Commerce



An Empirical Study on the Determinant Factors of Ethiopian **Commercial Banks Profitability**

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ABSTRACT

This study is focused on examining the impact of bank-specific, industry-specific and macroeconomic determinants of Ethiopian commercial banks profitability with balanced panel data of seven Ethiopian commercial banks that covers the period 2001-2010. The paper used Ordinary Least Square (OLS) technique to investigate the impact of capital, size, loan, deposits, noninterest income, noninterest expense, credit risk, market concentration, economic growth, inflation and saving interest rate on major profitability indicator i.e., return on asset (ROA). The estimation results show that all bank-specific determinants, with the exception

of saving deposit, significantly affect commercial banks profitability in Ethiopia. Market concentration is also a significant determining factor of profitability. Finally, concerning to macroeconomic variables, only economic growth exhibits a significant relationship with banks' profitability. The results are useful to both academics and policy makers.

Research Paper

KEYWORDS : Ordinary Least Square (OLS), Return on asset (ROA)

Introduction

The study of bank performance becomes even more important in view of the ongoing financial and economic crises, which will have a fundamental impact on the banking industry in many countries around the globe. Previous studies on sub Saharan African countries, including Ethiopia, Valentina Flamini et al., (2009) have made a study on the determinants of commercial bank profitability in the region by using a sample of 389 banks from 41 Sub-Saharan Africa (SSA) countries. According to Valentina Flamini et al., (2009), bank profitability is high in Sub-Saharan Africa (SSA) compared to other regions.

During the last seven years Ethiopia has experienced a remarkable GDP growth and it is expected to continue for the future. As recognized by economists and finance specialists, the role of banks is essential for the development of an economy. Currently, Ethiopia has three public-owned and 12 private commercial banks which are operating throughout the country. In addition, there are 4 additional private banks that are under establishment and will get operational in the near future and raise the number of private commercial banks to 16.

According to different banking area researchers, the banking sector profitability determinants are divided into two main categories, namely the internal determinants and the external determinants. The internal determinants include management controllable factors such as the level of deposit, the level of loans and advances, investment in securities, non-performing loans, non interest incomes, and overhead expenditure. Other determinants such as total capital and capital reserves, and money supply also play a major role in influencing the profitability. Similarly, external determinants include those factors which are beyond the control of management of the bank such as market share, market growth, market concentration, interest rates, inflation rates, and GDP growth.

This study examined, in a single equation framework, bank-specific, industry-specific and macroeconomic determinants of Ethiopian commercial banks profitability in the first decade of twenty-first century, i.e., from 2001 to 2010. This study have a great importance for the management of Ethiopian commercial banks through identifying significant determining factors of profitability from worldwide experience

General Objective:

To assess the impact of bank-specific, industry-specific and macroeconomic bank profitability determinants in Ethiopian commercial banks.

- To assess the impact of capital, bank size, loans, non-performing loans, deposits, fee based service, and non interest expense on the profitability of Ethiopian commercial banks;
- To analyze the significance of bank specific profitability de-

terminants on Ethiopian commercial banks profitability;

- To examine the impact of market concentration on the profitability of Ethiopian commercial banks;
- To analyze the significance of market concentration on Ethiopian commercial banks profitability;
- To assess the impact of economic growth, real interest rate and inflation on Ethiopian commercial banks profitability; and
- To analyze the significance of macroeconomic profitability determinants on Ethiopian commercial banks profitability.

3 research hypotheses about the determinants of bank profitability are formulated based on theories and past empirical studies related to a bank's profitability.

Hypothesis 1. Bank specific determinants such as capital, loans and advances, credit risk and non interest expense determinants significantly affect bank profitability.

Hypothesis 2. The amount of loan issued and economic growth has a positive impact on banks profitability.

Hypothesis 3. Credit risk, non interest income and non interest expense have a negative relationship with banks profitability.

Methods and materials

Data

Secondary data with bank specific variables of the study is driven from balance sheet and income and loss statement of seven Ethiopian commercial banks such as Commercial Bank of Ethiopia, Awash Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank and Nib Bank. The above banks which are included in the study have been operating for the last 10 years, from the year 2001 up to now. For this regard, 10 years (2001-2010) financial statement of the selected banks has used in the analysis and all the financial statements are consolidated on June 23 (Sene 30) of each year. For industry and macroeconomic variables, the data is obtained from National Bank of Ethiopia (NBE), which regulates the banking sector of the country, and from Ministry of Finance and Economic Development of Ethiopia (MoFED) which regulate the macroeconomic issues of the country.

