

GENERAL AND SPECIFIC BEHAVIOR OF INTEREST MARGIN: EVIDENCE FROM POST CRISIS INDONESIAN BANKING

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ABSTRACT

This study addresses one aspect of banking intermediation processes namely how banks set their interest margin. Building from existing theoretical framework as initialized by Ho and Saunders (1981) and further extended by Maudos and Guevara (2004), we propose an empirical scheme that focuses more on internal characteristics. Besides that, also try to investigate some possibilities of specific behavior pertinent to particular category of banks and persistence of profitability. Several findings on behavior variables confirm the theoretical conjecture: liquidity, efficiency, size of asset and macroeconomic condition. Other findings especially on interest rate volatility response and banking relationships provide unique and novel insights. Unlike predicted by theory, banks are unable to perform the role as funds dealer and absorb the cost of money market volatility. Relationship has enabled a certain category of banks to obtain higher interest margin than average.

JEL Classification : C23 G21 L11 L21

Keywords: Net Interest Margin, Internal Characteristics, Panel Data

1. INTRODUCTION:

Financial Sector is the backbone of the economy. It helps to allocate financial resources from surplus to deficits unit more efficiently. According to Levine (1997), this efficiency comes from the ability of financial sector to deal with asymmetric information that is usually pervasive in the industry. The ability emerges from the acquired knowledge and technology after long time operation. Besides that, the efficiency also comes from economics of scale.

The financial sector itself can cover either bank based or market based. Each has its own merit. How well the financial sector in channeling the fund surplus is also affected by industry behavior which in turn is also affected by the structure, regulation, competition (ie existence of barrier to entry), etc.

In this article, we focus on a sub of financial sector, namely, banking. We are interested in the banks because of their dominant shares in Indonesia financial industry. As can be seen in figure 1, banking Industry accounts for almost 48% share of intermediation business. Therefore, it can be said that the overall efficiency of Indonesia financial sector would significantly be affected by banks performance.

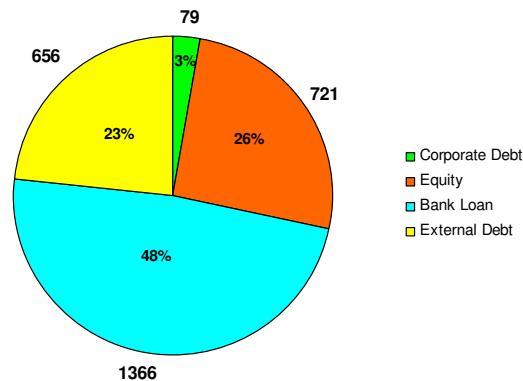


Figure 1. Financing in Indonesia (Rp. Trillion, source; Bloomberg, Bapepam and BI)

Banking is also fascinating due to its paramount risk to macro economy stability. No industry could force authority to conduct bail out policy¹. Lender of last resort (LOLR), Systematic Risk and Too Big to Fail (TBTF) are jargons unique only to banking industry. Since the health of banking system is vital, the competition could not be over emphasized. The banks somehow should be “guaranteed” to have an adequate return, at least to cover its operational cost. Bankruptcy of banks resulted from some fierce competition are not desired.

Lastly, banking is also interesting because of its role in money creation. By taking deposits and disbursing loan, banks have multiplied money originated from the Government. Therefore, banks have become an indispensable part of monetary policy. Central bank not only needs to know how much inflation needs to be reduced but also whether the policy would be effective. Monetary tightening policy could be ineffective if banks behave in undesirable way.

The above arguments show that the principle and behavior of bank business might differ

¹ Off course, we are excluding case in which there exist political intervention like recently occurred in US (The Ford and General Motor)

greatly from other industry, or even from other financial firms like securities house, insurance and pension funds. Therefore, the study becomes much more challenging and adventurous.

This study aims to capture one aspect of banking businesses namely pricing behavior. We take an integrative and simplistic approach. Banks are doing business by taking deposits from and giving loan to customers. In return for their service, banks obtain interest spread which they can determine by themselves.

There are three main contributions of this paper. First, we emphasize greatly on internal characteristic. There is significant size of study on banking pricing behavior and profitability. However, we think they have not sufficiently exploited the internal characteristics. Departing from the usual competitive set up, we argue that internal characteristics are the most important aspect for Banks pricing behavior.

Instead of assuming that all banks behave similiarly or differently only by fixed term we argue for possibilities of changing responses. In other words, we assume that in terms of interaction term, different banks behave distinctively against various changes in ~~its~~ their environment. This is the second contribution.

We study the effects of various independent variables to bank interest spread (proxied by net interest margin) which also accounts also its type. There are 2 categories of banks we are interested in. First is the category according to Bank Indonesia classification which such as SOE banks, Regional Banks, Private Foreign Exchange Bank, Private Non Foreign Exchange Banks and Foreign-Joint Venture banks. Second is the category according whether or not its shares are publicly traded (it is subject to market discipline or not).

The maintained hypotheses are whether there are differences not only through constant term but also through its slope factor. To preserve sufficient degree of freedom, we only focus on the behavior of certain variables namely profitability, productivity and efficiency.

The third contribution is related to the dynamics of interest spread. Goddard et al (2004) argue for the existence of profit persistence². Profit is needed for future growth. High future growth in turn would enhance production and competition capacity; thus, the possibilities of future promote higher profit. This argument could be addressed to enhance efficient market structure hypotheses (Smirlock, 1985 and Berger, 1995).

The outline of the articles is divided into six sections. The first section gives the motivation and overview of the research problems. In next two sections we will provide a brief review of Indonesian banking industry followed by current state of research on banks interest margin. The fourth part will expose the methodology and steps taken on how we are going to handle research problem. We will elicit the empirical findings and several caveats related to them in the fifth section. In the sixth section we will take a closer and attentive look at the empirical findings and relating with other findings in this area of research. We will conclude overall discussion with possible future research directions and policy implications in the last section.

