CHAPTER 4 : RESEARCH METHODOLOGY

This chapter outlines the research methodology for this paper. It consists of five parts, namely, the research hypothesis, the methodology, data analysis techniques, determinants and variables selection, and the data collection procedure.

4.1 RESEARCH HYPOTHESIS

The research hypotheses are outline as below:

H1= Capital adequacy has no statistical significant relationship with banks performance

H2= Management efficiency/expense management has no statistical significant relationship with banks performance

H3= Liquidity has no statistical significant relationship with banks performance

H4= Credit/asset quality has no statistical significant relationship with banks performance

H5= Size has no statistical significant relationship with banks performance

H6= Economic activity has no statistical significant relationship with banks performance

H7= Inflation has no statistical significant relationship with banks performance

H8= Concentration has no statistical significant relationship with banks performance

In summary, internal determinants (H1 – H5) do not have any impact on banks performance, statistically; and external determinants (H6-H8) have no relationship with banks performance, where:

$\beta_a = 0$ for the null hypothesis, a = H1 to H5;

$\beta_a \neq 0$ for the alternate hypothesis, a = H1 to H5

$\beta_b = 0$ for the null hypothesis, b = H6 to H8;

$\beta_b \neq 0$ for the alternate hypothesis, b = H6 to H8

4.2 RESEARCH METHODOLOGY

To examine the determinants of bank profits and interest margins in East Asia and Latin America, we rely on the model of previous literature (Abreau and Mendes, 2001; Ben Naceur and Goaeid, 2003; Kosmidou, Pasiouras and Tsaklanganos, 2007; Pasiouras & Kosmidou, 2007; Kosmidou, 2008). We consider the following formulation, distinguishing between the internal and external factors:

$$Z_{ijt} = \beta_{0+} \beta_a X_{ijt} + \beta_b Y_{jt} + \varepsilon_{ijt} \quad (1)$$

Where *i* refers to an individual bank; *t* refers to year; *j* refers to the country in which bank *i* operates.

Z_{ijt} is the dependent variable that refers to return on average assets (ROAA) or net interest margins (NIM) and is the observation of a bank *i* in country *j* at year *t.* X_{ijt} is a vector to represent the internal determinants or characteristics of bank *i* in country *j* at time *t*; Y_{jt} is a vector captured from the external factors/determinants of country *j* at time *t*. It is assumed that the ε_{ijt} is a normally distributed random variable.

The model is estimated using fixed-effects regression. The constant β_0 constitute the banks fixed effects. The fixed effects approach takes β_0 to be a bank specific constant term in the regression model (Ben Naceur and Goaeid, 2003; Kosmidou et al. 2007). Schmidt (2005) defined fixed effects to be a group of dummy variables that correspond to each cross-section unit in a panel data set, and they measure the effects of all factors that vary across cross-section units but do not change over time, Therefore, unobserved differences across banks are reflected in different intercept estimates for each bank (Park and Weber, 2006).

Extending equation (1) to reflect the internal and external variables as described in Table 1, the model is formulated as follows:

$$Z_{ijt} = \beta_o + \beta_1 EQAS_{ijt} + \beta_2 COST_{ijt} + \beta_3 LNDEP_{ijt} + \beta_4 LOSRES_{ijt} + \beta_5 SIZE_{ijt} + \beta_6 GDP_{jt} + \beta_7 INF_{jt} + \beta_8 CON3_{jt} + \varepsilon_{ijt} \quad (2)$$

Z_{ijt} : return on average assets (ROAA) or net interest margins (NIM) of bank *i* in country *j* at time *t*

INTERNAL DETERMINANTS

EQAS $_{ijt}$: Equity to Total Assets ratio of bank *i* in country j at time t, a measure of capital adequacy;

COST $_{ijt}$: Cost to Income ratio of bank *i* in country *j* at time *t*, a measure of management efficient/expenses management;

LNDEP $_{ijt}$: Net loans to Customer and short-term funding ratio of bank *i* in country *j* at time *t*, a measure of liquidity;

LOSRES $_{ijt}$: Loan loss reserves to gross loan ratio of bank *i* in country j at time *t*, a measure of credit or asset quality; and

SIZE $_{ijt}$: Natural log of total assets of bank *i* in country *j* at time *t*;

EXTERNAL DETERMINANTS

GDP$_{jt}$: Annual change in real GDP of country *j* at time *t*;