Definition of Variables

Return on asset (ROA) as a dependent variable. ROA, which is defined as net income divided by total asset, reflect how well bank managers are using the banks real investment resource to generate profit. Regarding the determining factors of profitability, the study identified the following explanatory variables under bank specific(Equity Capital, Bank Size, Loans and Advances, Deposits, Non Interest Income, Non Interest Expense, Credit Risk) industry specific(Market Concentration) and macroeconomic(Economic Growth i.e. GDP, Lending Interest Rate, Inflation) determinants.

Study design

The study used a panel regression technique to analyze the impact of bank specific, industry specific and macroeconomic determinants on Ethiopian commercial banks profitability. Panel modeling is used to identity a common group of characteristics while, at the same time, taking in to account the heterogeneity that is present among individual units. This technique also allows studying the impact of industry specific and macroeconomic determinants on profitability after controlling the bank- specific characteristics, with less collinearity among variables, more degrees of freedom and greater efficiency. The study is used a linear model to analyze the cross-sectional and time series data of seven commercial banks, one public and six private banks of Ethiopia.

The general linear regression equation of the study is:

ROAit = $\beta_0 + \Sigma \beta_1$ (BSD)xit + $\Sigma \beta_2$ (ISD)yt + $\Sigma \beta_3$ (MED)zt + eit

Where;

- ROAit is a dependent variable for bank i at time t.
- + $\beta_{0'} \beta_1, \beta_2$ and β_3 will be estimated coefficients including the intercept.
- (BSD)xit represent the x-th bank-specific determinants of bank i at time t.
- (ISD)yt represent the y-th industry specific determinants at time t.
- (MED)zt represent the z-th macroeconomic determinants at time t.
 eit is the error term.

The comprehensive regression equation of the study is:

 $\begin{aligned} \text{ROAit} &= \beta_0 + \beta_1 \text{CAP} + \beta_2 \text{SIZE} + \beta_3 \text{LOAN} + \beta_4 \text{SAVED} + \beta_5 \text{FIXD} + \beta_6 \text{NII} + \\ \beta_1 \text{NIE} + \beta_2 \text{CR} + \beta_0 \text{CONS} + \beta_{10} \text{GDP} + \beta_{11} \text{INT} + \beta_{11} \text{INF} + \text{eit} \end{aligned}$

Empirical results

Econometric Analysis

The empirical evidence on the determinants of Ethiopian commercial banks' profitability is studied based on balanced panel data, where all the variables are observed for each cross- section and each time period. The study has a time series segment spanning from the period

2001 up to 2010 and a cross section segment which considered seven Ethiopian commercial banks such as Commercial Bank of Ethiopia (CBE), Awash International Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank and Nib International Bank. To test the relationship between these commercial banks profitability (return on asset) and identified profitability determinants the following linear regression model is developed.

 $\pi it = \alpha + \beta \Sigma X^n it + eit$; $eit = vi + \mu it$ (1) n=1

Where; $\pi i t$ is the profitability (Return on Asset) of bank *i* at time *t*, where i = 1, ..., N; t = 1, ...,

T, α is a constant term, β is estimated coefficient, X^{*}it are the vector of n explanatory variables and eit is the disturbance (error term) with vi the unobserved variable effect and μ it the idiosyncratic error. This is a one-way error component regression model, where vi \Box IIN (0, $\sigma^2 \nu$) and independent of μ it \Box IIN (0, $\sigma^2 u$). On the other hand, the explanatory variables which are generically expressed in the above X^{*}it vector are grouped, as discussed in the methodology part, into bank-specific, industry-specific and macroeconomic variables. The general specification of model (1) in to these separated classifications is made as follows:

$$\pi it = \beta_0 + \beta_1 \Sigma (BSD)xit + \beta_2 \Sigma (ISD)yt + \beta_3 \Sigma (MED)zt + eit$$
(2)

Where; $\pi i t$ is a dependent variable for bank *i* at time *t*; $\beta 0$, $\beta 1$, $\beta 2$ and $\beta 3$ is estimated coefficients including the intercept; (BSD)xit represent the *x-th* bank-specific determinants of bank *i* at time *t*; (ISD)yt represent the *y-th* industry specific determinants at time *t*; (MED)zt represent the *z-th* macroeconomic determinants at time *t*; and eit is the error term.

