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Banking efficiency and performance: a test of banking characteristics in an emerging market

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Abstract: This study is to test the performance of Indonesian banks in the most-stable considered period, 2005–2007, after having the worst crisis in the Indonesian banks’ history, the Asian Financial Crisis 1997–1998. By using Return on Asset (ROA), Return on Equity (ROE), and Net Interest Income to Total Asset (NIITA) as the proxies for bank performance and Non Performing Loan (NPL) as the proxy for bank efficiency, we investigated 25 Indonesian banks for three consecutive years and applied multivariate regression analysis to test the proposed hypotheses. The results revealed the bank characteristics play important roles to determine the bank’s performance measurement; however, those variables have less influence on the bank efficiency measurement. This empirical phenomenon has opened an interesting analysis on the behaviour of banking industry in the emerging markets, which differs from the common findings in the developed markets.

Keywords: bank efficiency; bank characteristics; ROA; return on asset; ROE; return on equity; NPL; non performing loan.
1 Introduction

The Asian Financial Crisis 1997–1998 has given an important lesson for the Indonesian banking industry, which previously enjoyed an open and expansive financial policy, on how to manage the credit growth and the prudential banking principles. After having a booming period before the crisis 1997–1998, the number of Indonesian private commercial banks in 2005 has decreased from 144 to 122 fully operating banks (Bank Indonesia, 2005). Bank Indonesia, as the central bank in Indonesia, carries a three-fold responsibility, i.e., as monetary authority, the regulatory and supervisory
authority for the banking system and payment system. As such, Bank Indonesia’s most important task is to safeguard not only financial stability, but also economic system stability (Bank Indonesia, 2010). This task becomes the central point, especially, because Indonesian financial-services firms are facing a much tougher operating environment as a result of the various financial distresses, including credit crisis. Higher funding costs, increased defaults and limited opportunities for top-line growth are all contributing to a more challenging situation for the industry. Combined with the likelihood of additional compliance obligations, financial institutions are facing a level of difficulty they have not seen for many years. As a result, many firms are being forced to place more emphasis on reducing costs. In other words, they must become more efficient to get higher performance.

Improving efficiency has long been a challenge for the financial services industry, but cost management is not only about reducing expenses but also about generating more revenue per unit of cost. Indonesian banks vary widely in their commitment to cost management, and their commitment tends to be more cyclical than sustaining. The behaviour of those banks is intuitively also influenced by the increasing competition from non-bank institutions and from banks expanding into new markets. This situation is putting strong pressure on Indonesian banks to improve their earnings and to control costs. The critical factor in remaining survived and sustained is, clearly, to be efficient. Prior studies have shown that the most efficient banks have substantial cost and competitive advantages over those with average or below-average efficiency (Berger et al., 1993).

The mainstream of prior studies in banking efficiency measurement concentrates on loan management, bank size, growth level and the ownership (private or government owned). Spong et al. (1995) found that cost management and the quality of the human resources (bank managers and personnel) appear to play the largest role in banking efficiency. They also reported that one of the notable characteristics of efficient banks is the active involvement by directors and a commitment to controlling bank risk exposure, particularly where ownership is concentrated and the stockholders are more likely to be less diversified.

On the basis of the analysis of the profit function of banks, other studies reported the tendency of profit efficiency as the increase in bank size (Akhavein et al., 1997). This might result from improved risk diversification with increases in the scale of the banks’ operations. By mirroring the prior studies, it is interesting to investigate the identical idea of bank efficiency and performance measurement in the context of emerging markets, especially those that have passed through a difficult period, like financial distress. Have the same determinants influenced bank efficiency? Does NPL determine bank performance? Different from the previous ones, in this study, we explored the Indonesian bank efficiency from loan management and bank characteristics in the most-stable considered period in Indonesia after the Asian Financial crisis. We tested the influence of those independent variables on bank performance measurements (ROA and ROE), and applied the equivalent variables on the bank efficiency measurement. The results would inform us whether the investigated determinants play the same role after the crisis. It would also explain to us how implicitly the Indonesian banks learn from the crisis.

To present the empirical findings, the paper is organised as follows. The literature review and prior studies on bank efficiency and performance are briefly outlined in Section 2. The methodology and research model is described in Section 3, followed by
the research results and discussion in Section 4. We provide some concluding remarks in Section 5.