INF$_{jt}$: Annual inflation rate of country *j* at time t; and

CON3$_{jt}$: Assets of three largest banks to the assets of all banks in country *j* at time *t*

B_o: Constitute the bank specific fixed effects constant term in the regression model;

B_1 –β_8 : Parameters to be estimated

ε_{ijt} : Random variable

4.3 DATA ANALYSIS TECHINQUES

Our data consist of a time series for each cross-sectional member in the data set, and as such we use panel data (or longitudinal data). The use of panel data

offer a solution to the problem of bias caused by unobserved heterogeneity, a common problem in the fitting of models with cross-section data sets. Another advantage of panel data is that it allows control for certain unobserved characteristics of individuals or reveals dynamics that are difficult to detect with cross-sectional data. This study uses a balanced panel, as there is an observation for every unit of observation for every time period. There are no missing observations in any of the time period (Dougherty, 2007 and Wooldridge, 2009).

We use panel least square technique available in Eviews 5.1 for our model. Panel data correspond to data with large number of cross-sections, with variables held in single series in stacked form (Eviews 5.1 User's Guide). We consider our panel data to have large number of cross-sections, and hence, decided on panel least square estimation.

The model is first evaluated for the statistical significance of the estimated fixed effects using the redundant fixed effects-likelihood ratio. If the result is significant, the model is then tested with the Hausman test to confirm on the choice between fixed effects and random effects model. Hausman random effects testing evaluate the restriction that the random effects are uncorrelated with the explanatory variables (Eviews5 User's Guide). Finally, to control for cross-section heteroskedasticity for a robust coefficient covariance, estimate with White cross section standard errors & covariance (no d.f. correction).

4.4 DETERMINANTS AND VARIABLES SELECTION

The variables chosen or measures are based on literature, reflecting determinants for both bank profits and spreads. Specifically, we considered the works of Kosmidou (2008) for his study on bank profits in a particular country, Greece; Pasiouras & Kosmidou (2007), cross country study on bank profits in the European Union and Ben Naceur & Goaied (2003) on bank interest margins and profits in Tunisia. All these studies incorporated internal and external factors. Measures like capital equity, cost and liquidity are also common in Latin America literature on bank spreads.

4.5 PERFORMANCE MEASURES

The commonly used indicators of ex-post bank performance studies are ROAA and NIM. ROAA is net profit before tax divided by total average assets. As in Kosmidou (2008) and Athanasoglou et al., (2008), average assets of two consecutive years and not the end-year values is used, since profits are flow variable generated during the year. The ratio of return on average assets (ROAA), the dependent variable, measure the overall profitability of the bank, or the profit earned per dollar of assets and reflects how well bank management use the banks' real investment resources to generate profits (Ben Naceur & Goaied; 2003). For cross country studies, ROAA before taxes is used instead of after taxes, undistorted by taxation differences across countries (Biker and Hu, 2002).

The study of net interest margin (NIM) is an attempt to gauge the cost of financial intermediation (Brock and Suarez, 2000), and NIM reflect pure operational efficiency of the bank and the competitive nature of the banking market (Demirguc-Kunt et al., 2004). According to Demirguc-Kunt and Huizinga (1999), the efficiency of bank intermediation can be measured using both ex-ante (contractual rates charged on loans less deposit rates) and ex-post spreads (interest revenue – interest expense). However, ex-post spread is a more useful measure as it takes into account loan defaults due to high-yield and risky credits. In addition, ex-ante data are also deemed to be inconsistent as it is an aggregated data from various sources. In this study, NIM is net interest income divided by average earning assets, and it is a summary measure of banks net interest rate of return, an important component of bank profitability (Angbazo, 1997). NIM is focused on the profit earned on interest activities. As an accounting identity, the bank interest margin equals (pre-tax) profits plus bank operating cost, plus loan loss provisioning (and minus non-interest income) (Demirguc-Kunt and Huizinga, 2000).

4.6 INDEPENDENT VARIABLES: INTERNAL DETERMINANTS

Measures for internal determinants of performance are five bank characteristics. They are the ratio of equity to total assets, cost-to-income ratio, the ratio of bank's loans to customer and short-term funding, the ratio of loan loss reserves to gross loans and the bank's total assets which represent capital adequacy,

management efficiency or expenses management, liquidity, credit or asset quality and size respectively (Ben Naceur and Goaied,2003, Kosmidou, 2008).

