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### **Determinants of Net Interest Margin in Selected Commercial Banks in Ethiopia**

**B. Mohan Venkata Ram<sup>1</sup> and Enyew Alemaw Mesfin<sup>2\*</sup>**

<sup>1</sup>Department of Commerce and Management, Andhra University, India

<sup>2</sup>Department of Commerce and Management, Andhra University, India

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#### **ABSTRACT**

The aim of this study was to investigate into the determinants of net interest margin of selected commercial banks in Ethiopia over the period 2010 to 2017 inclusive. To do so, fixed effects panel regression model was employed for 13 selected commercial banks. The study covered bank level, industry level and macro level variables that affect the net interest margin of the selected banks. The findings of the study revealed that assets quality, capital adequacy, bank size, earning ability, liquidity position, management soundness, exchange rate, inflation and market concentration are significant factors for net interest margin of banks under the study. On the other hand, economic growth and political instability are found to be insignificant variables.

**KEY WORDS:** Net interest margin, exchange rate, market concentration

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#### **\*Corresponding Author**

**Enyew Alemaw Mesfin**

Research Scholar,

Department of Commerce and Management,

Andhra University, India and Lecturer,

Wollo University, Dessie, Ethiopia

Email; mesfinenyew@gmail.com

## **INTRODUCTION**

Financial institutions are playing pivotal role in the development of nations' economy particularly the banking industry has fundamental role in the development of a nation economy (Misra & Aspal, 2013)<sup>1</sup>. The main function of the this institutions is mobilizing resources from those who have excess supply especially in the form of deposits, channelling these funds to those who are in need of it and making productive investment opportunities (Teshome *et. al*, 2018)<sup>2</sup>. In order to do this function, financial institutions need to be stable and profitable enough (Asfaw, 2018)<sup>3</sup>.

As Mohanty (2017)<sup>4</sup> noted, the banking sector in Ethiopia is the crucial part of the economy and it is playing an important financial intermediary role, therefore, its health is very critical to the health of the country's economy at large. To ensure this role, the performance and healthy of this sector needs to be evaluated periodically (Alemu & Aweke, 2017)<sup>5</sup>.

One of the performance indicators of banking sector is net interest margin. Net interest margin (NIM) measures the difference between the interest income that the bank receives on loans and advances and interest expenses paid to its borrowed funds. Similarly, Gul *et.al* (2011)<sup>6</sup> defined net interest margin as the net interest income divided by total earnings assets.

The higher the net interest margin, the more would be the stability and profitability of banks. On the other hand, a higher net interest margin may indicate the riskier lending practices of banks associated with non-performing loan (Khrawish, 2011)<sup>7</sup>.

As noted by Saksonova (2014)<sup>8</sup>, net interest margin is the most appropriate criterion to evaluate the effectiveness and stability of banks' operations. It is better than the return on assets and return on equity to evaluate how successfully a bank manages its interest bearing assets. Most of the studies on net interest margins are based on developed countries data and banks specific variables. Therefore, the aim of this study is to investigate the bank specific, industry specific and macro level variables of net interest margin as measure of financial performance in the selected Ethiopian commercial banks.

## **REVIEW OF EMPERICAL RESEARCH STUDIES**

Zhou and Wong (2014)<sup>9</sup> found that market competition structure, average operating costs, degree of risk aversion, transaction size, implicit interest payments, opportunity cost of reserve, and management efficiency are the significant determinants of net interest margin in the Chinese commercial banks.

The bank-specific factors bank size, bank liquidity, and diversification, operating costs, and the macroeconomic environment in explaining the interest rate variation in CCA<sup>1</sup> countries are significant factors. Lack of competition, high operating costs and diseconomies of scale for small banks remain key impediments that prevent interest spreads from declining in some CCA countries (Almarzoqi and Naceur, 2015)<sup>10</sup>.

Income diversifications, deposit amount, export level and loan performances have a significant influence on the financial performance of Ethiopian banks. As such, commercial banks should increase export proceeds, capital and loan production, and should diversify the sources of non-interest incomes in order to improve financial performances, and stay competitive enough in the banking industry (Tefaye and Shete, 2015)<sup>11</sup>.

