



## Factors Influencing Credit Risk and Insurance Risk in General Insurance of Indonesia: Technical Reserve Ratio and Reinsurance Ratio (Financial Management Literature Review)

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**Abstract:** This article is a Literature Review to see whether there is an effect of the Technical Reserve ratio and the Reinsurance ratio on credit risk and insurance risk in General Insurance in Indonesia. The purpose of this scientific article is to build a causality research hypothesis between variables so that it can be used for further research. The topic of discussion is the area of financial management science. The method of writing this Literature Review article is Library Research with sources of books, journals and research articles contained in online media such as Google Scholar, Mendeley, Research gate and other academic media. From this literature review, it can be concluded that 1) the Technical Reserve ratio has an effect on credit risk; 2) Reinsurance ratio has an effect on credit risk; 3) Technical Reserve ratio has an effect on insurance risk; 4) Reinsurance ratio has an effect on insurance risk; and 5) insurance risk affects credit risk. Apart from these 2 exogenous variables that affect the 2 endogenous variables of credit risk and insurance risk, there are many other factors including the loss ratio, current ratio and total assets variables.

**Keyword:** RBC, Credit Risk, Insurance Risk, Technical Reserve Ratio, Reinsurance Ratio

### INTRODUCTION

Similar to a bank, an insurance company is also a financial institution that collects funds from the public. Banks collect public funds in the form of savings and deposits, while insurance companies also collect funds in the form of insurance premiums. Because they collect public funds, insurance companies are also required to follow strict regulations from the Financial Services Authority. One of the regulations from OJK related to this insurance business is the obligation to maintain a minimum limit of solvency which is often called Risk Based Capital. OJK requires the achievement of a minimum RBC ratio at a certain level (currently at minimum of 120%) whereby if there is an achievement of the RBC ratio below the set target, the regulator has the authority to order the insurance company to make a Financial Restructuring Plan (Article 50 POJK No.71/POJK.05/2016).

Risk-based capital can simply be defined as the amount of capital that must be owned by a company in order to cover the risks faced by the company. Insurance companies must

maintain the amount of capital that is commensurate with the risks it faces (US National Association of Insurance Commissioners).

Insurance risk and credit risk are the main risk components faced by insurance companies in Indonesia in addition to other risks such as market risk, liquidity risk and operational risk.

Based on regulations from the Financial Services Authority No.44 / POJK.05.2020 concerning the Implementation of Risk Management for Non-Bank Financial Services Institutions and OJK Circular Letter No. 8/SEOJK.5/2021 concerning the Implementation of Risk Management for Insurance Companies, Sharia Insurance Companies, Reinsurance Companies and Sharia Reinsurance Companies, it is stated that:

1. **Insurance Risk** is the risk of the Company's failure to meet its obligations to policyholders, the insured or participants as a result of the inadequacy of the Risk selection process (underwriting process), setting of premiums or contributions, use of Reinsurance, and/or claim handling.
2. **Credit risk** is the risk due to the failure of other parties to meet their obligations to the Company.

The RBC ratio as well as the amount of each insurance company's risk components are also reported in the published Financial Statements for public in the section of *the Solvency Level Compliance Table*.

Technical Reserve consists of premium reserves, claim reserves and also IBNR (incurred but not reported loss). Meanwhile, the use of reinsurance is a risk spreading mechanism which is expected to reduce the risk of insurance companies. According to (Bressan, 2018) Reinsurance can be used as a capital substitution to increase solvency whereby sharing risk with reinsurance companies can be beneficial for insurance companies in the form of capital relief.

In an insurance company's financial statements (Balance Sheet), this technical reserve is part of the Liability section of Assets while Reinsurance Asset is classified under the Non-Investment Assets section. Meanwhile, in the Income Statement, the premium paid to reinsurance is a deduction from the insurance company's income (considered as an expense) while changes to the Technical Reserve constitute income (if reserves fall) or vice versa become costs (if reserves increase). Both Technical Reserve and Reinsurance assets take up a sizable major portion of the assets on insurance companies' balance sheets.