2. INDONESIAN BANKING INDUSTRY :

Officially Indonesian banking system is divided into two categories: commercial banks and community loan-saving bank. By the end 2009, there are 121 commercial banks composed of 4 State

² Since we assume banks in Indonesia are conventional, their main profits come from interest spread. Therefore while we are talking about interest spread, inevitably we would talk about profit.

Owned (SOE) banks, 26 Regional banks, 33 private foreign exchange banks, 32 private non foreign exchange, 15 joint venture banks and 10 foreign banks. There are also 1897 community loan-saving bank. Community saving-loan banks are banks which operate in very limited scope and they do not involve in payment (clearing) system. The study focuses on commercial banks.

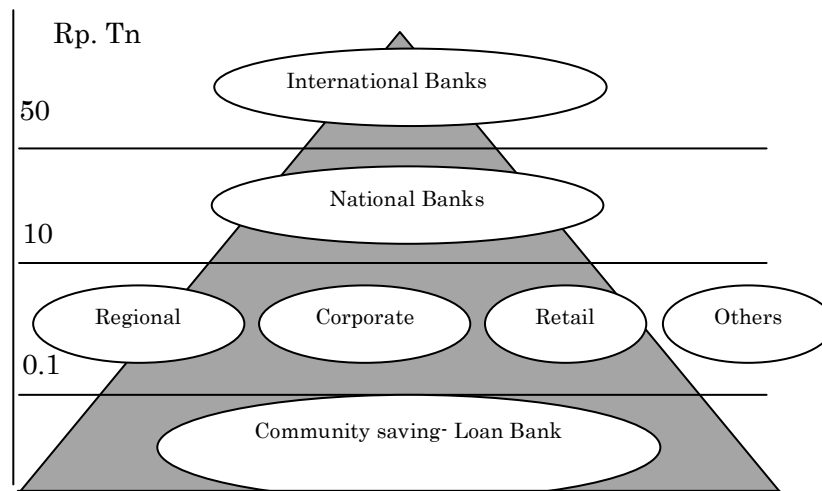


Figure 2. Indonesia Banking Architecture(source: BI)

Though such categories remain official in the time of writing, Bank Indonesia is planning a new classification (hierarchy to be more precise) called Indonesia Banking Architecture (IBA). The IBA classifies banks according to their capital. Banks whose capital is more than Rp. 50 Trillions are permitted to become international banks (ie have network in foreign countries). This type of banks is expected to be no more than 3.

Banks whose capital is between Rp. 10 Trillion to Rp. 50 Trillion are expected to be nationwide bank. This bank can operate in various segment ie corporate, commercial and retail banking as long as it is inside the nation border. To maintain status as commercial bank, a bank must have capital at least Rp. 100 billions. A commercial bank would be limited in operating segment if its capital is still less than Rp. 1 Trillions. As such, it becomes community saving loan bank.

No.	Indices	2000	2009	Growth
1	Total Assets (Rp. Tn)	899.8	2534.6	12.20
2	Total Deposits (Rp. Tn)	641	1973	13.31
3	Total Loans (Rp. Tn)	268.28	1437.9	20.51
4	Capital (Rp. Tn)	54.32	268.6	19.43
5	Number of Banks	150	121	-2.36
6	Number of Offices	6509	12837	7.84
7	Non Performing Loan (%)	22.8	3.31	-19.30
8	Net Interest Margin (%)	4.2	5.81	3.67

Table 1. Several Banking Sector Indices 2000-2009

Banking assets grew significantly after recapitalization (see table 1). The compounding annual growth (CAGR) reached 12.2% during 2000-2009 periods from 899.8 Trillion to 2.534,6 Trillions. Deposits grew by 13.3% and loan rose even higher by 20.51%. The loan to deposits ratio jumped from 42% to 73%, signaling that the intermediation process becomes normal again and becoming more prudent as surge in lending is not accompanied by deteriorating quality. The Non Performing Loan ratio even decreased from 22.8% to 3.31% as effect of restructuring process.

As a part of BI consolidation plan, the number of banks declined from 150 to 121. BI has forced banks to raise capital to Rp. 100 billion by the end of 2010. Several opted to merge to form larger banks and others were being taken over. Even though the number of banks declined during the period, the number of office doubled from 6509 to 12.837, indicating deeper penetration. Bank Capital also rose from 54.3 Trillion to Rp. 268.6 Trillion.

3. DETERMINATION OF NET INTEREST MARGIN: LITERATURE REVIEW:

Ho and Saunders (1981) build the first analytical model of bank interest margin. Building from hedging hypotheses and expected utility theorem, they derive the interest spread equation as follows

$$s = \frac{\alpha}{\beta} + \frac{1}{2} R \sigma_1^2 Q \tag{2.1}$$

Where s is the interest spread, α/β is a measure of market power, R is the bank’s risk aversion, σ_1^2 is variance of interest rate in deposits and loan and Q is a measure of bank transaction.

This equation is further developed by various authors. Allen (1988) considers credit risk, as the most important risk while McShane and Sharpe (1985) argue that money market rate is more influential. Angbazo (1997) has synthesized both arguments. More recent accounts are developed by Maudos and Guevara (2004) who have added risk premium and operating cost to the model. Furthermore, Hanweck and Ryu (2005) expand it into a dynamic environment.

