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The Determinant of Commercial Banks' Interest Margin in Indonesia: An Analysis of Fixed Effect Panel Regression[1]

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ABSTRACT: The purpose of this research is to study and analyze the determinant factors of commercial banks' interest margin in Indonesia, both internal factors (bank specific factors) and external factors. Internal factors are selected under this study consists of several aspects such as growth of the bank's assets, profitability, efficiency, capital adequacy, liquidity, and risk, meanwhile external factors are market power, inflation, and interest rates. Several variables have been used in previous studies to be used as a proxy. The study applied fixed effects on a panel data regression model to a panel of Indonesian commercial banks that covers the period 2008 – 2012. The results show consistent findings from previous studies. The net interest margin of Indonesian commercial banks are affected by the entire internal variables on a different level of significance, meanwhile inflation is the only external factors that affects on interest margins significantly at 5% level.

Keywords: net interest margin; commercial bank; panel data
JEL Classifications: C23; G21; L11

1. Introduction

Commercial banks are one of the economic actors who have a vital role in the economy of a country. It is especially for a country whose economy still dependent on the presence of banks as the main source of financing for economic activities. At the macro economic level, bank is one of the means to transmit monetary policy (transmission belt), meanwhile at micro economic level bank is a major source of financing for businesses and individuals (Koch and Donald, 2000).

Since financial intermediation function performed by commerial banks has an impact on the economic growth and economy stability of a country, commercial banks are required to have a good performance. By contrast, poor performance banks can lead to bank failures that can trigger a crisis of confidence to the banking system and lead to a slowdown in economic growth to decline or lead to a negative economic growth. Thus, if the banking sector is healthy and able to create a profit, it will be able to withstand shocks and contribute to the stability of the financial system (Athanasoglou *et al.*, 2005). In a country where the financial sector is dominated by commercial banks, any failure in the sector has an imense implication on the economic growth of the country. This due to the fact that any bankruptcy that could happen in the sector has a contagion effect that can lead to bank runs, crises and bring overall financial crisis and economic tribulations (Ongore and Kusa, 2013).

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If banks implement the financial intermediation function efficiently, they will encourage the economic growth of a country (Levine, 1997). One of the indicators that can be used in measuring the efficiency of banks is net interest margin. High net interest margin is often associated with the presence of inefficiencies in the banking system, particularly in developing countries, due to costs incurred as a result of the inefficiency which are transferred to bank customers by charging high interest rates (Fry, 1995; Randall, 1998; and Barajas *et al.*, 1999). In contrast to the lower net interest margin, the expected social cost incurred by the public to banking intermediation activities undertaken will also be low. Efficient intermediation costs are indicated by low interest rates and reflect the effectiveness of monetary policy, well maintained financial stability, and competitive banking system. High intermediation costs would reduce the incentive for economic actors (Hadad *et al.*, 2003).

Interpretation of the high net interest margin can be seen from two sides. First, high net interest margin reflects a low level of efficiency of banking and banking market conditions which is not competitive. Second, high interest margin reflects inadequate in banking regulations and high asymmetric information (Claeys and Vennet, 2007). Under certain conditions, high net interest margin is indicated with a high risk premium, while the conditions of increasing competition will encourage speculative behavior of the banking system that could lead to financial instability (Hellman, Murdock and Stiglitz, 2000).

Net interest margin is the difference between interest income received from bank loans and other earning assets at a given time period reduced by the amount of interest paid to depositors and holders of bank debt divided by the average number of earning assets in the same time period. In accordance with Bank Indonesia regulation on asset quality rating for commercial banks, earning asset is the provision of bank funds to earn income in the form of loans, securities, interbank placements, bill acceptances, bills of securities securities purchased under agreements to resale (reverse repurchase agreement), derivative receivables, investments, balance sheet transactions and other forms of provision of funds that can be equated with it.

Interest margin is one of the indicators that can be used in assessing the profitability of banks. Other indicators used to measure the profitability of banks are ROA and ROE (Murthy and Sree, 2003; Caruntu and Moranesscu, 2008). Thus, the higher the level of interest margin which is reflected, the higher profitability of the bank and bank stability is well-maintained. On the other hand, high NIM may also reflect the presence of lending practices with a high credit risk that banks should establish loan loss reserves are large enough (Khrawish, 2011).

2. Statement of Problem

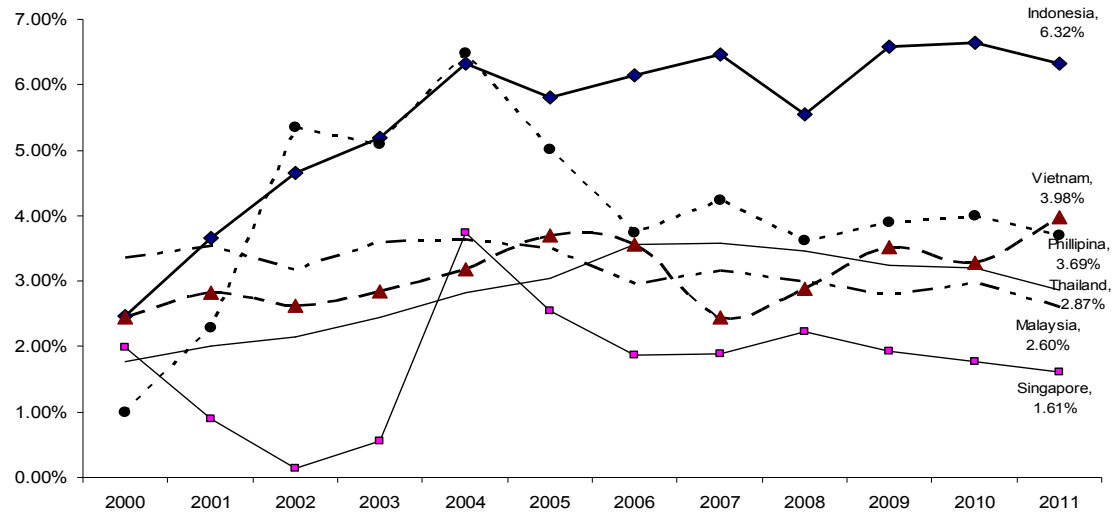
At the end of the second half of 2012 the market share of the assets of commercial banks amounted to 75.80% of the total assets of financial institutions in Indonesia (Bank Indonesia, Financial Stability Review, March 2013). This reflects that the commercial banks still play a role as the intermediary in the financial system in Indonesia. These conditions also indicate that the Indonesian economy is still highly dependent on the presence of commercial banks as the main source of financing the economy. However, when compared to the NIM of banks in other countries, particularly in ASEAN countries, Indonesia's banking NIM is higher. The high NIM of banks in Indonesia does not only reflect a higher level of profitability, but also has a negative impact on the Indonesian economy as a whole. NIM of banks in Indonesia and some ASEAN countries can be seen in Figure 1.