4.6.1 CAPITAL ADEQUACY

The ratio of equity to total assets (EQAS) is used as a measure of capital adequacy or strength. Capital adequacy refers to the sufficiency of the amount of equity to absorb any shocks that the bank may experience (Kosmidou, 2008). Berger (1995a) found the return on equity and the capital asset ratio are positively related for a sample of US banks for the 1983-1989 time period. Demirguc-Kunt and Huizinga (1999) found a positive relationship between capital and net interest income and profitability of banks. It is expected that well-capitalised banks (i.e. banks with higher equity to assets ratio) have higher interest margins on assets, and this "translates" to better profitability ratios (Abreau and Mendes, 2001). In addition, well-capitalised banks can charge more for loans and/or pay less on deposits as they faced lower risk of going bankrupt and the need for external funding is lower (Demirguc-Kunt, Laeven & Levine, 2004).

4.6.2 MANAGEMENT EFFICIENCY/EXPENSES MANAGEMENT

The cost-to-income ratio (COST) represents expenses management, measures the overheads or cost of running the bank, including staff salaries and benefits, occupancy expenses and other expenses such as office supplies, as percentage

of income. The major element is normally salaries, as percentage of income and it is used to provide information on variation of bank costs over the banking system (Kosmidou, 2008, Pasiouras & Kosmidou, 2007). Banks with higher operating costs are expected to have higher net interest margins and lower profitability. (Abreu and Mendes, 2001). Athanasoglou et al. (2008) explained that operating expenses can be viewed as the outcome of bank management, and COST is expected to be negatively related to profitability, since improved management of these expenses will increase efficiency and therefore raise profits. Molyneux and Thornton (1992) and Ben Naceur and Goaied (2003), however, found positive relationship between COST and bank profits. Molyneux and Thornton (1992) indicated staff expenses to be positively related with bank profits, which suggest high profits earned by firms in a regulated industry may be appropriated in the form of higher payroll expenditures. We expect positive relationship between NIM and COST, and the relationship between ROAA and COST could be positive or negative (mixed), based on literature.

4.6.3 LIQUIDITY

The net loans to customers and short-term funding ratio (LNDEP) is used to measure the relationship between liquidity management and performance. Without the required liquidity and funding to meet short-term obligations, a bank may fail, or at least be technically insolvent. To avoid insolvency problems, bank often hold liquid assets, which can be easily converted to cash. This ratio shows the relationship between comparatively illiquid assets (i.e. loans) and

comparatively stable funding sources (i.e. deposits and other short term funding). Higher figures denote lower liquidity, while the lower the value of this ratio, the more liquid the bank is. As liquid assets are associated with lower rates of return, higher liquidity would be associated with lower profitability. In other words, a positive relationship is expected between this variable and performance. (Kosmidou, 2008, Pasiouras & Kosmidou, 2007).

4.6.4 CREDIT RISK/ASSET QUALITY

Credit risk (or asset quality) is proxied by the quotient of loan loss provisions over loans (Angbazo, 1997). The ratio loan loss reserves to gross loans (LOSRES) indicates how much of the total portfolio has been provided for but not charged off and is used as a measure of bank's asset quality. With good asset quality, higher ratio implies positive relationship between risk and profit according to risk-return hypothesis. However, a negative impact of LOSRES on bank profitability would imply poor quality of loans that reduce interest income revenue and increase provisioning cost (Kosmidou, 2008). Nevertheless, Athansoglou et al. (2008) expect a negative relationship between ROAA and LOSRES as theory suggest that increased exposure to credit risk is normally associated with decreased firm profitability. Angbazo (1997) expect a positive relationship between credit risk and NIM, as risky loans requires higher net interest margins to compensate for higher risk of default. Hence, the sign for variable LOSRES with ROAA is negative and positive with NIM.

4.6.5 SIZE

Size is a variable to take into account economies or diseconomies of scale (Short, 1979). In most studies of banking, total assets of the bank is used as a proxy for its size to account for size-related economies or diseconomies of scale. The effect of growing size on bank profits is positive to a certain extent, after which the effect is expected to be negative for banks that become too large, due to bureaucracy or any other reasons. We use log total assets (LNSIZE) to proxy for size (Demirguc-Kunt et al., 2004 and Athanasoglou et al., 2008). Demirguc-Kunt and Huizinga (1999) indicate that bank size has a significant and positive impact on interest margins while Kosmidou (2008) findings show positive relationship between size and profit for Greek banks during the period of EU integration. On the other hand, other researchers reported negative correlation between size and interest margin (Ben Naceur and Goaeid, 2003) and bank profits (Pasiouras and Kosmidou, 2007). We expect the results to be mixed (positive/negative) for both bank profits and interest margins.