We base our empirical work from theoretical model of Maudos and Guevara (2004). They expand Ho and Saunders (1981) equation into the following form,

$$s = \frac{1}{2} \left[\frac{\alpha_D}{\beta_D} + \frac{\alpha_L}{\beta_L} \right] + \frac{1}{2} \left[\frac{C(L)}{L} + \frac{C(D)}{D} \right] - \frac{1}{4} \frac{U''(\bar{W})}{U'(\bar{W})} \left[(L + 2L_0) \sigma_L^2 + (L + D) \beta \sigma_M^2 + 2(M_0 - L) \sigma_{LM} \right] \tag{2.2}$$

$$U''(\bar{W})/U'(\bar{W})$$

Where α/β is a measure of market power, C/L and C/D is average operating cost, is the coefficient of risk aversion, L+D is size of operation, σ_L^2 is a measure of credit risk, σ_M^2 is a measure of interest rate risk and σ_{LM} is covariance of interest rate risk and market risk.

Since interest margin becomes a measure of profitability (or bank rents); therefore, the empirical review encompass bank profit studies. Bank profitability and its factors have been tested by various researchers. For current review on this topic, see Degryse and Ongena (2007) and Athanasoglou et al (2008). Here we present brief some important recent findings.

Demirguc-Kunt and Huizunga (1999) is one of the most cited sources. They have used an extensive dataset composed of bank level from 80 countries in the period of 1988-1995. Their study has found that bank interest margin (or spread) is positively correlated to leverage factor (equity to

total asset), ratio of loans to total assets, foreign ownership, size, ratio of overhead and total assets, inflation rate and short term market rate.

Angbazo (1997) studied net interest margin of a sample of US banks. According to Angbazo (1997), bank spread is positively affected by various measure of risk (ie credit risk, interest rate risk, liquidity risk), leverage and management efficiency. The same results that internal characteristics influence the spread significantly was obtained by Demirguc-Kunt and Huizinga (1999). Hawtrey and Liang (2008) using national level data in OECD countries also confirmed the findings.

Other recent bank level studies with similar results are Park and Weber (2004) in Korea, Pasiouras and Kosmidou (2007) in European Zone, Athanasoglou et al (2008) in Greece, and Zhou and Wong (2008) in China. On the other hand, Afanasieff et al (2002) has found a different conclusion. Their study on Brazilian Banking found that bank specific character does not significantly influence the net interest margin. Macro economic variables are the most relevant factors in explaining bank spread behavior.

Banks performance can also be analyzed within structure-conduct-performance paradigm (first introduced by Bain in 1956). There are two competing major hypotheses regarding the structure-profit relationship. First, the traditional school which states that firms in concentrated market would tend to exploit its market power (this statement is also known as relative market power hypothesis). In that way, they obtain a significantly high (abnormal) profit. Gilbert (1984) and Berger and Hannan (1989) are widely cited studies that support this hypothesis. An updated review could be seen in Berger et al (2004)

However, a positive correlation between profit and concentration could also come from efficiency. This hypothesis first outlined by Demsetz (1973) and Peltzmann (1977) who state that more efficient banks could drive other banks out of the industry. These banks, since they become more efficient, also obtain more profit. Hence, the more concentrated industry and more profitable banks are results of efficient and endogenous process. This hypothesis (also known as Efficient Structure Hypotheses, ESH) is supported by a study on 4800 US banks in 1980 by Berger (1995).

The impacts of macroeconomic changes also have been studied intensively. One of the most recent works is from Akhter and Dely (2009). They use national level panel data from Financial Soundness Indicators for 50 countries. Macro economic variables included in the study are business cycle, inflation, exchange rate and financial freedom. They have found that profitability (here measured by Return on Assets) are positively correlated to business cycle and inflation and negatively affected by exchange rate depreciation.

These results are in line with various other studies. Flamini et al (2009) work in Sub Saharan Africa banking industry has also found that stable growth and well managed macro economy boosted profit. Growth is also seen favorably to banking performance in Greece (Athansoglou et al, 2008) and Brazil (Afanasieff et al, 2009). The benchmark study by Demirguc-Kunt and Huizinga (1999) also supports these findings.

4. Methodology

This study aims to determine factors affecting bank interest margin. The hypotheses are verified through estimating the following linear model

$$S_{it} = \alpha + X\beta + \varepsilon_{it}; \quad \varepsilon_{it} = v_i + u_{it} \quad (4.1)$$

Where s_{it} is the net interest margin, α is the model constant intercept. X is the vector of control variables and ε_{it} is error component. We assume one way error component that stems from cross section heterogeneity. Therefore ε_{it} could be broken down into two components, the cross section type error component (v_i) and the idiosyncratic error (u_{it}). The heterogeneity could be in the form of fixed constant (Fixed Effect, FE) or random (Random Effect, RE). Redundant fixed effect likelihood ratio is used to test the more appropriate form of heterogeneity.

We use control variables from 3 categories namely: (1) internal characteristics, (2) measure of industry concentration and (3) macro economy condition. Since this study emphasizes the role of internal factor, number of variables in this category is much larger. They are 15 independent variables composed of (1) 10 internal characteristics variables, (2) 1 measure of industry concentration and (3) 4 indicators of macro economy. The list of variables and their expected sign in econometric work are shown in table 2.