From Figure 1 it can be seen that the net interest margin of Indonesian commercial banks rose from 2.47% in 2000 to 6.32% in 2011 with average 5.59%, which was the highest net interest margin among banks in ASEAN countries. In contrast, Singapore banks have the lowest net interest margin in the ASEAN countries i.e. 1.61% in 2011. Meanwhile, NIM of the Malaysian banking relatively stable with an average NIM of 3.2%. On the other hand, banks in the Philippines have the highest NIM in 2004, but then showed a down trend. At the end of 2011, Philippine banks have a NIM of 3.6%.

Bank Indonesia as the banking authorities in Indonesia has been trying to encourage commercial banks to lower NIM and loan interest rates at a reasonable level. One of the efforts made by Bank Indonesia was by publishing a policy package in early 2011, which required banks to publish prime lending rate to its customers in order to increase efficiency and lower loan interest rates to a reasonable limit.

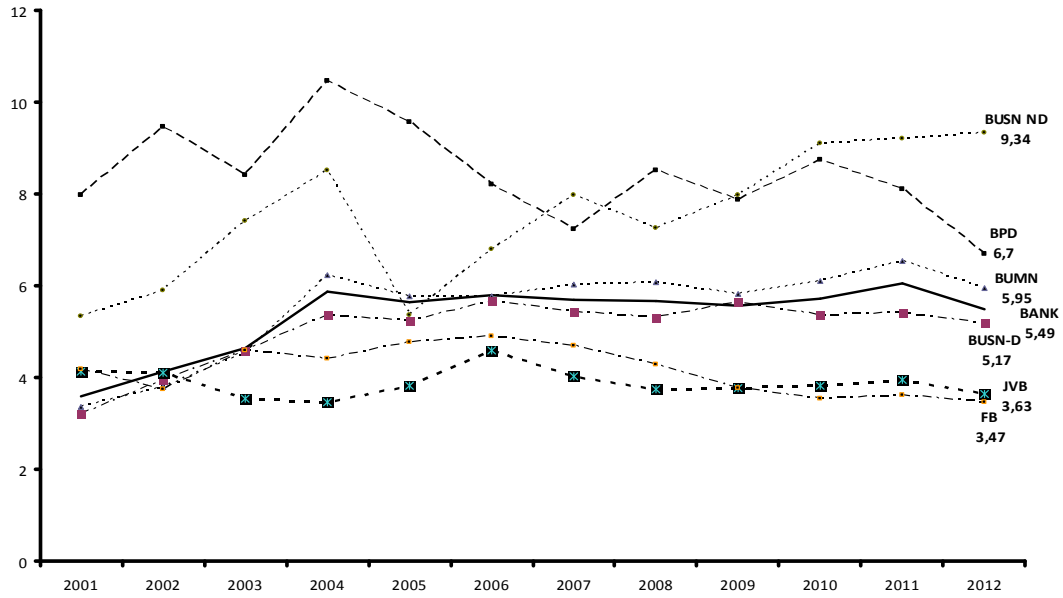
Commercial banks in Indonesia are divided into five groups, such as State-owned Banks (BUMN), National Private Commercial Banks (BUSN), Regional Development Banks (BPD), Joint Venture Banks (JVB), and Foreign Banks (FB). Grouping the commercial banks based on the ownership of banks, and for National Private Banks to be distinguished based on whether or not to conduct foreign exchange transactions, either acting on behalf of the bank or meet the demands of its customers. The NIM of each group of commercial banks in Indonesia during the period 2001 - 2012 can be seen in full in Figure 2.

Figure 1. NIM of Banking in Indonesia and ASEAN countries the period 2000 - 2011



Source: compiled from various sources

Figure 2. NIM of Commercial Banks in Indonesia



Source: Researcher, 2013

From Figure 2 it can be seen that NIM of non foreign exchange national private commercial bank is 9.34%, the highest NIM among commercial banks in Indonesia. Regional development banks (BPD), despite having an average NIM of 8.44% or a NIM highest average NIM group when compared with other commercial banks during period 2001-2012, has a NIM of 6.7% in 2012 or a decline when compared to 2011 which amounted to 8.1%.

3. Study Objectives

This study specifically analyzes the behavior and the factors that influence the determinants of NIM level commercial banks in Indonesia using variables that have been studied by previous researchers. And based on the issues that have been formulated, the goals of this research are:

1. Analyzing the determinants of NIM commercial banks in Indonesia.
2. Assessing whether bank ownership affects the relationship between the bank and the NIM determinant factor.
3.

4. Literature Review

Net interest margin analysis is one way of measuring the cost of financial intermediation, namely the difference between the cost of interest paid by the borrower to the bank and depositors received interest income (Brock and Suarez, 2000). Determinants of interest margin can be explained using two approaches, namely the traditional approach and modern approach. The traditional approach views of the variables that affect the net interest margin are done by analyzing the balance sheets of banks, whereas the modern approach by taking into account demand and supply rate based on the microstructure of the bank.

NIM is the ratio of net interest income to average total earning assets of banks. Net interest income is the difference between interest income and interest cost earned on interest expense paid, while the earning assets that are accounted for productive assets that generate interest (interest bearing assets), so that the equation can be made as follows:

$$ni = r * L - i * D \quad (1)$$

where: ni = net interest income
L = amount of loans granted
D = amount of deposits collected by bank
r = interest rate charged to borrowers
i = interest rate paid to the owner of the funds

Furthermore, L = D + E, and the number of L is generally a percentage of (D + E) because the bank must provide a reserve fund in the form of statutory reserves at the central bank, then the equation (1) can be rewritten as follows:

$$ni = r * [(1 - \alpha) * (D + E)] - i * D \quad (2)$$

$$ni = r * (1 - \alpha) * E + [(1 - \alpha) * r - i] * D \quad (3)$$

Where E is the amount of equity owned by the banks and α is the percentage which is the statutory reserve bank reserves at the Central Bank. If equation (3) derived in the first derivative with respect to D, then obtained as follows:

$$\frac{\partial ni}{\partial D} = (1-\alpha) * r - i \quad (4)$$

When the first derivative equal to zero, then the value of r will be as follows:

$$r = \frac{i}{(1-\alpha)} \quad (5)$$

Through equation (5), it can be interpreted that the bank can raise third party funds as much as possible if the interest rate for the loan is the result of interest expense of third party funds divided by the ratio of loanable funds (Manurung and Anugraha, 2013).