4.7 INDEPENDENT VARIABLE : EXTERNAL DETERMINANTS

The external determinants used in this study are macroeconomic variables and concentration, following literature which suggests that the environment in which commercial banks operate influences them.

4.7.1 MACROECONOMIC VARIABLE : GROSS DOMESTIC PRODUCT

Annual growth in real gross domestic product (GDP) and annual growth in the consumer price index (CPI) are two of the more commonly used macroeconomic indicators and are included in the list of regressors.

4.7.2 MACROECONOMIC VARIABLE : INFLATION

GDP is a measure of the total economic activity within an economy. It is calculated on an annual change, and a positive relationship is expected between this variable and banks performance. Biker and Hu (2002) and Kosmidou (2008) find positive relationship between GDP and bank profits. However, it should be noted that Demirguc-Kunt and Huizinga (1999) and Ben Naceur and Goaied (2003) reported that growth has no significant impact on ROA and NIM in their studies on banks in 80 countries (by the former) and Tunisia (by the later).

The consumer price index is used as a proxy for inflation (INF). According to Pasiouras and Kosmidou (2007), if banks anticipate inflation, profitability will be positive as banks can timely adjust interest rates, which results in revenue rising faster than cost. However, if banks fail to anticipate inflation (unanticipated inflation), the impact to profitability is negative, as banks may be slow in adjusting their interest rates, resulting in a faster increase in cost than the increase in revenues. Most studies (Bourke, 1989 and Molyneux and Thornton, 1992) found that inflation had a positive relationship with profit. Demirguc-Kunt and Huizinga

(1999) reported that inflation is associated with higher interest margin and higher profitability. On the other hand, Abreu and Mendes (2001) who examined Portugal, Spain, France and Germany over the period 1986 – 1999, found negative relationship between inflation and ROAA/NIM, as banks cost increased more than revenue. As such, the relationship for INF with ROAA/NIM could be positive/negative, based on literature.

4.7.3 CONCENTRATION

Concentration refers to the extent to which the banking industry is dominated by a few big banks (Park and Weber, 2006). Most of the earlier research in concentration was on structure-conduct-performance (SCP) based or market-power. According to Berger (1995b), the traditional SCP asserts that this finding reflects the setting of prices that are less favourable to consumers (lower deposit rates, higher loan rates) in more concentrated markets as a result of competitive imperfections in these markets. In contrast, the opposing theory, the efficiency market hypothesis (EMH) suggests that banks with superior management or production technologies have lower costs and therefore higher profits. As these banks will also gain a larger market share, the structure will become more concentrated due to efficiency gains. Many studies in banking literature find a positive statistical relationship between profitability and concentration (Short, 1979; Bourke, 1989; Molyneux & Thornton, 1992; Demirguc-Kunt and Huizinga, 1999). In contrast, Park and Weber (2006) found concentration has negative impact on bank profitability for Korean banks, contrary to the market structure

hypothesis, while Ben Naceur and Goaied (2003) study indicated negative relationship between concentration and net interest margin. We expect the results to be mixed (positive/negative) for ROAA, and negative relationship between concentration and NIM.

As in some previous studies (Demirguc-Kunt and Huizinga, 1999), it is not the intention of this paper to explain which hypothesis best explain the positive profit-structure relationship, rather, concentration is included based on literature review and for completeness.

Concentration is a national characteristic, measured country by country, and not measured at bank-level (Short, 1979 and Dermiguc-Kunt et al., 2004). There are at least two measurements of concentration, the Herfindahl-Hirshcman (HH) index and concentration ratios. The HH index not only take the largest banks, but all banks, and is the sum of the squared market shares of each bank's assets in a given year, $\sum (MS_i)^2$. Concentration ratios on the other hand, are the share of the market held by the largest, two largest or three largest. We chose the share of the largest three banks (CON3) as in previous study (Short, 1979; Kosmidou et al., 2007 and Garcia-Herrero et al., 2007). In our study, CON3 is calculated by dividing the total assets of the three largest banks in the market with the total assets of all banks based on sample obtained from Bankscope.

