Impact of Internet Banking on Financial Performance: Empirical Evidence from Commercial Banks of Ethiopia

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Abstract

The main objective of this study was to examine the impact of internet banking on financial performance, empirical evidence of commercial banks of Ethiopia. Specifically, the study empirically examined impact of internet banking, bank liquidity, capital adequacy, bank size, cost efficiency, deposit to asset ratio and inflation on financial performance. This study adopted explanatory research design with arrangement of secondary method of data collection via document analysis, panel, quantitative approach and deductive method of inquiry. The sample of this study was taken 10 banks covering the period 2010-2016. Descriptive and regression analysis were performed to analyze the data using Stata version 12. Besides, econometric model estimation procedures and specification tests plus multiple regression assumptions were tested. Accordingly, random effect regression model was chosen. The results of random effect regression analysis revealed that capital adequacy and cost efficiency were positively associated to banks financial performance, whereas bank liquidity, deposits to asset ratio and inflation was negatively correlated with banks financial performance. However, internet banking and size of banks has positive and negative respectively but statistically insignificant relationship with financial performance of banks in Ethiopia. Therefore, in the case of Ethiopia banks, internet banking and bank size has not considered as a factor that impact on financial performance of Ethiopia banks.

Keywords: Internet banking, financial performance, multiply regression and Commercial banks of Ethiopia.

1.1. Introduction

To date, the rapid spread of Internet banking all over the world its acceptance as an extremely cost effective and efficient delivery channel of banking services as compared to other existing channels (Zarei, et al.,2008). Internet banking in the world that was built in 1981 in USA, after that some famous bank introduced their internet banking one after another, such as Citibank and bank of America (Malak, 2007). Banking through internet has emerged as a strategic resource for achieving higher efficiency, control of operations and reduction of cost by replacing paper based and labour intensive methods with automated processes thus leading to higher productivity and financial performance (Malhotra, 2009). Internet banking is a new age banking concept; it uses technology and brings the bank closer to the customer. Internet banking refers to systems that enable bank customers to get access to their accounts and general information on bank products and services through the use of banks website, without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations (Thulani., et al, 2009).

The modern internet banking methods are new to the Ethiopian banking sector, all banks in Ethiopia are too late to move with technological advancement and they should clearly chart out the time plan for their integration and technological advancement (Gardachew, 2015). Based on the banking empirical literature different studies have been conducted in different parts of the world in order to identify the impact of internet banking on financial performance of banks, such as (K., 1998) Study in US bank result of study that show there was no evidence of difference in the financial performance of the internet and non- internet banking. In contrast to the results of (K., 1998), (Furst, 2000a, 2000b, 2002a and 2002b) found that banks in all size categories offering Internet banking were generally better performance and tended to rely less significantly on traditional banking activities in comparison to non-Internet banks. (Deyoung, 2001 & 2005) Study conducted in US, 12 internets only banking in 1997 and 2001 the result was poor financial performance but higher assets growth of pure play internet banking. (Sathye, 2005), studies conducted in Australia during 1997-2001in credit union the result show internet banking doesn't have a significant impact on financial performance and risk profile. However, the findings in different firms revealed that mixed and contradicting results of internet banking on banks performance. In comparison with this research studies carried out in the developed countries, to the best of the researcher knowledge, no study has not yet examined on the impact of internet banking on financial performance of commercial banks in Ethiopia. Due to this background the main purpose of this study also proposes and tests the existence of financial performance gaps between internet banks and non-internet banks in Ethiopia.

1.2. Review of Related Literature

Internet banking: is defined as the use of internet and telecommunication networks to deliver a wide range of value added products and services to bank customers (Steven, et,al 2002).Through the use of a system that allows individuals to perform banking activities at home or from their offices or over the internet. Internet banking through traditional banks enables customers to perform all routine transactions, such as account

transfers, balance inquiries, bill payments, and stop-payment requests, and some even offer online loan applications. Customers can access account information at any time, day or night, and this can be done from anywhere. Internet banking has improved banking efficiency in rendering services to customers (Karuik, 2005).

1.3. Empirical Literatures on Impacts of Financial Performance

There are different empirical studies exist in the world which are examined on impact of internet banking on banks financial performance, such as Delgado et al. (2006), Punjab et al. (2009), (K., 1998) (Furst, 2000a, 2000b, 2002a and 2002b) and (Sathye, 2005). However, the findings revealed that mixed and contradicting results of internet banking on banks financial performance.