A study conducted by Ho and Saunders (1981) is a pioneer in analyzing the NIM to make banking model as intermediary between the recipient and the channeling of funds. This model is called the dealer's model. In this model, the bank serves as an intermediary being risk averse between loan markets and third party funds market. Based on this analysis, the magnitude and the determination of NIM are determined by two main factors, namely the degree of competition among banks in collecting and placing funds and exposure factor of interest rate money market where the bank is located.

Ho and Saunders model is also called the bid-ask spread approach, where the model is as follows:

$$s = a + b = \frac{\alpha}{\beta} + \frac{1}{2} + R\sigma_1^2 Q \quad (6)$$

where:
s = *spread* (the difference between lending and deposit rates)

a + b = the provision of immediacy of liquidity services
$\frac{\alpha}{\beta}$ = the ratio of intercept (α) and the slope (β) of the symmetric deposit, loan and non-tradisional output arrival functions of the bank
R = coefficient of bank risk aversion
= variance of interest rates on deposits and loans
σ_I^2 = measure of the magnitude (size) of bank transactions

Ho and Saunders model is the bases for academic research in making models of the net interest margin. NIM model which developed by Ho and Saunders (1981) became the bases of further research in developing models of commercial banks net interest margin, such as NIM models developed by McShane and Sharpe (1985), Allen (1988) and Angbazo (1997). This model is also used by Saunders and Schumacher (2000), Brock and Suarez (2000), and Drakos (2002). Furthermore, the formula model of Ho and Saunders adjusted by Maudos and Guevara (2004) into the following equation:

$$s = a + b = \frac{1}{2}\left(\frac{\alpha_D}{\beta_D} + \frac{\alpha_L}{\beta_L}\right) + \frac{1}{2}\left(\frac{C(L)}{L} + \frac{C(D)}{D}\right) - \frac{1}{4}\frac{U''(W)}{U'(W)} \left[(L + 2L_0)\sigma^2{}_L + (L + D)\sigma^2{}_M + 2(M_0 - L)\sigma_{LM}\right] \quad (7)$$

Based on equation (7) above, the interest margin (s) is a function of the sum of the two parameters, namely a and b are margin of fund deposits market and credit markets as compensation for funds market interest rate risk and credit risk. Thus the interest margin is determined by the elasticity of the credit market and funds market (alpha and beta) as well as the cost of credit portfolio management and bank funding structure. In addition there are risk factors which banks assume to be risk-averse, that are money market volatility factors and capital market along with its covariance.

Empirical evidence of the adoption model of Ho and Saunders concluded that the concentration of the banking market structure significantly affected on NIM in Argentina, Chile, Colombia, Mexico and Peru (Martinez, Maria and Mody, 2004). On the other hand, foreign banks have more efficient costs to have lower NIM compared to domestic banks. Gelos (2006) found that there were significant differences between the NIM banking in Latin American countries and the NIM of banks in developing countries. The study concluded that the high NIM of banks in Latin American countries due to the low level of competition, resulting in less efficient banks and interest rates are relatively high. Gounder and Sharma (2012) using the model of Ho and Saunders with panel data approach finds that NIM has a positive relationship with the rate of interest paid bank, operating costs, the strength of the market, and credit risk.

The other model of NIM is the model developed by Klein (1971) and Monti (1972) by developing a firm theoretic model. This model tested, the bank as a static model between deposit supply and loan demand. This model was further developed by Wong (1997), Salazar (1999), and Carbo and Rodriguez (2007).

5. The Data

This study uses secondary data from published financial statements quarterly and annual reports of commercial banks as well as using other data from Bank Indonesia, such as the Indonesian Banking Statistics, Indonesian Financial Stability Review and inflation rate, while the interest rate using the rate guaranteed interest is determined by Indonesia Deposit Insurance Corporation as a benchmark rate used by commercial banks to set deposit rates and lending rates. This research was also supported by the results of previous studies related and relevant.

The data collected are then arranged in a panel data which is the two-dimensional data, namely a fusion between the dimension of time (*time series*) and the dimensions of the data public commercial banks (*cross section*) so that it can provide a lot more information is needed in this study. Data panel also has the advantage because it is robust to several types of violations of the Gauss Markov assumptions, namely heteroskedasitas and normality (Wooldridge, 2010).

Panel data used in this study is longitudinal data, which is by setting a number of sample cross section and then follow the observed variables from time to time during the period of observation. This study's panel data also has a number of the same time series observations (balanced panel data), beginning the first quarter of 2008 to the fourth quarter of 2012.

Samples used were all commercial banks in Indonesia, which is still in operation at the end of 2012, but not including Islamic banks. The commercial banks should be able to present the quarterly publication of the financial statements during the period of the first quarter of 2008 to the fourth quarter of 2012, respectively, have never experienced substantial losses during the period of observation, and do not have variables that were statistically significantly different from the other commercial banks.

With the methods and criteria above, then we obtain a sample of 30 commercial banks. The sample consists of 4 state-owned banks (BUMN), 13 national private commercial banks (BUSN), 8 regional development banks (BPD), 3 joint venture banks and two foreign banks. Based on the screening process, there is a bank in BUSN group has suffered substantial losses in 2011 resulting in the banks has a negative NIM and there is a regional development bank (BPD) has a very volatile asset growth in some periods time. The commercial banks included in the joint venture banks and foreign banks are known to have an average NIM very low and variable determinants, such as minimum capital ratio (CAR), Loan to Deposit Ratio (LDR), and ROA are statistically significantly different when compared with other commercial banks sampled in this study. Furthermore, these banks are not included in further data processing.

Data analysis was done using Microsoft Excel application program, Econometric Views (EViews), SPSS, and STATA. Data analysis was done with the data panel model to determine the sensitivity of each of the variables that affect the NIM of banks, whereas the effect of ownership on bank performance is evaluated using proprietary code as a dummy variable.

6. Research Variables

Research variables used in this study are divided into two, namely internal factors (bank specific factors) and external factors. Internal factors consist of variables derived from the bank's performance, as reflected in the balance sheet, income statement, and other financial reports are prepared and published by the bank in accordance with applicable regulations, while the external factors are variables that are not related to the bank's management but reflects the economic conditions that affect the operation and performance of the bank (Athanasoglou *et al*., 2005). The type and definition of each variable used in this study can be seen in full in Table 1.