Plakalović and Alihodžić (2015)<sup>12</sup> studied the impacts of liquidity risk, operating costs, credit risk, the index of market concentration, funding risk, the growth rate of gross domestic product and consumer price index on NIM and they found that except the concentration level and real GDP growth, all other variables have significant effects on banks net interest margins.

Yigermal (2017)<sup>13</sup> in his study on determinants of Ethiopian private commercial banks profitability found that, bank size, GDP growth rate, interest rate spread, loan to deposit ratio, inflation, loan concentration index are significant performance factors of private commercial banks in Ethiopia from the year 2005 to 2014.

The study conducted by Alemu & Aweke (2017)<sup>5</sup> showed that, asset quality, management efficiency, earning ability and liquidity were the key drivers of profitability for private commercial banks in Ethiopia. However, the capital adequacy is insignificant in the determination of net interest margin.

Moreover, net interest margin is negatively related with non-interest income, non-performing loans, total assets and exchange rates and volatility in exchange rates in Turkish banking sector (Yuksel and Zengi, 2017)<sup>14</sup>.

The results of Rani and Zerga (2017)<sup>15</sup> showed that capital adequacy, management efficiency, earnings, liquidity ratios, and industry growth rate affected significantly and all the macroeconomic determinants were having positive but insignificant impact on financial performance of Ethiopian commercial banks during the period 2005 to 2015.

## **MATERIALS AND METHODS**

Explanatory research design is used because this design attempts to clarify the relationship between two aspects of a situation or phenomenon (Kumar, 2011)<sup>16</sup>. There are 18 commercial banks

operating in Ethiopia. Of these banks 13 sample banks have been selected purposively on the basis of audited financial statements from the year 2010 to 2017. The financial statements of sample banks are gathered from NBE<sup>2</sup> and their respective websites. Macro level data were obtained from World Bank data base.

**Table 1: Definition of variables and measurements**

Variable Type	Variable	Measurement	Notions
<b>Dependent Variable</b>	Net interest margin	Interest income-interst expenseto total loans and advances	NIM
	Assets quality	Non performing loan to total loans and advances	ASQ
<b>Independent Variables</b>	Bank size	Log of total assets	BSZ
	Capital adequacy	Capital to total assets ratio	CAP
	Earning ability	Interest income to total income ratio	ERA
	Liquidity position	Liquid assets to total assets ratio	LQP
	Management soundness	Total loan and advance to total deposit ratio	MGS
	Inflation	Annual inflation rate	INF
	Exchange rate	Real exchange rate at the end of the year	EXR
	Economic growth	Real GDP grwoth rate	GDP
	Market concentration	Herindahl-Hirschman Index	HHI
	Political instability	Political instability index	PIS
	Lag of NIM	First lag of net interest marigin	LAGNIM1

Fixed effect panel regression model is used to estimate the coefficients of variables based on the result of hausman test employed to test whether the random effect model is appropriate. As revealed in the following table, p-value of this test is 0.0489\* which is significant at 5% and it indicates that the errors are correlated with explanatory variables. As such, using random effect panel regression model is not appropriate. Therefore, the appropriate model is fixed effect panel regression model than random effect panel model.

**Table 2: Correlated Random Effects - Hausman Test result**

Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	12.649845	6	0.0489*

*Source:Source:Own calculation using Eviews 10 software package*

The fixed effect regression model used in this study is;

$$NIM_{i,t} = \alpha + \beta_1 ASQ_{i,t} + \beta_2 BSZ_{i,t} + \beta_3 CAP_{i,t} + \beta_4 ERA_{i,t} + \beta_5 LQP_{i,t} + \beta_6 MGS_{i,t} + \beta_7 INF_{i,t} + \beta_8 EXR_{i,t} + \beta_9 GDP_{i,t} + \beta_{10} HHI_{i,t} + \beta_{11} PIS_{i,t} + \beta_{12} LAGNIM1_{i,t} + \mu_{i,t}$$

Where  $\mu_{i,t}$  indicates the error term for bank  $i$  at time  $t$ ,  $\beta_1, \beta_2, \dots, \beta_{12}$  are the coefficients of independent variables and  $\alpha$  is the constant. According to the diagnosis tests all the assumption are satisfied except auto correlation. To fix auto correlation problem, the first lag is taken. According to

Wooldridge (1960)<sup>17</sup>, there is no series multicollinearity problem because all of the VIFs are less than 10 as shown in the following table.

