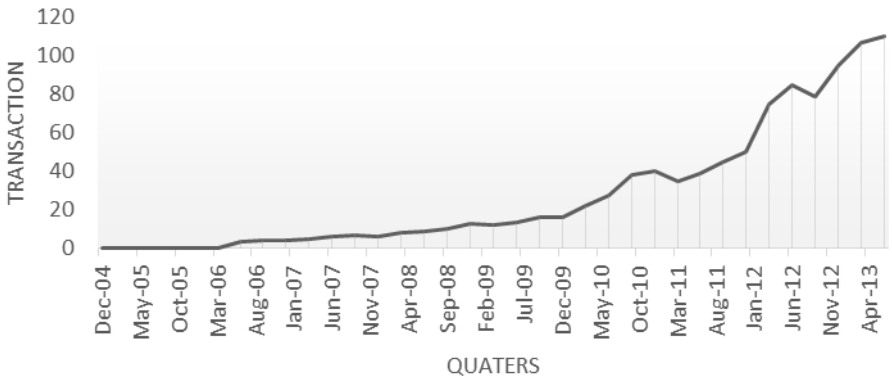

Figure 1. Trend of Transactions through Internet Banking

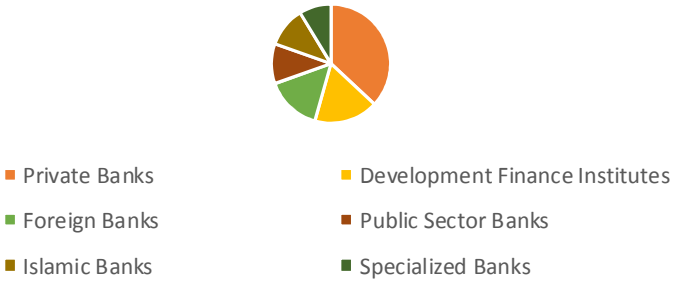

Figure 2. Categories of banks in Pakistan

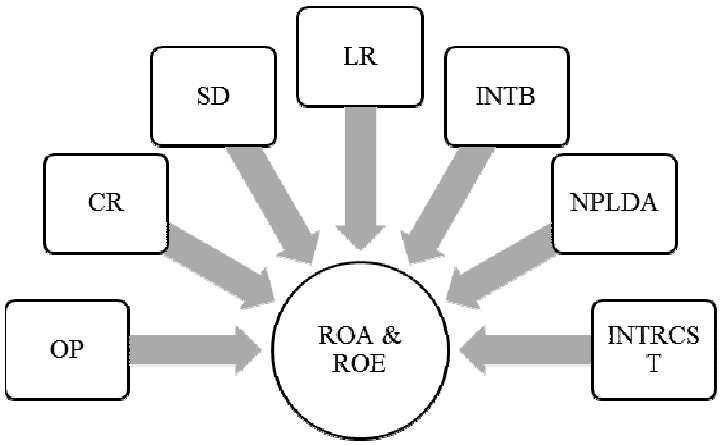

Figure 3. Conceptual Framework