England, et al. (1998) was the most important study, which estimated the number of US banks offering internet banking and analyzed the structure and performance characteristics of these banks. It establish no evidence of major differences in the performance of the group of banks offering Internet banking activities compared to those that do not offer such services in terms of profitability, efficiency or credit quality. However, transactional Internet banks differed from other banks primarily by size.

In contrast to the results of England, et al. (1998), Furst et al. (2000a, 2000b, 2002a and 2002b) found that banks in all size categories offering Internet banking were generally more profitable and tended to rely less heavily on traditional banking activities in comparison to non-Internet banks. An exception to the superior performance of Internet banks was the new start-ups Internet banks, which were less profitable and less efficient than non-Internet banking. The authors concluded that Internet banking was too small factor to have affected banks profitability.
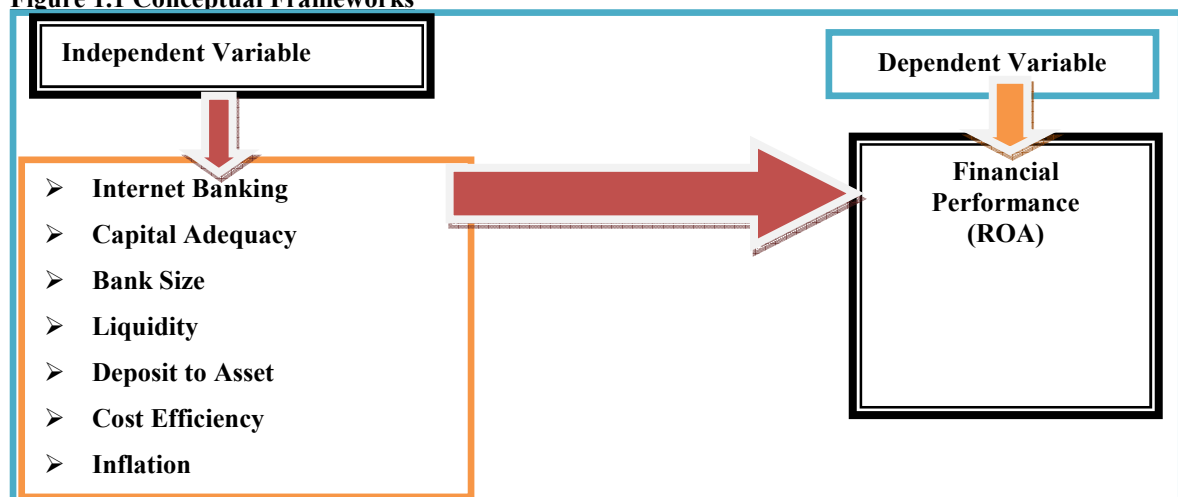
Sullivan (2000) found that click and mortar banks in the 10th Federal Reserve District incurred somewhat higher operating expenses but offset these expenses with somewhat higher fee income. On average, this study found no systematic evidence that banks were either helped or harmed by offering the Internet delivery channel. Similar to the results of Furst et al., this study also found that de novo click and mortar banks performed significantly worse than de novo brick and mortar banks.

Hassan et al. (2003) study result says that the Internet banking institutions were performing significantly better than the non-Internet groups. Additionally, the risk variables associated with the Internet group continued to be lower relative to the non-Internet group. According to Carlson, (2001) conducted study in U.S.2517 national banks on impact of internet banking on financial performance. The result is revealed that internet banking is not having an independent impact on financial performance.

1.4. Conceptual Framework for the study

The conceptual framework was the mental picture of the relationship between the independent variables, and dependent variable of the study.

Figure 1.1 Conceptual Frameworks

2. Research Methodology

This focus on the manner in which the study had been conducted to address the objectives of the study stated in the introductory chapter. It greatly concern research approach and design, type of data and data collection techniques, sampling mechanisms including sample size, method of data analysis and measurement of variables included in the regression model and model specification.

2.1. Research Design and Approach

The choice of research design depends on objectives that the researchers want to achieve (Admas, 2007). The study would be used explanatory research design. Explanatory research design it examines the cause and effect relationships between dependent and independent variable (Kothari, 2004)**.**

2.2. Population, Sampling and Sampling Technique

The populations of this study would be including all commercial banks in Ethiopia which are 18 in number. A sample consists of a panel of ten (10) commercial banks from the total population of 18 banks operated in the Ethiopia.

2.3. Data type and source

The type of data for this study was use secondary data for the period 2010-2016. Data for this study would be obtained from the National Bank of Ethiopia (NBE).