2 Literature review

In the unpredictable and dynamic environment, the benefits of a stronger focus on efficiency can be significant. According to Weill (2003), banks that generally maintained a consistent approach to efficiency improvement also enjoyed superior stock-price growth in addition to being better prepared to fund organically investments. Furthermore, banks that effectively manage their operating costs will more likely have more room to manoeuvre during the current credit crisis than banks that do not. This may be particularly significant for banks struggling to rebuild capital positions damaged by the crisis. In this environment, any contribution to the bottom line is important.

Banking efficiency has been the subject of many studies in the past decades (Berger and Humphrey, 1997; Amel et al., 2004; Brissimisa et al., 2010). The interest in estimating bank efficiency is related to questions about which characteristics can be observed in outperforming institutions, such as size, ownership and market share. Most of the studies seek to identify improvements after privatisation, foreign entry, mergers and changes in countries’ macro-economic and regulatory conditions.

In banking industry, the bank efficiency ratio is a quick and easy measure of a bank’s ability to turn resources into revenue. The lower the ratio is the better (50% are generally regarded as the maximum optimal ratio). An increase in the efficiency ratio indicates either increasing costs or decreasing revenues. It is important to note that distinctive business models can generate different bank efficiency ratios for banks with similar revenues. For instance, a heavy emphasis on customer service might lower a bank’s efficiency ratio but improve its net profit. Banks that focus more on cost control will naturally have a higher efficiency ratio, but they may also have lower profit margins.

In addition, the more a bank generates in fees, the further it may concentrate on activities that carry high fixed costs (and thus create worse efficiency ratios). The degree to which a bank can leverage its fixed costs also affects its efficiency ratio, i.e., the more scalable a bank is, the more efficient it can become. For these reasons, comparison of efficiency ratios is generally most meaningful among banks within the same model, and the definition of a ‘high’ or ‘low’ ratio should be made within this context.

To measure bank efficiency and bank performance has become a complicated matter, especially in the presence of agency problems and conflict of interests among stakeholders. A unique model that can capture financial and non-financial information to measure bank efficiency and bank performance is the current need of this complicated environment. Differences in efficiency between private-owned and state-owned banks may also come from discrepancies in size or in structure of activities (Tecles and Tabak, 2010). If, for instance, private-owned banks are smaller than domestic-owned banks, a higher-cost efficiency for private-owned banks may be the result of diseconomies of scale rather than superior managerial performance. According to Tecles and Tabak (2010), size and structure of activities are the result of management choices, as bank managers are responsible for production decisions.

In spite of the large amount of empirical literature devoted to banking efficiency on all continents (Berger and Humphrey, 1997), there are only a few studies that measure banking efficiency in Southeast Asian emerging economies, which suffered
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from the Asian Financial crisis. A likely reason for this deficit may be the relative lack of banking data in these countries, with long periods of data missing (Weill, 2003). Besides that reason, it is important to observe the effects of economic reform taken by the Indonesia government as a part of agreement with International Monetary Fund (IMF) and World Bank (Hossain and Chowdhury, 1996). The deregulation of the financial system, enhancement of the degree of competition, elimination of the imbalances in financial markets and improvement of the performance of banks and other financial institutions within the financial system were the implementation forms of the agreement.

Regardless of which calculation method is used, the bank efficiency measurement’s purpose is to evaluate the overhead structure of a financial institution. Banking is no different from any mature industry: Companies that survive keep their costs down. The efficiency measurement indicates how effectively a bank is operating and how profitable it is. After the crisis and reform period, competition forced management improvements.

Bank Indonesia (2005) reported that the fall in the NPL rates contributed to a more consistent expansion of credit. However, as the Indonesian banking system was still relatively inefficient in the years after Asian Financial crisis (Bank Indonesia, 2010), it is interesting to measure how efficiency has evolved in the more recent period and analyse whether the efforts for strengthening the national financial system have allowed banks to become more efficient, with greater ability to compete in the market. NPL as the proxy of loan management is one of the common variables used in measuring bank efficiency (Altunbas et al., 2000; Fan and Shaffer, 2004; Girardone et al., 2004). Berger and DeYoung (1997) argued that bad banking management will result in bank’s inefficiency and affects the process of granting loans. Therefore, banks’ inefficiencies might lead to higher NPLs.

By using bank characteristics, loan management and ownership structure, this study will investigate the banks’ efficiency and performance and test two hypotheses, i.e., the influences of bank characteristics and loan management on bank performance and the effects of bank characteristics on bank efficiency (efficient loan management).

3 Methodology

We have chosen the sample period from 2005 to 2007 owing to the most-stable considered period after the financial crisis and the time of most Indonesian companies relatively apply the good corporate governance principles (Bank Indonesia, 2010). The data used in the estimations cover 25 banks for a-three consecutive years, with 75 observations.