Table 6 provide a summary of the definitions, notation and the expected effect of the explanatory variables of bank profits and net interest margins, while Table 7 provides the summary of the seven independent variables with respect to previous studies.

Table 6 : Definitions, Notation and Expected Effect of the Explanatory Variables of Bank Profits and Net Interest Margins

		Variable	Measure	Notation	Expected effect
Dependent variable		**Profitability**	Net profit before tax/ Average total assets	ROAA	
			Net interest Income/ Earning assets	NIM	
Internal determinants	**Bank-specific**	**Capital Adequacy**	Equity/Total assets	EQAS	Positive
		Efficiency/ Expense Management	Cost/Income	COST	Mixed (ROA) Positive (NIM)
		Liquidity	Net loans/Customers and short-term funding	LNDEP	Positive (ROAA)
		Credit Risk/Asset Quality	Loan loss reserves/Gross loans	LOSRES	Negative (ROAA) Positive (NIM)
		Size	Log total assets of the bank	LNSIZE	Mixed
External Determinants	**Macro-economics**	**Economic activity**	Real gross domestic product annual growth rate	GDP	Positive (ROAA) No Impact (ROAA/NIM)
		Inflation	Consumer price index annual growth rate	INF	Mixed
		Concentration	Assets of three largest banks/assets of all banks in sample	CON3	Mixed (ROAA) Negative (NIM)
Mixed = Positive/Negative					

Table 7 : Summary of Expected Sign on the 7 Variables with Respect to Previous Studies

EQAS	ROAA	**+**	Bourke (1989); Demirguc-Kunt & Huizinga (1999); Demirguc-Kunt et al. (2004); Abreau and Mendes (2001);Kosmidou (2008)
	NIM	**+**	Demirguc-Kunt & Huizinga (1999);Saunders and Schumacher (2000); Demirguc-Kunt et al. (2004); Abreau and Mendes (2001)
COST	ROAA	**-**	Bourke (1989); Abreau and Mendes (2001); Athanasoglou et al. (2008)
		+	Molyneux and Thornton (1992); Ben Naceur and Goaied (2003)
	NIM	**+**	Barajas, Steiner and Salazar (1999); Demirguc-Kunt and Huizinga (1999); Brock and Suarez (2000); Abreau and Mendes (2001); Ben Naceur and Goaied (2003); Martinez and Mody (2004)
LNDEP	ROAA	**+**	Molyneux & Thornton (1992); Kosmidou (2008); Pasiouras & Kosmidou (2007) - Higher liquid, less profit
LOSRES	ROAA	**-**	Kosmidou (2008); Athanasoglou et al. (2008)
	NIM	**+**	Angbazo (1997); Kosmidou, Tanna & Pasiouras (2005)
SIZE	ROAA	**+**	Kosmidou (2008)
		-	Kosmidou, Tanna, Pasiouras (2005); Pasiouras & Kosmidou (2007)
	NIM	**+**	Demirguc-Kunt and Huizinga (1999)
		-	Ben Naceur and Goaeid (2003)
GDP	ROAA	**+**	Biker and Hu (2002); Kosmidou (2008)
		No impact	Demirguc-Kunt and Huizinga (1999); Ben Naceur and Goaied (2003)
	NIM	**No impact**	Demirguc-Kunt and Huizinga (1999); Ben Naceur and Goaied (2003)
INF	ROAA	**+**	Bourke (1989); Molyneux and Thornton (1992); Demirguc-Kunt & Huizinga (1999); Biker and Hu (2002); Pasiouras & Kosmidou (2007) for domestics banks; Athanasoglou et al.(2008)
		-	Abreau and Mendes (2001); Pasiouras and Kosmidou (2007) for foreign banks; Kosmidou (2008);Demirguc-Kunt & Huizinga (1999)
	NIM	**+**	Demirguc_Kunt & Huizinga (1999)
		-	Abreau and Mendes (2001)
CON3	ROAA	**+**	Short (1979); Bourke (1989); Molyneux & Thornton (1992); Demirguc-Kunt and Huizinga (1999)
		-	Park and Weber (2006)
	NIM	**-**	Ben Naceur and Goaeid (2003)

EQAS = Equity/Total Assets; COST = Cost/Income; LNDEP = Net Loans/Customers and Short-term funding; LOSRES = Loan loss reserves/Gross loans; SIZE = LNSIZE; GDP = Real gross domestic product annual growth rate; INF = Inflation; CON3 = Assets of 3 largest banks/assets of all banks in sample

4.8 DATA COLLECTION PROCEDURE

Banks level data are obtained from the Bankscope Database of Bureau van Dijk's company, supplemented by macroeconomic data from International Financial Statistics August 2009, International Monetary Fund and World Development Indicators 2009, World Bank.