The equation that account for individual explanatory variables which

are specified for this particular study is given as follows.

$$\begin{split} \pi it &= \beta_0 + \beta_1(CAP) + \beta_2(SIZE) + \beta_3(LOAN) + \beta_4(SAVED) + \beta_5(NII) + \\ \beta_6(FIXD) + \beta_7(NIE) + \beta_8(CR) + \beta_9(CONS) + \beta_{10}(GDP) + \beta_{11}(INF) + \end{split}$$

 $\beta_{12}(INT) + eit$

The study adopted a dynamic specification of the model by including a one year lagged profitability variable (π i,t-1) on the right hand side of the previous equation. The equation augmented with lagged dependent variable (Return on Asset) is:

 $\begin{aligned} \pi it &= \beta_{_0} + \beta_{_1} \ (\pi i, t\text{-}1) + \beta_{_2}\Sigma(BSD)xit + \beta_{_3}\Sigma(ISD)yt + \beta_{_4}\Sigma(MED)zt \ + eit \end{aligned} \label{eq:mit_state}$

The comprehensive regression equation of model (3) is:

$$\begin{split} \pi it &= \beta_0 + \beta_1(LAGROA) + \beta_2(CAP) + \beta_3(SIZE) + \beta_4(LOAN) + \beta_5(SAVED) \\ &+ \beta_6(NII) + \beta_7(FIXD) + \beta_8(NIE) + \beta_9(CR) + \beta_{10}(CONS) + \beta_{11}(GDP) + \\ &+ \beta_{12}(INF) + \beta_{13}(INT) + eit \end{split}$$

Finally, the study made autocorrelation test using Durbin-Watson statistic (DW stat). Autocorrelation is a mathematical representation of the degree of similarity between a given time series and a lagged version of itself over successive time intervals. Durbin Watson is a test for first order autocorrelation – i.e., it tests only for a relationship between an error and its immediate previous value (Chris Brooks, 2008). The Durbin-Watson stat result always fall between 0 and 4, and the results between 0-1 indicates a negative autocorrelation, 1-1.5 and

2.5-3 are inconclusive regions, 3-4 indicates positive autocorrelation, and result approaching 2 from both sides indicates no autocorrelation in the residuals.

The first group, bank specific factors, includes factors which are controllable by the management of a bank such as capital, bank size, loans and advances, saving deposit, fixed deposit, non interest income, non interest expense, and credit risk. The second group is industry specific variable which has only one explanatory factor called market concentration. The last group is macroeconomic determining factors that are beyond the control of specific bank management that include real GDP growth, inflation rate and saving interest rate.

The analysis starts with the broad statistical description of both dependent and explanatory variables of the study and it provides descriptive about statistical mean, maximum value, minimum value and standard deviation of each variables. The correlation among explanatory variables also discussed in the analysis. Finally, three econometric specifications are estimated under fixed-effect (model 2) and dynamic-effect (model 3) regression models. The first econometric regression is made by using only bank-specific variables. In the second regression, market concentration which is the only industry specific variables are added while in the third regression, in addition to those already mentioned factors, macroeconomic indicators are included. The estimations are performed by the ordinary least squares (OLS) technique, which is suitable for data sets where serial correlation and/or heteroscedasticity might not be present (Chris Brooks, 2008).

variables	Mean	Maximum	Minimum	Std. Dev.
ROA	0.021646	0.0388	-0.0212	0.010614
CAP	0.095461	0.2699	0.0162	0.044446
SIZE	9.509354	10.8706	8.3541	0.565212
LOAN	0.516054	0.7466	0.1926	0.125774
FIXD	0.082147	0.2582	0	0.056835
SAVED	0.444144	0.6456	0.2307	0.115606

NII	0.455643	0.7199	0.2742	0.114046
NIE	0.025207	0.089	0.0087	0.012168

CR	0.013583	0.0972	0	0.017737
CONS	0.53295	0.703	0.4121	0.097979
GDP	0.08734	0.1357	-0.0216	0.048689
INF	0.1043	0.364	-0.106	0.126156
INT	0.113	0.1275	0.1075	0.007367

As stated in table 1, from the total of 70 observations, the highest return on asset is 0.0388 and the lowest return on asset is -0.0212. That means, the most profitable bank of the sample banks earned 3.9 cents of net income from a single birr of investment and the maximum loss incurred by one of the sample banks are a loss of 2.12 cents on each birr of investment. Regarding the loans and advances, on average, almost half of the total asset of the bank (0.52) is kept in terms of loan. From interest bearing deposits, average saving deposit to total asset ratio (0.44) is much higher than average fixed deposit to total asset ratio (0.08). Noninterest income of the banks, on average, is 45% of total income but noninterest expense to total asset ratio (2.5%) is small. The mean of market concentration which is defined by Herfindahl-Hirschman Index (HHI) is 0.53. HHI is a commonly accepted measure of market concentration and it takes into account the relative size and distribution of firms in a market and it approaches to zero when a market consists a large number of firms of relatively equal size. On the other hand bank size which is measured by logarism of total asset has the highest standard deviation (0.56) that means it is the most deviated variable from its mean as compared to others. The smallest standard deviation is reported in saving interest rate (0.007) and return on asset (0.010614) variables.

