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INDONESIAN CAPITAL MARKET REVIEW

Bank Income Diversification from Stock Market Perspective: Evidence from ASEAN+3

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This paper empirically examines the effect of banks' revenue diversification on the stock-based return and risk measures using data on the ASEAN-5, and addition from China, Japan, and South Korea banking sector. This paper use panel Fixed Effect and robustness test with Random Effect and TSLS. We use non-interest income share as a measure for revenue diversification. We find that revenue diversification has no effect on bank's market value but significantly decrease bank total risks. When non-interest income is decomposed, we find that fee-income business has significant positive effect on bank value. Furthermore, it's important to see characteristic of banks that practice diversification, such as bank size and capital. Overall, we provide evidence that banks, especially larger ones with good condition on capital, could increase their value and lower their risk by diversifying non-interest income, especially with fee income as well as other types of non-interest income.

Keywords: Bank; Income Diversification; Capital; Risk; Value

JEL classification: G21; G10; C22; C23

Introduction

The global financial crisis which happened in 2008 has triggered new regulation in banking, Basel III, which requires banks to have higher capital requirement. According to the Basel Committee on Banking Supervision, Basel III requires banks to hold additional capital as capital buffer. On average, the minimum capital requirement for banks is 10.5% (only counting capital conservation buffer), compared to 8.0% from Basel II. This percentage could be higher if countercyclical capital buffer and capital surcharges are included. This much higher capital requirement could cause banks to face capital gap, from which they would try to deleverage and eventually reduce their lending growth in

order to reach target capital (Maurin & Toivanen, 2012). Moreover, recent years, due to financial deregulation and development, banks have involved themselves in various activities beyond their basic ones, such as insurance, fiduciary services, securities underwriting, etc (Sawada, 2013). Because of these conditions, banks would have started to diversify its income source from its traditional activities which is giving loans. This condition gives rise to concerns as to whether banks should diversify or retain its focus on traditional functions. Furthermore, there is also the question whether the diversification could increase its value and decrease its volatility.

Based on previous research, there are two different sides to explain effects of diversifica-

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tion on return and volatility. On one side, based on portfolio theory from Markowitz (1952), there is E-V Rule, which states that there is a portfolio with some assets within that could give the lowest risk with a given expected return or the highest expected return with given risk level. Aside from increasing return, diversification could decrease its volatility. Based on Kwan and Laderman (1999), wider scope of revenue-based bank could give better trade-off of return and risk. However, the negative effect depends on what type of diversification activities, because there are some activities that naturally riskier, such as a bank's involvement in insurance. Based on Laeven and Levine (2007), banks that shift to non-interest business and investment business, on average will be valued higher than banks that only specialize in traditional activities.

On other hand, Stiroh and Rumble (2006) states diversification could provide benefit, but it is offset by increasing exposure because of non-interest-based business that is fluctuates more and is not always profitable compared to the bank's traditional activities.

This research refers to Sawada (2013) that analyzes the benefit of diversifying. Sawada (2013) analyzes the effect of diversification on a bank's value and risk, which he divides into 3, total risk, systematic risk (beta) and idiosyncratic risk. His findings provide evidence that diversification has positive effect on a bank's market value. He also finds fee-generating income business could decrease all types of risk (total risk, systematic, and idiosyncratic risk). Unlike other studies, Sawada (2013) uses stock-based return and risk. Only by doing this, he could decompose risk into 3 types that is very important to know not only for banks, but investors as well. Sawada also specify non-interest income into 3, trading income, fee income, and other non-interest income, to be more specific of what kind of diversification that is more impactful.

We conduct this research because we are interested in knowing the effect of diversification, especially when the measurement is stock-based. As far as we know, most research of this scope uses performance-based return and risk

(example, risk measurement from risk adjusted-ROA). By using stock-based return and risk, the information derived is richer as we could provide a deeper explanation on what kind of risk is affected by diversification. This study also contributes insight about diversification in emerging markets, (such as ASEAN-5) because the previous studies with similar methods are conducted in Europe and US, and Sawada is the first in Asia (Japan). The countries in our sample are countries that are known as the ASEAN-5 and we also include China, Korea, and Japan. Some of them are deeply affected by the Asian financial crisis that occurred between 1997 and 1998, and even Indonesia had faced bank runs that it requested help from IMF. But since the financial crisis, the banking system in Asia has undergone structural changes and integration, increasing consolidation. Up until the global financial crisis the foreign presence has reached on average 43% in terms of ratio of foreign banks to total number of banks in the host country (Jeon & Wu, 2014). In the upcoming year, the ASEAN banking system itself is going to establish ABIF, which is banking integration in ASEAN that would make any ASEAN bank easily start operations in other nations in ASEAN. Our paper also contributes to this upcoming integration in helping to inform those banks whether diversification could support their operations as well as the preparation for increased competition with other banks as ABIF is realized.