Table 3: Multicollinearity Test result

Variable	VIF	Tolerance
ASQ	1.149111	0.870238
BSZ	1.783948	0.560554
CAP	1.416065	0.706182
ERA	2.377651	0.420583
LQP	2.773304	0.360581
MGS	1.685376	0.593339
INF	1.633346	0.61224
EXR	3.027729	0.330281
GDP	1.702558	0.587352
HHI	1.571529	0.636323
PIS	1.098293	0.910504

*Source: Own calculation using Eviews 10 software package*

## RESULTS AND DISCUSSION

According to Table 4 below, Prob. (F statistic) 0.000000 indicates that the model fitted the data at 1% significance level which enhanced the reliability and validity of the model used in this study. The goodness of the fit  $R^2$  is 0.9517 which indicates 95.17% changes in the net interest margin is explained by the variables included in the model whereas the remaining 4.83% its change is due to changes in the other variables not included in the model. The adjusted  $R^2$  0.9378 indicated that 93.78% changes in the net interest margin is explained by the independent variables considered in the model. The advantage of using adjusted  $R^2$  over the  $R^2$  is that  $R^2$  will never decrease as you add more independent variables, even though, the variable has no scientific relationship with regressed variable (Brooks, 2008)<sup>18</sup>.

Beside the above, all variables are significant except GDP and PIS. Specifically, asset quality is negatively and significantly related with NIM with the coefficient of -0.056141 which indicates 1 Ethiopian Birr (ETB) increase in non-performing loan to total loans and advances reduces 5.61 cents in net interest margin and p value of 0.0079 represents it is significant at 1% and vice versa. Asset quality has also 0.020597 standard error which indicates the errors of coefficient estimates. The non-performing loan ratio measures the effectiveness of the bank in receiving repayments on its loans. The result is consistent with the findings of Bace (2016)<sup>19</sup>, Angbazo (1997)<sup>20</sup>, Islantince (2016)<sup>21</sup>, Tesfaye and Shete (2015)<sup>11</sup> and Almarzoqi and Naceur (2015)<sup>10</sup>.

**Table 4:Fixed effect panel regression model result**

Variable	Coefficients	Std. Error	t- statistics	Prob.
ASQ	-0.056141	0.020597	-2.725693	0.0079*
BSZ	0.575930	0.198476	2.901767	0.0048*
CAP	0.024055	0.007664	3.138641	0.0024*
ERA	0.028230	0.007099	3.976575	0.0002*
LQP	-0.017010	0.008814	-1.929916	0.0572***
MGS	-0.027319	0.013607	-2.007742	0.0480**
INF	-0.017045	0.005823	-2.927054	0.0045*
EXR	0.122655	0.031806	3.856379	0.0002*
GDP	0.021059	0.036588	0.575554	0.5665
HHI	0.156140	0.027396	5.699366	0.0000*
PIS	0.006094	0.003688	1.652372	0.1024
LAGNIM1	0.694657	0.061263	11.33889	0.0000*
Constant ( $\alpha$ )	-0.134063	0.02655	-5.048199	0.0000*
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.951750	Mean dependent var.		0.046904
Adjusted R <sup>2</sup>	0.937879	S.D. dependent var.		0.015350
S.E. of regr.	0.003826	Akaike info criterion		-8.094877
F-statistic	68.61072	Durbin-Watson stat		1.921532
Prob. (F-statistic)		0.000000*		

\*indicates significant at 1%, \*\*indicates significant at 5% and \*\*\* indicates significant at 10%.

Source: Own calculation using Eviews 10 software package

Log of total asset as a measure of bank size has positive and significant effect on net interest margin at 1% as revealed in table 4 (coefficient 0.575930 and p value 0.0048). This indicates that a 1% increase in bank size will increase net interest margin by 57.59 cents and vice versa. The standard error of bank size is highest than other variables (0.198476) which shows that the bank size of Ethiopian commercial banks is deviated according to their total assets and positive sign indicates that the banks realizing economies of scale have better net interest margin. This means banks can allocate fixed costs over a greater asset base, thereby reducing their average costs or reduce risk by diversifying operations across product lines, sectors, and regions to promote their profitability. The same result is found by Almarzoqi and Naceur (2015)<sup>10</sup>, Eglyet.al, (2017)<sup>22</sup>, Yang and Qi (2017)<sup>23</sup> and Ozili (2017)<sup>24</sup>.