Tabel 1. Research Variables

Aspect	Variable	Indicator	Expected Sign	References
Internal Factors (Bank Specific Factors)				
Growth	Asser Growth (LNSIZE)	Lognormal asset growth $Ln(Aset_{t+1} – Aset_{t0}/Aset_{t0})$	Negative	Maudos and Guevara (2004); Demirguc-Kunt *et al.* (2004); Liebeg and Schwaiger (2006); Athanasoglou *et al.* (2008); Bennaceur and Goaeid (2008); Sidabalok and Viverita (2011); Manurung and Anugraha (2013).
Profitability	Return on Asset (ROA)	Total Income/Total Asset	Positive	Ongore and Kussa (2013)
Efficiency	Operating cost to operating income	Operating cost/Operating income	Positive	Saunders dan Schumacher (2000); Brock and Suarez (2000); Maudos and Guvera (2003); Lieberg and Schwaiger (2006); Sidabalok and Viverita (2011);
Capital	Capital Adequacy Ratio (CAR)	((Tier1 Capital+ Tier2 Capital) / Risk Weigthed Assets	Positive	McShane and Sharpe (1985); Brock and Suarez (2000);
Liquidity	Statutory reserves (GWM)	Average bank checking account balane at central bank/total deposits past two months earlier report	Positive	Brock and Suarez (2000); Sidabalok dan Viverita (2011)
	Loan to Deposit Ratio (LDR)	Total loan/Total deposit	Positive	Brock and Suarez (2006); Manurung and Anugrah (2013).
Risk	Non Performing Loan (NPL)	Number of non performing loans / total loans	Positive	Angbazo (1997); Fungacova (2008); Sidabalok dan Viverita (2011)

External Factors				
Market Power	Loan Market Power (MPR)	Loan amount/Total of bank loans	Positive	Fungacova (2008); Sidabalok and Viverita (2011); Manurung and Anugrah (2013)
Inflation	Inflation rate	Average inflation rate per quarter	Positive	Brock and Suarez (2000); Bennaceur and Omran (2011)
Interest rate	Interest rate deposit insurance	Deposit insurance rates are determined by Indonesian Deposit Insurance Corporation (LPS)	Positive	Saunders and Schumacher (2000); Brock and Suarez (2000)

To answer the research objectives related to the determinant factor in the Indonesian banking NIM, use panel data equation model as follows:

$$\mathbf{NIM_{it}} = \boldsymbol{\beta_{it}} + \boldsymbol{\beta_1}\mathbf{LNSIZE_{it}} + \boldsymbol{\beta_2}\mathbf{ROA_{it}} + \boldsymbol{\beta_3}\mathbf{BOPO_{it}} + \boldsymbol{\beta_4}\mathbf{CAR_{it}} + \boldsymbol{\beta_5}\mathbf{GWM_{it}} + \boldsymbol{\beta_6}\mathbf{LDR_{it}} + \boldsymbol{\beta_7}\mathbf{NPL_{it}} + \boldsymbol{\beta_8}\mathbf{MPR_{it}} + \boldsymbol{\beta_9}\mathbf{INFL_{it}} + \boldsymbol{\beta_{10}}\mathbf{LPS_{it}} + \boldsymbol{\varepsilon_{it}}$$

where:

NIM_{it}	:	Net margin (NIM) of bank *i* at time *t*
$LNSIZE_{it}$	:	Lognormal growth of bank assets on quarterly basis of bank *i* at time *t*
ROA_{it}	:	Return on Asset of bank *i* at time *t*
$BOPO_{it}$	:	The ratio of operating expenses to operating income
CARit	:	Capital adequacy ratio of bank *i* at time *t*
GWM_{it}	:	Statutory reserve ratio to be maintained by bank *i* at time *t*
LDR_{it}	:	Loan to deposit ratio of bank *i* at time *t*
NPLit	:	Non performing loan ratio of bank *i* at time *t*
MPR_{it}	:	Market share of loan of bank *i* at time *t*
$INFL_{it}$	:	Average inflation rate in quarterly
LPS_{it}	:	Guaranteed interest rate set by Indonesia deposit insurance corporation (LPS)
β_0	:	Constitute the bank specific fixed effects constant term in the regression model
β_1 - β_{10}	:	Parameters to be estimated
ε_{it}	:	Random variable

With an explanation of each operational variables of the study are as follows:

a. *Net Interest Margin* (NIM)
   Net interest margin is the dependent variable in this study. Net interest margin is the cost of financial intermediation, and is defined as net interest income divided by average earning assets of the bank. Net interest margin data used in this study were collected from Indonesian commercial bank financial statements published on a quarterly basis.
b. *Logarithm SIZE (LNSIZE)*
   Bank size is a variable that is used to measure the economic scale. In most of the studies on banking, the bank's total assets are used as a proxy. Bank size has a positive relationship with the bank's revenue to a certain extent, and will have a negative impact if the size of very large banks, because of bureaucratic or other reasons. This study uses log total assets (LNSIZE) as a proxy of the size of the bank as used Demirguc-Kunt et al. (2004) and Athanasoglou *et al*. (2005).
c. *Return on Asset* (ROA)
   ROA is used to measure the revenue generated from the bank's use of the bank's assets. ROA is the bank's ability to generate earnings by the total assets owned. This ratio indicates the efficient management in managing a bank.
d. *Operational Cost to Operational Income* (BOPO)
   The ratio of operating expenses to operating income is often called the efficiency ratio is used to measure the ability of bank management to control operating expenses to operating income. ROA ratio reflects the increasing lack of ability of banks to reduce operating costs and increase operating income which may result in losses as banks are less efficient in managing its business.
e. *Capital Adequacy Ratio* (CAR)
   Capital Adequacy Ratio is a ratio used to measure a bank's capital adequacy to cover all the potential inherent risk in the bank earning assets, mostly in the form of loans. CAR based on the principle that any assets owned by the bank carries the risk that banks should provide capital for a certain percentage of total earning assets. In accordance with the conditions set by Bank Indonesia

to adopt international banking regulations relating to minimum capital adequacy (*Basel Capital Accord*) set by the Basel Committee on Banking Supervision, currently all commercial banks in Indonesia have to have minimum capital of at least 8 % of total risk-weighted assets (risk weighted assets). Banks often maintain capital ratios above the minimum regulatory capital ratio in expanding its business through the provision of credit. Increasing the amount of the loan will be accompanied by increased credit risk exposure, and the cost of maintaining higher capital ratios will be closed from the spread between lending rates and deposit rates.