From the description above, it is assumed that there is an influence between the Technical Reserve ratio and the Reinsurance ratio to insurance risk and credit risk in General Insurance in Indonesia. For this reason, this Literature Review article will discuss relevant previous researches aimed to substantiate the theory under study and explain the relationship among variables and build hypothesis as basis for further research.

Based on the above background, the following research questions are formulated for discussion in order to build hypotheses for further research, namely:

1. Does the Technical Reserve ratio affect credit risk?.
2. Does the Reinsurance ratio affect credit risk?.
3. Does the Technical Reserve ratio affect insurance risk?.
4. Does the Reinsurance ratio affect insurance risk?.
5. Does insurance risk affect credit risk?

## LITERATURE REVIEW

### Credit risk

Failure of other parties to fulfill their obligations to insurance companies will cause credit risk or what is often called counterparty risk. Credit risk basically arises because the counterparty is unable to meet its obligations (Krenn & Oschischnig, 2003).

(Al-Yatama et al., 2020) using sample of insurance companies in Kuwait, concluded that financial performance (ROE, ROA) is mainly influenced by operational risk and credit risk.

Based on OJK Circular Letter No.24/SEOJK.05/2017 concerning Guidelines for Calculation of Risk-Based Minimum Capital Amount for Insurance and Reinsurance Companies, Credit risk is defined as the risk of possible loss or decline in asset value caused by:

1. Failure of debtors and/or other parties to meet its obligations to the Company
2. Failure/inability of the reinsurer to meet its obligations to the Company.

It is further regulated regarding the calculation of credit risk as follows:

- a. For credit risk due to the failure of debtors and/or other parties to meet its obligations to the Company, it is determined by multiplying the risk factor (FR) for certain types of assets by the AYD value (Assets that are allowed / Admitted Assets).

$$\text{Amount of fund} = \sum(\text{AYD}_i \times \text{FR}_i)$$

AYD<sub>i</sub> = AYD asset i.

FR<sub>i</sub> = risk factors for asset i

- b. For credit risk due to the failure/inability of the reinsurer to meet its obligations to the Insurance Company or Reinsurance Company is determined by multiplying the Reinsurance exposure (ER) by the risk factor (FR).

The amount of Reinsurance exposure is calculated from the Technical Reserve for the reinsurer (reinsurance assets), namely the portion of Reinsurance assets that is derived from the estimated claim recovery value for the reinsured portion minus the reinsurer's deposit in any forms placed by the reinsurer with the Insurer, including the premium retained by the Insurer which the insurer has full authority to use the deposit.

$$\text{Amount of fund} = \sum(\text{ER}_i \times \text{FR}_i)$$

ER<sub>i</sub> = reinsurance exposure for reinsurer i

FR<sub>i</sub> = i

Reinsurer is the business partner who is most closely related to the insurance company. To mitigate this credit risk, insurance companies shall avoid concentration of assets on a handful of certain reinsurance parties. Insurance companies also have very large assets in the form of bonds either issued by the state or corporate. The Covid-19 pandemic event had a major impact on the credit risk of insurance companies (Yin et al., 2022), many corporate bonds had their ratings downgraded. Research of (Gonzalez & Naranjo, 2013) concludes that credit risk is influenced by stock volatility and also macroeconomic conditions, especially for insurance companies in Europe.

This credit risk (counterparty risk) variable has also been studied by previous researchers such as (Biais et al., 2016; Chang, 2014), (Assagaf & Ali, 2017), (Mansur & Ali, 2017), (Darwisayah et al., 2021).

### Insurance Risk

It is more well known referred to as underwriting risk or business risk. This is a risk associated with the insurance company's business itself, namely the risks borne by the insurance company which are arising from the insurance contract made with its customers. This insurance risk can be caused by the risk of natural disasters or risks caused by human activities. This risk can be mitigated by increasing insurance premiums or reinsurance (Krenn & Oschischnig, 2003)

According to OJK regulations, Insurance risk (RA) is the risk of the Company's probable failure to fulfill its obligations to policyholders or the insured as a result of the inadequate risk selection process (underwriting), premium setting (pricing), and/or claims handling.