Literature Review

According to Stiroh (2004) as quoted on Lukmawijaya and Kim's (2015), increasing non-interest income on commercial banks in USA can reduce the volatility of a bank's profit because of two factors: (1) Non-interest income has less correlation with the whole business than the traditional interest income; and (2) The expanded product line and cross selling opportunities related to the growth of non-interest income benefits a bank's revenue portfolio.

Li and Zhang (2013) in China, showed that the decreasing volatility of net operating income was influenced by decreasing net interest

income, paralleling the decreasing covariance between net interest income and non-interest income. The decreasing covariance indicates that the development from non interest income of banking industry in China will benefit the diversification activities. Interestingly, Li and Zhang also found that the marginal revenue from such diversification will continue declining gradually due to the high volatility of non-interest income than net interest income. This means that the preference for diversification can aggravate a company's risk, due to the additional risks that is larger than the increase in revenue. Hidayat, Kanikaka, and Miyamoto (2012) provides another perspective in a related study in the case of banks in Indonesia. The result states that the excess reliance on commission and fee activities are related to high banking risk. These risks arise from the volatility of income especially in the small-sized banks.

Lee, Yang, and Chang (2013) found that in 22 South Asia countries, the non interest income activities played an important role in reducing the bank's risks, but not in increasing the bank's profitability. This is because the speed of reconstruction in Asia's various financial markets was not uniform after the financial crisis occurred. The effect of non-interest activity to the profitability and risks on Asian banks were varied and it depended on the bank's business specification and the country's level of income.

Meslier, Tacneng, and Tarazi (2014) studied to see whether bank income diversification is beneficial for emerging economy from 39 universal and commercial banks in the Philippines. Their results showed that diversification is beneficial for Philippine banks because they have a different non-interest income structure. For an average Philippine bank, the share of trading activities in non-interest income is relatively higher compared with the average US bank. Most of the fee based income is obtained from traditional bank intermediation activities, and trading income is nontraditional as its growth is less correlated with net interest income growth.

Nguyen et al. (2012) found that from 153 commercial banks in five ASEAN countries (Indonesia, Malaysia, Philippines, Thailand, and Vietnam), the association between bank market

power and revenue diversification had changed over time, suggesting that credit losses experienced by banks earlier, during and after Asia's Financial Crisis, encouraged ASEAN banks (especially those with market power in the deposit markets) to diversify into non-traditional activities to compensate their losses. When the markets recovered and loan demand increased, however, traditional interest-based business has become more important. Even after excluding the crisis variable, the result remained consistent across the models.

Another finding by Shim (2013) on US bank holding companies showed that from diversified banks that have broader sources of operating revenue, the probability of insolvency risk decreases possibly because more diversified revenue portfolios are associated with less volatile profits. Banks can attain capital savings by reducing portfolio risks through revenue diversification.

Edirisuriya, Gunasekarage, and Dempsey (2015) found another things in his studies of diversified bank on South Asian countries (Bangladesh, India, Pakistan, and Sri Lanka). They found that stock market responds to the diversification with a high market-to-book values. However, at a certain level of diversification, market valuation and Z-score gives a negative response towards increasing diversification.

Effects of non-interest income on bank value (ME/BE ratio)

Portfolio theory from Markowitz (1952) states E-V rule, or expected return-variance of return rule, that portfolio with some assets within could give lowest risk with given expected return or highest expected return with given risk level. To create this type of portfolio, the first thing to do is to make sure to diversify the assets within. Diversification is not only about quantities, but assuring that assets should be from different background. In other words, banks' income portfolio should not only focus on one source of income, but from other sources with different characteristics. This could give banks a portfolio of income that is similar with E-V Rule. If all the bank's source of in-

come has the same characteristic, it tends to perform badly at the same time, compared to if the banks diversify their income source and ensure that many has different characteristics. By diversifying in different sectors, they could lower the possibility of financial pressure, because of the bank's characteristic that is mostly high-levered (Diamond, 1984). Banks that diversify as well as integrating human capital, information, and technology in a better synergy could increase profitability. Banks could allocate resources more efficiently (by reducing agency problem) with internal capital market (Scharfstein & Stein, 2000).

Research that is done by Sawada (2013) and Baele et al. (2007) in Japan and Europe respectively, finds that when banks diversify income from non-interest income could give positive impact on bank's value.

Effects of Non-interest income on bank risk

Baele et al. (2007) finds that from standard portfolio theory, cash flow combination from uncorrelated income sources would be more stable than from correlated sources. The explanation behind is already stated in Markowitz's portfolio theory (1952); firms that avoid investing in a group of asset with high covariance because of the same industry background could decrease its variance. That's why banks should diversify in order to ensure their source of income has low covariance. Kwan and Laderman (1999) states wider scope of revenue base could give better trade-off of the bank's risk and return. Yet the negative effects depend on what types of diversification is done, because some diversification activities are naturally riskier, such as diversification into insurance activities.

Baele et al. (2007) finds non-linear relationship between diversification and bank-specific risk. A downward sloping relationship shows that banks mostly reduce risk by income diversification (but up to certain threshold).