Table - 2. Correlation among Explanatory Variables

	502	JOAN	10.0	BAVED	741	NE	CX,	00%	G0P	207	20
	+				+		123				
CAP	0.825	0.354	0.289	-0.084	0.294	0.225	0.137	0.117	-0.098	+0.081	0.162
123	.1	-0,723	-0.46	-0.191	0.487	-0.37	0.062	-0.587	0.301	0.379	-0.105
PART		1	3.462	0.335	3.651	0.392	3.008	0.22	-0.023	-0.13	-0.184
					4						
192			1	-9.283	0.259	0.197	0.144	0.099	-9.012	-0.029	-0.241
SAVE							1.00				
				1	-0.26	-0.01	0.017	-0.002	0.03	-0.042	0.017
							1.				
54					4	-2.916	0.195	-0.325	0.143	0.172	-0.084
248						1	0.214	0.366	-0.132	-0.266	0.276
CR.							1	0.338	-0.391	-0.169	0.033
0005								1	4.93	-0.715	0.291
009									10	0.234	-0,265
NF											-0.518

A correlation is a single number that describes the degree of relationship between two variables. As indicated in the above correlation matrix all the highest (more than 50%) correlations that have occurred among explanatory variables are surprisingly inverse correlations. During the last 10 years the size of all banks (log of total asset) which are included in this study shows improvement. Increase in the size of the bank shows a higher negative correlation with loan to total asset ratio (-0.723), capital to total asset ratio (-0.623),

and market concentration (-0.567). The correlation result of -0.723 and -0.623 implies, even though the size of all banks (total asset) has been increased for the last 10 years, the contribution of loan and equity capital on banks investment is reduced. In addition, market concentration have had inversely correlated with macroeconomic variables such as inflation (-

Volume-4, Issue-4, April-2015 • ISSN No 2277 - 8160

0.715) and real GDP growth (-0.519). This is because the concentration of Ethiopian banking sector is reduced through time and contrary inflation rate and GDP growth of the country increases. A strong negative correlation is also occurred between loan to total asset ratio and noninterest income (-0.651), and between inflation rate and saving interest rate (-0.518). A strong negative relationship between loan and non interest income implies the two sources of income of the banking sector goes in different directions. On the other hand, the highest positive correlation is occurred between bank size and noninterest income (0.48) that means, as described above, since the size of all banks increased time to time, the amount of non interest income earned by each banks also increased. In addition, the loan to total asset ratio and fixed deposit to total asset ratio shows the second highest positive correlation (0.46).

Table - 3. Fixed	Effect Regression Result of	Bank- Specific
Variables		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
с	-0.132485	0.028855	-4.591403	0.0000
САР	0.086330**	0.022943	3.762732	0.0004
SIZE	0.011220***	0.002376	4.721652	0.0000
LN	0.073260***	0.012040	6.084564	0.0000
FS	-0.014094	0.019334	-0.728990	0.4688
SAVE	-0.004187	0.016397	-0.255351	0.7993
NII	0.041672***	0.009266	4.497224	0.0000
NIE	-0.184689	0.070155	-2.632577	0.0107
CR	-0.272342***	0.046876	-5.809885	0.0000
R-squared	0.714385	F-statistic	19.07180	
Adjusted R-squared	0.676928	Prob(F-statistic)	0.000000	
S.E. of regression	0.006033	Durbin-Watson stat	1.395218	

*,**, and *** denotes significance level of 10%, 5% and 1% respec-

tively.

 Table - 4. Fixed Effect Regression Result of Bank and Industry Specific Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
с	0.009070	0.047868	0.189478	0.8504

Volume-4, Issue-4, April-2015 • ISSN No 2277 - 8160

САР	0.035268	0.025485	1.383870	0.1715
SIZE	0.001509	0.003498	0.431347	0.6678
LN	0.055683***	0.012098	4.602679	0.0000
FS	-0.041613**	0.019347	-2.150940	0.0355
SAVE	0.012360	0.015738	0.785355	0.4353
NII	0.028250***	0.009299	3.038066	0.0035
NIE	-0.106593	0.067974	-1.568136	0.1221
CR	-0.243062***	0.043756	-5.554876	0.0000
CONS	-0.045858***	0.012925	-3.548074	0.0008
R-squared	0.763918	F-statistic	21.57216	
Adjusted R-squared	0.728506	Prob(F-statistic)	0.000000	
S.E. of regression	0.005530	Durbin-Watson stat	1.692802	

*,**, and *** denotes significance level of 10%, 5% and 1% respec-

tively.