- a. For non-renewable insurance products with a term of > 1 year and renewable insurance products with a term of > 1 year and providing other benefits after a certain period, the calculation of insurance risk is as follows :

$$RA = \max ((CP^* - CP), 0)$$

CP\* = premium reserve calculated with the best estimate plus a margin for risk of deterioration with a 95% confidence level of premium reserve adequacy (company level).  
CP = premium reserve as per financial report (balance sheet) and in accordance to company actuary's calculation.

A stress test to achieve a 95% (ninety five percent) confidence level is carried out on all variables forming the premium reserve calculation, except for the interest rate variable (stress test for the interest rate variable is calculated in the market risk).

Renewable = the terms and conditions of the policy can be renewed on every policy anniversary.

For renewable insurance products with a term of 1 year or > 1 year, the calculation of insurance risk is as follows:

$$RA = \sum ((CAPYBMP_i - AR_i) fcp_i)$$

CAPYBMP<sub>i</sub> = unearned premium reserve for line of business i  
AR<sub>i</sub> = reinsurance asset on unearned premium reserve for line of business i  
fcp<sub>i</sub> = risk factors for unearned premium reserve for line of business i

- b. The calculation of insurance risk (RA) for claim reserve is as follows :

$$RA = \sum ((CK_i - AR_i) fck_i)$$

CK<sub>i</sub> = claim reserve for line of business i  
AR<sub>i</sub> = reinsurance asset on claim reserve for line of business i  
fck<sub>i</sub> = risk factors for claim reserve for line of business i

- c. The calculation of insurance risk (RA) for catastrophe reserve is based on the following formula:

$$RA = \sum ((CARB_i - AR_i) fcb_i)$$

CARB<sub>i</sub> = catastrophe reserve for line of business i  
AR<sub>i</sub> = reinsurance asset on catastrophe reserve for line of business i  
fcb<sub>i</sub> = risk factor for catastrophe reserve for line of business i

The amount of fcp, fck, fcb risk factors vary for each line of business.

Risk management in insurance companies has traditionally focused more on business risks or insurance risks faced by companies which originating from the products sold. Actually, in each stage of the company's development, the main risks faced are also different (Wang et al., 2019) so that insurance company should understand the risk thoroughly.

The increase in the frequency and severity of natural disaster events caused by climate change has led to an increase in insurance risk due to natural disasters (Tesselaar et al., 2020) and even risks resulting from climate change are difficult to insure (Charpentier, 2008).

Among previous research on insurance risk variables (underwriting risk) like as conducted by (Chen et al., 2020; Valecký, 2017), (Ali et al., 2022), (Mulyani et al., 2020), (Sivaram et al., ., 2020), (Agussalim, MP, Rezkiana, A., & Ali, 2016), (Masruhin et al., 2021), (Richardo et al., 2020), (Zahran & Ali, 2020), (Fardinal et al., 2022).

### **Technical Reserve Ratio**

(Pratiwi Hidayah Ndaru & Soesetio, 2021) the Technical Reserve Ratio is used to measure the level of adequacy of funds needed to meet technical obligations. Technical liabilities consist of unearned premium plus estimated claims. According to PSAK 28, the formula for this Technical Reserve ratio is:

$$\text{Technical Reserve Ratio} = \frac{\text{Technical Reserve}}{\text{Net Premium}}$$

A low ratio value may mean that insurance company reserves its technical obligations too low so that if its conditions are not solvent, the company has to readjust its capital level. On the other hand, a high ratio value is also not good and may indicate that the company's business is not profitable. This ratio is related to claims so that any increasing trend in claims shall be monitored by the company.

To understand the importance of making the right technical Reserve calculations, we can use the concept of accounting equations whereby on the Balance Sheet there is :

ASSET = Liability + Equity. Meanwhile, in the Income Statement there is :

INCOME = REVENUE – EXPENSE.

Income = change in retained earnings + dividend to owners

Retained Earnings = Owners Equity – contributed capital

Owners' equity = Asset – Liability

So Retained Earnings = Asset – Liabilities – Contributed Capital

Thus

Income = Change in Assets – Change in Liabilities – change in contributed capital + Dividends to owners (Foundations of Casualty Actuarial Science, 2001).

Changes in Liabilities such as Technical Reserve items will affect the company's income.