Research Methods

Our study uses data from independent banks and financial groups with banking business

units in some countries in ASEAN+3 (Indonesia, Malaysia, Filipina, Thailand, China, Japan, and Korea) from 2007 until 2014. We used the database from Bankscope for each bank-specific variable and we used Thomson Reuters for banks' stock prices data. We chose this period because of the limited data before 2007 on Bankscope and limited banks that are already publicly listed before that period. We also have some criterions for the sample similar as Sawada (2013). First, banks should be actively traded, at a minimum of 80% of trading days in a year. Second, financial groups should have a consolidated report using bank format, so it could be compared with independent bank. Third, financial groups should have a bank as their subsidiary. Fourth, independent banks that are not subsidiary from financial groups are also included in the sample. By these criterions, our sample comprises of 54 banks and financial group and yields 378 total observations. The list of banks could be seen in Appendix Table 1.

The main purpose of this study is to analyze the effects of income diversification on a bank's value and risk by using stock-based data and this effect could be shown from the following equation 1.

$$Y_{it} = \alpha_1 + \alpha_2 \cdot DIV_{it} + \gamma X_{it} + \eta_i + \varepsilon_{it} \quad (1)$$

Y_{it} represents stock-based bank's value (Market to Book Equity Ratio) and stock-based bank's risk (total risk, systematic risk, and idiosyncratic risk). DIV_{it} and X_{it} represent revenue diversification measurements and control variables, respectively. We follow Sawada (2013) to modify the dependent variable, which is winsorized at 0.5% level to control for outliers. Stiroh (2006) and Baele et al. (2007) states that using stock-based value and risk would give benefits, such as forward-looking benefit of stock price and decomposition of risk into systematic and idiosyncratic. Sawada (2013) states that using ME/BE in particular as proxy could give a varied result because the ratio also reflects the bank's funding structure.

$$\frac{ME}{BE} = \frac{\text{number of shares outstanding} \times \text{current stock price}}{\text{book equity value}} \quad (2)$$

Total risk:

$$R_{i,t} = \alpha_i + \beta R_{m,t} + \varepsilon_{i,t} \quad (3)$$

In order to decompose risk from stock based data, we use estimation from market model (equation 3). $R_{i,t}$ indicates daily stock return of stock I at time t and $R_{m,t}$ is return of daily market indices at time t. For market indices, we use stock indices from different countries, according to sample banks' countries. By using daily stock return and daily stock indices, we estimate equation 3 for each year and each bank, so we obtain coefficient β as a bank's systematic risk. Then, from equation 3 we also estimate the residual. For total risk and idiosyncratic risk, we use standard deviation of bank stock return and standard deviation of residuals and we annualize by multiplying the standard deviation with the squared root of total trading days in one year. After we get the total risk, systematic risk, and idiosyncratic risk from the regression on equation 3, each of them are later used as dependent variables on equation 1 to find the evidence of diversification effects on banks' risk.

The independent variables that are used in equation 1 is the income diversification measurement, which is non-interest income proportion (that later would be decomposed into fee income, trading income, and other non-interest income). Sawada (2013) defines banks' operational income by adding total interest income and non-interest income. Specifically, banks' operational income comes from 6 components. These are interest income, fee and commission, trading income, other operating income, other income, and commission from trust accounts. Sawada (2013) decompose non-interest income into fee income, trading income, and other non-interest income, to give further explanation of diversification. Provision, commission, and fee is net income from commission or provision that comes from derivative transaction or net fee from managed funds (Siamat, Kusumawardhani, & Agustin, 2005). Fee income is used to see proportion of fee income to total operational income. Trading income is the total income or loss from foreign exchange transactions, profit or loss from derivative, profit or

loss from financial assets (Meslier et al., 2014). While other non-interest income comprises of all income that comes from operational activities, but not directly linked to actual business (Kohler, 2014). The higher values of these ratios (non-interest income share, fee income share, trading income share, and other non-interest income share, show that a bank focuses more on non-traditional activities. Appendix Table 2 provides the formula for each diversification measure.

We also use some control variables X_{it} on equation 1. The first is the equity-to-asset ratio. This variable is used to measure a bank's capital, bank's leverage, agency cost, and as buffer if shock occurs. The second is the cost-to-income ratio, used to measure a bank's efficiency. Similar to Sawada (2013), we expect this variable could have a negative impact on ME/BE, or in other words, firm value will be decreased if cost-to-income increase. Non-performing loans (NPL) are loans that are given to unhealthy firms, already beyond its maturity term, and the result of restructuring. We expect NPL to have negative impact on firm value and positive impact on risk measurement. Return-on-asset ratio (ROA) gives information about a bank's profitability. Sawada (2013) expects that ROA to have a positive impact on banks' value but an unclear effect on risk. The last control variable, bank size, will be estimated by log of total bank asset. In order to control for the individual effects of each bank, we estimate equation 1 with within-effect model η_i and all the explanatory variables are used in lag 1 year form to avoid simultaneity.