This paper uses a regression model for the first hypothesis, which investigates the influence of bank characteristics and loan management on bank performance (ROA, ROE and NIITA). Then, we will estimate the loan management (bank efficiency) with bank characteristics as the independent variables to answer the second hypothesis. The exploratory variables, which are used as the proxy of bank characteristics, are total asset (Size), asset growth (Growth) and dummy variable, whether the bank is privately owned (Private). In addition, NPL was used as bank efficiency measurement (LogNPL). The linear relationship between the investigated variables and bank performance (ROA/ROE/NIITA) was made to reflect that any changes in exploratory variables may
give some direct impact on the bank’s performance. Thus, the first full model is written as follows:

\[ \text{ROA} / \text{ROE} / \text{NIITA} = \beta_0 + \beta_1 \text{LogNPL}_i + \beta_2 \text{Size}_i + \beta_3 \text{Growth}_i + \beta_4 \text{Private}_i + e_i \cdots (1) \]

The parameters, \( \beta_1, \beta_2, \ldots, \beta_4 \), represent the size of impact of each exploratory variable to bank performance, \( \beta_0 \) is a basis value of bank performance if all the exploratory variables are null and \( e \) is a random error. All the parameters \( \beta_0, \beta_2, \ldots, \beta_4 \) are unknown and they were estimated using an ordinary least square approach. The estimated regression function in equation (1) was tested on some standard statistical features and tests, including adjusted \( R^2 \), F-test, t-test, error investigations, etc.

To measure the bank efficiency, we developed a second model as follows:

\[ \text{LogNPL}_i = \beta_0 + \beta_2 \text{Size}_i + \beta_3 \text{Growth}_i + \beta_4 \text{Private}_i + e_i \cdots (2) \]

The same standard statistical features and tests, including adjusted \( R^2 \), F-test, t-test and error investigations, were also applied to equation (2).

4 Research results and discussion

The descriptive data revealed that NIITA, as one of the proxies for bank performance measures, has almost the same average number with ROE, i.e., 10.24%, but it has a smaller standard deviation value, compared with ROE that is equal to 2.06%. To remedy the abnormal distributed data of NPL, which is indicated by the KS-Z (Kolgomorov-Smirnov Z) significance value that is smaller than 0.05, we transform the NPL value into logarithmic value. The result of Kolgomorov-Smirnov Z normality test method is presented in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Max</th>
<th>Min</th>
<th>Std. Dev.</th>
<th>KS Z</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>75</td>
<td>0.0114</td>
<td>0.05</td>
<td>-0.03</td>
<td>0.0107</td>
<td>1.054</td>
<td>0.217</td>
</tr>
<tr>
<td>ROE</td>
<td>75</td>
<td>0.1052</td>
<td>0.38</td>
<td>-0.36</td>
<td>0.1013</td>
<td>1.247</td>
<td>0.089</td>
</tr>
<tr>
<td>NIITA</td>
<td>75</td>
<td>0.1024</td>
<td>0.15</td>
<td>0.07</td>
<td>0.0206</td>
<td>1.152</td>
<td>0.141</td>
</tr>
<tr>
<td>LogNPL</td>
<td>75</td>
<td>-1.49</td>
<td>-2.46</td>
<td>-0.58</td>
<td>0.3532</td>
<td>0.560</td>
<td>0.912</td>
</tr>
<tr>
<td>Size</td>
<td>75</td>
<td>7.1933</td>
<td>8.50</td>
<td>5.87</td>
<td>0.7479</td>
<td>0.929</td>
<td>0.354</td>
</tr>
<tr>
<td>Growth</td>
<td>75</td>
<td>0.1627</td>
<td>0.82</td>
<td>-0.029</td>
<td>0.1534</td>
<td>0.872</td>
<td>0.432</td>
</tr>
<tr>
<td>Private</td>
<td>75</td>
<td>0.1600</td>
<td>1.00</td>
<td>0.00</td>
<td>0.3691</td>
<td>4.397</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Data processed

4.1 Bank performance measurement

Since we employed the unbalanced panel data, the classical normality assumption tests, i.e., autocorrelation, multicollinearity and heteroscedasticity, are not obligatory (Gujarati, 2003). However, it is important to determine which estimation model is more appropriate, Random Effect or Fixed Effect. Then, Hausman test is used in this study. The available number of sample becomes 71 observations for ROA, ROE and NIITA.
Our findings show that loan management, size and growth-rate play an important role in generating the yield of the bank, which is shown on the entire model (Table 2). The findings on ROA and ROE are in line with the work of Basu et al. (2004), which measured the Argentinean banks’ performance. The negative and significant value of NPL was seemingly common in the emerging markets that were previously suffered from the financial crisis. However, we found some interesting results on the NIITA models. There are:

- a positive relationship between NPL and NIITA
- a negative relationship between Size and NIITA
- an inverted relation between Growth-rate and NIITA.

