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Menur Agustini
Faculty of Economics and Business, Universitas Indonesia

Viverita Viverita
Faculty of Economics and Business, Universitas Indonesia, viverita.d@ui.ac.id

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INDONESIAN
CAPITAL MARKET REVIEW

Factors Influencing the Profitability of Listed Indonesian Commercial Banks Before and During Financial Global Crisis

Menur Agustini and Viverita*
Department of Management, Faculty of Economics Universitas Indonesia

As a country with bank-based economy, stability and soundness of its banking industry are crucial matters for Indonesia especially in dealing with the crisis period, such as financial global crisis which occurred in 2008. Considering the crucial impact of the crisis, this study aims to examine determinants of bank profitability (as the measurement of stability and soundness of banking industry) before and during the crisis period. Using the Generalized Method of Moment (GMM), this study analyzes the profitability of listed commercial banks using unbalanced panel data over the period of 2002-2009. To investigate the impact of recent financial global crisis, this study uses time dummy variable to separate the pre-crisis period (2002-2006) and during the crisis period (2007-2009). Findings of this study show that in the pre-crisis period, bank-specific factors i.e. lagged profitability, bank size, bank capitalization, and diversification and external factors which are inflation and stock market-based financial development statistically and significantly affect bank's profitability. Furthermore, the crisis is proven to have significant impact on the effect of inflation and stock market-based financial development toward bank profitability. Whereas, through the general model which is not separate the pre and during crisis periods, this study shows that bank-specific factors such as lagged profitability, bank size, and bank capitalization are proven to have significant effects on bank profitability while external factors that also have effects are bank-based financial development and bank concentration.

Keywords: *Bank profitability, financial global crisis, Generalized Method of Moment*

Introduction

Indonesia, as well as some other countries like China, Korea, Tunisia, and Egypt, has bank-based economy where the banking sector possesses most of its financial sector assets. The data shows that in 2009 and 2010, approximately 79.5 percent of assets in the financial sector are dominated by banking sector. Trehan (2008) explains that in a bank-based financial system, the economy depends on the performance of its banking industry; thereby the soundness and stability of its banking system are crucial matters. In addition, the channeling processes in which savings are distributed to productive activities can determine economic growth and wealth of a country. Moreover, the soundness and stability of banking sector are important to limit economic downturns related to financial panics and to avoid adverse budgetary consequences on the governments (Naceur and Omran, 2011). Given the crucial role of banking system for the economy, it is important to know what are factors influencing the performance banking sector (Dietrich and Wanzenried, 2010), especially in the period pre and during the latest global financial crisis.

*UI Campus, Depok 16424, Indonesia, E-mail: viverita.d@ui.ac.id

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Yong-Chin and Jung-Hua (2006) suggested that long-term profitability should be the ultimate goal of banks among other goals. Generally, banks pursue such as maximum shareholders value, bigger market power, higher growth, or greater operating efficiency. But, when bank suffers low profitability, market will devaluate its stock value, current investors will sell their shares which can lead to capital problem, and depositors will withdraw their fund that may harm bank's future growth. As of Albertazzi and Gambacorta (2009), profitability is commonly used as a measurement of the soundness and stability of banking sector, since it is justified by that the knowledge of the link between business cycle fluctuation and bank profitability.

This paper examines factors influencing bank profitability before and during latest financial global crisis or subprime mortgage crisis using unbalanced panel data of Indonesian commercial banks listed in Jakarta Stock Exchange (JSX) over the period 2002-2009. Using dynamic panel data estimation, this paper accounts for profit persistence characteristic in the banking industry. The empirical results suggest that internal factors including size, capitalization, and diversification statistically and significantly affect bank profitability. The evidence also indicates that external factors such as inflation, stock market-based financial development, bank-based financial development, and bank concentration are proven statistically and significantly affected bank profitability. While crisis shows negative effects toward bank profitability since its level is lower at the crisis period.

The rest of the paper is organized as follows: Section 2 provides a brief review of the relevant literature, that is, determinants of bank profitability which the current research draws up on. Section 3 presents data and methodology. In section 4, we provide the findings of the study. Section 5 concludes the paper.