f. Minimum reserves requirement (GWM)
In accordance with the definition of Bank Indonesia regulation, reserve requirement is the minimum amount that must be maintained by the bank in the amount set by Bank Indonesia. There are three types of reserve requirement in the context of banking in Indonesia. First, the so-called primary reserve, which is the minimum deposit required to be maintained by banks in the form of demand deposit account at Bank Indonesia. Second, the secondary reserve requirement is the minimum reserves that must be maintained in the form of Bank Indonesia Certificates (SBI), Government Securities (GS), SBSN, and / or excess reserve. And the third is the LDR reserve, ie the minimum deposit required to be maintained in the form of a bank deposit account at Bank Indonesia at the percentage of third-party funds is calculated based on the difference between a bank's LDR and LDR targets.

g. *Loan to Deposit Ratio* (LDR)
LDR is the ratio of loans to third parties in rupiah and foreign currency, excluding loans to other banks, to the third party deposits that include checking accounts, saving accounts, and time deposits. LDR reflects how much the bank's ability to repay the withdrawal of funds by depositors to rely on loans as a source of liquidity. This ratio is an indicator of vulnerability and the ability of a bank. The higher the ratio means the low capacity of the concerned bank liquidity. This is because the amount of funds required to finance the loan becomes larger.

h. *Non Performing Loan* (NPL)
The banking industry is also called a risky industry considering each bank's business activities which can not be separated from risk. With its primary function as an intermediary institution, the biggest risk faced by banks is credit risk. Financial ratios are used as a proxy for the amount of credit risk which is the ratio of non-performing loans (NPLs). NPL is a large amount of non-performing loans on a bank compared with the total loans.

i. *Market Power Ratio* (MPR)
In this study, the loan market share of a bank to total bank loans are used as a proxy variable of market power (MPR).

j. *Inflation rate* (INFL)
Inflation is a process of rising prices in general and constantly associated with the market mechanism that can be caused by various factors, including increased private consumption, excess liquidity in the market that triggered the consumption or even speculation, as well as due to the distribution of disfluencies goods.
Several previous studies suggested a positive relationship between inflation and bank profitability. High rates of inflation are generally associated with high interest rates, so if inflation is not anticipated and the bank is slow in adjusting interest rates, then there is a possibility that interest cost rising faster than interest income thus negatively affect on the profitability of banks.
Inflation data used in this study is that the inflation rate announced by Bank Indonesia as the central bank on its website. It is considering the objectives of Bank Indonesia is focused on achieving a single goal of achieving and maintain both the stability of exchange rate. The stability of exchange rate contains two aspects, namely the stability of the currency for goods and services and stability against the currencies of other countries. The first aspect is reflected in the development of the inflation rate, while the second aspect is reflected in the development of the exchange rate against the currencies of other countries.

k. *Interest rate* (LPS)
Net interest margin is the ratio of a bank's net interest income to average earning assets of banks. The bank's net interest income is bank interest income minus interest expense. Thus the net interest margin is highly dependent on lending rates and deposit rates offered by banks. Deposit rates and lending rates are influenced by market interest rate benchmark.

In general, commercial banks in Indonesia using a guaranteed interest rate specified by the Indonesia Deposit Insurance Corporation (LPS) as a reference in setting deposit rates which in turn will affect on the amount of loan interest rate charged by the bank to the debtor. Literally sense guaranteed interest rate is the highest savings interest rate that can be guaranteed by the Deposit Insurance Agency (LPS). Understanding secured is when a bank encounters a problem and must be liquidated, then the existing customer deposits in the bank will not be lost.

7. Correlation Analysis

Before performing descriptive analysis, first tested the correlation between the variables consisting of NIM, asset growth (LNSIZE), efficiency (ROA), capital adequacy (CAR), liquidity ratio (GWM and LDR), credit risk (NPL), loan market share (MPR), inflation rate (INFL), and interest rates (LPS) as presented in Table 2.

Tabel 2. Correlation Between Variables

	NIM	LNSIZE	ROA	BOPO	CAR	GWM	LDR	NPL	MPR	INFL	LPS
NIM	1.0000										
LNSIZE	0.0341	1.0000									
ROA	0.7347	0.0572	1.0000								
BOPO	-0.4724	0.0020	-0.8118	1.0000							
CAR	-0.0504	0.0096	-0.1280	0.1017	1.0000						
GWM	-0.0154	0.0243	0.0765	-0.1817	0.0939	1					
LDR	0.1985	-0.0656	0.0496	0.1187	-0.2274	-0.1505	1				
NPL	-0.1199	-0.0545	-0.1515	0.262	-0.1989	-0.1607	0.107	1			
MPR	0.0291	0.009	0.1905	-0.3086	-0.1867	-0.0183	0.0529	0.1599	1		
INFL	0.0176	-0.0611	-0.0571	0.072	0.0231	0.1317	-0.0348	0.0598	-0.0164	1	
LPS	0.0302	-0.0831	-0.0808	0.1539	0.0476	-0.311	-0.0834	0.1759	-0.0107	0.7499	1

From Table 2, it was known that the ROA had the strongest positive correlation with NIM (0.7347). Variables other internal variables had a significant positive correlation with the NIM is LDR (0.1985) and LNSIZE (0.0341). The third variable external variable also has a positive correlation with NIM, namely LPS (0.0302), MPR (0.0291), and INFL (0.0176). On the other hand, MPR variables have a positive correlation with ROA (0.1905), whereas LPS has a positive correlation with infl (0.7499) and ROA (0.1539).

8. Descriptive Statistic

Summary of descriptive statistics of each variable for the entire sample period and the bank used in this study can be seen in full on Table 3. From Table 3, it was known that the average NIM of commercial banks into the sample in this study is 6.29%, the lowest NIM is 1.35 % and the highest NIM is 18.68% with standard deviation 2.24%. On the growth side of the asset during the period of the first quarter of 2008 to the fourth quarter of 2012, the lognormal average asset growth of commercial banks is equal to 4.21% per quarter, the highest growth is 28.49% with standard deviation 6.96% and the lowest growth is -19.03%, or in other words there is a bank that has experienced negative growth or a decline of 1.05% of assets. The level of profitability that is reflected by ROA shows that the average ROA of commercial banks is 2.51% with the highest ROA of 10.34 % and there is a commercial bank had a negative ROA of 1.05 %. In terms of efficiency, the average ratio of operating cost to operating income (BOPO) is 79.79%, the lowest BOPO is 48.82% and the highest BOPO is 113.60% with a variation of 10.99%.