Summary of Measurement of Dependent and Independent Variables

No	Dependent Variable	Symbol	Measurement	Expected Sign
	Return on Asset	ROA	Net income before tax / Total Assets	
Independent Variable				
1.	Internet Banking	INT	Dummy variable that take (1) for the bank who adopted internet banking and zero otherwise	+
2.	Bank Liquidity	BLD	Current asset /Total Asset	-
3.	Capital Adequacy	CAD	The ratio of Equity Capital to Total Assets.	+
4.	Bank Size	BAS	Logarithm of the value of total assets	+
5.	Deposit to Asset	DTA	The ratio of Total Deposit /Total Assets	+
6.	Cost Efficiency	CEF	Total Operating Expense / Total Income	_
7.	Inflation	INF	Average Consumer price index	_

2.4. Hypothesis of the Study

H_1: Internet banking and financial performance are positively associated.
H_2: Bank liquidity and financial performance have negative relationship.
H_3: Capital adequacy and financial performance are positive relationship.
H_4: Bank size and financial performance have positive associated.
H_5: Deposit to asset and financial performance are positive relationship.
H_6: Cost efficiency and financial performance are negative associated.
H_7: Inflation and financial performance have negative relationship.

3. Econometric Model specification and Data Analysis

This study used Panel data multiple regression to determine the impact of internet banking on financial performance of selected Ethiopian banks by including the dependent and independent variables of the study. Internet banking is a dummy variable that affect bank performance and capital adequacy, bank size, cost efficiency, deposit of assets and inflation (Carlson, 2001). Hence, the following regression model will be specified with some modification depending on prior studies on the issue under investigation such as (Sathye, 2005); (K., 1998), (Furst, 2000a, 2000b, 2002a and 2002b).

$$Y_{it} = \beta_0 + \beta_1 {}^* INT_{it} + \sum \beta_i X_{it} + \varepsilon_{it} \ \ldots\ldots\ldots\ldots\ \text{(Equation-1)}$$

Where
$Y_{it} =$ Dependent variable of bank i at time t,
$INT_{it} =$ Internet banking is a dummy variable equal to 1 for internet banks and zero otherwise
$X_{it} =$ the control variables for bank i at time t,
$\varepsilon_{it} =$ the disturbance term
$I =$ indexes bank level observations
$t =$ indexes time in years.

Equation -1 is extended to include all explanatory as follows,

$$Y_{it} = \beta_0 + \beta_1 {}^* INT_{it} + \beta_2 CAD_{it+} + \beta_3 BAS_{it+} + \beta_4 BLD_{it} + \beta_5 DTA_{it+} + \beta_6 CEF_{it} + \beta_6 INF_{it+} \varepsilon_{it}$$

Where

$Y_{it} =$ Financial Performance of bank i at time t,

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INT $_{it}$ = Internet is a dummy variable equal to 1 for Internet banks and zero otherwise
CAD$_{it}$ = Capital adequacy of bank i at time t,
BAS$_{it}$ = Bank size of i at time t.
BLD$_{it=}$ Bank Liquidity of i at time t
DTA$_{it}$ = Deposit to Assets of bank i at time t
CEF$_{it}$ = Cost Efficiency of bank i at time t.
INF$_{it}$ = Inflation of bank i at time t.
ε_{it} = the disturbance term I at time t.
i = indexes bank level observations
t = indexes time in years
β_1, β_2, - β_7 are the parameters estimate/coefficient of the independent variables.

3.1. Method of Data Analysis
This study was used descriptive and inferential statistics. Mean, standard deviation, minimum, and maximum is calculate and present in tables for the purpose of descriptive analysis. For inferential statistics, the researcher used STATA software version 12 Outputs determines the relationship between the dependent and independent variables. Econometric model specification tests including Chow-test, Breusch and Pagan Lagrange Multiplier test and Hausman-test was used to select the best suited model among pooled regression model, fixed effect model, and random effect model. In the same fashion, diagnostic tests for the classical linear regression model assumptions would be carried out.

3.2. Econometric Model Estimation Procedures and Specification Tests
The main objective of this study was to examine the impact of internet banking on financial performance of Ethiopian banks using panel data collected from annual financial report. Panel studies begin by making comparison among three models, pooled regression model, fixed effect model, and random effect model while estimating econometric models. Therefore, the choice among pooled regression model, fixed effect model and random effect model is very important as it largely influences conclusions on the individual coefficients (Gujarati, 2003). Specification tests and determination of appropriate panel data model were carried out by using F- test, Breusch and Pagan Lagrange Multiplier test, and the Hausman test to select the appropriate model.

Therefore, from the results of the F-test, Breusch and Pagan Lagrange Multiplier test and Hausman-test, the best model used in this study was Random effect regression model. Hence, the regression results of the random effect model were used for statistical inference and further analysis of the individual coefficients.