Result & Discussions

The overall descriptive statistics of the data used in this paper is can be seen on Table 1. The highest standard deviation from the performance and risk measurement variables appears in ME/BE ratio. Meanwhile, the non-interest income share variable has the highest standard deviation in the revenue diversification of revenue. The second table (Table 2) shows the correlation matrix among the core variables in the research. The correlation between other non-

Table 1. Statistic Descriptive

Variables	Obs.	Mean	Std. Dev.	Maximum	Minimum
Performance and Risk Measures					
market-to-book (MEBEWIN)	432	1.16900	0.7635	4.4504	0.0403
Market beta (BETAWIN)	432	0.34680	0.1365	0.7584	0.0714
Total risk (TOTRWIN)	432	0.28610	0.1213	0.6876	0.0045
Idiosyncratic risk (IDIOWIN)	432	0.69060	0.4855	1.6908	-0.1952
Measures for revenue diversification					
Non-Interest Income Share (NIS)	432	0.30280	0.1285	0.7235	0.0103
Trading income share (TS)	432	0.04690	0.0777	0.6194	-0.1911
Fee income share (FS)	432	0.16450	0.0939	0.6100	-0.0381
Other non-interest income share (OOIS)	432	0.28800	0.1382	0.7024	-0.2623
Other Control Variable					
Bank size (ASET)	432	12.8163	2.0876	17.5508	7.2883
Non-performing loans (NPL)	432	0.03060	0.0222	0.1165	0.0007
Profitability (ROA)	432	0.01110	0.0086	0.0458	-0.0634
Equity-to-assets (EA)	432	0.09100	0.0338	0.2649	0.0162
Cost to Income (COI)	432	0.52770	0.1338	1.5656	0.0140

Table 2. Correlation matrix

Correlation Matrix of Main Variables									
	NIS	TS	FS	OOIS	ASET	NPL	ROA	COI	EA
NIS	1.0000								
TS	0.2100	1.0000							
FS	0.4974	-0.0616	1.0000						
OOIS	0.8702	0.1356	0.4462	1.0000					
ASET	0.0643	-0.1548	0.3376	0.0140	1.0000				
NPL	0.3353	0.1697	0.0363	0.3099	-0.3526	1.0000			
ROA	0.0630	0.0240	-0.1449	0.1192	-0.2487	0.0828	1.0000		
COI	0.0559	0.1274	-0.0203	0.0856	-0.3062	0.1432	-0.4684	1.0000	
EA	0.0679	0.0924	-0.1048	0.1488	-0.5790	0.3036	0.5313	-0.0468	1.0000

interest income and non-interest income share is particularly high, but we will simply ignore the high correlation here as they are used in a separate regression model.

Estimation results using ME/BE ratio as dependent variable is summarized in Table 3. At the first column, non-interest income share significantly and positively affects the value of the firm on 1% significance level. The result indicates that increasing NIS could increase the value of firm. This influence is in line with Sawada (2013), that NIS positively affects the value of the firm. This finding was highlighted by Baele et al. (2007). The stock market turns out to anticipate the diversification of revenue resource to improve the potential growth of a bank's return in the future. In other words, revenue and cost from diversification are valued more in the market compared to probability of cost that diversification will increase the complexity of business and agency cost. Moreover, Laeven and Levine (2007) told that a bank with activity switching from the traditional to the

non-interest revenue based and other investment of assets will have higher value than the traditional one. In addition, there are only two control variables that significantly affect a company's value, i.e. the size of the company and bad debt. Both of these variables affect the dependent variables negatively.

Column 2 in the Table 3 shows that the increase in the share of trading income as well as other non-interest income can increase the value of the company. This is reflected on the coefficient of each that significantly and positively influence the value of the company, at a significance level of 1%. Based on Meslier et al. (2014), trading income is one of source of non-traditional income which has less correlation with net-interest income growth. That is why it could support banks and in turn increase a bank's value. This also strengthens Li and Zhang (2010) statements that decreasing covariance with net-interest income will benefit diversification activities. Consistent with the results in column 1 of Table 3, the effect of

Table 3. ME/BE Regression

Variable (ME/BE)	1	2
Revenue diversification:		
Non-Interest Income Share (NIS)	0.440259*** (3.267489)	
Trading income share (TS)		0.861905*** (3.249837)
Fee income share (FS)		0.216882 (0.604281)
Other non-interest income share (OOIS)		0.323997*** (2.662144)
Control Variables:		
Bank size (ASET)	-0.083600** (-2.195986)	-0.076056* (-1.866618)
Non-performing loans (NPL)	-3.474797*** (-4.100078)	-2.411921** (-2.303913)
Profitability (ROA)	4.834544 (1.262831)	3.272640 (0.823477)
Equity-to-assets (EA)	-1.625659 (-1.468012)	-1.212287 (-1.088450)
Cost to Income (COI)	-0.162987 (-1.177091)	-0.277473 (-1.629615)
Adjusted R ²	0.809664	0.814112

This table reports coefficient estimates from panel regressions. Coefficient significant at the level of the 1%, 5% and 10% are marked with ***, ** and *, respectively. The number in brackets shows the t-statistic.

