Analysis of Bond's IFRS 9 Expected Credit Loss using Vasicek Method

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Abstract. Expected Credit Loss is the most important thing as it's the best way to mitigate the credit risk that arise in banking activities and directly impacted to statement of profit and loss. Previous regulation used historical component data that leads to late prediction will be replaced with new regulation that should incorporate forward looking scenario method so that the late prediction will not happen. The focus of this research is to analyze and estimate expected credit loss of bond's bank exposure that need to be impaired. This empirical research also compare different method and scenario for banks to predict expected credit loss. The data were collected based on the Bank's net corporate bond's as shown on December 2020 bank's annual report. Using Vasicek Method will allow bank to predict expected credit loss precisely as this method incorporate different forward looking macroeconomic scenario.

Keywords: Expected Credit Loss, Vasicek Method, IFRS 9

1 Introduction

The main business activity of banks is to provide credit. Apart from these main activities, other activities that can generate profits for banks are by purchasing securities instruments. Examples of securities instruments that are usually purchased by banks for generate profit or revenue are bonds. Based on the type of issuer/bond issuer, it is divided into two types, namely the first is government bonds which are issued by the state government and the second is corporate bonds issued by the company that issued the bonds [1].

Graph 1. Indonesian Bond's Market

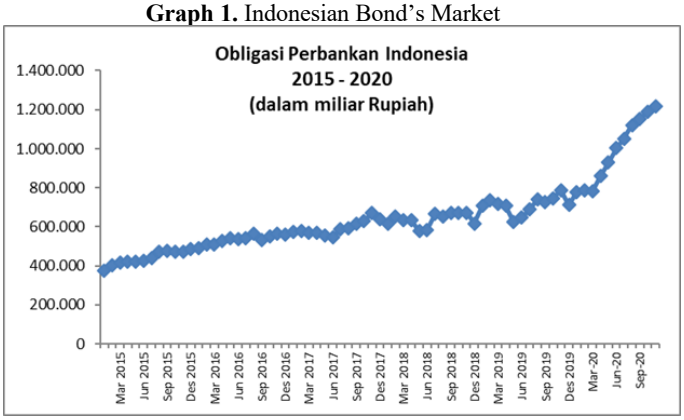

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Fig. 1 shows that in the last 5 years, outstanding of Indonesian bond's market derived from OJK Data that coSSSmplies all banking industry across Indonesia. In fact, in the span of five years (January 2015 – November 2020), there was a significant increase of up to 300%, which means that banks in Indonesia have always increased their exposure to bond instruments in the last five years.

Every asset is risk exposed, Bond is also exposed by risk, especially credit risk. Credit risk concerns the risk of loss arising from an obligor in ability to honor its obligations, for example a company failed to deliver it's coupon bond to the investor. To mitigate the risks, banks needs to put aside it's revenue as called as expected loss.

Expected loss is the average credit loss that we would expect from an exposure or a portfolio over a given period of time. The component of Expected loss is Probability of Default, Loss Given Default, and Exposure Amount. Expected loss is a multiplication of those 3 components.

Since 2005, the calculation of expected loss (CKPN) has been based on IAS 39 Financial Instruments: Recognition and Measurement which states that the bond instrument is one part of the instrument that requires allowance for the asset. Then in 2017, the Financial Services Authority (Otoritas Jasa Keuangan Indonesia) has launched a new policy or regulation that the estimation of CKPN (expected loss) is no longer based on historical data as in the previous regulation, but uses an expected credit loss projection.

The Projection of Expected Losses is self-regulated according to the International Financial Reporting Standard (IFRS) 9: Financial Instruments converges on the Statement of Accounting Standards (PSAK) 71: Financial Instruments effective January 2020 for Banking in Indonesia. All estimates of reserve losses for banks in Indonesia in 2020 underwent major changes due to changes in regulations related to this estimated reserve for losses. The main difference between IAS 39 and IFRS 9 is that IFRS 9 is formed from the time the credit is granted and securities are purchased. The difference from the application of the latest loss reserve calculation is in terms of the method or approach in determining the estimated loss reserve not only based on incurred losses, but most importantly based on predictions of future macroeconomic scenarios [2].

Magnou [3] proposes a method for calculating the estimated Probability of Default value using the Vasicek model method. Fundamentally, the Vasicek model is suitable for estimating the value of losses on credit risk to support banking activities. The Vasicek method can be used to describe the uncertainty of the occurrence of an event (default event) in the future according to the probability of default from the existing scenario. This method is a development of the Merton model where a contractual asset experiences a default if at maturity the value of the asset falls below its contractual obligation.