We argued that the NIITA of Indonesian banks was relatively constant owing to there were the financial intermediary function problems in Indonesia during 2005–2007. We estimated that the banks were making money through some financial instruments such as Indonesian Government Note rather than making a new credit.

A positive and insignificant value of Private, as the proxy for ownership structure, supported partially the work of Megginson et al. (1994), Boubakri and Cosset (1998). They found that private financial institution improves the firms’ performance. Their researches document strong performance improvements for their sample of privatised firms in developed and emerging countries, respectively. The significant and positive influence of Size on bank performance (ROA and ROE) is in line with the empirical findings of Okazaki and Sawada (2006). It also supports the study of Laeven (2006), which studied the effect of competition, diversification and ownership on the bank’s performance in some Asian countries. Laeven (2006) concluded positive effect of the variable Size and Growth on bank performance. In our study, even though the Growth variable has the same sign as the work of Laeven (2006), the value is not statistically significant. We assumed this slight difference owing to the proxy used, i.e., using asset growth, instead of operating income growth as done in the prior studies. The regression results for bank performance measurement are summarised and presented in Table 2.

### 4.2 Bank efficiency measurement

To measure bank efficiency, we regress to the bank efficiency measure on the bank characteristic variables, i.e., Size, Growth and Private. The results revealed that only private-owned bank significantly influenced bank efficiency (see Table 3). This finding is in line with the study of Berger et al. (2004), which find private banks to have higher profit efficiency than the state-owned banks in a sample of 28 developing countries. Our study supported a similar finding of Altunbas et al. (2001) that finds privately owned banks are more efficient than their mutual and public sector counterparts in the German-banking market. Private-owned banks all appear to benefit from the widespread economies of scale. This paper also supported the work of Micco et al. (2004). In their study, the state-owned banks operating in developing countries tend to have low-grade profitability than comparable private banks, and this inferior profitability is due to the lower net interest margin, the higher overhead costs (mostly because state-owned banks tend to employ relatively more people), and the higher NPLs.
### Table 2  
The regression results of bank performance measurement

<table>
<thead>
<tr>
<th>Variable</th>
<th>ROA</th>
<th>ROE</th>
<th>Net interest income to total asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hausman test Chi-square</td>
<td>(7.598035)</td>
<td>(13.240196)</td>
<td>(20.747740)</td>
</tr>
<tr>
<td>Model</td>
<td>Fixed effect</td>
<td>Random effect</td>
<td>Random effect</td>
</tr>
<tr>
<td>Constant</td>
<td>–0.026</td>
<td>–0.3015</td>
<td>0.0000</td>
</tr>
<tr>
<td>LogNPL</td>
<td>–0.1174</td>
<td>–0.9315</td>
<td>0.1079</td>
</tr>
<tr>
<td>(–4.3596)</td>
<td>(–4.5939)</td>
<td>(2.2283)</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>0.0057</td>
<td>0.0060</td>
<td>–0.0160</td>
</tr>
<tr>
<td>(3.6221)</td>
<td>(4.2731)</td>
<td>(–2.7875)</td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>0.0029</td>
<td>0.0270</td>
<td>0.0141</td>
</tr>
<tr>
<td>(1.1990)</td>
<td>(1.864)</td>
<td>(–4.9895)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>0.2348</td>
<td>0.0667</td>
<td>0.0000</td>
</tr>
<tr>
<td>(1.773)</td>
<td>(2.2421)</td>
<td>(0.1868)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.3310</td>
<td>0.3833</td>
<td>0.2664</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.2904</td>
<td>0.3459</td>
<td>0.2220</td>
</tr>
<tr>
<td>$F$</td>
<td>(8.163)</td>
<td>(10.2542)</td>
<td>(5.9935)</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>$N$</td>
<td>71</td>
<td>71</td>
<td>71</td>
</tr>
</tbody>
</table>

The numbers in parentheses are $t$-values.
The numbers in italic are $p$-values.