Table 4. Total risk regression

Variable (Total Risk Regression)	1	2
Revenue diversification:		
Non-Interest Income Share (NIS)	-0.104312* (-1.930254)	
Trading income share (TS)		0.100628 (1.321325)
Fee income share (FS)		-0.153105 (-1.403056)
Other non-interest income share (OOIS)		-0.256427*** (-4.747305)
Control Variables:		
Bank size (ASET)	-0.072678*** (-6.587588)	-0.069126*** (-5.991853)
Non-performing loans (NPL)	0.984018** (2.563329)	0.877995** (2.259745)
Profitability (ROA)	-0.843994 (-0.708953)	-0.190499 (-0.157270)
Equity-to-assets (EA)	-1.630253*** (-5.352222)	-1.61139*** (-5.265607)
Cost to Income (COI)	-0.065265 (-0.854685)	-0.024046 (-0.325986)
Adjusted R ²	0.529461	0.607841

This table reports coefficient estimates from panel regressions. Coefficient significant at the level of the 1%, 5% and 10% are marked with ***, ** and *, respectively. The number in brackets shows the t-statistic.

control variables the size of the company and the ratio of bad debt are significantly negative to the value of the company.

Table 4 summarizes the regression results of income diversification against company's total risk. In column 1, the non-interest income share has a negative effect and significant at the 10%

level. This means that increasing income diversification can reduce a company's total risk. This influence is also found by Sawada (2013) and Baele et al. (2007) in their studies. Stiroh (2004) as quoted on Lukmawijaya and Kim's (2015), mention possible reasons for this finding. Non-interest income has less dependency-

Table 5. Systematic Risk Regression

	(1)	(2)
Revenue diversification:		
NIS	0.005417 (-0.037898)	
Free Income Share		-0.976397*** (-3.439885)
Trading share		-0.125556 (-0.742322)
Other non-interest income share		-0.269820 (-2.245754)
Control Variables:		
Bank Size	0.013782 (-0.554852)	0.047648 (-1.889432)
Cost to Income	-0.009275 (-0.064409)	0.183980 (-1.286923)
Bad Loan Ratio	0.024571 (-0.028760)	0.170092 (-0.206322)
ROA	0.061245 (-0.028800)	1.763071 (-0.838212)
EA	-0.147847 (-0.196359)	-0.104458 (-0.143861)
Adjusted R ²	0.884971	0.892380

This table reports coefficient estimates from panel regressions. Coefficient significant at the level of the 1%, 5% and 10% are marked with ***, ** and *, respectively. The number in brackets shows the t-statistic.

with the overall business condition than traditional interest income. Reliance on non-interest income could reduce cyclical variation in bank profits and revenue (Stiroh, 2004). Our finding shows the possibility that non-traditional activities such as fee commission, trading activities, and other non-interest income are exposed to different shocks with traditional banking activities, which is pooling fund as deposit and giving loans. Therefore, adding non-interest income in a bank's revenue portfolio could reduce the bank's risk.

The evidence can also be seen from the real example of banks filing bankruptcy because they were only focused on lending activities, even to the fluctuating sectors such as oil and gas, such as the Penn Square Bank in Oklahoma for example. Similar occurrences can also be found in some banks in the US that suffered bankruptcy in 2008 because it was too focused in the subprime mortgage market. These results strengthen the statement made by Diamond (1984) that risk sharing due to diversification lowers the total risks borne by the company.

While in column 2, the negative influence is found only on the other non-operating income share that is significant at 1% level. This shows that the increase in other non-interest income

share can reduce the total risk of the company. This influence is not found to be significant by Sawada (2013) which only shows the fee and trading income as a negative independent variables.

On the part of the control variables, the size of the company and the ratio of equity to assets are consistently negative in column 1 and 2 at 1% significance level. Negative influence of the ratio of equity-to-assets against the risk of total company had also been summarized in Sawada (2013) and Baele et al. (2007) studies.

Table 5 shows estimation result for systematic risk. On column 1, the coefficient from non-interest income is positive but not significant. On the other side, column 2 shows that when we decompose total risk, the coefficient of fee income share is negative and significant at 1% level. This is linked with Sawada (2013) and shows that bank with higher share from fee income has lower systematic risk. Fee income and bank commission are conducted from its service such as cash management for the customers who enters into business transactions with foreign businessmen, administration fee from bank's service, etc. It shows that fee-based activity is not something that is related with the market, including when the bank does cash