This research aims to calculate the expected credit loss of the bank using vasicek method in order to follow recent regulation conducted by the OJK. Using Vasicek Method will allow bank to predict expected credit loss precisely as this method incorporate different forward looking macroeconomic scenario.

2 Literature Review

Risk management is a higher priority these days for the financial services industry. As experienced as results of economic crisis, such as 1998 and 2008 failure to address risk from a holistic perspective will have adverse consequences for banks, financial institutions and the

economy as a whole. As bank's activities is very risky business, banks need to do risk management method.

Risk is divided into 6 types [4]: interest risks, reinvestment risk, credit risk, liquidity risk, exchange risk, inflation risk. The most common and the riskiest is the credit risk. Credit risk happens when debtor fails to meet its obligation. When it happens it's called default.

Risk involved in buying bonds are interest rate risk, reinvestment risk, credit risk, liquidity risk, currency risk, inflation risk, and bond callable option risk. The biggest risk in buying bonds is credit risk. In measuring credit risk, there are two measures of credit risk, namely expected loss and unexpected loss. Expected loss or in other words reserve for losses is the average amount of risk of loss in a certain period of time that can be estimated by the bank based on historical loss data. Because it can be estimated, the expected loss is considered as a loss from each lending so that it is reserved as a deduction in total assets and as an expense in profit or loss.

Every corporate bond issued in Indonesia has a rating issued by a rating agency that aims to assess the performance of the bond issuing company and assess the credit quality, the better the quality of the company, the better the credit rating that will be obtained for the bond [5].

For bond's issuance credit risk happens when the issuance fails to pay its coupon to the investors. PT Express Transindo Bond's on 2017 fails to pay it's coupon so that the bond's rating become default. when bond's get default So that to incorporate such things, bank's need to make expected loss as a risk mitigation [5]. Estimation of expected credit loss must comply with Indonesian regulation as of Pernyataan Standar Akuntansi (PSAK) as a convergent of International Financial Reporting Standard (IFRS), since 2020 the estimation should be based on IFRS 9: Financial instruments.

Bonds are one of the assets of the banking sector that need to be provided for Impairment Losses. In its classification, bonds are part of the Amortized Cost in PSAK 71 (GPPC: implementation of IFRS 9 impairment, 2016), so that bond instruments must be reserved as well as credit instruments, including banks that have bond exposures affected by changes in the calculation of reserve losses.

In 2014, the International Accounting Standard Boards (IASB) issued a new regulation regarding the calculation of reserves, namely the International Financial Reporting Standard 9 – Financial Instrument to be adopted to replace the previous reserve regulation based on IASB 39 – Financial Instrument. Then in 2016, the Financial Accounting Standards Board issued the Exposure Draft PSAK 71: Financial Instruments which is the adoption of IFRS 9 Financial Instruments which is effective January 1, 2018 worldwide, and implemented in Indonesia directly since January 1, 2020. In terms of forward-looking, where forward looking describes changes in the reserve for losses as part of changes in economic conditions and the impact of credit risk.

In accordance with the forward looking principle, the calculation of reserve for losses is influenced by future macroeconomic projections, besides that in calculating the reserve for losses, banks must also have various scenarios that can occur in forecasting future macroeconomic projections in every condition of macroeconomic projections (Discussion Forum on PSAK Implementation Issues). 71 OJK: 2018).

The ECL formula in IFRS 9 is as follows:

$$ECL = PD\ (FL) x\ LGD\ (FL)\ x\ Exposure\ Amount \quad (1)$$

With :

ECL : *Expected Credit Loss*

PD (FL) : *Forward Looking Probability of Default*

LGD (FL) : *Forward Looking Loss Given Default*
Exposure : *Asset Exposure*

The Vasicek method was first introduced by Vasicek in 1976. This method is a type of interest rate factor to describe changes in interest rate values driven by market risk. Then developed until 2002 the vasicek method can be used to estimate the amount of capital needed to support a debt portfolio based on the probability of default of the loss [6].

Methods can be used to estimate the expected credit loss is linear regression and migration matrices, However, both methods are not suitable for calculating expected loss or projection of reserves for bond instruments because historically, the default data for bond instruments is too little, making it difficult to do an estimate. Magnou [3] suggest that another method that can be used is to use vasicek method since it doesn't require historical data, but also incorporate forward looking scenario method.