4. Diagnostic Tests for Classical Linear Regression Model Assumptions
4.1. Normality Test
Normality assumption is required in order to conduct single or joint hypothesis tests about the model parameters (Brooks C. , 2014).

4.2. Zero Mean Value of Errors
The first assumption required in the classical linear regression model is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated (Brooks, 2014) (Gujarati, 2003).

4.3. Multicollinearity Test
The assumption here is explanatory variables are not correlated with one another. A problem occurs when the explanatory variables are very highly correlated with each other, and this problem is known as multicollinearity (Brooks, 2014). Therefore, multicollinearity between the explanatory variables is not considered to be a problem here.

4.4. Model Specification Test
One of the assumptions of the classical linear regression model (CLRM) is that the regression model used in the analysis is correctly specified. Ramsey RESET test was performed for model specification with null hypothesis that the model has no omitted variables and its result was statistically insignificant supporting the null hypothesis.

4.5. Heteroscedasticity Test
The variance of the errors is constant which is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedasticity. If there is heteroscedasticity, the standard errors could be wrong and hence any inferences made could be misleading (Brooks, 2014). Modified Wald test was

used to test heteroscedasticity with null hypothesis that variance of errors is homoscedastic. Result of this test was statistically insignificant indicating that there is no existence of heteroscedasticity.

4.6. Autocorrelation Test

It is assumed that the errors are uncorrelated with one another otherwise there is autocorrelation. In fact, the consequences of ignoring autocorrelation when it is present are similar to those of ignoring heteroscedasticity. There exists the possibility that the wrong inferences could be made about whether a variable is or is not an important determinant of variations in the dependent variable (Brooks, 2014). Wooldridge test was used to test autocorrelation with null hypothesis that there is no first order auto correlation. However, Wooldridge test indicated statistically significant result supporting autocorrelation.

4.7. Empirical Results of Regression Analysis and Discussion on financial performance.

This section presented the overall empirical result of regression analysis on impact of internet banking on financial performance with empirical evidence of Commercial banks of Ethiopia. The dependent variable of this study is financial performance (ROA) and the independent variable of the study is internet banking, it is a dummy variable for banks adopted internet banking that take a value of one and otherwise zero and there is a control variable such as capital adequacy, banks liquidity, banks size, cost efficiency, deposit to asset ratio and inflation. Based on the econometric estimation of F-test, Breusch and Pagan Lagrange Multiplier test and Hausman-test, the best suited model used in this study was random effect regression model. The regression result was discussed as follows:

The result of random effect regression model the impact of internet banking on financial performance the coefficient of determination, R square and adjusted R square measures the proportion of the variation in dependent variable explained by the independent variables jointly (Gujarati 2004). The result R square and adjusted R square talk about the joint significance of the independent variables presented in the **Table 4.1**. The regression output reveals that the dependent variable is well explained by the explanatory variables in the model with R square and adjusted R square of 56.63% and 50.48% respectively and the rest of the variation of financial performance were not explained by the explanatory variables included in the model of this study. The F-statistic regression result was with P- value of zero (Prob > chi^2 =0.0000) and that also statistically significant, suggesting that variations in the dependent variable are well enough explained by the regresses in the model.

ROA	Coefficients	Robust Std. Err.	T	P>|t|
INT	.0043191	.0035879	1.20	0.229
BAS	-.0033645	.0035427	-0.95	0.342
BLD	-.0194789	.0090729	-2.15	0.032**
CAD	.0766068	.0457923	1.67	0.094***
CEF	.1083537	.0391354	2.77	0.006 *
DTA	-.0722334	.0289456	-2.50	0.013 **
INF	-.0000225	7.82e-06	-2.88	0.004 *
Con	.0212611	.0396367	0.54	0.592

Note: *, **, and *** = significant at 1%, 5%, and 10% significance level respectively

5   Conclusions

The results of empirical evidence from the econometric regression analysis of random effect model revealed that independent variables including: bank liquidity, capital adequacy, cost efficiency, deposit to asset ratio and inflation were statistically significant to explain banks financial performance of commercial banks of Ethiopia. Specifically, the result of the study indicates that capital adequacy and cost efficiency was positively associated to banks financial performance, whereas bank liquidity, deposit to asset ratio and inflation was negatively correlated with banks financial performance. Hence, those banks with, higher capital adequacy, lower liquidity, higher cost efficiency, lower deposit asset ratio and lower inflation established better banks financial performance than those with lower capital adequacy, higher liquidity, lower cost efficiency, higher deposit to asset ratio and higher inflation established banks in Ethiopia. However, internet banking and size of banks has positive and negative respectively, but statistically insignificant relationship with financial performance of banks in Ethiopia. Therefore, in the case of Ethiopia commercial banks, internet banking and bank size have not considered as a factor that impact on banks financial performance.