Table 6. Idiosyncratic Risk Regression

	(1)	(2)
Revenue diversification:		
NIS	-0.084756 (8.694380)	
Free Income Share		-0.051842 (-0.477003)
Trading share		0.169587** (1.967906)
Other non-interest income share		-0.222130*** (-4.413850)
Control Variables:		
Bank Size	-0.067698 (-6.712947)	-0.061166 (-5.542191)
Cost to Income	-0.082368 (-1.194707)	-0.027157 (-0.387653)
Bad Loan Ratio	0.378026 (0.871326)	0.354728 (0.842918)
ROA	-2.732871 (-2.379872)	-1.827649 (-1.607947)
EA	-1.519457 (-5.205044)	-1.421034 (-4.877867)
Adjusted R ²	0.454326	0.473283

This table reports coefficient estimates from panel regressions. Coefficient significant at the level of the 1%, 5% and 10% are marked with ***, ** and *, respectively. The number in brackets shows the t-statistic.

management (because its role is only to become the intermediary). It is different from trading activities that can be influenced by market risk because it is related with the use of financial instruments and is written down on bank's trading book. From the explanations above, the capital market can anticipate the correlation between the market portfolio return and fee income, lower than any other revenue sources. That kind of anticipation is a result from the expectation that fee income will be a stable revenue source for the bank.

Table 6 shows the estimation result from idiosyncratic risk. Column 1 shows that non-interest income coefficient is negative and not significant. This result corroborates the findings of Sawada (2013) that bank in general cannot reduce the idiosyncratic risk by increasing non-interest income shares. Many banks nowadays tend to diversify their incomes (Sawada, 2013). Baele et al. (2007) finds that when banks are overly confident about diversification, their bank-specific risks become larger. On the other hand, trading share is proved to have positive and significant effect on idiosyncratic risk. This strengthens Li and Zhang (2013) finding that the marginal revenue from such diversification will continue to decline gradually due to the

high volatility of non-interest income than net interest income. It means that the preference for diversification can aggravate the companies' risk. This result also strengthens Hidayat, Kani-kaka, and Miyamoto (2012) finding that excess reliance on the activity of the commission and fee are related to high banking risk. However, on our findings, the relation is one with excess reliance on the activity of trading. Another possible reason for this finding is that trading activity raises the volatility of net income growth (Stiroh, 2004).

Robustness Test

Random Effect

This study uses two robustness tests, these are Random Effect and simultaneity by using TSLS. The result from Random Effect is used to see the impact on banks' value and risk, and whether on average it gives similar results with the Fixed Effect model, especially in terms of the direction of the effect (positive or negative). The result of Random Effect could be seen in Table 7. One important thing to take from the result is overall, it has similar result with the benchmark model (fixed effect). On average the

Table 7. Robustness test (Random Effect)

Explanatory Variables	ME/BE 1	ME/BE 2	Total Risk 3	Total Risk 4	Idiosyncratic 5	Idiosyncratic 6	Beta 7	Beta 8
Revenue diversification								
Non Interest Revenue Share	0.266063 (0.921799)		-0.184119*** (-3.149774)		-0.084365 (-1.483686)		-0.180023 (-1.086929)	
Fee Income Share		-0.528558 (1.006445)		-0.074989 (-0.697183)		-0.104538 (-1.088994)		-0.555764* (-1.776371)
Trading Income Share		0.734479* (1.831697)		0.049951 (0.540308)		0.117472 (1.425021)		-0.187871 (-0.829153)
Other Non-interest income share		0.361084 (1.386774)		-0.285717*** (-4.771893)		-0.185426*** (-3.473200)		-0.385736*** (-2.608607)
Control Variable								
Bank Size	-0.049368 (-1.452091)	-0.037237 (-1.047415)	-0.009015* (-1.903771)	-0.018007*** (-2.869352)	-0.027162*** (-5.068756)	-0.022581*** (-4.02838)	0.032984 (1.443704)	0.051066** (2.147091)
Equity to asset	-1.484747 (-1.089912)	-1.437999 (-1.060296)	-0.670379** (-2.208921)	-0.985522*** (-3.193771)	-0.776763*** (-2.799899)	-0.634133 (-2.304514)**	-1.376527** (-1.775616)	-1.173883 (-1.519251)
Cost to income	0.236613 (0.719546)	0.214687 (0.647396)	0.17333** (2.575242)	0.081858 (1.116438)	0.001393 (0.021309)	0.032597 (0.498411)	0.020454 (0.108940)	0.148030 (0.778122)
NPL	-0.655915 (-0.360179)	-0.653400 (-0.368027)	0.916838** (2.535631)	1.336321*** (3.517067)	0.249194 (0.709524)	0.324259 (0.956595)	0.709975 (0.669941)	0.738495 (0.710507)
ROA	14.989010*** (2.952323)	13.094070** (2.581972)	1.590117 (1.404038)	0.441826 (0.380896)	-0.572143 (-0.550446)	-0.338901 (-0.327648)	0.694755 (0.24134)	2.287334 (0.793176)
Constant	1.548278*** (2.628103)	1.449593** (2.437546)	0.434596 (4.483899)	0.660684*** (5.726904)	0.719201*** (7.019182)	0.665129*** (6.45845)	0.398991 (1.072691)	-0.583043 (0.580284)
F-stat	2.373109	2.462580	6.124922	8.429634	6.595518	7.076585	1.398326	2.557712
Prob	0.029114	0.013107	0.000004	0.000000	0.000001	0.000000	0.214166	0.010055

This table reports coefficient estimates from panel regressions. Coefficient significant at the level of the 1%, 5% and 10% are marked with ***, ** and *, respectively. The number in brackets shows the t-statistic.

benchmark model shows higher t-statistic and lower probability.