No.	Name of Variables	Proxy and Description	Expected Sign
Dependent Variable			
1	Intermediation Premium	Net Interest Margin (NIM), Difference of interest revenue and interest cost divided by total productive assets.	
Internal Characteristics			
1	Liquidity Measure	Loan To Deposit Ratio (LDR), total loan divided by total deposit	Negative
2	Human Capital Productivity	Emp_To_Ops, Employment related cost divided by total operational cost	Negative
3	Measure of Government Support	GB To TA, Government Bond owned by banks divided by Total Assets	Positive
4	Efficiency Measure	OCOI, operational cost to operational income	Negative
5	Capital provision	Capital Adequacy Ratio (CAR), TIER 1 & 2 Capital divided by risk weighted capital	Positive
6	Size	Value of total asset	Positive
7	A measure of Prudent Management	Non Performing Loan (NPL), loan classified as doubtful and default divided by total loans	Negative
8	Measure of Diversification	TA to Loan, total assets divided by total loan	Negative
9	Bank Type	Dummy variables: 1. Government, 2. Regional Provinces, 3. Forex Private, 4. Non Forex private and 5. Foreign-Joint Venture	N/A

10	A measure of capital market access	Dummy Public: 1 Public listed, 0 Non Public Listed	N/A
Industry Concentration			
11	Concentration Measure	Herfindahl Hirschman Index	Positive
Macro Economy Variables			
12	Volatility of Money Market Rate	JIBOR6_VTY, Standard deviation of Jakarta Inter Bank Offer Rate 6 month	Positive
13	Overall economic condition	Growth: annual percentage change of real GDP	Negative
14	General price pressure	Inflation: annual percentage change of consumer price index	Positive
15	External condition	Exchange rate Depreciation: annual percentage change of exchange rate	Positive

Table 2. Variables: Description and Expected Sign

The data is of semiannual frequency mostly obtained from bank financial reports compiled by Ekofin. There are 2420 observations composed from 121 banks (cross section units) operational in period June 2000 to December 2009 (20 time series points). Macro economics data used are from national sources (BPS and Bank Indonesia).

The econometric techniques used are quite varied and depend on situation. At the beginning we use various linear panel data methods like pooled least square³, fixed effect and random effect. We conduct various estimations in order to see the robustness of parameter obtained. In addition, there is also a possibility of time dummy effect that renders Pooled Effect and Random Effect estimator are likely to be biased. Nevertheless, using Fixed Effect without testing its appropriateness would risk the loss of the degree of freedom (hence efficiency) and when the time unit is relatively smaller than cross section, the problem even could be more severe (bias of estimates). Lastly, the linier model also enables us to see the effect of time invariant variables such as bank type and market access dummies⁴.

Next we also take a serious note on findings of bank profit persistence by Berger et al (2000) and Goddard et al (2004). Various factor like market power, informational opacity, managerial motives and macroeconomic shocks could cause bank profit to be persistence. In this regard, the previous period profit would affect current or even future profit. Failing to account for this fact would cause systematic relationship between independent variables with regression residuals. The estimating obtained from this way might be biased. The Dynamic Panel Data method devised by Arrelano & Bond (1991) is designed to cope with this problem.

³ We use a variant of pooled least squares called Estimated Generalized Least Squares (EGLS) to obtain parameters that accounts (robust) for heterocedasticity in the data .

⁴ Reader interested in the technical discussion on various methods in panel data econometrics could refer to Baltagi (2005) and/or Cameron and Triverdi (2005).

	ROA	NIM	LDR	EMP_TO_OPS	GB_TO_TA	OCOI	CAR	ASSET	NPL	DEPR	GROWTH	IHH	INFLASI	TATOLOAN	JIBOR6_VT
Mean	0.021962	0.064258	0.807973	0.203642	0.049966	0.841688	0.378017	11896742	0.079436	4.667760	5.186956	820.5677	8.604804	3.553917	0.134260
Median	0.021500	0.057600	0.705746	0.194439	0.000000	0.818346	0.196700	1713228.	0.032750	3.794333	5.161377	743.5671	7.324581	1.892118	0.123070
Maximum	0.518000	0.609900	72.36729	0.595104	0.768496	12.26280	50.49710	3.70E+08	3.935197	35.14085	7.158433	1354.111	17.79305	494.3969	0.340972
Minimum	-1.529900	0.080000	0.000000	0.000000	0.000000	0.908000	-1.679400	1.000000	0.000000	23.68881	1.643278	591.1861	2.040000	0.000000	0.026883
Std. Dev	0.049700	0.042318	1.946904	0.094123	0.109042	0.466237	1.596639	35685078	0.194116	15.16779	1.174953	224.1090	3.982853	14.29900	0.076117
Skewness	-14.18307	3.374787	31.86975	0.652367	3.152642	14.20880	22.34699	5.578591	10.31040	0.366424	-1.016896	0.924734	0.497855	21.74026	1.135394
Kurtosis	418.0529	34.82838	1093.950	3.705802	14.08870	315.6168	590.3164	38.22928	161.3719	2.622499	4.909472	2.688786	2.714737	635.3482	3.794725
Jarque-Bera	17451586	106742.4	1.20E+08	221.8827	16407.18	9935799.	34982927	137696.5	2571945.	68.52360	784.7244	354.6694	108.1753	40510281	583.6298
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	53.14719	155.5036	1955.295	492.8133	120.9173	2036.885	914.8005	2.88E+10	192.2357	11295.98	12552.43	1985774.	20823.62	8600.479	324.9094
Sum Sq	5.975184	4.331950	9169.062	21.43016	28.76248	525.8345	6166.649	3.08E+18	91.15077	556519.7	3339.463	1.21E+08	38372.88	494592.0	14.01505
Dev	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20
Observations	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20	24.20

Table 3. Descriptive Statistics of Variable

5. Estimation & Diagnostics

First we outline the descriptive statistic. Since we use dataset from secondary resources, some unusual feature is inevitable (see table 2). Several features could be justified as reasonable. For example, we could see that Return on Assets could reach 0.518 (51.8%). This is extremely high and very unusual; nevertheless, it is still possible to happen in certain situation. The same judgment could be held against the value of Loan to Deposit Ratio (720%). Particular foreign -joint venture banks are known as inactive in deposits market, however they are quite aggressive in lending (especially through bond market).

