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RESEARCH ARTICLE

Does Diversification Lead to Better Loan Portfolio Returns? Empirical Evidence from Indonesian Banks

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Abstract: The composition of the loan portfolios of Indonesian banks are analysed in this study to determine whether loan diversification or loan focus strategies lead to better loan portfolio returns. This study is based on secondary data obtained from the Indonesian Banking Directory of the Indonesian Central Bank, as well as commercial bank annual reports provided by Infobank magazine and the Indonesian Banking Development Institute. Data pertaining to 109 commercial banks for the period 2003 to 2011 were analysed using non-parametric testing of means and panel data regression. The research findings indicate that the loan portfolios of government-owned, domestic-owned, and foreign-owned banks in Indonesia differ in terms of the extent of their diversification to different economic sectors. Furthermore, a significant positive relationship exists between economic sector loan diversification and loan portfolio returns. However, similar results were not found for loan type diversification.

Keywords: Loan Portfolios, Diversification, Bank Ownership Types, Indonesia

JEL Classification: *G21*

The composition of loan portfolios reflects to what extent banks apply focus or diversification strategies.[1] De-Haas, Ferreira, and Taci (2010) stated that loan portfolio compositions of banks as financial intermediaries are determined by bank characteristics such as ownership and size. Degryse, Havrylchyk, Jurzyk, and Kozak (2012) also found loan portfolio composition differences between different bank ownership types.

After being severely affected by the 1997 Asian financial crisis, Indonesia implemented banking industry reforms that included changes in bank ownership structures and their permitted spheres of activity (Atahau, 2014). The country's central bank, Bank Indonesia, also introduced extensive prudential bank lending regulations after the crises. This research focus on the post-restructuring period with major prudential regulations already introduced from 2003 to 2011. The differences in the diversification of loan portfolios of various Indonesian bank ownership types over the period 2003 to 2011 are measured, analysed, and compared with their loan portfolio returns.

Findings from this research show that definite economic sector (EHHI)[2] portfolio diversification differences exist between the different bank types (Government Banks (GBs), Foreign Banks (FBs), and Domestic Banks (DBs) in the key years of this research. The differences exist amidst significant changes in both EHHI and loan type (THHI) loan portfolio compositions of the different bank ownership types over the total study period—more diversification by FBs and DBs and increased concentration by GBs. Notwithstanding the opposite loan portfolio movement of GBs compared to that of FBs and DBs, the combined EHHI and THHI levels for all bank ownership types show overall diversification over the 2003 to 2011 period. This is in line with previous studies conducted by Kamp, Pfingsten, and Porath (2005) that German banks also tend to diversify over time.

The findings from multivariate analysis applied in this research show that diversification leads to better loan portfolio returns. The findings are aligned with that of Elsas, Hackethal, and Holzhauser (2010), however not aligned with the corporate finance theory and findings of other researchers, according to which banks should implement focus strategies to reduce agency problems and exploit their management expertise in certain sectors. Differences between the findings of this research and that reported by other researchers may be explained by the use of loan interest income in this research instead of return on assets (ROA), and return on equity (ROE) used in the other research and theory. This study uses the ratio of loan interest income to average total loans since interest income of banks from loans (after loan repayment defaults) constitutes the actual achieved return. Therefore, it is considered to be a more relevant measure of loan portfolio return. On the other hand, ROA and ROE which are widely used as proxies of overall bank performance, emanate from the combined total spectrum of bank activities, not only lending. The focus of this paper is the comparison of banks in terms of their bank lending returns, therefore, the loan interest income ratio is selected. The difference of this loan performance measure is also supported by results that show insignificance of diversification towards overall bank performance when re-running the multivariate analysis using ROA and ROE to substitute the loan interest income ratio. Other aspects like the legal lending limits that are placed on banks by the central banks, and risk perspectives of banks about economic sectors and product types with resultant differences in pricing of loans for the sectors and loan types may also affect the findings.

Literature Review

Different bank ownership types may focus on different borrower types, as reflected in their loan portfolio compositions (De-Haas et al., 2010). The different loan portfolio compositions result from inter-alia differences in organisational structure, access to liquidity, exposure to asymmetric information (Degryse et al., 2012), motives, technology, and innovation capability (Berger, Clarke, Cull, Klapper, & Udell, 2005).

Degryse, Havrylchyk, Jurzyk, and Kozak (2012) researched the differences in the loan portfolio composition of different Polish bank ownership types. The findings indicated that foreign-owned banks charge lower interest rates and have lower interest rate spreads. The lending rate difference is caused by differences in the loan portfolio compositions across bank ownership types.

De-Haas, Ferreira, and Taci (2010) studied 220 banks in 20 transition countries. Using ordinary least squares regression, they confirmed differences in loan portfolio composition across different bank ownership types. Loan type variables such as consumer lending, small and medium enterprise lending, lending to large enterprises, and lending to state-owned enterprises were included in the research. The results indicated that government-owned banks lend more to government-owned enterprises than what domestic- and foreign-owned banks do. Foreign-owned banks focus on mortgage lending and lending to the subsidiaries of international firms with focus on the corporate segment. The research did not include an analysis of different economic sector categories; however, this may be due to a lack of available micro-level data to conduct such an analysis.