The differences between the results are followed. Random effect shows that fee income proportion has a negative impact on firm value which could be seen in column 2. Random effect also estimates that there is a negative impact (but not significant) of income diversification on systematic risk, which could be seen in column 8.

Adding this result with the result from Table 3 until Table 6, the benchmark model and the Random effect gives evidence that income diversification by non-interest income could decrease banks' total risk and increase in fee income share could decrease its systematic risk. Increase in diversification through other non-interest income share could decrease idiosyncratic risk as well.

Two-Stage Least Square

Although we have used explanatory variables in the form of 1 year lag to avoid endogeneity, there is yet a small probability that sim-

ultaneity exists (such as reverse causality). For that reason, we conduct regression from equation 1 with instrumental variables to control endogeneity. We use diversification measure (DIV_{it}) that is lags by 2 years as instrumental variable. We also use interaction between asset and dummy year as instrumental variables. On the first step, we regress instrumental variables and other control variables on diversification measure at one year lag (as dependent variable). From the result, we take the fitted values and use it on second step regression. On second step, we regress the fitted values and other control variables on market to book equity and banks' risk. The result could be seen in table 8. For column 1, 3, 5, and 7, we use non-interest income as a diversification measure that will be included as instrumental variables. On column 2, 4, 6, and 8, the instrumental variables are fee income share, trading income share, and other non-interest income share.

On Table 8 column 2, we find that fee income has positive coefficient and significant effect on banks' value. Column 3 shows that non-interest income proportion has negative

Table 8. Robustness Test (IV Estimation)

Explanatory Variables	ME/BE 1	ME/BE 2	Total Risk 3	Total Risk 4	Idiosyncratic 5	Idiosyncratic 6	Beta 7	Beta 8
Revenue diversification								
Non Interest Revenue Share	-0.278089 (-0.599838)		-0.162475** (-2.05975)		-0.026478 (-0.36628)		-1.338822 (-3.949117)	
Fee Income Share		1.518929** (2.311524)		-0.064341 (-0.582897)		-0.110875 (-1.093884)		0.037222 (0.078816)
Trading Income Share		0.508768 (0.590073)		0.236037 (1.629719)		0.07253 (0.545361)		-0.173586 (-0.280125)
Other Non-interest income share		-0.859183 (-1.601475)		-0.242234*** (-2.687914)		-0.091703 (-1.108147)		-1.631236 (-4.230599)
Control Variable								
Bank Size	-0.023206 (-0.901099)	-0.043804* (-1.65497)	-0.008809** (-2.010414)	-0.004863 (-1.093827)	-0.018573*** (-4.625176)	-0.014342*** (-3.512806)	0.08428*** (4.475358)	0.09225*** (4.849491)
Equity to asset	-1.874707 (-1.172294)	-2.056073 (-1.281003)	-0.229673 (-0.844095)	-0.071653 (-0.265761)	-0.090311 (-0.362179)	0.016252 (0.065646)	1.120795 (0.958421)	1.566197 (1.357715)
Cost to income	0.081931 (0.231059)	0.060451 (0.160103)	0.209064*** (3.465231)	0.220485*** (3.476359)	0.100069* (1.809898)	0.120233** (2.064431)	0.535436** (2.064951)	0.726002*** (2.675393)
NPL	-0.201866 (-0.091031)	-0.503573 (-0.220087)	0.804419** (2.131989)	0.858224** (2.232943)	0.420996 (1.217532)	0.625181* (1.771394)	0.168667 (0.104011)	0.83248 (0.506239)
ROA	54.05435*** (8.973418)	58.00887*** (9.038369)	1.273219 (1.242248)	1.345331 (1.247873)	1.175656 (1.251657)	1.129023 (1.140452)	-2.641173 (-0.599586)	0.022593 (0.004898)
Constant	1.016937** (1.985646)	1.167884** (2.244286)	0.347797*** (3.991271)	0.294662*** (3.370919)	0.445185*** (5.574762)	0.398076*** (4.959321)	-0.358921 (-0.958372)	-0.583043 (-1.558942)

This table reports coefficient estimates from panel regressions. Coefficient significant at the level of the 1%, 5% and 10% are marked with ***, ** and *, respectively. The number in brackets shows the t-statistic.

coefficient and is significant on total risk. This result shows that an increase in non-interest income share proportion could decrease banks' total risk, even when controlling for endogeneity. Column 4 shows that other non-interest income share has a negative coefficient and is significant on banks' total risk. Adding this result with Table 3 to 7 gives strong and robust evidence that income diversification by non-interest income could decrease banks' total risk.