*Source:* Processed data

### Table 3  
The regression results of bank efficiency measurement

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non Performing Loan (NPL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hausman test Chi-square</td>
<td>(7.943777)</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.0188</td>
</tr>
<tr>
<td>Model</td>
<td>Random effect</td>
</tr>
<tr>
<td>Constant</td>
<td>–0.083</td>
</tr>
<tr>
<td>Size</td>
<td>0.0057</td>
</tr>
<tr>
<td>(0.6109)</td>
<td>0.5434</td>
</tr>
<tr>
<td>Growth</td>
<td>0.0094</td>
</tr>
<tr>
<td>(1.2556)</td>
<td>0.2136</td>
</tr>
<tr>
<td>Private</td>
<td>0.0047</td>
</tr>
<tr>
<td>(2.5422)</td>
<td>0.0133</td>
</tr>
</tbody>
</table>
Banking efficiency and performance: a test of banking characteristics

Table 3  The regression results of bank efficiency measurement (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non Performing Loan (NPL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R^2$</td>
<td>0.1509</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.1128</td>
</tr>
<tr>
<td>$F$</td>
<td>(3.9682)</td>
</tr>
<tr>
<td>$p$-value</td>
<td>0.0115</td>
</tr>
<tr>
<td>$N$</td>
<td>71</td>
</tr>
</tbody>
</table>

The numbers in parentheses are t-values.
The numbers in italic are p-values.

Source: Processed data

The insignificant effects of Size and Growth on bank efficiency measure are quite interesting. Altunbas et al. (2001) found that the larger-size banks tend to realise greater economies. The size of public- or state-owned banks that is commonly bigger than private-owned banks influences the efficiency measure in the context of cost and profit advantages, which can possibly be explained by their lower cost of funds. We predicted that the cause of insignificant effect is the number of sample used. Most of the prior studies used more than 50 banks as the sample size, for instance, Alhadeff and Alhadeff (1964) used 200 banks, and Tschoegl (1983) used 1000 banks.

5 Conclusion

Our research has revealed some important findings related to the banking efficiency and performance, which specifically focus on the effects of bank characteristics and loan management. In Indonesia, NPL and the bank size played an important role in generating a high profit, or high performance. This finding implicitly informs us the management performance of Indonesian banks after having suffered terribly in 1997–1998, when the Asian Financial crisis surged and demolished a number of Indonesian banks. Indonesian banks’ management has learned from the crisis and applied better corporate governance and prudential banking principles. It is indicated by the significant and negative value of NPL on bank profitability.

It also informs us how the Indonesian government through Bank Indonesia (the Indonesian central bank), as the monetary and economic regulator, has worked to form a solid financial stability to support the Indonesian banks to be more efficient. The awareness of banking efficiency as the essential factor for a well-functioning economy has encouraged Indonesian banks to merge and consolidate its size to achieve maximum efficiency. This effort is the pre-requisite condition for the Indonesian banks to operate efficiently by directing society’s savings towards those enterprises with the highest expected social returns and monitoring them carefully after lending, where society’s scarce resources are allocated more efficiently. Our study also revealed that the Indonesian government’s policy to liberalise banking industry and encourage more participation from private sector is a right policy. It is indicated by the significant and positive value of private variable on loan management, which is proxied by NPL. Indonesian private-owned banks have been able to be more efficient in managing its business; especially, they have successfully applied effectively and efficiently cost
management. This kind of efficiency, of course, will in turn promote economic growth. By contrast, banks that simply operate with waste and inefficiency will slow economic growth and reduce society’s economic welfare.

Besides the academic contribution provided in this paper, indeed, the methodology adopted here, the financial ratio method, is subject to some limits. Moreover, further research is needed on this topic not only to confirm these results but also to investigate the origins of bank efficiency and performance measurement.

As the simple implementation of this research, there are some strategies that could be utilised for Indonesian banks to keep efficient and profitable. They are:

- **Protect our existing customer base.** It means we must be assured that we know exactly who our best customers are and keep them happy.
- **Increase our service and products per household,** by conducting proper and sustained research, to answer the questions:
  - Do we know how many of our customers only have savings’ products and no checking products?
  - How many are checking-customers that have no-saving’s products?
  - How many are customers without debit cards or not using their debit card?
  - What is about internet banking, bill pay, direct deposit, e-statement status?
  - All these products and services potentially add spread-income, non-interest fee income, reduce expense and affect the customer lifetime value.
- **In addition,** the Indonesian bank should focus on acquiring deposit-rich customers. A simple segmentation strategy within small business and retail markets that focuses on high average non-interest deposits should be our focus.

**References**