Diversification reduces specific (idiosyncratic) risk which enable banks to reduce their monitoring efforts and therefore lower their operating costs, which *ceteris paribus* should lead to higher cost efficiency (Rossi, Schwaiger, & Winkler, 2009). Furthermore, the benefit of diversification stems from employing economies of scope across different categories such as economic sectors and geographical areas (Laeven & Levine, 2007). Elsas et al. (2010) provided empirical evidence

supporting the efficiency of diversification.[3] Studying nine countries over the period of 1996–2008, they found that diversification creates market value and increases bank profitability due to economies of scope.

In another study, Acharya, Hasan, and Saunders (2002) found that diversification produces riskier loan portfolios for high-risk banks and reduces their returns. In addition, Laeven and Levine (2007) found that the diversification premiums, in terms of economies of scope that a bank should get from engagement in multiple activities, are insufficient considering the increasing agency problems associated with product diversification.

The negative results from loan portfolio diversification emanate from factors such as loan monitoring and loan portfolio quality (Acharya et al., 2002; Elyasiani & Deng, 2004; Rossi et al., 2009). The lack of loan monitoring by bank managers in a diversified loan portfolio may result in more loan loss provisioning. This is explained by the "lack of expertise" hypothesis which states that loan portfolios may consist of low quality individual loans emanating from a "lack of expertise" in areas diversified to. Therefore, although highly diversified, the loan portfolios may also create higher than average loan loss provisions. This loan quality problem may require banks to incorporate additional economic capital as a safe-guard for the risk-weighted assets (Rossi et al., 2009). This may reduce the financial return of the banks substantially, as supported by findings of Behr, Kamp, Memmel, and Pfingsten (2007) in the German banking industry—they indicate that diversification is more effective in reducing risk than improving returns in the German banking sector.

Some governing rules like the legal lending limits that are placed on banks by the central banks are diversification favourable, whilst other regulations regarding branching, entry, and asset investment restrictions often encourage focus strategies (Berger, Hasan, & Zhou, 2010). However, the existence of regulatory guidelines instigating diversification that result in a large number of individual clients and industries may increase monitoring cost and reduce cost efficiency (Rossi et al., 2009). Furthermore, due to the fact that managers are risk averse, they may incur additional cost in search for high quality loans to apply diversification. Those factors may reduce diversification risk-return efficiency.

A focus strategy, as opposed to a loan portfolio diversification strategy, suggests concentration on specific segments where a bank has superior knowledge and monitoring ability. Focusing on a specific segment is effective when banks face information asymmetry (Acharya et al., 2002; Berger et al., 2010; Kamp et al., 2005; Tabak, Fazio, & Cajueiro, 2011). Due to different degrees of asymmetric information about borrowers, the composition of bank loans across sectors may differ (Dell'Ariccia & Marquez, 2004). Re-allocation of loans (commonly known as flight to captivity) to sectors where greater adverse selection problems exist may take place when banks face more intrinsic overall competition from other outside lenders entering the market. It means that more lenders may attract borrowers in sectors subject to low information asymmetries. The existing informed lenders may have to deal with more captured (but also higher risk) borrowers that did not previously form part of their market in such sectors (Dell'Ariccia & Marquez, 2004).[4]

To conclude, existing research provides evidence of the benefit and cost of loan portfolio diversification and bank performance in different countries with return on equity and total assets as measure of bank performance. No direct comparison has been conducted between bank ownership types, levels of loan diversification, and loan portfolio returns. To contribute to the existing research, this study examines whether specific bank ownership types (GBs, DBs and FBs) differ in terms of loan portfolio diversification and their loan portfolio returns.

A Brief History of the Indonesian Banking Industry

The Indonesian banking industry has undergone a series of deregulation and reregulation processes since 1967. Starting with the enactment of Indonesian Government Act Number 14/1967 on Banking (1967), the deregulation continued, with the most significant changes being introduced during the 1980's. The deregulation was intended to reduce the role of GBs by leveling the playing field for all banks. In this regard, regulations regarding government direct control over lending practices (interest rate ceilings and the allocation of loans) were relaxed.

The liberalisation of the Indonesian banking industry increased the number of banks (FBs) and reduced the

dominance of GBs in the banking industry (Bennet, 1999). However, low capital levels of banks, risky lending, and lack of good Central Bank supervision forced re-regulation (Adiningsih, 1996). As such, the new Indonesian Government Act Number 7/1992 on Commercial Banks (1992) was an effort to reduce bank expansion and improve the prudential operation of banks. However, the problems that already existed in the banking sector at that stage could not be solved. In fact, it led to Indonesia being severely impacted by the Asian Financial Crisis in the late 1990s.

The de-liberalisation of the banking sector after the crises took the form of bank consolidation and numerous prudential policies (Pangestu, 2003). Intense restructuring was undertaken by the government. This process included bank closures, introduction of a blanket guarantee scheme (BGS), and the creation of the Indonesian Banking Restructuring Agency (IBRA), providing liquidity support to banks and recapitalization of banks (Agusman, Cullen, Gasbarro, Monroe, & Zumwalt, 2014). This intervention by government led to temporary bank ownership concentration since some of the former domestic-owned banks became temporary government-owned banks. However, the government's shares in these banks were sold off again during the 2000–2002 period (Sato, 2005). The introduction of the BGS in 1998 also weakened the market discipline of banks according to Hadad, Agusman, Monroe, Gasbarro, and Zumwalt (2011). After these initial actions, a new banking architecture scheme was introduced on 9 January 2004 to reinforce the banking system fundamentals in response to internal and external shocks and served as the blueprint for future banking development.