Literature Review

Empirical studies on bank profitability and its determinants have been done by many previous studies. For example, Naceur and Omran (2011), Dietrich and Wanzenried (2010), Albertazzi and Gambacorta (2009), Flamini et al. (2009), Garcia-Herrero et al. (2009), Antahanasoglou et al. (2008), and Naceur and Goaied (2008) using countries data.

Profitability reflects how well banks are run given the environment in which banks operate (Garcia-Herrero et al., 2009). Typically, profitability is measured by return on assets, return on equity, and net interest margin (Dietrich and Wazenried, 2010; Sufian and Habibullah, 2010) or expressed as a function of internal and external factors (Dietrich and Wanzenried, 2010). Internal factors are those that are most influenced by managerial decision, while external factors are those that related to industrial and macroeconomic matters reflecting economic and legal environment in which financial institutions operate (Sufian, 2011).

Most studies related to bank profitability, considered bank size and capital as major internal determinants of bank profitability. Dietrich and Wanzenried (2010), also Naceur and Omran (2011), used bank size to capture the presence of economies or diseconomies of scale in banking sector. Sufian (2011) found a positive but not statistically significant relationship of bank size and profitability indicating the absence of economies of scale condition in Korean banking sector. A negative and statistically significant relationship of bank size and its profitability has been found in Sub-Saharan countries banking sector reflecting diseconomies of scale (Flamini et al., 2009). This may be caused by the effect of bureaucratic obstacles and managerial inefficiencies suffered by banks as they become too large.

Bank capitalization reflects capital strength of bank and considered as an important determinant of bank profitability as they regulated in Basel Committee in form of capital requirement ratio (Loannidi et al., 2010). Bank capital can also be a good proxy for bankruptcy cost (Flamini et al., 2009). This can be done by relaxing the assumption of one-period perfect capital markets with symmetric information. A positive and statistically significant relationship of bank capital and its profitability has been found by Anthanasoglou et al. (2008) in Greek

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commercial banking sector. This indicates that a well-capitalized bank is able to pursue business opportunity more effectively and has more time and flexibility in dealing with problems resulting from unexpected loss.

Currently, some studies figured out diversification as one of factors influencing bank profitability. This is another way of bank to generate other than interest on loanable funds. Furthermore, an increasing competition among banks which comes from deregulation has driven banks to exaggerate its product and service range (Goddard, 2004). The empirical studies on the relationship between diversification and profitability provide conflicting results. Sufian (2011) found that diversification has a positive and statistically significant relationship with profitability of Korean banking sector. It indicates that Korean banking sector has a lot more non-interest generating revenues such as income from the stock market and other fee based services. In the contrary, Berger et al. (2010) found that diversification leads to decreasing profitability as a result of increasing costs on China banking sector when they did diversification.

Earlier studies also include external determinants such as inflation, economic growth, taxation, financial sector development, bank concentration, and regulatory variable like reserve requirements in their analysis. Sufian and Habibullah (2010) used fluctuations in inflation rate as a proxy of macroeconomic risk as external factor that will affect bank profitability. Positive effect toward bank profitability will be found when management is able to effectively forecast future inflation rate and absorb it into interest rate. Whereas, a negative effect will be found when management was incapable to effectively forecast the inflation rates which resulting an excessive cost than revenues (Naceur and Goaied, 2008). Naceur and Omran (2011) found a negative and significant relation between inflation and bank profitability, indicating that banks in MENA (Middle East and North African) countries are not capable to effectively forecast future inflation. Therefore, inflation rate are not fully anticipated which leads to higher cost. On the other hand, Naceur and Goaied (2008) found positive but not statistically significant relationship between inflation rate and profitability in Tunisian banking, indicating inflation rate has been absorbed into saving and loan rate.