The significance of estimation results, given in table 4, is quite sufficient. Most of the parameters have a high level of confidence (around 99%). Nevertheless, a substantial part of the estimation does not have algebraic sign as expected. Estimation whose sign happens to be as expected are Loan to Deposit Ratio (LDR), Operational Cost to Operational Income (OCOI), Non Performing Loan (NPL), Total Asset to Loan (TA to Loan), growth and inflation. Several variables like asset, Total Asset to Loan (TA to Loan) and depreciation have modest significance. We will take a closer look on this finding in the next section.

Since we use a panel dataset, we have to account for unit heterogeneity especially cross section. There are two assumptions of heterogeneity, fixed affect and random effect. We have tested some assumptions which are more appropriate through likelihood ratio test. This is a test to measure if all of the cross section dummies (fixed effects) are significance. Failing to reject null hypotheses would mean that pooled regression or a random effect is more favorable.

Redundant Fixed Effects Tests
Equation: FE_NIM
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	9.832251	(120,2285)	0.0000
Cross-section Chi-square	1007.468046	120	0.0000

Table 5. Fixed Effect Testing

The test result shown in table 5 convincingly rejects the null hypotheses of redundant fixed effect. Therefore, we have to use estimation technique which accounts for cross section heterogeneity.

Next, since we use a large amount of internal characteristics variables, it is only natural to check for possible (linear) correlation among them. This is given in table 5. Here we can see that the correlation coefficients are quite low (generally below 0.50). Therefore, it seems that we can ignore the potency of multi colinearity.

The last diagnostic check is for the Dynamic Panel Data (Arrelano-Bond estimator). We have to verify whether the residuals are not correlated with independent variables. As such we conduct the Sargan test for over-identifying restriction. The test statistic is distributed as $\chi(p-k)$ where p is the instrument rank and k is the number of estimated coefficient. With instrument rank of 123 and estimated coefficient of 15, the calculated of p value of obtaining J statistic 107.27 is 0.3537. Therefore, we cannot reject the null hypotheses that residual series is orthogonal to independent variables.

Variables	Panel EGLS		Fixed Effect (FE)		Random Effect (RE)		Arrelano-Bond (1991, AB)	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
LDR	-0.00009	- 0.5014	-0.0003	- 0.329	-0.0003***	-1.661	-0.0003*	-6.49
ROA	0.0085*	6.257	0.0012	0.735	0.0019	0.993	0.0053*	24.52
Emp_To_Ops	0.1826*	36.600	0.1108*	9.354	0.1321*	11.396	0.1090*	37.51
GB_To_TA	-0.0258*	-7.819	-0.0327*	- 3.503	-0.0351*	-5.013	-0.0246*	- 19.97
OCOI	-0.0106*	-6.703	-0.0082*	- 4.385	-0.0085*	-3.425	-0.0033*	- 19.02
CAR	-0.0014*	-5.386	-0.0009*	- 2.161	-0.0011*	-4.425	-0.0015*	-4.21
Asset^	0.0005	2.331	-0.0008	1.145	0.0005	1.195	-0.0024*	- 5.058
NPL	-0.0150*	-5.325	-0.0122*	- 3.226	-0.0129*	-3.323	-0.0617*	- 41.80
TA_To_Loan	-0.0002*	-4.257	-0.00004	- 0.896	- 0.00007***	-1.688	-0.00001	-0.29
IHH^	-0.0089*	-4.231	-0.0187*	- 4.772	-0.0165*	-4.224	-0.0084**	-2.28
JIBOR6_VTY	-0.0350*	-6.582	-0.0482*	- 5.158	-0.0466*	-4.931	-0.0289	-6.21
Growth	-0.0017*	-5.032	-0.0024*	- 3.977	-0.0024*	-3.985	-0.0021*	- 34.41
Inflation	0.0010*	10.15	0.0011*	6.465	0.0011*	6.582	0.0005*	4.32
Depr	-0.0001*	-4.465	-0.00004	- 0.720	-0.00005	-1.095	0.00004**	2.50

Notes:

^ in log form

*, ** and *** significant under $\alpha = 1\%$, 5% and 10% respectively

Table 4. Panel Estimation

	ROA	NIM	LDR	EMP_TO_OPS	GB_TO_TA	OCOI	CAR	ASSET	NPL	DEPR	GROWTH	IHH	INFLASI	TATOLOAN	JIBOR ₆	VTY
	1.000000	0.24448	0.218416	0.075785	-0.030849	0.531512	0.053252	0.015215	0.105644	0.059779	-0.042676	0.057626	0.048704	-0.022186	-0.000514	
		1.000000	0.020108	0.425974	-0.187570	0.166434	0.004976	0.055467	0.182817	0.105777	-0.009292	0.188375	0.081374	-0.083198	-0.019975	
			1.000000	0.000541	-0.058256	0.057350	0.000219	0.031302	0.154373	0.025463	-0.046580	0.000241	0.027243	-0.047939	-0.007744	
3				1.000000	-0.246656	0.009125	0.222469	0.070651	0.127042	0.012358	0.132965	0.252162	0.075854	0.051347	0.012872	
					1.000000	0.036810	0.031196	0.525237	0.032784	0.014547	-0.035170	0.009604	0.024997	-0.010522	-0.004005	
						1.000000	0.083594	0.027523	0.150130	0.001109	-0.008810	0.008832	0.006261	0.079302	0.006749	
							1.000000	0.035881	0.010972	0.006394	-0.012829	0.021489	0.036534	0.138128	-0.006579	
								1.000000	0.005902	0.027376	0.026484	0.091634	0.023105	-0.019902	0.030123	
									1.000000	0.203101	-0.061482	0.334860	0.070966	-0.016857	-0.017117	
										1.000000	0.091357	0.495103	0.058390	-0.026527	0.161106	
											1.000000	0.316636	0.263761	-0.020739	-0.043425	
												1.000000	0.053453	0.021327	-0.158397	
													1.000000	-0.007783	0.357950	
														1.000000	-0.038290	
															1.000000	

Table 6. Cross Correlation of Variables

6. ANALYSIS:

6.a. General Findings:

The Loan To Deposit Ratio (LDR) parameters are correctly signed but quite small. They are around -0.0009 to -0.0003 with the estimation obtained from RE and Arrelano Bond (AB) that are statistically significant. Our findings are in line with conventional wisdom. A high LDR will trigger an “interest rate war” which in turn would depress the margin. This empiric also has been confirmed by Demirguc-Kunt and Huizinga (1999) and by Afanasieff et al (2002).