The increasing role performed by FBs and DBs in the Indonesian banking industry in the post crisis era from 2003 to 2011 (Atahau, 2014), together with the prudential regulations introduced by Bank Indonesia for lending practice could have made definite differences to loan portfolio diversification and returns of different bank types.

Research Methodology

Sample, Types, and Sources of Data

This research utilises secondary data from The Indonesian Central Bank Library, Infobank magazine, and the library of The Indonesian Banking Development Institute (LPPI). The central bank library provides individual bank ownership data and financial statements whereas Infobank magazine provides loan allocation data based on loan types and economic sectors. Information from LPPI also supplements loan allocation data and loan interest income not provided by Infobank magazine. Using these sources, data pertaining to a nine year period of operations (2003–2011) for 109 commercial banks in Indonesia were analysed. By design, Islamic commercial banks were excluded from the sample due to different accounting/financial reporting standards compared to that of the conventional banks. The year 2003 is chosen as the start year since it represents the commencement of the post-Asian Financial Crisis period, marked by the commencement of the banking industry recovery and the implementation of comprehensive bank regulatory requirement changes that were designed to reinforce the fundamentals of the banking system in response to internal and external shocks and to serve as the framework for future banking development. These regulatory requirement changes relate to corporate governance (PBI 5/8/PBI/2003), risk management implementation (PBI 5/8/PBI/2003), and changes to Bank Indonesia liquidity credit management (5/20/PBI/2003). This was followed by the Indonesian banking architecture (API) scheme, constructed by Bank Indonesia that became applicable in 2004. The year 2007 is selected to represent the end of the pre-Global Financial Crisis (pre-GFC) period since preliminary data analysis about bank restructuring, insolvencies, loan risks, and profit generation of banks in the sample did not show any evidence of GFC impact at this stage. The year 2011 represents the final year of the post-GFC period in this study since it was the latest complete bank data that could be retrieved when the study was conducted. Furthermore, a different reporting format on sectoral loan allocation and Non-Performing Loans (NPLs) became applicable in January 2012 (PBI 10/40/PBI/2008). These changes would impact the comparison of findings from 2012 onwards compared with previous years due to the dissimilarity of the data.

The key dates of 2003, 2007, and 2011 enabled specific comparisons of the extent of differences and changes over the periods 2003 to 2007 (post-Asian crises and pre-GFC time period) and 2007 to 2011 (GFC and post-GFC time-period), and also the total 2003 to 2011 period.

Variable Definition and Measurement

For analysis purposes, banks are categorised into three types of ownership (GBs, FBs, and DBs). The criteria of Mian (2003) (La-Porta, Lopez-De-Silanes, and Shleifer 2002) and Magalhaes, Urtiaga, and Tribo (2010) are applied for calculating the total ownership percentage of government-, foreign-, and domestic-owners of each bank. This research uses the 50% direct ownership threshold[5] which is consistent with the previous research conducted by Mian (2003), Barth, Caprio, and Levine (2004), Micco, Panizza, and Yanez (2007), and Berger et al. (2010).

The loan portfolio diversification is measured using the Hirschman Herfindahl Index (HHI) as applied by Winton (1999), Acharya et al. (2002), and Hayden, Porath, and von Westernhagen (2006).[6] For this research there are two types of HHIs, namely, Economic Sector HHI (EHHI) and Loan Type HHI (THHI). Loan diversification means a more equal loan portfolio distribution to the different economic sectors, whilst concentration means high exposure to one or a few sectors only (Tabak et al., 2011). To measure the loan portfolio returns, the ratio of loan interest income to the average total loans is applied. In the broader sense, it reflects the comparative pricing of banks.

The control variables representing bank-specific characteristics used in this study are: bank sizes, bank equity percentages, bank liquidity percentages, and loan repayment default risk. This research uses the natural logarithm of bank Total Assets to account for size. Bank equity percentage is measured by the ratio of Total Equity to Total Assets whereas liquidity percentage is measured by ratio of Total Loans to Total Deposits. Loan portfolio repayment default risk is measured by the ratio of Non-Performing Loans (NPLs) to Total Loans. Interest rate and Gross Domestic Product (GDP) serve as the macroeconomic variables. Attachment 2 reflects all the variables, their definitions and how they are measured.

Data Analysis

All research data is numerical, therefore quantitative data analysis is carried out. Firstly, descriptive statistics of the variables (means and standard deviations) for each of the key years (2003, 2007, and 2011) were calculated to determine data tendency and deviations. Secondly, univariate statistics in the form of the test of means were used to find the differences in loan portfolio diversification of GBs, FBs, and DBs. The non-parametric test was applied since the data is not normally distributed. Finally, panel data regression was employed to determine the impact of loan portfolio diversification on loan portfolio returns using the equation below:

$$Return_{it} = \alpha + \beta OWN_{it} + \lambda EHHI_{it} + \gamma THHI_{it} + \zeta NPL_{it} + \eta controls_{it} + \delta MACRO_{t} + \varepsilon_{it} \quad (1)$$

Where:

$Return_{it}$ = loan portfolio return for bank *i* at year *t;*
OWN_{it} = vector of ownership structure variables;
$EHHI_{it}$ = loan portfolio diversification (based on economic sector) variables;
$THHI_{it}$ = loan portfolio diversification (based on loan type) variables;
NPL_{it} = loan portfolio repayment default risk for bank *i* at year *t*;
$MACRO_{t}$ = vector of macroeconomic control variables;
$Controls_{it}$ = vector of bank specific control variables;
$\alpha, \beta, \delta, \gamma, \lambda, \zeta$ = regression coefficients; and
ε_{it} = the disturbance term.