Economic growth as measured by growth of GDP (Gross Domestic Product) would generate higher demand for banking products and provides opportunity for banks to gain higher revenue (Sufian and Habibullah, 2010). By using deviations of real GDP growth, Anthanasoglou et al. (2008) found a positive and statistically significant relationship between economic growth and bank profitability. In contrast, Naceur and Omran (2011) failed to find significant relationship between GDP growth and bank profitability.

Like other financial institutions, banks are subject to tax obligation. As tax obligation reduces post tax profit, taxation is expected to have negative impact toward bank profitability (Dietrich and Wanzenried, 2010). Empirical evidence from Hassan and Bashir (2003) as well as from Dietrich and Wanzenried (2010) showed that there is significant effect of taxation toward profitability in MENA countries and in Switzerland.

Financial development can be divided into bank-based development and market-based development. Their relationship with profitability may form as a substitute or complementary to the banking and capital market (Naceur and Omran, 2011). Naceur and Goaied (2008) found a positive and statistically significant relationship between market-based development and bank profitability, indicating complementary relationship between banking and capital market. In addition, they found negative but not statistically significant relationship between bank-based development and bank profitability.

Bank concentration measures market structure to prove Structure-Conduct-Performance (SCP) hypothesis in banking industry. SCP hypothesis states that market power that showed by concentrated market, yields monopoly profit (Dietrich and Wanzenried, 2010). According to the results, bank concentration ratio shows positive and statistically significant effect toward commercial bank profitability in Switzer-

land which indicates the presence of SCP hypothesis. In contrast, Naceur and Omran (2011) found negative and statistically significant effect of bank concentration toward profitability.

The last external determinant deals with bank regulation that is reserve requirement which is regulated in the form of capital requirement. Naceur and Omran (2011) provided evidence of positive and statistically significant effect of reserves toward bank profitability indicating that reserves as implicit tax has been transferred to customers in form of higher loan rate or lower deposit rate.

Research Method

Data

This study uses a sample of unbalanced panel data of commercial banks listed in Jakarta Stock Exchange (JSX) over the period 2002-2009. All banks' balance sheets and income statements are obtained from Reuters Knowledge which are used to calculate bank-specific variables using the standardized global accounting standard. Macroeconomics level data such as inflation and country stock-market capitalization are obtained from World Bank while GDP per capita and nominal GDP are provided by *Badan Pusat Statistik* (BPS) Indonesia. Finally, data on total assets of all commercial banks and ranks for the five biggest commercial banks in Indonesia are obtained from the Indonesian Financial Statistics provided by Bank Indonesia.

Method and variable specification

The empirical studies on bank profitability might suffer from three sources of inconsistency problems: highly persistent profit, omitted variables, and endogeneity bias. To correct these problems, this study employs dynamic panel data estimation to examine the effect of internal and external determinants of bank profitability (Phyogossian and Hesse, 2009). The estimation is more suitable in studying bank profitability since it provides more accurate results than a static panel which uses fixed and random effects model (Hadad et al., 2011). Furthermore, Baltagi (2005) stated that the dynamic relationship is characterized by the presence of lagged dependent variable among regressors. By using fixed and/or random effects, error term may be correlated with lagged variable which leads to biased and inconsistent estimators. In order to have a better estimation of the dynamic relation between independent and dependent variable, following Arellano and Bond (1991), this study uses first-differences Generalized Method of Moment (GMM).

To examine the effect of subprime mortgage crisis, this study uses dummy variable interaction, thus the different effect of factors influencing bank profitability before and during subprime mortgages crisis can be analyzed. The value of dummy variable takes zero value for pre-crisis period (2002-2006) and takes one for during crisis period (2007-2009). The model specified to examine factors influencing bank profitability before and during crisis is as follows:

$$\begin{aligned} Prof_{it} = {} & \alpha + \beta_1 Prof_{it-1} + \beta_2 B_{it} + \beta_3 M_t + \beta_4 F_t + \\ & \beta_5 C_t + \beta_6 R_{it} + D^*\beta_7 + D^*\beta_8 Prof_{it-1} + \\ & D^*\beta_9 B_{it} + D^*\beta_{10} M_t + D^*\beta_{11} F_t + D^*\beta_{12} C_t \\ & + D^*\beta_{13} R_{it} + \eta_i + \varepsilon_{it} \end{aligned} \quad (1)$$