In connection with this Technical Reserve, the full definition according to PSAK 28 is as follows:

### **Estimated Claim Liability**

Estimated claims liability is the estimated amount of liability that is dependent on claims that are still in the process of being settled, including claims that have occurred but have not been reported. Changes in the amount of the estimated claim liability, as a further review process and the difference between the estimated amount of the claim liability and the claims paid, are recognized in the statement of comprehensive income in the period in which the change occurs. The entity does not recognize any provision for possible future claims as a liability if the claim arises under an insurance contract that does not exist at the end of the reporting period.

### **Reinsurance Asset**

Reinsurance assets are the value of net contractual rights of cedant in the Reinsurance contract, which consists of the estimated reinsurance recovery for claims that are still in the process of settlement; claims that occurred but have not been reported; and Reinsurance

portion of premium that has not yet been accounted as income. Reinsurance recovery estimates for estimated claims liabilities are recognized and measured at the same time and consistent with when the estimated claim liabilities arise.

Impairment in the value of reinsurance assets occurs when there is objective evidence as a result of events that occurred after the initial recognition of reinsurance assets, which caused the cedant not to receive the entire amount in accordance with the terms of the contract; and the event has an impact that can be reliably measured as to the amounts that the cedant will receive from the reinsurer. Impairment analysis of Reinsurance assets can be carried out periodically.

The carrying amount of the Reinsurance asset is impaired using an allowance account. The amount of the loss is recognized in comprehensive income. Reinsurance assets are derecognized when the contractual rights have expired or when the contract is transferred to another party.

Many studies have discussed the Technical Reserve ratio variables including but not limited to (Gaganis et al., 2016; Lyzhechko & Rozora, 2019; Nagy & Cotlet, 2011), (SiVARAM et al., 2019), (M & Ali, 2017), (Ilhamalimy & Ali, 2021), (Setyadi, 2017), (Pusparani et al., 2021).

### **Reinsurance Ratio**

According to the Reinsurance Association of America, Reinsurance is insurance carried out by insurance companies. This is a mechanism (risk management tool) carried out by insurance companies to reduce the risk it receives by sharing part or all of the insurance risks it bears to other parties (reinsurance companies / reinsurers).

$$\text{Reinsurance Ratio} = \frac{\text{total reinsurance premium}}{\text{total gross premium}}$$

This ratio indicates the use portion of reinsurance by insurance companies. This ratio is inversely proportional to the retention ratio where the greater the reinsurance, the smaller the retention itself.

In return for receiving the risk sharing from the insurance company, the reinsurance company is entitled to a portion of the insurance premium received by the insurance company. Insurance companies also need to purchase certain reinsurance protection (such as excess of loss) to protect them from losses due to natural disaster risks due to the accumulation of own retained natural disaster risk.

The purchase of reinsurance protection is a cost for the insurance company but has an impact on reducing risk (volatility of the loss ratio). Therefore, by buying reinsurance the insurance company incurs a cost to reduce its underwriting risk (Cummins et al., 2021).

According to a study (J. Park et al., 2021) Reinsurance transactions are used by affiliated insurance companies not only to manage underwriting risk and increase underwriting capacity but also to subsidize capital through the internal capital market. For companies that are not affiliated with Reinsurance, it is necessary to find alternatives risk transfers without the need to incur large Reinsurance costs.

Regarding this reinsurance variable, there have been many previous studies conducted by researchers including (Hu et al., 2018; Upreti et al., 2022; Zanutto & Clemente, 2022), (Octavia & Ali, 2017), (Somad et al., 2021), (Suharyono & Ali, 2015), (Ali & Ekawati, 2012).