Findings

Descriptive Statistics

Table 1 contains the descriptive EHHI statistics for the different bank ownership types. It is used to assess the change of bank loan portfolio diversification over the nine-year period within the context of the 2003–2007 post Asian crisis and pre-GFC period, the 2007–2011 post-GFC period, and the total 2003–2011 period. Therefore, the extent of bank loan portfolio diversification is compared in each of the three key years (2003, 2007, and 2011) for the 109 banks representing the sample (note that a tendency of diversification is expressed as a decrease in the measure).

The combined EHHI mean for all banks indicates overall EHHI diversification for banks over the nine-year study period and decreases from 43.4% in 2003 to 40.2% in 2011 (showing an increase in diversification). This is demonstrated by the positive skewness score of data over time, which indicates the tendency of EHHI scores to become lower. When considering the

Table 1. *Loan Portfolio Diversification (EHHI) Descriptive Statistics for the Different Bank Ownership Types*

	2003	**2007**	**2011**
Panel A: All Banks			
Mean	0.434	0.416	0.402
Std. Dev.	0.214	0.351	0.223
Minimum	0	0.164	0.144
Maximum	1	0.994	1
Kurtosis	3.664	3.270	3.311
Skewness	1.149	1.077	1.140
Number of Banks	109	109	109
Panel B: Government-Owned Banks			
Mean	0.531	0.561	0.577
Std. Dev.	0.232	0.236	0.243
Minimum	0.233	0.164	0.144
Maximum	0.984	0.974	0.964
Kurtosis	2.027	1.860	1.966
Skewness	0.515	-0.045	-0.172
Number of Banks	30	*30*	30
Panel C: Foreign-Owned Banks			
Mean	0.463	0.397	0.345
Std. Dev.	0.245	0.163	0.187
Minimum	0	0.192	0.145
Maximum	1	0.883	1
Kurtosis	3.017	4.752	8.019
Skewness	0.613	1.346	2.228
Number of Banks	27	35	37
Panel D: Domestic-Owned Banks			
Mean	0.363	0.333	0.327
Std. Dev.	0.157	0.159	0.166
Minimum	0.186	0.173	0.169
Maximum	0.995	0.995	0.960
Kurtosis	9.266	8.780	6.783
Skewness	2.379	2.231	1.875
Number of Banks	52	44	42

Legend: The descriptive statistics shown in Panel A-D are expressed in percentage. EHHI=Loan Portfolio Diversification based on Economic Sectors. The number in italic means that the data is normally distributed based on the value of skewness which reside in the range of -0.5 and +0.5. According to Bulmer (1979), "if the skewness is between -0.5 and +0.5, the distribution is approximately symmetric."

EHHIs of different types of banks, it is evident that it is only in the case of GBs that the diversification decreased (more concentrated) over the total period of time (2003 to 2011), with a prominent decrease in the first period of time up to 2007, and a slower decrease during the post-GFC period thereafter. The changes in the skewness of the data scores of GB's from positive (in 2003) to negative (in 2007 and 2011) also indicate

Table 2. *Loan Portfolio Diversification (THHI) Descriptive Statistics for Different Bank Ownership Types*

	2003	**2007**	**2011**
Panel A: All Banks			
Mean	0.615	0.629	0.582
Std. Dev.	0.202	0.183	0.195
Minimum	0	0.334	0.333
Maximum	1	1	1
Kurtosis	2.529	2.103	2.513
Skewness	0.240	0.316	0.790
Number of Banks	*109*	*109*	109
Panel B: Government-Owned Banks			
Mean	0.587	0.623	0.621
Std. Dev.	0.186	0.165	0.196
Minimum	0.375	0.378	0.144
Maximum	0.907	0.953	0.964
Kurtosis	1.780	1.799	1.966
Skewness	0.578	*0.202*	-0.172
Number of Banks	30	*30*	30
Panel C: Foreign-Owned Banks			
Mean	0.667	0.676	0.641
Std. Dev.	0.228	0.197	0.231
Minimum	0	0.357	0.345
Maximum	1	0.995	1
Kurtosis	3.937	1.779	1.668
Skewness	-0.687	*0.007*	0.344
Number of Banks	27	*35*	37
Panel D: Domestic-Owned Banks			
Mean	0.604	0.596	0.503
Std. Dev.	0.196	0.179	0.127
Minimum	0.337	0.334	0.344
Maximum	0.997	1	0.957
Kurtosis	2.227	2.751	5.439
Skewness	0.656	0.592	1.356
Number of Banks	52	44	42

Legend: The descriptive statistics shown in Panel A–D are expressed in percentage. THHI=Loan Portfolio Concentration based on Loan Types. The numbers in italic means that the data is normally distributed with skewness in the range of -0.5 and +0.5. According to Bulmer (1979), "if the skewness is between -0.5 and +0.5, the distribution is approximately symmetric."

their tendency to become less diversified over time. The diversification of FBs and DBs both increase with the largest increase in diversification for FBs (11.8%). The major increase occurred between 2003 and 2007 and continued slower thereafter. DBs also show an increase in diversification of 3.6% over the total study period. This change is much smaller than that of FBs, but shows the same tendency with a larger

increase between 2003 and 2007 compared to the 2007 to 2011 time period. The positive skewness of the data scores which indicate the tendency of EHHI scores to become lower (more diversified) for FBs and DBs in 2003, 2007, and 2011 affirm the tendency of these bank groups to diversify.