where $Prof_{it}$ is the performance of bank i during the period t and is measured by $ROAA$. B_{it} is vector of bank-specific characteristics (internal determinants) of bank i during the period t which consists of bank size, capitalization, and diversification. M_t is a vector of macroeconomic variables during the period t which consists of inflation, real GDP per capita growth, and taxation. F_t is a vector of financial development control variables at the period t which consists of bank-based financial development and market-based financial development. C_t is a measure of bank concentration at the period t. R_t is a vector of regulatory impediments on banks at the period t which is measured by reserve requirement. η_i the unobserved bank-specific effect and ε_{it} the idiosyncratic error.

Bank profitability shows a tendency to persist over time, reflecting impediments to market competition. As a consequence, we specify a dynamic model by including a lagged depen-

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Table 1. Variable specifications

Variables	Description
	Dependent variable :
ROAA	Net profit over average total assets (%)
	Independent variables :
Internal determinants	
Bank size	Measured by natural logarithm of total assets
Bank capitalization	Proxies by Equities over Assets (EQAS) ratio as measurement of capital adequacy, or bankruptcy cost. The higher the ratio, the lower the cost.
Diversification	Also known as business model, proxies by non-interest income to total revenue ratio.
External determinants	
Annual inflation rate	Measured by growth of Consumer Price Index (CPI).
Real GDP per capita growth	As a measurement of economic growth, proxies by Real Gross Domestic Product (GDP) growth.
Taxation	Proxies by Effective Tax Rate (ETR) which comes from ratio of tax paid to pretax profit.
Bank-based financial development	Proxies by total assets of all commercial banks to nominal GDP ratio.
Stock market-based financial development	Proxies by country stock market capitalization to nominal GDP ratio
CR5 (Concentration Ratio 5)	As a measurement of commercial banks concentration, calculated from total assets of five biggest commercial banks to all commercial banks total assets ratio.
Reserves requirement	To measure the effect of bank regulation toward bank profitability, calculated from current account with Bank Indonesia to total deposits ratio.

dent variable among the regressors, i.e. $Prof_{it-1}$ (one-period lagged profitability). While coefficient attached with this lagged dependent variable is known as speed of adjustment to equilibrium (β_1). A value of β_1 between 0 and 1 implies persistence of profit, but they will eventually return to their normal level. A value close to 0 indicates an industry that is fairly competitive, while a value close to 1 implies a less competitive structure (Flamini et al., 2009).

Beside the main model that separate before and during crisis period, this study also specifies general model without dummy for separating before and during crisis to examine factors influencing bank profitability in a more general point of view. The model for general analysis is specified as follows:

$$Prof_{it} = \beta_1 Prof_{it-1} + \beta_2 B_{it} + \beta_3 M_t + \beta_4 F_t + \beta_5 C_t + \beta_6 R_{it} + \eta_i + \varepsilon_{it} \quad (2)$$

Determinants of bank profitability and variable selection

In this section, both dependent and independent variables selected to study bank profitability will be described. See Table 1 for the summary of variable specification.

Dependent variable

This study is using *ROAA* (Return on Average Assets) as the only one proxy of bank profitability that acts as dependent variable. *ROAA* is defined as the ratio of net profit to total assets possessed by bank (Dietrich and Wanzenried, 2010). *ROAA* is considered as a better proxy of bank profitability, compared to *ROAE* (Return on Average Equity) because *ROAE* tends to ignore the increasing bankruptcy cost related to high usage of leverage. Banks that have high

leverage tend to have lower equity that leads to higher *ROAE*, but disregards increasing risks related to high leverage (Anthanasoglou et al., 2008).

Hassan and Bashir (2003) explain that *ROAA* reflects how well bank management is in utilizing its financial resources and real investment to gain profit (Sufian and Habibullah, 2010). The average value of total assets is employed as denominator to capture the changes in assets during the fiscal year (Dietrich and Wanzenried, 2010).