3 Methodology

Data used in this research is from Bank X 2020 Annual reports of its corporate bond's exposure and rating as shown on Bank's investor relation menu, others such as macroeconomic data is gathered from Badan Pusat Statistik (BPS) and Bank Indonesia (BI), and for default rate is used from 2019 Pefindo default study.

Magnou [3] proposes the method of calculating the estimated value of the Probability of Default using Vasicek model method. Fundamentally, the Vasicek model is suitable for estimating the value of losses on credit risk to support banking activities. The Vasicek method can be used to describe the uncertainty of an event (default event) in the future according to the probability of default of the existing scenario. This method is an extension of the Merton model in which a contractual asset experiences a default if at maturity the asset's value falls below its contractual obligation.

Vasicek Method formula as shown on Magnou [3] is as described:

$$PD\ (FL) = \phi\left[\frac{\phi^{-1}\ (PD) - \sqrt{\rho}\ z}{\sqrt{1-\rho}}\right] \quad (2)$$

With :
PD (FL) : *Forward Looking Probability of Default*
PD : *Histories Probability of Default*
ρ : *asset correlation.*
z : *standard normal distribution general state of economy* (GDP).

To Find that PD (FL), researchers need to find the PD data, ρ, and *z*. The asset correlations, in short, show how the asset value (e.g. sum of all asset values of a firm) of one borrower depends on the asset value of another borrower. the formula of asset correlation (ρ) is as shown below:

$$\rho = 0{,}12\ x\ \frac{1-\exp\ (-50\ x\ PD)}{1-\exp(-50)} + 0{,}24\ x\ (1 - \frac{1-\exp(-50xPD)}{1-\exp(-50)}) \quad (3)$$

Probability of Default (PD) used for this research is uses as shown on Pefindo Default Study (2018) data, the data is grouped by each rating and has its own outstanding. Figure 2

shows that for Rating AAA, the probability of default is 0,00% and the probability of default of Rating CCC is 68,46%.

Table 1. Probability of Default

Rating	Outstanding (Billion Rupiah)	Probability of Default (PD)
AAA	963,058	0.00%
AA	896,276	0.00%
A	467,512	0.30%
BBB	79,873	3.04%
BB	5,176	30.91%
B	400	0.00%
CCC	1,205	68.46%

And the z is used to incorporate forward looking scenario, this research uses GDP as z value of standard normal method as GDP is the best way to general state of the economy. GDP is derived from Badan Pusat Satistik for historical data 2012–2020, and then for forecast GDP data is derived from Bank Indonesia Statement, there are 3 scenarios, optimistic scenario, base scenario, and pessimistic scenario to incorporate different scenario. z is calculated using standard normal method:

$$z = \frac{x - \mu}{\sigma} \tag{4}$$

After researched found all 3 components to calculate Probability of Default Forward Looking (FL) using vasicek method, now researchers can estimate expected loss using this formula:

Expected Loss = $PD\ Vasicek\ x\ 45\%\ x\ Exposure\ Amount\ Obligasi$

Researcher believe by using this methodology, banks can predict expected losses more accurately based on macroeconomic scenario that banks choose. This methodology will make bank to impair more on expected loss when the economic is in not a good condition, and the expected loss will be lessen during a good economic condition.

4 Result and Discussion

Researchers use secondary data by Bank's X Bond's net exposure as shown on Bank's 2020 annual report. After that researcher calculate the component to estimate the PD (FL) using standard normal method and asset correlation formula. After that researcher estimate the expected credit loss by multiplication three components (PD, LGD, and EA). Based on the net exposure bond's bank's data, it shows that most of the rating that bank's has is AAA which is the highest grade of the rating. the data is gathered by rating as shown on table 2:

Table 2. Bond's Net Exposure

Rating	Outstanding (Million Rupiah)
AAA	4.844.770
AA+	1.006.341
AA	667.189
AA-	435.523
A+	256.804
A	127.327

Rating	Outstanding (Million Rupiah)
Grand Total	7.337.954

After that to estimate the PD(FL) researchers gathered the information as shown on table below. As shown on the table, researchers use 3 scenario to incorporate different macroeconomic approach that IFRS 9 required, the scenario is optimize which has 5% GDP projection, the second one is Base which has 4% GDP projection, and lastly pessimistic projection which has 3% projection.