Comparison of kurtosis scores of all the different bank groups in 2003 and 2007 shows that the loan portfolio of DBs have the highest score. It indicates the tendency of the EHHI of DBs to be clustered around the mean, thus the intra group bank EHHIs do not differ much from each other. However, in 2011, FBs show the highest kurtosis score, showing more intra group similarity than DBs and GBs. The EHHI means of the different bank ownership types also indicate that the difference in the diversification of GBs compared to that of FBs and DBs increased over the total study period, whilst the difference between the diversification of FBs and DBs decreased tremendously.

The combined THHI for all banks decrease from a mean of 61.5% in 2003 to a mean of 58.2% in 2011 (showing an increase in diversification), although a minor decrease in diversification occurred between 2003 and 2007 (Table 2). This is supported by the increasing positive skewness of data scores which show a general tendency of banks to diversify over time. In general, the THHI levels of all the different bank types are higher (reflecting lower diversification/ higher concentration) than their EHHI levels contained in Table 1. This is due to the fact that there are only three loan types to which the THHI measurement applies compared to 10 different sectors for the EHHI measurement. Furthermore, FBs show the highest THHI levels (least diversified) followed by GBs. This is different to the situation regarding EHHI levels where GBs show the highest levels (least diversification). Thus considering both EHHI and THHI, it is evident that although GBs are more concentrated in terms of sectors that they provide loans to than FBs, they are more diversified in terms of the loan types that they provide to their more concentrated markets. DBs are the banks with the lowest THHI levels (highest loan type diversification). This is supported by the fact that DBs have the highest positive data skewness score over time. This is similar to their comparative EHHI levels and indicates that they are the banks with the highest sectoral diversification as well as loan type diversification. When considering the changes in the THHIs of the individual bank types, it is evident that the GB and FB loan type diversification increased from 2003 to 2007, whilst at the same period of time the loan type diversification of DBs decreased slightly. On the other hand, in the period thereafter (post-GFC period from 2007 to 2011), the loan type diversification of GBs increased very slightly, that of FBs increased more, and that of DBs show a comparatively substantial increase. Therefore, it is evident that GB loan type diversification occurred mainly in the 2003 to 2007 period, whilst FB and DB loan type diversification occurred mainly in the 2007 to 2011 period with DBs showing the most diversification.

Comparison of the THHI kurtosis scores of the bank groups in 2003 shows that FBs represent the bank group with the highest score. However, in 2007 and 2011, the loan portfolios of DBs have the highest score showing more intra group similarity than FBs and GBs.

Differences in the Loan Portfolio Diversification (EHHI and THHI) of Government-, Foreign-, and Domestic-owned Banks

Table 3 displays the results of the univariate tests performed to verify the descriptive EHHI statistic findings presented in the previous section of this paper. The Wilcoxon Signed Rank Test is applied to verify the statistical significance of the EHHI changes for GBs and all the banks combined whereas the Mann-Whitney test is used for each of the remaining bank ownership types (FBs and DBs).[7]

The analysis show that there are statistically significant differences in the EHHI means for the total study period (2003 to 2011) when all bank types are considered. It therefore confirms that the overall diversification of banks in Indonesia increased over the study period. In the case of individual bank types, the Wilcoxon Signed Rank Test and Mann-Whitney Test do not indicate significant diversification level changes for GBs, but increases in FB diversification from 2003 to 2011 and from 2007 to 2011 are significant. In the case of DBs the diversification increase from 2003 to 2007 is significant as well as the increase over the total 2003 to 2011 period. The increase is not significant in the post-GFC period.

The EHHI differences across bank ownership types (GBs, FBs, and DBs) are statistically significant in 2003, 2007, and 2011, as shown by the Kruskal Wallis

Table 3. *Loan Portfolio Diversification (EHHI) Univariate Statistics for the Different Bank Ownership Types*

	2003–2007	2007–2011	2003–2011
Panel A: All Banks			
Mean Difference	-0.018	-0.014	-0.032
Z	2.260	1.577	2.462
Prob > z	0.0238**	0.115	0.0138**
No. of Observations	109	109	109
Panel B: Government-Owned Banks			
Mean Difference	0.03	0.016	0.046
Z	0.554	0.384	0.843
Prob > z	0.5793	0.7007	0.3994
No. of Observations	60	60	60
Panel C: Foreign-Owned Banks			
Mean Difference	-0.066	-0.052	-0.118
Z	-1.100	-2.112	-2.311
Prob > z	0.2712	0.0346**	0.0208**
No. of Observations	62	72	64
Panel D: Domestic-Owned Banks			
Mean Difference	-0.03	-0.006	-0.036
Z	-1.890	-0.683	-2.160
Prob > z	0.0588*	0.4949	0.0308**
No. of Observations	96	86	94

Panel E: Kruskal Wallis Test	*Year across Bank Ownership Types*
	p-value
2003	0.0019***
2007	0.0001***
2011	0.0001***

Legend: The Wilcoxon-signed rank tests for the paired samples of all banks and GBs are performed by comparing 2003 with 2007, 2007 with 2011, and 2003 with 2011 since the number of banks in each time period is equal (paired sample). The Mann-Whitney tests are conducted for FBs and DBs for the non-paired samples. The percentage change in means of EHHI ($EHHI_t$-$EHHI_{t-1}$) between two years is shown as mean differences. ***, **, and * respectively correspond to 1%, 5%, and 10% significance levels.

results (Panel B, Table 3). Thus, definite sectoral portfolio diversification differences exist between the different bank types in the key years.