Independent variables

As bank-specific determinants of bank profitability, we use these following variables:

- *Bank size*: To measure bank size, this study employs value of total assets. Anthanasoglou et al. (2008) suggested that the most important question underlying bank policies is the optimum size with which bank can gain maximum profit. Generally, many studies found a positive relationship between bank size and its profitability. This relationship is true when big size leads to economies of scale (Sufian, 2011). Other studies, like Flamini et al. (2009), ever mentioned that bank with big size is considered as a less risky bank due to the Too-Big-to-Fail (TBF) assumption which allows bank to charge lower deposit rate (lower input price), hence higher profitability. Thus, in this study, bank size is expected to have positive effect on its profitability, at least up to a certain point.
- *Bank equity over assets ratio*: In this study, *EQAS* ratio is applied as a proxy of bank capital strength. Bank capital may be an important variable that determines its profitability in term of a measurement for bankruptcy risk. This works by relaxing the assumption of perfect capital markets since the assumption with no bankruptcy risk, capital structure has no important implication and value only can be generated by assets (Flamini et al., 2009). Many studies postulate about positive effect of bank capital on its profitability. Naceur and Kandil (2009) explained that well-capitalized banks have more immune toward bankruptcy risk and allowed to pay lower cost of fund, thus gain higher profitability. In addition, well-capitalized banks have more support which allowed them to conduct more risky asset, i.e. loan, which can be the source of revenue for bank (Garcia-Herero et al., 2009). In this case, bank capital is expected to have positive relationship with bank profitability.
- *Diversification*: Nowadays, financial institutions are intense in conducting diversification strategy. Through fee-based business, trading business, or insurance business, banks are able to gain non-interest revenue from this strategy (Elsas et al., 2010). Drucker and Puri (2009) explained banks with diversification strategy have opportunity to gain economies of scale by spreading their fixed costs into various products or geographic areas (Berger et al., 2010). Furthermore, since margin from trading operations and fee and commission income is higher than interest operations, profitability will be expected higher when banks have bigger portion of non-interest generating revenue activities (Dietrich and Wanzenried, 2010).

As external determinants, this study uses these following variables:

- *Inflation*: Annual inflation rate is employed as measurement of macroeconomic risk and proxied by growth of Consumer Price Index (CPI). Perry (1992) explains that the effects of inflation on bank profitability depend on how well banks are anticipating the rate of future inflation. Inflation will have positive effect if management is able to forecast future inflation effectively and adjust it into interest rate. Otherwise, negative effect will occur and cost will increase faster than revenue, hence may harm bank profitability (Sufian and Habibullah, 2010).
- *Real GDP per capita growth*: This study uses growth of real GDP per capita as a measurement of economic growth. The higher economic growth will lead to the greater demand for loans (Dietrich and Wanzenried, 2010). Moreover, Sufian and Habibullah (2010) explained that in a booming economy, banks have opportunity to raise their margin, thus will increase their profitability. Related to

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capital market, economic growth may cause increasing capital market transactions, bring more capital gain realization or higher commissions for banks, hence yields higher profitability.