Conclusions

This study aims to see if the bank could take advantage in diversifying its income from different activities by observing the impact of diversification of income on company value and risk, based on data from the stock market. Proportions of non-interest income is used as the measurement for the diversification of income.

To conclude the model and robustness test, there are four important things to state. First, overall the non-interest income has no significant impact on banks' value because it is not supported by the robustness test. However, robustness test with TSLs gives evidence that fee income has positive impact to bank value.

Secondly, we found that banks, especially for those of a larger size, increasing their income diversification with non-interest income could minimize total risk of the bank; specifically on the proportion of other non-interest income. These results are consistent with two robustness test which shows that income diversification (proportions of non-interest income and other non-interest income) and bank size has significant and negative impact on total risk. Then, we found that when the bank increases the proportions of fee income, it can reduce its systematic risk. This result is consistent with robustness test by random effect model. Lastly, a bank with good capitalization can minimize total and idiosyncratic risk. This result is consistent with robustness test by random effect which shows that the equity to asset ratio has a negative and significant impact to total and idiosyncratic risk.

To summarize, a bank (especially large and have good capitalization) can increase its value for investors and reduce its volatility (total risk, systematic risk, and idiosyncratic risk) by diversifying of income with non-interest income, especially through fee income and other non-interest income.

Based on this research, along with the preparation of implementing Basel 3, this can provide important information to bank supervisor, regarding the increased capital requirements. Based on our research, we suggest banks to diversify and increase their non-interest income share, if in the future they would need to deleverage and choose to reduce their lending in order to achieve target capital. By increasing non-interest income, they can reduce vola-

tility during the adjustment time. For further research, there is non-linear relationship between risk and non-interest income, so it can be known if there is maximum point of the bank in diversifying by increasing the proportion of non-interest income. Another consideration for future research is adding country-specific variable as control variables to have cross-country study.

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Appendix

Appendix Table 1

Number	List of Banks	Number	List of Banks
1	Bangkok Bank Public Company Limited	29	Mitsubishi UFJ Financial Group Inc-Kabushiki Kaisha
2	Siam Commercial Bank Public Company Limited		Mitsubishi UFJ Financial Group
3	Krungthai Card Public Company Limited	30	Sumitomo Mitsui Financial Group, Inc
4	TMB Bank Public Company Limited	31	Mizuho Financial Group
5	Thanachart Capital Public Company Limited	32	Resona Holdings, Inc
6	Kasikornbank Public Company Limited	33	Shinkin Central Bank
7	TISCO Financial Group PCL	34	The Bank of Yokohama, Ltd
8	Bank of Ayudhya Public Company Ltd.	35	Chiba Kogyo Bank
9	Kiatnakin Bank Public Company Limited	36	Shizuoka Bank
10	AMMB Holdings Berhad	37	Joyo Bank Ltd.
11	Hong Leong Finance Limited	38	Shinsei Bank Limited
12	RHB Capital Berhad	39	Bank of Kyoto
13	Public Bank Berhad	40	Industrial Bank of Korea
14	BIMB Holdings Berhad	41	Hana Financial Group
15	BDO UnibankInc	42	Shinhan Financial Group
16	Bank of The Philippine Islands	43	Bank Mandiri (Persero) Tbk
17	Security Bank Corporation	44	Bank Pan Indonesia Tbk PT-Panin Bank
18	China Banking Corporation - Chinabank	45	Bank ArthaGrahaInternasionalTbk
19	Metropolitan Bank & Trust Company	46	Bank Victoria International TBK (PT)
20	Rizal Commercial Banking Corp.	47	Bank PermataTbk
21	Union Bank of the Philippines	48	PT Bank CIMB NiagaTbk
22	Philippine National Bank	49	Bank Danamon Indonesia Tbk
23	Oversea-Chinese Banking Corporation Limited OCBC	50	PT Bank Rakyat Indonesia AgroniagaTbk
24	Industrial & Commercial Bank of China (The) - ICBC	51	Bank Negara Indonesia (Persero) - Bank BNI
25	Bank of China Limited	52	Bank Central Asia
26	China Minsheng Banking Corporation	53	PT Bank Bukopin
27	China Merchants Bank Co Ltd	54	PT Bank Woori Saudara Indonesia 1906 Tbk
28	Hua Xia Bank co., Limited		

Appendix Table 2

Diversification measurement (DIV_{it})	Formula
Non-interest income	$\frac{\text{non interest income}}{\text{operational income}}$
Fee income	$\frac{\text{fee and commission income}}{\text{operational income}}$
Trading income	$\frac{\text{profit or loss from foreign exchange transaction, derivative, and from financial asset}}{\text{operational income}}$
Other non-interest income	$\frac{\text{non interest income} - \text{Fee income} - \text{Trading Income}}{\text{operational income}}$