ROE sign is all as expected, especially for Panel EGLS and AB estimates a high statistical significance achieved. This confirms that the pressure from owner has influence the intermediation behavior of banks. The coefficient is small though.

The measure of human capital productivity (as proxy by emp_to_ops) is correctly signed and significant under any estimation methods. The numerical magnitude is quite high, from 0.1090 (AB) to 0.1826 (FE). This is clear indication that bank front office personnel do exert significant influence to customer, ie relationship does matter. Rajan (1992) and Boot and Thakor (2000) formulate a theoretical framework on relationship banking under competitive environment. The empirical work on relationship banking however is still inconclusive and seems to differ, depending on the country (see Freixas and Rochet, 2008 for recent survey).

The estimation found the efficiency proxy (OCOI) on scale of -0.0106 to -0.0033. These parameters have proper sign and high level of significance. The findings suggest that banks chose to absorb cost from inefficiencies (in form of smaller NIM) rather losing competition. The results obtained an empirical support from Maudos and Guevara (2004) and Athanasoglou et al (2008). Nevertheless works by Demirguc-Kunt and Huizinga (1999), Afanasieff et al (2002) and Flamini et al (2009) seem to suggest the other way around, banks try to pass on its cost inefficiencies to other.

The latter two studies are interesting since their objects are in some developing countries (Brazil and Sub-Saharan Africa) which are quite the same with us. These findings imply more careful

investigation to address question why banking in these region behave quite differently.

We found that assets influence on spread is quite weak. The estimation is in range of -0.0024 to 0.00052 with higher significance achieved by the first. In this regards, the empirical findings seem to give support for both relative market power and efficient structure hypotheses (with a slight tendency toward the latter). Indeed studies in this area are inconclusive either. Maudos and Guevara (2004) found that size negatively affect margin in France and Italy where its effect is positive in Germany and Spain. Other study with different methodology found that bank behavior tends to support efficient structure, that is large size is due to positive (winning) evolution (see Park and Weber, 2005).

Proxy of Measure of Prudent Management shows that one percent increase in NPL would be absorbed by interest margin. This cost absorption is on the range of 0.015 to 0.062, a moderate value. Again this also signs correctly as a measure of management quality especially in credit risk taking behavior. The benchmark study of Maudos and Guevara (2004) use different proxy: ratio of loan to total asset. They found it to be around 0.0010-0.0036 range.

This difference is worth noting since it might imply a different practice. In Maudos and Guevara frame work, banks act as a dealer that only concern is moving funds from surplus agents (savers) to deficit agent (borrowers). They charge a fee for this service. The higher the risk of deficit agent (the banks might not get the full repayment), the higher the fee. The hypothesis is well supported. On the contrary in Indonesia, banks also assumed the risk. Therefore higher NPL would reduce NIM. This behavior might be result from stiffer competition in Indonesia which the same conclusion reached by Athanasoglou et al (2008).

The macro economic variables of growth and inflation obtained the assumed sign nevertheless small role. Growth and inflation signal a good state of macro economy. This in turn would imply the intensity of competition hence reduce interest margin. The effect is on the range of -0.0021 to -0.0017 with sufficient significance. These findings are quite contrast with previous studies. Athanasoglou et al (2008) set a procyclical profit relationship and found a support from a panel of Greece banks. The same result was obtained by Afanasieff et al (2002) and Flamini et al (2009). Using a different approach Akhter and Daly (2009) also found supports for the procyclicality of profit. On the other hand, Demirguc-Kunt and Huizunga (1999) found the estimates that are more similar to ours.

We are expecting to find the GB_To_TA to be positive. A substantial portion of government bonds would give a particular bank a competitive edge against others⁵. Nevertheless, the estimation shows that the estimates are on the range -0.0351 to -0.0246 with sufficient significance (a marked contrast). There are a few explanations on this. First, the bonds are not providing sufficient interest revenue either because they are variable rate or inadequate fixed rate. Second, since the banks already have passive income they might have less incentive to diversify the funding hence relied too heavily on expensive fund like time deposit. This is, off course, would depress their margin.

The estimates of Capital are also wrongly signed albeit the sizes are also small (in the range of -0.0015 to -0.0009). Sufficient significance is obtained under any estimation technique. Higher capital should enable banks to expand, compete more effectively and acquire more profitable business hence raised their margin. This conjecture has a well founded empirical support see Demirguc-Kunt and Huizunga (1999), Athanasoglou et al (2008) and Flamini et al (2009) among others.

⁵ Indeed, the popular anecdotes in Indonesia mark banks that have been heavily recapitalized are said to be living on tax payer money.

We think the negative coefficient obtained here might result from carry over effect of recapitalization. The recapitalization in early 2000 has shifted significantly the ownership pattern of Indonesian banking. Most banks lose their ties with corporate groups either acquired by foreign or become independent. As a result in addition of huge capital, management risk appetite might decrease sharply. There is no incentive of related lending and management focus is on capital preserving.

Next, we see that the proxy of diversification quite weak. Its numerical values are very small, between -0.0002 to -0.00007 with only pooled regression giving significant result. Our result most closely resembles that of Flamini (2009). It seems that in developing countries, the greater product-service scope does not significantly increase pricing power. However different conclusion obtained by Demircug-Kunt & Huizinga (1999) and Afanasieff (2002), in which greater diversification do enhance interest margin (and thus profitability).