 Table - 5. Fixed Effect Regression Result of All Determining Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
с	0.005175	0.061055	0.084767	0.9327
САР	0.037693	0.025004	1.507493	0.1372
SIZE	0.000840	0.003576	0.234964	0.8151
LN	0.053177***	0.014010	3.795567	0.0004
FS	-0.039948**	0.019379	-2.061377	0.0438
SAVE	0.011071	0.015875	0.697408	0.4884
NII	0.029338***	0.010586	2.771468	0.0075
NIE	-0.127836	0.078940	-1.619396	0.1109

CR	-0.209366***	0.045773	-4.574051	0.0000
CONS	-0.037426**	0.018026	-2.076212	0.0424
GDP	0.042578**	0.018290	2.327942	0.0235
INF	0.000314	0.009880	0.031807	0.9747
INT	0.020811	0.148869	0.139791	0.8893
R-squared	0.787711	F-statistic	17.62513	
Adjusted R-squared	0.743018	Prob(F-statistic)	0.000000	
S.E. of regression	0.005380	Durbin-Watson stat	1.723373	

*,**, and *** denotes significance level of 10%, 5% and 1% respec-

tively.

As described in the econometric analysis section variability in commercial banks profitability is not only explained by the specified bank specific, industry specific and macroeconomic factors. Instead, variability in commercial banks profitability (return on asset) could be attributable to those variables and its own past trend. To test the serial correlation between return on asset and its own one year lagged value the dynamic regression model (model 3) is developed

The previous tables which are summarized in the appendices shows the empirical results of the estimation of model 2 and 3 using fixed effect and dynamic effect regression models respectively. As indicated in the tables the two regression results shows the highest explanatory power (\mathbb{R}^2) of approximately 0.8 when both bank specific, industry specific and macroeconomic variables are included in the models. The R-squared result of 0.8 endorse that 80% of the variation in the dependent variables of the model. The remaining 20% of the variation in the dependent variables of the study.

According to the DW stat result of the study, except regression results of bank specific variables, there is no autocorrelation which occurred between the variables and their respective lagged value. On the other hand, under fixed effect regression model the value of f- statistic is 17.6 and strongly significant at 1% significant level supporting the validity and stability of the model relevant for the study. The dynamic regression model f- statistic result is 15.2 which is slightly lower than the fixed effect model but highly significant even at less than 1% significant level. It means the dynamic model is relatively less valid and unstable than fixed effect regression model be serially correlated with its own one year lagged value. Considering the validity of the models particularly the fixed effect regression model the following sections discussed about regression results.

Among the bank specific variables, capital (CAP), bank size (SIZE), loan (LOAN), fixed deposit (FIXD), non interest income (NII), non interest expense (NIE) and credit risk (CR) shows significant impact on Ethiopian commercial banks profitability. Market concentration and real GDP growth of the country are also significant determinants of Ethiopian commercial banks profitability.

Conclusion

Concerning to regression results, bank specific determinants are able to explain a substantial part of banks profitability in Ethiopia (Rsquare of 71% and 73% respectively). Regarding equity capital, the coefficient of capital is positive and significant at 1% significant level when the estimation is made by using only bank specific variables . Bank size, loan, and non interest income of Ethiopian commercial banks are also positive and highly significant factors of profitability. In order to resist the credit risk challenges banks should improve the quality of loans they provide through installing better assessment methods of potential borrowers.Concerning market concentration, the regression result indicates a negative and highly significant impact on Ethiopian banks profitability. According to the regression result, the current real economic growth (GDP) of the country makes commercial banks to be more profitable. Generally, the study find that all bank specific factors (with the exception of saving deposit), market concentration, as well as economic (GDP) growth significantly affect Ethiopian commercial banks profitability for the last 10 years.

Policy Implications

Ethiopian commercial Banks should strive to improve their equity capital investment and their size. Since loan and fee based activities are the main source of revenue, they should improve the level of those activities. In order to resist the challenges of credit risk, fixed deposit and non interest expense items on profitability, Ethiopian commercial banks should improve the quality of loans, effectively utilize funds from fixed deposit, and properly manage the level of non interest expenses as salary and administration expenses. Future researches are warranted to include and measure the impact of nonfinancial determining factors of banks profitability such as management quality, efficiency and productivity, bank age, and number of bank branches.



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