Table 3. Descriptive Statistics of Research Variables

STATISTIC	NIM	LNSIZE	ROA	BOPO	CAR	GWM	LDR	NPL	MPR	INFL	LPS
Mean	0.0629	0.0393	0.0251	0.7979	0.1686	0.0731	0.7484	0.0269	0.0293	0.0593	0.0724
Min.	0.0135	-0.1903	-0.0105	0.4882	0.0957	0.0406	0.3054	0.0022	0.0004	0.0278	0.0550
Max.	0.1868	0.2849	0.1034	1.1360	0.6106	0.1270	1.2848	0.0860	0.1521	0.1214	0.1000
Std. Dev.	0.0224	0.0696	0.0154	0.1099	0.0530	0.0192	0.1577	0.0141	0.0387	0.0275	0.0115
Skewness	1.3974	-0.2420	0.9995	0.0541	3.4988	0.2056	0.1362	0.6778	1.5548	0.9887	0.4766
Kurtosis	6.5599	4.7379	5.7513	2.8378	23.1231	2.1669	3.2794	3.6611	4.3356	2.8321	3.0659
Jarque-Bera	392.61	62.3757	221.6720	0.7288	8699.82	16.5434	2.9190	43.6012	219.52	75.4853	17.4987
Probability	0.0000	0.0000	0.0000	0.6946	0.0000	0.0003	0.2324	0.0000	0.0000	0.0000	0.0002

The level of capital adequacy of commercial banks in Indonesia was above the minimum capital capital requirement set by Bank Indonesia, i.e. 8 %. CAR of banks in Indonesia is in the range of 9.57% to 61.06% with a standard deviation of 5.30%. In terms of liquidity, as reflected by the variable minimum reserve requirement (GWM) and LDR, where the average GWM is 7.31%, with the lowest GWM is 4.06 % and the highest GWM is 12.70% with a variation of 1.92%. While the average LDR is 74.84%. Average level of non-performing loans (NPLs) is 2.69%, where the lowest NPL of 0.22% and the highest is at 8.60% with a standard deviation of 1.41%. Market power (MPR) which reflects a bank's market share of loans to total bank loans in Indonesia showed that the highest MPR was 15.21 % and the lowest was 0.04% with an average MPR of 2.93%.

9. Determinant Factors of Net Interest Margin

One goal of this study was to analyze the factors that affected on the NIM of Indonesian commercial banks. The analysis uses a panel data regression. Then it will be tested in order to determine the appropriate panel data models between the fixed effect model (FEM) and the random effect model (REM).

Testing and determination of appropriate panel data model are done by using the Chow-test, Lagrange Multiplier test (LM-test), and the Hausman test. Chow-test is done by comparing the Pooled Least Squares (PLS) with Fixed Effect Model. Chow-test assumes the error terms in the regression will be normally distributed with the same variance (σ^2). If the value of Chow Statistic (F.stat) generated from the test is greater than the F-table, the null hypothesis is rejected so that the model chosen for use is Fixed Effect Model, and vice versa. LM-test is done by comparing the PLS with Random Effect Model, while the Hausman-test is done by comparing the Fixed Effect Model with Random Effect Model. From the results of the Chow-test and Hausman-test, both for Indonesian commercial banks, state-owned commercial banks, national private commercial banks, and regional development banks shows that the best model used is Fixed Effect Model (FEM). Table 4 shows the complete results of data processing using a data panel fixed effect model to analyze the determinant factors net intereset margin of Indonesian commercial banks.

From Table 4 is known that bank specific factors and external factors affect on the net interest margin of Indonesian commercial banks. The entire internal variables, such as LNSIZE, ROA, ROA, CAR, GWM, LDR, and NPL statistically affect on the interest margin of Indonesian commercial banks significantly. ROA and ROA effects on NIM at 1% significance level, reserve requirement (GWM) at 5% significance level, and LNSIZE, CAR, LDR and NPL respectively affect the net interest margin at the 10% significance level.

Table 4. Determinant of Indonesian Commercial Banks' Interest Margin

Variables	Indonesia Banks	State Owned Banks	National Private Banks	Regional Dev. Banks
LNSIZE	**0.0091** *)	0.0083	0.0064	0.0049
	(1.8076)	(0.6800)	(1.0398)	(0.4919)
ROA	**0.6849** ***)	0.1927	0.1269	**0.8563** ***)
	(13.4387)	(1.5177)	(0.8551)	**(10.8203)**
BOPO	**0.0563** ***)	0.0016	-0.0024	0.0409 ***)
	(7.3780)	(0.0628)	(-0.1301)	**(2.8278)**
CAR	**0.0137** *)	-0.0623	**0.0131** *)	-0.0393
	(1.7018)	(-1.5503)	(1.8744)	(-1.2117)
GWM	**-0.0542** **)	0.0285	**-0.0808** ***)	-0.0342
	(-2.3116)	(0.6033)	(-3.2072)	(-0.6047)
LDR	**0.0077** *)	0.0153	-0.0064	0.0134
	(1.7061)	(1.3065)	(-1.1090)	(1.3867)
NPL	**0.0757** *)	0.1239	0.0032	**0.1992** *)
	(1.9205)	(1.1040)	(0.0703)	(1.8739)
MPR	0.0851	0.1075	-0.1520	1.5600
	(0.9252)	(1.0066)	(-1.2648)	(1.1807)
INFL	**0.0479** **)	**0.0781** *)	0.0375	0.0681
	(2.1032)	(1.7513)	(1.5727)	(1.2636)
LPS	-0.0667	-0.0494	**-0.1104** *)	0.0019
	(-1.1246)	(-0.4120)	(-1.6951)	(0.0141)
Obs	460	80	240	140
R-squared	0.9119	0.9350	0.8099	0.8685

Notes:
*) Statistically significant at the 1% level
**) Statistically significant at the 5% level
***) Statistically significant at the 1% level

LNSIZE have a positive effect 0.0091 on the net interest margin, this means that each increase of one unit LNSIZE assets, will be followed by a rise in NIM of 0.01. In other words, the growth of bank assets would increase bank's interest margin. In general, the cause of the bank's asset growth due to an increase in the amount of bank loans. If the loan expansion is not managed well, then the bank will potentially suffer a loss due to rising non performing loans. To anticipate potential losses from non performing loans, the bank will increase the amount of loan loss reserves and finally it will encourage banks to raise interest spread. This is in line with the results of research conducted Demirguc-Kunt and Huizinga (2000) which indicates that the size of the bank has a significant and positive impact on interest margin. Instead, Tin *et al*. (2011) found that size has a negative relationship, in which large banks tend to have lower interest margin due to the large banks to be inefficient so it will lower interest margins. Ben Naceur and Goaeid (2003) also obtain a negative relationship between the size of the bank and the interest margin.