**Tabel 1: Past Relevant Researches**

| No | Author (Year)                            | Past research results  | Similarity with this Article   | Differences with this Article  |
|----|--|--|--|--|
| 1  | (Aniseh et al., 2019)                    | Profitability, underwriting risk and reinsurance simultaneously affect the solvency of the insurance company   | Underwriting risk, Reinsurance   | The solvency need specific elaboration according to RBC calculation<br>Profitability variables not part of this article.           |
| 2  | (Rahayu Ningsih et al., 2021)            | Retention ratio and underwriting results affect the solvency while size and investment return do not affect the solvency   | Retention ratio affect solvency<br>Retention ratio is the inverse of reinsurance ratio | The solvency need specific elaboration according to RBC calculation  |
| 3  | (Harjadi & Sihombing, 2020)              | underwriting ratio, net premium growth ratio, and risk based capital have significantly negative affect to Financial Distress. Loss ratio, liability to liquid asset ratio and technical reserve ratio significantly to affect positively to financial distress while investment yield ratio does not any effect to potential financial distress                             | Technical reserve ratio variable   | Variables of Net premium growth ratio , investment yield RBC as independent variables while this study RBC is dependent variables. |
| 4  | (Pratiwi Hidayah Ndaru & Soesetio, 2021) | loss ratio, liquidity ratio, technical reserve ratio and year of operation affect the performance ratio but not consistent across all model. Retention ratio has no effect to the performance. To increase the public image, insurance company tend to increase technical reserve  | Technical reserve ratio<br>Retention ratio   | Variables: loss ratio, liquidity ratio and performance ratio.  |
| 5  | (Prowanta & Siswanti, 2021)              | The claim expense ratio has a positive effect on the solvency ratio and stock prices while the technical reserve ratio has no effect on the solvency ratio but has a negative effect on stock prices.  | Technical reserve ratio  | claim expense, stock price variables   |
| 6  | (Manurung et al., 2022)                  | Total assets have a significant positive effect on RBC, loss ratio has a weak negative effect on RBC, GDP has a negative medium effect on RBC.<br><br>IR, CPI and BIR have no effect on RBC even though they are correlated with RBC.  | RBC ratio  | Difference in other variables  |
| 7  | (Setyaningsih et al., 2021)              | premium income and underwriting results partially affect the profitability of insurance companies. While the investment returns and Risk Based Capital partially have no effect on the profitability of insurance companies. Premium income, investment returns, underwriting results and risk based capital simultaneously affect the profitability of insurance companies. | RBC ratio  | RBC as independent variables while profitability as dependent  |

|    |                               |  |                      |  |
|----|-------------------------------|--|----------------------|--|
| 8  | (Hidayat & Yusniar, 2021)     | investment return ratio and risk based capital have a significant effect on the financial performance of the insurance company, while the claims expense ratio, liquidity ratio, own retention ratio, premium growth ratio have no effect on the insurance company's financial performance | Retention ratio, RBC | Difference : dependent variable (profitability) and also in other independent variables. |
| 9  | (Renaldo et al., 2021)        | Current ratio has a positive effect on RBC, interest rates have a negative effect on RBC, premium growth and GDP have no effect on RBC   | RBC                  | Different dependent variables.   |
| 10 | (Wahyuddin & Mauliyana, 2021) | Premium income, investment returns and risk-based capital have a significant positive effect on insurance company profits.   | RBC                  | RBC as independent variable, profit as dependent so it is different from this articles.  |
| 11 | (Pramestika, 2019)            | RBC has no effect on net premium growth and ROA but effect on ROE  | RBC                  | RBC as independent variable, ROE ROA as dependent which is different from this article   |

**RESEARCH METHOD**

The writing of this Literature Review article uses a qualitative method approach through library studies with sources of books, journals and research articles found in online media such as Google Scholar, Mendeley, Research gate, and other academic media. The issues discussed are part of the scope of the financial management field. The nature of this research is exploratory to clarify variables, develop hypotheses and provide direction for further research (Ali, H., & Limakrisna, 2013).

**FINDINGS AND DISCUSSION**

Based on the formulation of the problem, relevant theoretical studies and previous research, the discussion of this literature review article is:

**The influence of the Technical Reserve ratio on credit risk.**

Technical Reserve is not just used to fulfilling obligations to policyholders but also a huge asset to be invested. Most of the Technical Reserves of insurance companies are placed in stocks and bonds (Kondrat et al., 2019). If placed in bonds, it will increase and subject to credit risk. In the Technical Reserve there is also a portion of Reinsurance where if the Reinsurance party defaults, it will cause an increase in credit risk for the insurance company. (Cai et al., 2014) (Gatamel & Lemoyne de Forges, 2012) (S. C. Park et al., 2019)