Indonesia's economic growth (GDP) is a general state of economy that can describe economic conditions. Historically, Indonesia's average economic growth from 2012–2020 was at 4.62% with a standard deviation of 1.77%. Indonesia's average economic growth from 2012–2019 has always been above 4.9%. Due to the effects of the Covid-19 pandemic, Indonesia's economic growth in 2020 decreased drastically to -2.07%, causing Indonesia's average economic growth from 2012 to 2020 to decline significantly.

Table 3. Z standard normal method

Variable	Scenario		
	Optimist	Base	Pessimist
Mean (m)	4,62%	4,62%	4,62%
Standard Deviation	1,77%	1,77%	1,77%
GDP (x)	5%	4%	3%
z	0,22	(0,35)	(0,92)

Z standard normal method on fig. 4 is derived from the formula of z standard method, it shows that different number of z of each scenario with being optimistic get the highest number of z.

Table 4. Probability of default Vasicek

Variable	Scenario		
	Optimist	Base	Pessimist
PD Pefindo	0,05%	0,05%	0,05%
Rho	187,08%	187,08%	187,08%
Z	_(0,35)	(0,92)	(1,20)
PD Vasicek	0,018%	0,056%	0,097%

The PD Vasicek is different for each scenario as shown on fig. 5, for better GDP projection (optimistic scenario), the PD Vasicek is less than others projection, it shows that the probability of default for a good economy is lessen than others. The Probability of default for not quite good economy, the least GDP projection, show the biggest Probability of default, which means the probability of a company to default is bigger when the economic on a recession mode. This is in line with most publication that GDP is inversely related with expected credit loss estimation.

Table 5. Expected Credit Loss

Optimistic Scenario			
Rating	Outstanding (Million Rupiah)	GDP	Alternative (Million Rupiah)
Grand Total	7.337.954	5%	2.342
Base Scenario			

Rating	Outstanding (Million Rupiah)	GDP	Alternative (Million Rupiah)
Grand Total	7.337.954	4%	4.527
Pessimistic scenario			
Rating	Outstanding (Million Rupiah)	GDP	Alternative (Million Rupiah)
Grand Total	7.337.954	3%	7.304

In contrast, the estimation of expected credit loss using the Vasicek method gives different estimation results according to the scenario, compared to the PD Through the cycle – IAS 39-PSAK 55 method as shown on fig. 6. If the rate of economic (GDP rate) growth declines and banks need to increase reserves, while according to the calculation of reserve losses, the reserves are still sufficient so that there is no need to add reserves, it can be said that banks are considered too late to set aside some of the profits that are used as a form of loss reserves, this is what is called a little too late to estimate.

The results of the estimated expected credit loss are also in accordance with the main principle of IFRS 9, where the allowance for future losses includes macroeconomic factors, seen from three different scenarios with different scenario projections, it can be said that the estimation of the allowance for losses using the vasicek method is in accordance with the main principles. from IFRS 9 or currently applicable financial accounting standards.

The projection for Optimistic scenario show the least amount of expected loss that bank's needs to impaired and the pessimistic scenario show the most amount of expected loss. It shows that this method works perfectly for IFRS 9 calculation. Bank's need to impair more when the condition is not good, while bank's do not need much to impair when the economy is in good condition.

5 Conclusion

The Vasicek method can be used to estimate expected loss in accordance with IFRS regulation 9 – PSAK 55 which requires future macroeconomic factors as part of the component of calculating expected loss. The calculation of the estimated loss reserve using the vasicek method can produce estimates with various macroeconomic scenarios, where the estimated loss reserve produces a smaller value when economic projections improve and increases when economic projections deteriorate, this is different from the previous method where there is only one estimated expected loss for all economic conditions.

Economic projections are important for banks as part of the component for calculating expected loss. Economic projections are inversely proportional to the estimated expected loss, so banks need to make economic projection scenarios that are in accordance with future economic conditions so that the results of reserve estimates are more appropriate.

The researcher submits the following suggestions for further researchers, for the Banking Industry, the Vasicek method can be used as a method that can be used to estimate expected loss based on the description previously explained, the Vasicek method can estimate expected loss according to future macroeconomic scenarios. regulator, this research is expected to be a comparison in calculating the estimated expected loss with other methods that can support the performance of the banking industry. Other things that can be done is using another credit asset such as credit loan to estimate the expected loss and also estimate the expected loss using linear regression.

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