Return on Asset (ROA) reflects the level of bank profitability. ROA is significantly positive effect on banks' interest margin. This indicates that in order to improve profitability, the bank will seek to increase net interest income by increasing interest margin. The bank will also raise interest margin to cover increases in operating costs, thus the increase in ROA will encourage banks to raise interest margin.

Capital adequacy ratio (CAR) contributes statistically significant positive effect on the interest margin. This indicates that the addition of the required amount of capital in order to support business expansion and as a buffer in anticipation of all the potential risk of loss in any business activity, both in normal and abnormal conditions, will increase the cost of capital of the bank. Bank will finance an increase in the cost of capital by raising the interest margin. This is consistent with the results of research conducted Kunt and Huizinga (2000).

On the other hand, statutory reserve (GWM) has a negative relationship with the interest margin. This suggests that if banks maintain large liquid assets, either in the form of current accounts at the central bank or other liquid assets, bank will not have liquidity problems and also have excess liquidity, but on the other hand will reduce banks' ability to obtain interest income when the funds are placed in the form of loan or other earning assets.

Loan to deposit ratio (LDR) is another bank specific factor that has an influence on interest margins of commercial banks in Indonesia at 10% significance level. LDR increases as a result of greater loan growth compared to the growth of third party funds collected by the bank. This condition causes an increase in the bank's net interest income as a result of interest revenue growth greater then growth of interest expense to be paid by the bank. Similarly, if an increase in non-performing loans (NPL) will increase the loss reserve bank to be established in order to anticipate potential losses of bad loans, thus it will encourage bank to increase interest income and resulted in increased interest margin.

External factors used in this study are market power (MPR), which is reflected by the magnitude of bank loan market share, inflation rate (INFL) and interest rate (LPS). The results of this study indicate that inflation is the only external factor that contributes significantly positive effect on interest margins of Indonesian commercial banks. This is consistent with the results of research conducted Brock and Suarez (2000). The increase in high inflation rate would reduce the debtor's ability to meet its obligations to the bank, both principal repayments and interest payments on the loan, thereby increasing non-performing loans (NPLs) in bank's loan portfolio and bank must establish a loan loss reserve in a great value and to cover the losses, banks will raise lending rates or in other words to raise bank interest margin.

In the group of state-owned banks, interest margins are not affected by bank-specific factors, only affected by the rate of inflation. This indicates that the state owned bank's interest margin is affected by only general market risk arising as a result of volatility in macroeconomic conditions. On the other hand, during the period of observation, the performance of state-owned banks better performance when compared to the national private commercial banks and regional development banks, so that the internal factors do not significantly affect on the state-owned bank interest margin.

In the group of national private banks, interest margins are significantly affected by CAR, GWM and LPS. CAR has the positive impact on interest margins as previous explanations. The statutory reserve (GWM) has a negative impact on interest margins of Indonesian commercial banks. Meanwhile, the interest rate used in this study is the guaranteed interest rate set by Indonesian Deposit Insurance Corporation (LPS). Increasing this interest rate will increase interest cost to be paid to depositors. On the other hand, in an effort to increase the market share of loans and compete with other commercial banks in Indonesia, the private national banks should lower lending rates, it will reduce the interest spread represents the difference between interest rates on loans with interest rates on deposits.

Interest margin of regional development banks are significantly influenced by bank specific factors, such as ROA, BOPO, and NPL; but there are no external factors affecting on the interest margin because these banks only focus on specific customer groups (niche market) and certain types of loans, i.e loan to fixed-income debtor class (employees) with a low risk of loan defaults. ROA has a significant positive effect on interest margins of regional development banks. This indicates that the regional development bank interest margin is determined the magnitude of the return on assets as one of the key performance indicators banks' management. Regional development bank interest margins are also significantly influenced by the ratio of interest expense to interest income (BOPO). Higher BOPO will increase interest spread to compensate for the increase in operating costs. Similarly for NPL, increase in the level of non-performing loans will increase loan loss reserves and encourage bank to raise lending rates which in turn will further widen the interest spread.

10. Conclusion

Interest margin of Indonesian commercial banks is affected by bank-specific factors and external factors. The entire internal factors (bank-specific factors) used in this study have an influence on the interest margin on a different level of significance. ROA is an internal factor which holds a definitely significant positive effect on net interest margin, meanwhile inflation is the only external factors that affects on interest margins significantly at 5% level.

In general, there are behaviors towards the commercial banks in Indonesia, which always expects to maintain a stable net interest margin at a certain level in the long term. It is intended to be able to sustain the achievement level of return that has been predetermined by the owner or ultimate shareholder of the bank. Thus, the high net interest margin is not defined as the low level of efficiency of Indonesian commercial banks, but rather reflects the high asymmetric information and the high level of profitability of the bank's management to be achieved within the framework of the capital

increase in order to maintain organic growth in bank assets. It may also reflect the presence of lending practices with a high credit risk that banks should establish loan loss reserves which are large enough.

Determinant factors that affect on the net interest margin of each group of commercial banks in Indonesia are determined by the characteristics of business, business complexity, and ownership identity of the bank group. For example, inflation is the only determinant factor affecting on the net interest margin of state-owned commercial bank. On other hand, determinant factors that affect the net interest margin of national private bank are capital, statutory reserves, and interest rates on deposits are guaranteed by Indonesian Deposit Insurance Corporation; while the net interest margin of regional development bank is affected by profitability (ROA), efficiency (BOPO), and credit risk (NPL).

References

Allen, L. (1988), *The Determinants of Bank Interest Margins: a note,* Journal of Financial and Quantitative Analysis, 23(2), 231–235.

Angbazo, L. (1997), *Commercial Bank Net Interest Margin, Default Risk, Interest Rate Risk and Off-balance sheet Banking*. Journal of Banking and Finance 21, 55-87.

Athanasoglou, P.P. *et al*. (2005), *Bank-Specific, Industry-Specific and Macroeconomic Determinants of Bank Profitability*, Bank of Greece, Working Paper.