- *Effective tax rate*: Fiscal issue has significant effect on banking industry behavior. This behavior is called tax-shifting in which, through interest rate adjustment mechanism, banks are able to transfer their tax obligation towards depositor, borrower, and other fee-generating services purchasers (Albertazzi and Gambacorta, 2010). To measure this taxation variable, this study employs Effective Tax Rate (ETR) as its proxy. Regardless this tax-shifting ability, Dietrich and Wanzenried (2010) expect negative relationship between taxation and profitability, since tax obligation reduces post tax profits.
- *Financial development*: This study also examines the impact of financial development on bank profitability. It uses two measurements for financial development, one as the measurement for bank-based financial development, and the other refers to market-based financial development. Bank-based financial development is proxied by ratio of total assets of all commercial banks to nominal GDP ratio. It is postulated to have negative effect on bank profitability since the higher development in banking sector, the more banks in the industry, and the tighter competition among banks (Naceur and Goaied, 2008). In contrast, market-based financial development, is proxied by stock market capitalization to nominal GDP ratio, and expected to have positive effect on bank profitability because in a well-developed stock market, loans problem can be reduced and enable banks to better evaluate credit risk since stock market contributes reinforcement of firm equity and provides information on traded firms (Naceur and Omran, 2011).
- *Bank concentration*: This measure aims to examine the structure of banking industry, whether it is high concentrated or low concentrated. This study uses CR5 variable which is calculated form total assets of five biggest commercial banks divided by all commercial banks total assets. Bank concentration is included in this study to account for Structure-Conduct-Performance (SCP) hypothesis that postulates about positive effect of market power on bank profitability, regardless its efficiency (Samad, 2008). In high concentrated market, banks have power to exert collusive behavior. This collusion may result in higher rates being charged on loans and lower interest rates being paid on deposits, hence bank concentration is expected to have positive impact on profitability.
- *Reserves requirement*: Beside Capital Adequacy Ratio (CAR), reserves requirement is regulated in bank regulation on capital requirement (Naceur and Kandil, 2009). To measure reserves requirement, this study employs ratio of current account in Bank Indonesia (central bank) to total deposits. Naceur and Omran (2011) suggest that reserves can be an expense for banks since it does not generate revenue, or even if it does, the rate will be lower than market rate. Therefore, reserves requirement is expected to affect negatively towards bank profitability. In addition, reserves is also categorized as implicit tax, hence through interest rate adjustment, banks are able to transfer their opportunity cost of keeping reserves towards customers.

Result and Discussion

All the findings reported in this section are results from GMM estimations on the effects of bank-specific and external factors on bank profitability using time dummy variable (Table 2), as well as without dummy variable (Table 3). The dependent variable is the return on average assets (*ROAA*). The full sample includes unbalanced panel data from 15-28 banks. The period covers the years of 2002 to 2009. Variables in italics are instrumented through the GMM procedure following Arellano and Bover (1995). Coefficients that are significantly different from zero at the one percent, and five percent level are marked with * and **, respectively. The Hansen test is the test for over-identifying restrictions in GMM dynamic model estimation. Arellano-Bond test AR (2) refers to the Arella-

Table 2. Factors affecting bank profitability: A model with time dummy variables

Independent variable	Coefficient	T-stat probability
L.ROAA	-1.1560	0.030**
BANK SIZE	0.1070	0.010**
EQAS RATIO	1.1220	0.005*
DIVERSIFICATION	-0.2210	0.021**
INFLATION	-0.5360	0.002*
EFFECTIVE TAX RATE	-0.0130	0.705
BANK-BASED DEVELOPMENT	-0.2530	0.127
MARKET-BASED DEVELOPMENT	-0.3250	0.000*
RESERVES REQUIREMENT	0.1280	0.026**
DUMMY	-0.6430	0.010**
DUMMY OF L.ROAA	0.8190	0.033
DUMMY OF BANK SIZE	-0.0005	0.949
DUMMY OF EQAS RATIO	0.2660	0.250
DUMMY OF DIVERSIFICATION	0.2190	0.161
DUMMY OF INFLATION	1.1190	0.001*
DUMMY OF TAXATION	-0.0050	0.920
DUMMY OF BANK-BASED DEV.	0.6140	0.046
DUMMY OF MARKET-BASED DEV.	0.4240	0.000*
DUMMY OF RESERVES REQ.	0.0002	0.997
Probability *F-stat*	0.000*	
Arellano-Bond test for AR(2)	*Z-stat* probability = 0.222	
Hansen test of overid. restrictions	Chi-square probability = 1.000	

no–Bond test that average autocovariance in residuals of order 2 is 0 (H_0: no autocorrelation).

Empirical results for model specified with dummy variables

Table 2 presents summary results for a model with time dummy variables. Due to the collinearity problem, dummy variable of bank concentration and growth of real GDP per capita have been dropped automatically by software. Therefore, model specified with dummy variables will exclude bank concentration and growth of GDP per capita variables.