6.   Implications of the Study

Research is significant for many reasons. First, it is undertaken to contribute to existing information about issues by providing additional results to confirm or disconfirm results of prior studies and add value to existing knowledge. Second, it is undertaken to suggest improvements for practice. Third, it provides information to

policy makers (Creswell, 2012). Accordingly, the findings of this study have theoretical, practical and policy contributions and suggestions.

6.1. Implications for Policy Makers and Regulators

Internet banking is a new age banking concept it uses technology and brings the bank closer to the customer. Internet banking refers to systems that enable bank customers to get access to their accounts and general information on bank products and services through the use of banks website, without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations (Thulani, et al 2009). Based on the finding the policy makers focus on the awareness, uses and adoption of internet banking on the banking industry in Ethiopia.

6.2. Practical Implications for Banks

The finding of this study was suggested that commercial banks of Ethiopia internet banking is not effect on financial performance. The result of internet banking is not expected as commercial banks of Ethiopia, because the modern internet banking is a new technology to the Ethiopian commercial banking sector. All banks in Ethiopia are too late to move with technological advancement and customers are not awareness about the use and benefits of internet banking technology, then banks create awareness and promotion of the new technology of internet banking to the customers and increase the facilities of internet banking to the customers.

6.3. Implications for further Researchers

The study focused on the impact of interne banking on financial performance empirical evidence of commercial banks of Ethiopia. Furthermore it serves as a useful reference for future research especially relating to the banking sector. First, the study was confined to the banking sector and the results aren't able to generalization to other sectors. Hence, future studies can be carried out to expand coverage to incorporate other sectors of financial institutions in order to have a comprehensive view of impact of internet banking and examinations of financial performance and by using other measurement of financial performance such as the net profit margin and return on equity.

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Appendix

Table 4.1 Pooled OLS against fixed-effect specification test (F-test)

```
F test that all u_i=0:      F(9, 55) =      4.43                 Prob > F = 0.0002
```

Table 4.2: Breusch and Pagan Lagrangian multiplier test for random effects

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[Campanycode,t] = Xb + u[Campanycode] + e[Campanycode,t]

        Estimated results:
                                    Var         sd = sqrt(Var)
                    _____
                    ROA |      .0001197          .01094
                      e |      .0000487          .0069787
                      u |      7.11e-06          .0026664

        Test:    Var(u) = 0
                                        chibar2(01) =      4.18
                                    Prob > chibar2 =    0.0205
```

Table 4.3 Hausman Specification Tests of Random-Effects against Fixed-Effects

```
                ——— Coefficients ———
                (b)            (B)            (b-B)         sqrt(diag(V_b-V_B))
              random          fixed        Difference              S.E.
    _____
        BAS | -.0033645      -.0038641       .0004995              .
        BLD | -.0194789      -.0258142       .0063353              .0023319
        CAD |  .0766068       .1285488      -.051942               .
        CEF |  .1083537       .107561        .0007927              .
        DTA | -.0722334      -.0989458       .0267124              .
        INF | -.0000225      -.0000209      -1.61e-06              .
    _____

                    b = consistent under Ho and Ha; obtained from xtreg
             B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

            chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =      3.95
            Prob>chi2 =     0.5561
            (V_b-V_B is not positive definite)
```

Table 4.4 Normality test

```
. swilk u

                 Shapiro-Wilk W test for normal data

     Variable |   Obs         W           V          z        Prob>z
    _____
           u |    70      0.97915     1.283      0.542      0.29377
```

Table 4.5 Multicollinearity tests

```
    Variable |     VIF        1/VIF
    _____
        BAS |     2.15      0.464236
        INF |     1.58      0.633759
        CAD |     1.57      0.635648
        CEF |     1.51      0.663621
        BLD |     1.30      0.768327
        DTA |     1.30      0.768586
        INT |     1.23      0.811420
    _____
    Mean VIF |     1.52
```

Table 4.6Model specification test for omission of variables

Ramsey RESET test using powers of the fitted values of ROA
Ho: model has no omitted variables
F(3, 60) =   2.29
Prob > F =   0.0876

Table 4.7Heteroscedasticity test

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

HO: sigma(i)^2 = sigma^2 for all i

chi2 (10)  =        12.68
Prob>chi2  =        0.2419
```