Contrary to theoretical conjecture, the interest rate risk (volatility) is not factored into interest margin. Our findings of the estimates are ranging from -0.0482 to -0.0289 with considerable significance for all techniques. This is a sharp contrast from the benchmark empirical work of Saunders and Schumacer (200) and Maudos and Guevara (2004) that found the parameter to be positive. Nevertheless sub samples (country specific) result of Maudos and Guevara (2004) is not as strong as their overall estimation. This gives a hint that the relationship of margin and interest volatility should be verified further.

We argue that the absorption of interest volatility into bank spread is (again) caused by stiff competition. Indonesia adopted inflation targeting framework of monetary policy in which interest rate become intermediate target⁶. In this regard, we suppose the volatility of money market interest rate would not be so wide compared to another regime. Nevertheless the negative and significant estimates suggest the otherwise. Banks do suffer losses in their money market transaction and choose to absorb them. This indicates that money market fluctuation is not random. Banks still have to learn more about it or Central Bank should make the policy rate more credible.

The concentration measure (Herfindahl Hirschman Index, IHH) is not correctly signed. The study found it to be between -0.0187 (FE) to -0.0084 (AB) which sufficient statistical significance. This results support the efficient structure suspected from the size findings obtained before. The banking industry is becoming concentrated however it is also more efficient. The findings however do not agree to those obtained by Demircug-Kunt and Huizinga (1999) and Maudos and Guevara (2004) but more closely resemble to those of Athanasoglou et al (2008) and Park and Weber (2006).

We found that the impact of depreciation is inconclusive and very small (even though significance obtained under Panel EGLS and AB technique). Using panel EGLS, one percent Rupiah depreciation would cause a decline in interest margin around 0.0001 while using AB it would raise margin to 0.00004.

The small impact of exchange rate movement could be addressed to two facts. First, during the period of study (2000-2009), exchange rate could be said stable between 8700-10.000 which occasional break out between sides. Therefore, there is not much influence could be exerted by the movement of currency. Second, banks greatly reduced the exposure to foreign exchange. The ratio of Foreign Exchange Loan to Total Loan is sharply declined from around 30% to 15%.

Lastly we note that the profit is indeed persistence. The coefficient is 0.0811 with very high t

⁶ The instrument is in form of a policy rate (called Bank Indonesia rate). Bank Indonesia (BI) announces a target Interest rate that should generally hold in money market. To enforce its credibility, BI frequently conducts open market operation to absorb or inject liquidity to support the targeted rate.

statistic (67.44). This supports the theoretical conjecture and empirics outlined by Berger et al (2000) and Goddard et al (2004). The last period profit would increase current capital and enable banks to expand and exploit the business opportunities.

After examining the general result, we will turn to an intermediation behavior that might be specific to particular category of banks. As mentioned above, we use two different classifications. Firstly, it is based on type and second based on public monitoring. Here, instead of using ROA as independent variables, we use Return on Equity (ROE). We think this proxy is more appropriate in measuring profit drive since the classification is related to ownership concept. We examine three variables that are considered to be very different from each category. They are Return on Equity, Emp_to_ops and OCOI.

6.b. Specific Behavior:

First we examine specific behavior based on type. This is done by using dummy variables in which foreign-joint venture bank is the baseline (that is when all dummies are zero). We begin with the level effect and then proceed to interaction terms.

Type	Level Effect	Interaction Terms		
		ROE	Emp_To_Op	OCOI
State Owned Bank (Type=1)	0.0034 (0.489)	0.0080** (1.927)	0.1637* (8.821)	-0.0242* (-4.408)
Regional Bank (Type=2)	0.0274** (2.528)	0.0399* (5.076)	0.1083* (6.369)	-0.0370* (-3.280)
Private Foreign Exchange (Type=3)	-0.0039 (-1.0455)	0.0011 (0.418)	0.0830* (6.517)	-0.0027 (-0.775)
Private Non Foreign Exchange (Type=4)	0.0152* (3.235)	0.0173* (4.353)	0.1057* (8.191)	-0.0207* (-4.401)
Foreign-Joint Venture Bank (Type=5, base category)	0.0976* (6.275)	0.0028 (1.404)	0.0567* (5.402)	-0.0047*** (-1.869)

t statistics under the parentheses

*, ** and *** significant under $\alpha = 1\%$, 5% and 10% respectively

Table 7. Specific Behavior Based on Type

From level effect (see table 7), Regional, Private Non Foreign Exchange and Foreign-Joint Venture banks seem to have a statistically significant competitive edge to both SOE and Private Foreign Exchange Banks. Foreign-Joint Venture banks have 0.098 higher NIM over both SOE and Private Foreign Exchange Banks while Regional banks have 0.125 (0.0976+0.0274) and Private Non Foreign Exchange banks have 0.113 (0.0976+0.0152).

The apparently superior performance of Regional, Private Non Foreign Exchange and

Foreign-Joint Venture banks perhaps could be addressed by orientation and specialization. These factors create a kind of distance and/or borders that mark segmented market (Degryese and Ongena, 2007). Foreign-Joint Venture banks for example are famous for targeting a very wealthy segment by offering sophisticated and distinguished products. In return they could charge a high fee or smaller interest on deposits.

Regional banks have captive markets, the regional governments (provinces and residencies). These banks are usually small hence the sheer scale of regional government is usually sufficient to cover its cost and giving economic profit. Few regional banks have announced their intention to become nationwide banks recently.