Bank Indonesia (2013), *Financial Stability Review Desember 2012*, Bank Indonesia.

Barajas, A., Steiner, R., Salazar, N. (1999), *Interest Spread in Banking in Colombia 1974-96*, IMF Staff Paper, 46, 196-224.

Bennaceur, S., Goaied, M. (2008), *The Determinants of Commercial Bank Interest Margin and Profitability: Evidence From Tunisia*, Frontiers in Finance and Economics, 5(1), 106-130.

Brock, P., Suarez, L. (2000), *Understanding the behavior of bank spreads in Latin America,* Journal of Development Economics, 63, 113–134.

Carbo, V.S., Rodriguez, F.F. (2007), *The Determinants of Bank Margins in European Banking*, Journal od Banking and Finance, 31(7), 2043-2063.

Caruntu, G.A., Romanescu, M.L. (2008), *The Assessment of Banking Performances-Indicators of Performance in Bank Area*, MPRA Paper No. 11600.

Claeys, S., Vennet, R.V. (2007), *Determinants of Bank Interest Margins in Central and Eastern Europe: A Comparison with the West*, Research Department, Sveriges Riksbank, SE-103.37.

Demerguc-Kunt, A., Huizinga, H. (2000), *Determinant of Commercial Bank Interest Margins and Profitability: Some International Evidence*, World Bank Economic Review

Demerguc-Kunt, A., Leaven, L., Levine, R. (2003), *The Impact of Bank Regulation, Concentration and Institution on Bank Margin*, National Bureau of Economic Research. Working Paper 9890.

Drakos, K. (2002), *The Dealership Model for Interest Margins: The Case of the Greek Banking Industry*, Journal of Emerging Finance 1, 75-98.

Fry, M.J. (1995), *Money, Interest and Banking in Economic Development*, Second ed., John Hopkins University Press.

Gelos, R. (2006), *Banking Spreads in Latin America*, IMF Working Paper WP/06/44, International Money Fund.

Gounder, N., Sharma, P. (2012), *Determinants of Bank Net Interest Margins in Fiji, A Small Island Developing State*, Applied Financial Economics, 22, 1647-1654.

Hadad, M.D., Santoso, W, Dwityapoetra, S.B. (2003), *Intermediation Cost Study of Some Banks in Indonesia: Is Interest Credit Banks overpriced?*, Bank Indonesia Working Paper.

Hellmann, T., Murdock, K.C., Stiglitz, J.E. (2000), *Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?*, American Economic Review, 90(1), 147–165.

Ho TS. and Saunders A. (1981), *The Determinants of Banks Interest Margins: Theory and Empirical Evidence*, Journal of Financial and Quantitative Analysis, XVI(4), 581–600.

Khrawish, H.A. (2011), *Determinants of Commercial Banks Performance: Evidence from Jordan*, International Research Journal of Finance and Economics, Zarqa University, 5(5), 19-45.

Klein, Michael A. (1971), *A Theory of Banking Firm*, Journal of Money, Credit and Banking, 3(2), 205–218.

Koch, T.W., Mac Donald, SS. (2000), *Bank Management*. Fourth Edition. Orlando. The Dryden Press. Harcourt Brace College Publishers.

Levine, R. (1997), *Financial Development and Economic Growth*, Journal of Economic Literature. 35(2), 688-726.

Liebeg D., and Schwaiger, M.S. (2006), *Determinants of the Interest Rate Margins of Austrian Banks*, Financial Stability Report, 12, 104-116.

Manurung, A., Anugraha (2013), *Net Interest Margin: Bank Publik di Indonesia*, Journal of Business and Entrepreneurship, 1, 64-79.

Martinez, P., Soledad, M., Mody, A. (2004), *How Foreign Participation and Market Concentration Impact Bank Spreads: Evidence from Latin America,* Journal of Money, Credit and Banking, 36(3), 511-37.

Maudos, J., Fernandez de Guevara, J. (2004), *Factors Explaining the Interest in the Banking Sectors of the European Union*, Journal of Banking and Finance 28, 2259-2281.

Maudos, J., Solis, L. (2009), *The Determinants of Net Interest Income in the Mexican Banking System: An Integrated Model*, Journal of Banking and Finance, 33(10), 1920-1931.

McShane, R.W., Sharpe, I.G. (1985), *A time Series-Cross Section Analysis of Determinants of Australian Trading Bank Loan-Deposit Interest Margin: 1962-1981*, Journal of Banking and Finance, 9, 155-136.

Monti, M. (1972), *Deposit, Credit and Interest Rate Determination under Alternative Bank Objectives*, In Mathematical Methods in Investment and Finance, edited by Szego, G.P. and Shell K., North Holland Amsterdam.

Mujeri, M.K., Younus, S. (2009), *An Analysis of Interest Rate Spread in the Banking Sector in Bangladesh*, The Bangladesh Development Studies, XXXII, No. 4, 1-33.

Murthy, Y., Sree R. (2003), *A Study on Financial Ratios of major Commercial Banks*, Research Studies, College of Banking & Financial Studies, Sultanate of Oman.

Neaceur S. B., and Omran, M. (2011), *The Effects of Bank Regulations, Competition, and Financial Reforms on Bank's Performance*, Emerging Market Review, 12, 1-20.

Ongore, V.O., Kusa, G.B. (2013), *Determinants of Financial Performance of Commercial Banks in Kenya*, International Journal of Economics and Financial Issue, 3(1), 237-252.

Randall, R. (1998), *Interest Rate Spread in the Eastern Caribbean*, IMF Working Paper 98/59. International Monetary Fund, Washington.

Saunders, A., Schumacher, L. (2000), *The Determinants of Bank Interest Rate Margins: an International Study*, Journal of International Money and Finance 19, 813–832.

Sidabalok, L.R. and Viverita. (2011), *The Determinants of Net Interest Margin in the Indonesian Banking Sectors*, Universitas Indonesia, Research Paper No.13-02.

Verbeek (2008), *A Guide to Modern Econometrics*, John Willey & Sons, Ltd., 3rd. Edition.

Wong, K.P. (1997), *The Determinants of Bank Interest Margin Under Credit and Interest Rate Risks*, Journal of Banking and Finance, 21, 251-271.

Wooldridge, J.M. (2010), *Econometric Analysis of Cross Section and Panel Data*. 2nd Edition. MIT Press.

Xavier, F. and Rochet, J.C. (1999), *Microeconomics of Banking*, Massachusets Institute of Technology (MIT), USA.