Capital adequacy has positively and significantly related with NIM with the coefficient of 0.024055 and p value of 0.0024 respectively as noted in the above table. This revealed that an increase in 1 ETB in total capital to total assets increased the NIM by 2.40 cents & vice versa. The capital adequacy ensures the financial soundness of banks in absorbing a reasonable amount of loss before insolvency of banks happen (Fatim, 2014)<sup>25</sup>. Uniformly, Rani and Zerga (2017)<sup>15</sup> and Tesfaye and Shete (2015)<sup>11</sup> found the consistent result.

Earning ability is measured in terms of the interest income to total income ratio and it is the ability of the bank in generating income from its lending services. In other words, it measures the interest income from lending operations as a percentage of the total income generated by the bank in a year. Interest income includes income on advances, interest income on deposits with other banks and interest income on debt instruments. According to table 4, earning ability has statistically positively significant impact on the net interest margin of Ethiopian commercial banks which shows a 1 ETB increase in earning ability will increase 2.82 cents in the net interest margin (coefficient 0.028230 and p value 0.0002). This implies an increment in the interest income to total income of the bank which is the direct reflection of an increment in the loans and advances granted to customers will have positive effect on net interest margin. The result is supported by Albulescu (2015)<sup>26</sup>.

The liquidity position indicates the extent to which banks have liquidity on hand, funded by relatively stable and predictable deposits, than by potentially debt funding. This means it is the ability of banks to change the current assets in to cash and pay to depositors without high financial losses (Bace, 2016)<sup>19</sup>. Liquidity position of Ethiopian commercial banks has negative and significant (at 10%) effect on their net interest margin (coefficient -0.017010 and prob. 0.0572). This implies that, banks have excess liquidity position and this excess has an opportunity costs or return forgone from loan not provided. Therefore, an increase in 1 EBT in the liquidity position will be a 1.70 cent reduction in the net interest margin.

Management soundness is the measures of the extent to which banks' main funds are being used for lending which is the main banking activity. Loan and advances are necessary to earn profit and serves the interest being paid to the deposits. This ratio measures ability of the bank's management in converting the deposits available into high earnings on loan and advances. It is found that, MGS is negatively and significantly (at 5%) related with net interest margin as revealed in table 4 above (coefficient -0.027319 and p value 0.0480).

Moreover, the finding of this study revealed that inflation has negative and significant impact on the net interest margin at 1% as shown in Table 4 ( $\beta = -0.017045$  and P value 0.0045). This result is supported by Perry (1992)<sup>27</sup>. He noted that the effect of inflation on banks interest is depends on whether inflation is expected or unexpected. When the inflation is expected, the banks will adjust their interest rates accordingly, thereby increasing the interest rate margins. When the inflation is not anticipated, banks will unable to adjust their interest rates and may affect the interest margin negatively because of increased costs occasion by inflation. Therefore, net interest margin of banks in Ethiopia is not adjusting in line with the inflation.

Furthermore, it is found that there is positive and significant association between exchange rate and net interest margin at 1% ( $\beta = 0.122655$  and p value = 0.0002). This implies that, a 1%

increase in exchange rate will have 12.26 cents increase in NIM. This finding is consistent with the finding of (Hacker *et.al*2010)<sup>28</sup>.

Market concentration has the positive and significant impact on net interest margin ( $\beta = 0.156140$  & p value = 0.0000). This implies that economies of scale is positively contributing to net interest margin for Ethiopian commercial banks. Hussain (2014)<sup>29</sup> and Yigermal (2017)<sup>13</sup> found consistent results in their reaserch study. Lastly, theLAGNIM1is has positive and significant effect on net interest margin (p value 0.0000). This means the preceding year NIM has positively contribute for the current year NIM.

## **CONCLUSIONS**

The result of this study revealed that assets quality, liquidity, management soundness, and inflation are negative and significant factors of financial performance of Ethiopian commercial banks measured in terms of net interest margin. In addition to this, bank size, capital adequacy, earning ability, exchange rate, market concentration, and lag of net interest margin have negative and significant effects on net interest margin. On the other hand, political instability index, which is taken from World Bank data base is considered as the indicator of political instability and economic growth has no stastical significant impact on the net interest margin.

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