**The effect of the Reinsurance ratio on credit risk.**

The Reinsurance Ratio has an effect on credit risk because of a situation where the insurance company fails to obtain recovery from the reinsurance company due to the bankruptcy of the reinsurance company. This is in line with research conducted by (Cai et al., 2014) (Gatamel & Lemoyne de Forges, 2012) (S. C. Park et al., 2019)

**The influence of the Technical Reserve ratio on insurance risk**

In the Technical Reserve there is an estimated claim component which in line with the premise that the occurrence of a claim will increase insurance risk. Insufficiency of the Technical Reserve will increase insurance risk for insurance companies (Nagy & Cotlet,



2011). This relationship can also be vice versa where an increase in insurance risk requires an increase in the Technical Reserve (Alhassan, 2018).

**The effect of the Reinsurance ratio on insurance risk.**

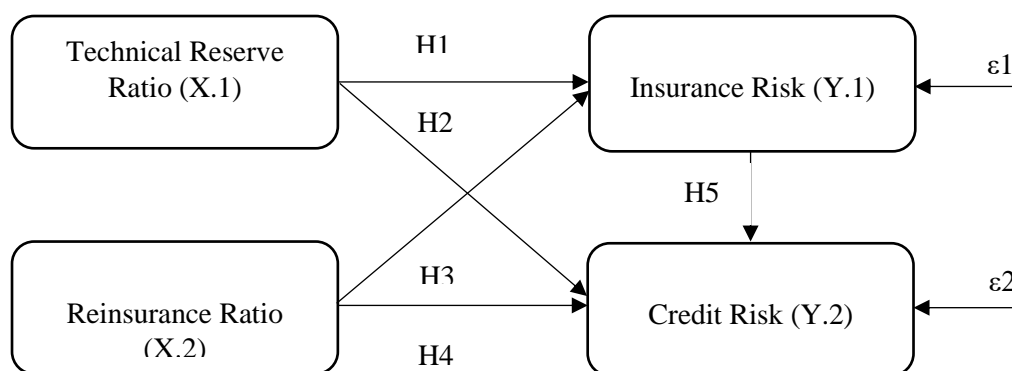
The use of reinsurance is intended as a mechanism for risk mitigation for insurance companies. With reinsurance, it is expected that the risk of insurance companies will decrease because some of the risk is shared with other companies (Bressan, 2018; Cummins et al., 2021).

**The effect of insurance risk on credit risk.**

Insurance risk occurs if the claim has increased but the collected premium is insufficient for example due to a natural disaster. With the increase in insurance risk, efforts are needed to collect Reinsurance claims which pose a risk of credit risk. Many studies have been conducted on the problem of risk aggregation in insurance companies (Carlehed, 2019; Eling & Jung, 2020; Savelli & Clemente, 2011).

**Conceptual Framework**

By using the formulation of the problem, theoretical studies, relevant previous research and discussion of the influence between variables as above, the framework for thinking in this article is as follows:



**Gambar 1: Conceptual Thinking Framework**

Based on the above conceptual framework we may induce that technical Reserve ratio and Reinsurance ratio affect credit risk and insurance risk either directly or indirectly. Meanwhile, insurance risk can also affect credit risk, vv.

Apart from these two exogenous variables that affect the endogenous credit risk and insurance risk variables, there are many other factors including the loss ratio, current ratio and total assets variables.

**CONCLUSIONS AND SUGGESTIONS**

**Conclusions**

Based on the theory, relevant articles and discussions, following hypotheses can be formulated for further research:

1. Technical Reserve ratio has an effect on credit risk.
2. Reinsurance ratio has an effect on credit risk.
3. Technical Reserve ratio has an effect on insurance risk.
4. Reinsurance ratio has an effect on insurance risk.
5. insurance risk affects credit risk.

## Suggestions

Research on the influence of Technical Reserve and Reinsurance ratio to RBC especially on insurance risk and credit risk in General Insurance in Indonesia is still very limited. Therefore, further research with quantitative descriptive methods is needed to empirically test the above hypothesis by collecting financial data from General Insurance companies in Indonesia.

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