Only banks with accounting statements from 2003 – 2008 generated from Bankscope database are included in the sample. Excluded from this study, are Singapore, Philippines and Chile, which we had earlier intended to be included in our study. Singapore is excluded from this analysis, as surprisingly, information on Singapore banks is scanty in Bankscope. Data for Philippines is from 2004-2008, while Chile from 2008 onwards, which does not fulfill the six-year period criteria of 2003 – 2008 for purpose of this paper.

We use the "Peer Analysis" function available in Bankscope, which provided many banks information simultaneously. Bankscope yielded a total number of 533 banks for the 10 countries (Table 8) with information on standard ratios calculated based on global summary format. For each of the banks' financial statement generated, Bankscope also provided a consolidation code, indentifying consolidated and unconsolidated statements, where for purpose of this research, both are included in this sample. The banks are inspected for missing values and outliers. The outliers pertain specifically to cost to income ratio (COST) and net loans to customer and short-term funding (LNDEP). COST variable range

from a minimum of 10.65% (Indonesia) to maximum of 745.35% (Argentina), while LNDEP from 1.47% to 981.27% (both from Indonesia).

Table 8 : Countries and Number of Banks

	Initial Sample[1/]	After Inspection				
		Missing Values	COST >100%	LNDEP >200%	Final Sample	Share (%)
Malaysia	34	14			20	59
Thailand	20	6	2		12	60
Indonesia	69	34	2	1	32	46
Korea	19	4		1	14	74
Argentina	69	35	22	1	11	16
Brazil	154	99	13	9	33	21
Colombia	17	8			9	53
Mexico	93	76	6		11	12
Peru	19	11			8	42
Venezuela	39	22			17	44
TOTAL	**533**	309	45	12	**167**	31
EAST ASIA	**142**	58	4	2	**78**	15
LATIN AMERICA	**391**	251	41	10	**89**	17

COST= Cost/Income ratio; LNDEP = Net Loans/Customers and Short-term funds
Source: Bankscope

In our study, only banks with COST within the ratio of 0% - 100% are included. We then had to decide on whether the same criteria of 0%-100% should be applied to LNDEP, as there are a substantial number of banks with LNDEP ratio above 100%. Using the same criteria would mean a further reduction of over 30 banks. A review of the data showed that quite a number of Korean banks have LNDEP ratio of above 100%, with one Korean bank having a ratio of 213.29% This seem to be quite consistent with the 26 March 2010 press release of

Financial Services Commission, South Korea's financial regulator, which reported the Korean domestic bank's industry loan-to-deposit ratio to be 127.1% at end-2007, and 110.4% as at end January 2010. Hence, we use Korean banks as benchmark, and decided to include banks with LNDEP ratio below 200% in order not to reduce further the sample size. After deleting missing data and outliers, we have a balanced panel of 167 banks (31% of the original number of banks). Table 8 display the number of banks for each of the 10 countries in the final sample.

4.9 CHAPTER SUMMARY

In summary, we use a balanced panel data of 167 banks from four East Asia and six Latin America countries for the period 2003 – 2008. The countries are Malaysia, Thailand, Indonesia, Korea, Argentina, Brazil, Colombia, Mexico, Peru and Venezuela. We apply panel least square technique on the fixed effects regression model, with White cross section standard errors & covariance (no d.f. correction) for a robust coefficient covariance to control for cross-section heteroskedasticity. Two measures of banks performance are used; for bank profits, the return on average assets (ROAA) and for bank spreads, net interest margins (NIM). ROAA is net profit before tax divided by total average assets, while NIM, interest revenue less interest expense divided by average earning assets. Measures for internal determinants of performance are five bank characteristics. They are the ratio of equity to total assets, cost-to-income ratio, the ratio of bank's loans to customer and short-term funding, the ratio of loan loss

reserves to gross loans and the bank's total assets which represent capital adequacy, management efficiency or expenses management, liquidity, credit or asset quality and size respectively. The external factors selected for this study is annual growth in real gross domestic product (GDP), annual growth in the consumer price index (CPI) and concentration ratio. In the next chapter, Chapter 5, we provide the results of our empirical study.