Wald test conducted on the model shows that the model specified with dummy variable indicates a fine goodness of fit. Hansen test indicates no evidence for over-identifying restriction. This means that there is no correlation between instrumental variable and residual. Arrelano-Bond test for AR (2) indicates no evidence for the presence of second-order autocorrelation. Overall, crisis has reduced profitability of Indonesian commercial banks that showed by negative and significant coefficient of dummy variable.

Before crisis, lagged dependent variable (*L.ROAA*) which measures the profit persistence in bank industry is statistically significant with negative sign, indicating no evidence of persistency profit in Indonesia commercial bank industry. This condition continues until during crisis period as the dummy of lagged dependent variable shows statistically insignificant effect towards bank profitability. This might comes from operating inefficiency related to high profitability possessed by banks. Garcia-Herrero et al. (2009) explained that profitable banks are able to spend higher advertising cost or hire more labor which may lead to operating inefficiency hence reduced banks' future profitability.

For all different time period, bank size which is proxied by total assets shows positive and statistically significant effect on bank profitability. This indicates the presence of economies of

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Table 3. Factors affecting bank profitability: A model without time dummy variables

Independent variables	Coefficient	T-stat probability
L.ROAA	-0.3306	0.025**
BANK SIZE	0.1206	0.005*
EQAS RATIO	1.3901	0.001*
DIVERSIFICATION	0.0107	0.861
INFLATION	0.7285	0.454
GROWTH OF REAL GDP PER CAPITA	0.4900	0.232
EFFECTIVE TAX RATE	-0.0170	0.159
BANK-BASED DEVELOPMENT	0.6808	0.005*
MARKET-BASED DEVELOPMENT	-0.0316	0.333
BANK CONCENTRATION	0.0492	0.003*
RESERVES REQUIREMENT	0.1297	0.063
Probability *F-stat*	0.000*	
Arellano-Bond test for AR(2)	*Z-stat* probability = 0.538	
Hansen test of overid. restrictions	Chi-square probability = 0.494	

scale in Indonesian commercial banks, since banks with big size have more output and able to reduce their average cost. In addition, banks with big size are considered as less risky banks, based on Too-Big-to-Fail (TBF) assumption, hence they are allowed to charge lower deposit rate and able to attract more depositors to save their money on those safer banks (Flamini et al., 2009).

The capital ratio which is defined by equity over total assets ratio (*EQAS*) shows positive and statistically significant effect on bank profitability before and during crisis period. It indicates banks with higher equity are considered as banks with lower bankruptcy cost, thus they are allowed to pay lower funding cost (Naceur and Kandil, 2009). Besides, well-capitalized banks are able to fund their investment without external funding (Anthanasoglou et al., 2008).

The last internal determinant of bank profitability in this study is diversification or business model. The empirical results show that banks with more non-interest income share portion in their total income might harm their profitability since diversification variable (*DIFF*) shows negative and significant effect toward bank profitability. This may due to incapability of Indonesian commercial banks to exert diversification strategy. Klein and Saidenberg (1998) suggested that by doing diversification, banks may lose their comparative advantage since they conduct business which unrelated with their core business (Berger et al., 2010). In addition, banks need to operate in well-developed stock market to successfully run diversification strategy (Naceur and Kandil, 2009) which is still not provided in Indonesia.

Considering the external factors related to the macroeconomic environment and the financial structure in Indonesia, this study finds that inflation has different impact on bank profitability before and during crisis. Before crisis, inflation shows negative and statistically significant effect on bank profitability indicating management does not effectively anticipate future inflation, hence cost increase faster than revenue. In contrast, inflation has positive and statistically significant effect on profitability in during crisis period. This study also finds that taxation has statistically insignificant and negative effect on profitability in all different time period indicating banks are exerting tax-shifting behavior towards their customers.

In the case of financial development indicators, bank-based financial development does not show any significant effect on bank profitability in before and during crisis period. Meanwhile, stock market-based financial development shows negative and statistically significant effect on bank profitability in pre-crisis period. It indicates that stock market and bank have a substitute relationship. In the contrary with pre-crisis period, stock market-based financial development shows positive and significant effect

on profitability indicating stock market is able to provide source of alternatives revenue in the crisis period when demand for loan decreases.