The Private Non Foreign Exchange banks are famous for their versatile approach to customers. Unlike their Foreign Exchange counter parts; these private banks usually are small and not rigid in implementing product procedure (especially loan) in return for higher fees. These banks are favorite option for lower middle class enterprises seeking for funding. Indeed, casual studies often found that they obtain business from entities overlook by large banks.

The existence of distance and border has been explored intensively by various scholars. Petersen and Rajan (2002) and Saunders and Allen (2002) are among the first prominent study on spatial pricing. They found that pricing is positively correlated with distance. The farther location of customers to banking center, the higher is the interest rate. Guiso et al (2004) found that locality has provided bank with significant edge over national bank branch.

These advantages extend beyond the level effect. The profitability drive from owners is the highest for Regional Banks. One percent additional required return to equity imposed to regional banks would result in 0.04% higher interest margin. This is followed by Private Non Foreign Exchange whose owner profitability drive is around 0.017. Interesting enough the effect is not statistically significant for Foreign-Joint Venture types. SOE banks have small drive albeit significant (around 0.008).

In line with general findings, we found strong support for human capital contribution to raising net interest margin. If we assume that high human capital investment strongly correlated with relationship orientation then all banks emphasized this aspect. Interestingly we find that SOE banks emphasized the most the relationship aspect compared to other type. This inclination is followed respectively by Regional Banks, Private Foreign Exchange, Private Non Foreign Exchange and Foreign-Joint Venture banks.

The strong orientation of relationship banking by both SOE and Regional banks though interesting is not at all surprising. Both types of bank have captive market. SOE banks have a strong and long time relationship with government institution and other state enterprise. Indeed substantial resources have been devoted to maintain this relationship.

Regional and SOE banks are also more willing to absorb inefficiencies into the margin. A one percent operational cost over operational income would result in a decrease 0.042% of Regional banks net interest margin while it is 0.029% for SOE banks. Private Foreign Exchange banks are less

willing to absorb their inefficiency. This might be due to their relative better operational performance or their policy to pass the cost to customers.

Overall assessment shows that Foreign-Joint venture banks have not operated significantly different compared to their domestic counterparts (especially when talking in terms of financial performance). The SOE and Regional banks are also not performing inferior. They might be less efficient but they also have higher ownership profitability drive (which we think more than compensating).

The findings give a challenge to popular belief that foreign banks are more superior and SOE (including regional) banks are poor. Our findings are not new; other authors also have questioned the belief. Pasiouras and Kosmidou (2007) raised the question from their study in European banking during period of 1995-2001. Sensarma (2006) and Fu and Heffernan (2009) raised similar doubt from their work on Indian and China banking system.

Type	Level Effect	Interaction Terms		
		ROE	Emp_To_Op	OCOI
Public Owned	-0.0162* (-4.707)	-0.0099* (-3.797)	-0.0007 (-0.063)	0.0198* (6.472)
Non Public (base category)	0.1079* (6.596)	0.0162* (8.598)	0.1801* (33.326)	-0.0208* (-9.898)

*, ** and *** significant under $\alpha = 1\%$, 5% and 10% respectively

Table 8. Specific Behavior Based on Public Monitoring

Public ownership seems to have a negative level effect on net interest margin (see table 8). These banks usually have lower margin compared to closed banks (-0.0162 versus 0.0917). Profitability drives from ownership also less pronounce in the case of publicly listed banks. For public banks the sensitivity of NIM to ROE is 0.0063, much less than non public whose sensitivity is 0.0162. The relationship orientation is also much lesser in open banks. The interaction terms of Emp_to_op is negative but very small and insignificant (-0.0007) while it is 0.1801 for closed banks. Last and interestingly, public banks tend to pass their operational inefficiencies to customer while their closed counterparts choose to absorb them.

We suppose there might be two reasons for this phenomenon. First public banks might be exposed to tighter competition. Being public means a greater potential of takeover, hence banks are more driven to capture other bank share especially through pricing scheme (which implies lowering margin). Second, being public also implies closer monitoring. In this regard, the banks are less flexible to extend loans for lesser quality of borrower for higher margin. High quality debtors then would have a better negotiation power and thus demand a better pricing (that further depress bank margin).

7. CONCLUSION:

Overall the study on Indonesian banking interest margin is supportive to existing literature. Bank spread is a negative function of liquidity condition, operational efficiency and quality of management. Better macroeconomic condition (higher growth and higher inflation) leads to more competition thus lowering net interest margin. The asset size and concentration measure coefficients

suggest that the banking industry characteristic is more inclined toward efficient structure hypotheses: even though banking becomes more concentrated, it is more efficient. Smaller member industry with larger size is the result of increasing performance.

Our work has revealed several interesting findings. They are

- a. Substantial portion of government bond (as a result of recapitalization) in banks book does not positively contribute to higher margin. On contrary, the larger the bonds portion the smaller the net interest margin.
- b. Better capitalized banks are not able to optimize their position. Capital preservation has taken dominant role in bank behavior.
- c. Banks do not pass fully the cost of money market volatility to customers. This is a contradiction to the theoretical conjecture. Either bank failed to learn the role of BI rate or the policy rate has not enough credibility has caused this cost absorption.
- d. Greater product coverage does not help banks to increase their margin.
- e. Significant role of relationship management has been revealed. The intensity is quite high, and explains why certain type of banks could charge higher margin than other.

Further researches are promising since the study has revealed several evidences contrary to the theory. Specifically, future study should address the failure of one aspect of dealership namely passing on the volatility of money market interest rate. The study offers a substantial value to authority as to design more effective monetary policy.

Findings on relationship banking also offer significant value for further exploration. Here we obtain relationship do enable banks to price above competitive market. Nevertheless, works on relationship banking in emerging market are still scarce. Attention perhaps should be directed to the scope and extent of how the relationship banking is conducted. Is it positive for efficiency of industry or detrimental instead? The policy implication of further investigation is paramount.

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