Table 4 shows that changes in the THHI means for the total study period (2003 to 2011) are significant (p-value ≤ .05) when all bank types are considered. However, the THHIs of the GBs and FBs on their own do not show any statistical significant changes. It is only the changes in the THHI levels of DBs that show high significance in the 2003 to 2007 and the 2007 to 2011 periods. Although it is only DBs that shows significant THHI changes over time, the THHI differences across all bank types (GBs, FBs, and DBs) are significant in year 2003 and 2011, but not in 2007. Thus, although changes over time are not evident for all the different bank ownership types, they do differ significantly from each other at both the start and at the end of the study period.

Table 4. *Loan Portfolio Diversification (THHI) Univariate Statistics for the Different Bank Ownership Types*

	2003–2007	2007–2011	2003–2011
Panel A: All Banks			
Mean Difference	0.014	-0.046	-0.032
Z	-0.443	3.264	1.965
Prob > z	0.6578	0.0011***	0.0494**
No. of Observation	109	109	109
Panel B: Government-Owned Banks			
Mean Difference	0.036	-0.002	0.034
Z	0.769	-0.044	0.917
Prob > z	0.4420	0.9646	0.3593
No. of Observation	60	60	60
Panel C: Foreign-Owned Banks			
Mean Difference	0.009	-0.035	-0.025
Z	-0.021	-0.817	-0.788
Prob > z	0.9830	0.4140	0.4304
No. of Observation	62	72	64
Panel D: Domestic-Owned Banks			
Mean Difference	-0.008	-0.093	-0.101
Z	0.101	-2.583	-2.518
Prob > z	0.919	0.0098***	0.0118**
No. of Observation	97	86	95

Panel E: Kruskal Wallis Test	Year across Bank Ownership Types
	p-value
2003	0.0922*
2007	0.2042
2011	0.0086***

Legend: The Wilcoxon-signed rank tests for the paired samples of all banks and GBs are performed by comparing 2003 with 2007, 2007 with 2011, and 2003 with 2011 since the number of banks in each time period is equal (paired sample). The Mann-Whitney tests are conducted for FBs and DBs for the non-paired samples. The percentage change in means of THHI ($THHI_t$-$THHI_{t-1}$) between two years is shown as mean differences. ***, **, and * respectively correspond to 1%, 5%, and 10% significance levels.

The Effect of Loan Portfolio Diversification on Loan Portfolio Returns

The impact of loan portfolio diversification on loan portfolio returns is presented in Table 5.

A correct robust setting of variance estimator has been applied in the regression. The constant term represents DBs since the dummy variable is assigned for FBs and GBs. DBs are treated as the base case because these banks represent the largest number of banks. Therefore a dummy variable does not exist for these banks. The results show that EHHI, DBs, GBs, and GDP have significant relationships with loan portfolio returns. To verify the distinction between bank ownership types in the diversification-return relationship, a base case regression without bank ownership type dummies was conducted. The coefficient of sectoral diversification (EHHI) from the base case regression is slightly higher (-0.054) than the regression conducted with bank ownership

Table 5. *Panel Data Regression: Relationship Between Loan Portfolio Diversification and Loan Portfolio Returns* ($Return_{it} = \alpha + \beta OWN_{it} + \lambda EHHI_{it} + \gamma THHI_{it} + \zeta NPL_{it} + \eta controls_{it} + \delta MACRO_{t} + \varepsilon_{it}$)

		Loan Portfolio Return
CONSTANT	Coefficient	0.153*
	t-Statistic	1.82
GB	Coefficient	0.035**
	t-Statistic	2.45
FB	Coefficient	-0.010
	t-Statistic	-1.1
EHHI	Coefficient	-0.056*
	t-Statistic	-1.74
THHI	Coefficient	0.120
	t-Statistic	1.47
NPL	Coefficient	0.001
	t-Statistic	0.85
LN TA	Coefficient	0.001
	t-Statistic	0.34
EQUITY	Coefficient	0.0000
	t-Statistic	0.19
LQDT	Coefficient	-0.0001
	t-Statistic	-0.74
INT.RATE	Coefficient	0.000
	t-Statistic	0.26
GDP	Coefficient	-0.000***
	t-Statistic	-2.77
Fixed Effect		Yes
Year Dummy		Yes
Number of observations		981
Number of banks		109
R-squared		0.4605
Adjusted R-Squared		0.3824

Legend: This table presents the results of equation 1. The dependent variable is Loan Portfolio Return (Loan Interest Income-LIntInc). The independent variables are bank ownership types (Government-owned banks (GB), Foreign-owned banks (FB) and Domestic Banks (DB)), loan portfolio diversification based on economic sector (EHHI), loan portfolio diversification based on loan types (THHI), and loan portfolio risk (NPL). Size (LnTA), Capital (EQUITY) and liquidity (LQDT) serve as the control variables while Interest Rate (INT.RATE) and Economic Growth (GDP) serve as macroeconomic variables. The table contains coefficients, t-statistics, and P-values from fixed effect panel data regression with robust standard errors. ***, **, and * respectively correspond to 1%, 5%, and 10% significance levels.

type dummies. The result confirms the previous findings of the differences in the diversification-return relationships between the bank ownership types.