Lastly, banking regulation measured by reserves requirement shows a positive and statistically significant effect on bank profitability. It is clearly indicating a strong tax-shifting behavior where banks transfer their opportunity cost of keeping reserves (which can be classified as implicit tax) towards customers through explicit margin, hence reserves can positively affect positively.

Empirical results for model specified without dummy variables

This section presents the results of model estimation without dummy variables. Findings of the estimation are summarized in Table 3.

For a model without time dummy variable, Wald test shows a fine goodness of fit. In addition, Hansen test shows no over-identifying restrictions, and Arellano-Bond test for AR (2) shows evidence of no second order autocorrelations among residuals.

Same with the model specified with dummy variables, lagged dependent variable shows negative and statistically significant effect on bank profitability, indicating operating inefficiencies of profitable banks. Bank size as measured by total assets shows positive and significant effect on bank profitability, indicating economies of scale presence. In addition, bank capital which proxied by equity over total assets ratio also shows positive and statistically significant effect on bank profitability. This provides evidence of lower bankruptcy cost which is related to higher equity possessed by banks. In general, bank-based development variable shows positive and significant relationship with profitability which indicates that a tight competition motivates banks to minimize their cost, thus increase their profitability. This finding is consistent with Naceur and Omran (2011). They found that banks in well-developed banking sector tend to minimize their operating cost in order to keep being profitable in the competitive environment. Furthermore, the impact of the market structure, approximated by the CR5 seems to have a statistically significant and positive effect on bank profitability. It supports the SCP hypothesis in Indonesian commercial bank industry. This indicates banks with market power are able to charge lower deposit rate and higher lending rate through collusive behavior.

Conclusion

This study examines the profitability of Indonesian listed commercial banks using unbalanced panel data over the period of 2002-2009 by using dynamic panel data estimation following Arellano and Bond (1991). To account the impact of recent subprime mortgage crisis, this study uses time dummy variable to separate the pre-crisis period (2002-2006) and during the crisis period (2007-2009). In addition, to solve inconsistency problems, such as highly persistent profit, omitted variables, and endogeneity bias, this study employs dynamic panel data estimations to examine the effect of internal and external determinants of bank profitability.

In general, subprime mortgage crisis has reduced overall profitability of Indonesian commercial banks. To take into account the profit persistence characteristic in banking industry, this study included lagged dependent variable among regressors. The empirical results indicate that in all different time period, profitable banks tend to suffer operating inefficiency which causes banks to have lower profitability in the next period. In addition, findings of this study also indicate that Indonesian commercial banks' profitability is mainly explained by bank size and bank capital due to their positive and significant effect on profitability in all specified model and different time period.

Inflation shows different effect on bank profitability as it is negatively affects bank profitability in the pre-crisis periods and turns into positive sign at the crisis periods. This explains how banks enhance their forecast ability toward inflation in the crisis period yet able to effectively anticipate high inflation due to crisis into higher lending rate. Beside inflation, stock market-based financial development also shows different effect toward profitability in the pre-crisis and during crisis periods. Before crisis

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period, banks and stock market indicate a substitution relationship and it turns to be complementary in the crisis period as banks try to find other alternative revenues in order to survive in the crisis period due to decreasing in loan demand.

Indonesian commercial banks are also still lacking in profitably conducting non-traditional activities or diversification; yet diversification shows negative and statistically significant effect on bank profitability in the pre-crisis period. Indonesian commercial banks also show minimizing cost behavior as the competition in industry is getting tighter. It is shown by the positive effect of bank-based financial development on bank profitability. A positive effect of bank concentration on its profitability indicates the presence of collusive behavior among powerful banks as postulated by Structure-Conduct-Performance (SCP) hypothesis. Finally, through positive effect of reserves and insignificant effect of taxation toward bank profitability, the tax-shifting behavior is proved in Indonesian commercial banks industry.

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