This finding contradicts Iannotta, Nocera, and Sironi (2007) and other studies reporting that government-owned banks under-performed compared to other bank ownership types (Barth et al., 2004; Beck, Demirguc-

Kunt, & Maksimovic, 2004; Berger et al., 2005; Dinc, 2005; La-Porta, Lopez de-Silanes, & Shleifer, 2002; Mian, 2003; Micco & Panizza, 2006; Sapienza, 2004; Taboada, 2011). The contradiction between the findings of this research and the findings of the other researchers is difficult to explain comprehensively. However, the use of loan interest income as dependent variable in this study, compared to the use of ROA and ROE as dependent variables in all other referenced studies could contribute to the differences in the findings. The loan interest income constitutes only a part of the spectrum of income, expenses, liabilities, and assets required for calculating ROA and ROE figures, although the loan interest income used in this research contributes substantially to ROA and ROE figures. To verify the impact of the use of ROA and ROE on the findings of this research, the model was re-run by replacing loan interest income with ROA and ROE. EHHI and THHI coefficients were both insignificant with the application of ROA and ROE. This comparative finding confirms that the loan interest income constitutes only a part of the spectrum of income, expenses, liabilities, and assets required for calculating ROA and ROE figures. The latter measures can therefore, with focus on loan portfolio returns, be regarded as more indirect measures and support the arguments of this paper for selecting loan interest income ratio as the better proxy for bank loan portfolio performance (return).

Further analysis to determine the relationship between return and diversification has been conducted by including multiplicative interaction terms between bank ownership types (GBs and FBs) and diversification (EHHI and THHI). The results show a significant coefficient for the interaction between GBs and EHHI. Thus, it can be concluded that the return of banks significantly differ in terms of EHHI but no significant relationship exists between the return of banks in terms of THHI.

The significant negative relationship between EHHI and loan portfolio returns indicates that the more sectorally diversified banks are, the higher their returns. However, no significant results are found for THHI and the control variables. The statistically significant negative relationship between GDP and loan portfolio returns represents the economic impact on the portfolio returns of market segments that banks conduct business with. The GDP data used for the research represents nominal constant GDP figures. GDP growth is not applied because multicollinearity problems occurred when it was used in the panel data regression model for this research. Furthermore, the panel data regression coefficient for GDP is zero (up to 3 decimal places) as reflected in Table 5. Therefore the impact of GDP on bank returns for the period of this research is minor notwithstanding its significance. The overall diversification of the banks across different sectors of the Indonesian economy, amidst the significant impact of GDP and specifically the diversification of FBs and DBs, may serve as indicator that diversification may also be applied by banks to hedge the GDP impact that may be more severe on some sectors than others. The actual impact of GDP on the different sectors could, however, not be verified with the data at hand since economic sector loan returns are not available. From a more overall economic perspective the diversification tendency of banks serves as evidence that, over time, a wider spectrum of economic activities and segments are financed by banks in Indonesia. Thus, a broader sphere of economic development is lately supported than previously.

Conclusions

Previous research like that of De-Haas et al. (2010) indicated that bank ownership is one of the bank loan portfolio determinants, as it may affect the market segment focus on banks. This paper attempts to determine whether GBs, FBs, and DBs differ in terms of their loan portfolio diversification and also seeks to determine the impact of loan portfolio diversification on their loan portfolio returns.

Findings from this research show that GBs, FBs, and DBs differ with regard to loan portfolio diversification. The EHHI differences across bank ownership types (GBs, FBs, and DBs) are statistically significant in 2003, 2007, and 2011, as shown by Kruskal Wallis results. Thus, definite sectoral portfolio diversification differences exist between the different bank types over the 2003 to 2011 study period. The overall EHHI and THHI diversification levels of Indonesian banks changed significantly over the study period from 2003 to 2011. The changes represent diversification by FBs and DBs and increased concentration by GBs. However, when the EHHI and THHI of all bank ownership types are grouped, it indicates overall diversification over the 2003 to 2011 period. The findings are consistent with the findings of Pfingsten and Kai (2002), Behr

et al. (2007), and Hayden et al. (2006) which found a similar trend of diversification for the German banks during the 1990s and early 2000s.

When controlling for year effect by using year dummies for bank ownership type variables, EHHI, DBs, GBs, and GDP significantly affect loan portfolio returns as measured by loan interest income. Sectoral loan concentration is a significant variable that indicates that the more diversified banks are, the higher their loan portfolio returns are. It provides evidence that loan portfolio diversification leads to better loan portfolio returns for banks in general but the relationship between the return of banks and diversification may differ based on the differential impact of GDP on sectors, thus implicating diversification choices. Findings in this study do not support the corporate finance theory that banks should implement focus strategies to reduce agency problems and exploit their management expertise in certain sectors. However, the differences in the findings of this study and the corporate finance theory may firstly be explained by the use of loan interest income in this research instead of ROA and ROE applied in previous research. ROA and ROE, which are widely used as proxies of overall bank performance, emanate from the combined total spectrum of bank activities, not only lending. The focus of this paper is the comparison of banks in terms of their bank lending returns, therefore the loan interest income ratio is selected. The exclusion of overhead costs in the calculation of returns in this research may explain the differences with the findings of other papers since these costs may considerably increase with the diversification of bank loan portfolios. However, the direct overhead cost implication of loan portfolio diversification requires a total analysis of all sources of bank income generation and the allotment of costs to it. No data exists for this purpose. In addition, the fact that FBs and DBs (which represent almost 70% of the Indonesian banking industry) show the tendency to diversify their loan portfolios serve as ground-level indication that they regard it as advantageous for loan portfolio returns from operational top management perspective.

Secondly, other aspects like the legal lending limits that are placed on banks by the central banks, and the risk perspectives of banks about different economic sectors and product types, may also implicate the findings.

Finally, a significant negative relationship exists between GDP and bank loan portfolio returns, but the impact is minor due to a zero (up to three decimal places) coefficient.

The findings reported in this paper may be of considerable interest to banks with regards to the relationship between bank loan portfolio diversification and returns for different bank ownership types. Banks may consider actively applying diversification strategies to improve the performance of their loan portfolios.

Notes

1 The construction should take into account some factors such as asset mix, loan types, diversification, geographic limits, expertise, policy formulation, and environmental issues (Sathye, Bartle, Vincent, & Boffey, 2003).

2 Herfindahl-Hirschman Index (HHI) is a measure of loan portfolio concentration. EHHI refers to sectoral/ industrial loan portfolio concentration.

3 The different results from Laeven and Levine (2007) might relate to differences in how they measured diversification: Different measures used, explanatory variables, regression frameworks, and samples (Elsas et al., 2010).

4 Flight to captivity implies that banks re-allocate their portfolio towards more captive borrowers when shocks to their balance sheet, or from their competitive environment, force them to alter their lending patterns.

5 The thresholds of the research is generally based on accounting standards which states that ownership of more than 50% is regarded as dominant (Kieso, Weygandt, & Warfield, 2010).

6 The Indonesian economic sectors to which banks can lend are equal to 10 according to central bank classification as follows: agriculture, hunting, and agricultural facilities; mining; manufacturing; electricity gas and water; construction; trade, restaurants, and hotels; transportation, warehousing, and communications; business services; social services; and others. The loan types are equal to three, namely, working capital, investment, and consumption.

7 The non-parametric tests are used since most of the data is not normally distributed. In some cases where the data is normally distributed as indicated by the skewness value, the non- parametric tests are still preferred based on retaining uniformity in the analysis. Furthermore, when the mean and median values are similar (in the case of a normal distribution), using the

median as the basis does not have a large implication. Two non-parametric tests are used (Wilcoxon-signed rank test and Mann Whitney test) based on the sample size of each group. The Wilcoxon-signed rank test is used for paired samples whereas the Mann-Whitney test is used for non-paired samples.

[8] GDP growth was used in the regression previously but GDP growth was dropped due to its collinearity with the interest rate.

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Attachment 1: Selected Empirical Research on Loan Portfolios

Author	Country and Period	Loan Portfolio Variables	Performance Variables	Main Results
Winton (1999): A Modelling Approach	US banks, 1970–1990	Composition by sectors	Risk and Return	Institution's credit risk depends on diversification and monitoring incentives. It does not always result in reduced risk of failure
Acharya et al. (2002)	105 Italian banks, 1993–1999	Portfolio composition by industrial sector, broad asset sector, and geographic	Return (ROA & ROE) and Risk	Diversification of bank assets is not guaranteed to produce superior performance and/or greater safety for banks
Pfingsten and Rudolph (2002)	7 Germany bank groups, June 1970–June 2001	Concentration risk/ diversification based on Industry	-	There is a trend toward diversification based on bank group analysis. A discrepancy exists in lending across sectors related to the ownership structure and size of group of banks under public law
Kamp et al. (2005)	2218 German banks, 1993–2002	Loan Portfolio Composition: Diversification	-	Majority of banks (credit cooperative and savings banks) increased loan portfolio diversification while regional banks and subsidiaries of foreign banks tend to be more focused
Hayden et al. (2006)	985 German banks, 1996–2002	Portfolio composition by industries, broad economic sectors, and geographical regions	Return (operating Profit/Total Assets and operating profit/ Total Equity) and Risk	No large performance benefits can be associated with diversification since each type of diversification tends to reduce the banks' returns. Impact of diversification depends strongly on the risk level
Behr et al. (2007)	2231 Germany banks, 1993–2002	Portfolio composition based on economic sectors	-	Concentration increases banks' returns and decreases loan loss provision and non-performing loans
Berger et al. (2010)	88 Chinese banks, 1996–2006	Portfolio diversification based on geographic, loans, deposits and assets types	Profits, Costs, and Efficiency	Diversification lower profits, increase costs, reduce profit, and cost efficiency
Rossi et al. (2009)	125 large Austrian commercial banks, 1997–2003	Portfolio composition: diversification based on economic sectors and loan book granularity	Risk, cost, and profit efficiency	Although diversification negatively affects cost efficiency, it increases profit efficiency and reduces realized bank risk. It seems to have a positive impact on banks' capitalization
Tabak et al. (2011)	96 commercial banks, January 2003–February 2009	Portfolio composition: diversification strategy	ROA and ROE	Loan portfolio concentration increases returns and also reduces risks for foreign banks. State-owned banks seem to be less affected by the degree of diversification