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Premium Reserves Calculation on Whole Life Insurance Using The Fackler Method

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Abstract— Everyone has a risk of death and as they get older, the risk of death will increase. Therefore, everyone suggested to have insurance. Not only for individual, the risk is also faced with insurance provider. There are several categories of life insurance. One of the category is whole life insurance. Whole life insurance has benefit for lifetime of the insured. The insurance provider will pay beneficiaries when the policyholder dies within any years. There are two major methods of calculating premium reserve which are prospective and retrospective method. The Fackler method adapting the concept of retrospective method. The assumptions of the Fackler method that final reserve value is determined as the reserve at the end of the next year. Considering the long-term impact, this study conducted premium reserves calculation on whole life insurance using the Fackler method. This study use "Tabel Mortalitas Penduduk Indonesia 2023" from BPJS Kesehatan as Mortality Data and 5.75% as interest rate from BI-Rate. The result of this study shows that the amount of premium reserves reaches the promised benefit at the age of 67 years old for male and 70 years old for female. Life expectancy in Indonesia is 73 years old for male and 78 years old for female. Based on the result, the Fackler method success reaches the promised benefit below life expectancy Indonesia.

Keywords— life insurance, whole life insurance, premium reserves, the fackler method

I. INTRODUCTION

Risk is made to negative outcomes only [1]. Risk is not one-sided, because the outcome uncertainty implies the potential for both favorable and unfavorable outcomes. People who face risk are more worried about the negative consequence than the positive one, which is reflected in some definitions of risk that place a strong focus on the negative outcome. When a negative event occurs, the benefit lost is larger than the benefit gained from a comparable negative outcome. Nowadays, there are many disasters that can happen to anyone. In recent years, there have been many fires, floods, and several natural disasters in Indonesia and even in the world. In addition to disasters caused by nature, several disasters can also occur ranging from serious illnesses to accidents that cause death. Therefore, everyone has a risk of death and as they get older, the risk of death will increase. People who have dependents to support their families have great responsibilities with various risks faced. When a head of the family is sick and unable continue working, the entire family faces great risks. Therefore, everyone is suggested to have insurance ranging from health insurance to life insurance. Life insurance will ease the burden of the family left behind, with premiums paid every month or every year will be a benefit that can be claimed when the insured dies. Even though people already have insurance, there are other risks that come from insurance companies. There is a risk that insurance companies fail to pay the promised benefits, this can happen due to various things including inflation, political decisions, and bankruptcy. Therefore, insurance companies must have reserves including premium reserve.

Under Otoritas Jasa Keuangan (OJK) Regulation no. 71/POJK.05/2016 Article 19 Paragraph (1), insurance companies must form technical reserves for all insurance contracts. Therefore, the components of technical reserves, including premium reserves for policies with duration of more than one year is listed in Otoritas Jasa Keuangan (OJK) Regulation no. 71/POJK.05/2016 Article 20 Paragraph (2). In addition, Under Otoritas Jasa Keuangan (OJK) Regulation no. 69/POJK.05/2016 Article 44 Paragraph (1) section (d), the actuary of the insurance companies has responsibility to calculate reserve. Otoritas Jasa Keuangan (OJK) Regulation no. 71/POJK.05/2016 are focused on the technical reserve that insurance companies must maintain including premium

reserves. The regulations provide the foundation for the regulatory requirements on how premium reserves should be calculated using actuarial assumptions, ensuring that insurance companies can cover future policy claims and obligations. In addition

There are two types for calculating premium reserve, the first one is Retrospective Method and the second is Prospective Method. One of method to calculate premium reserve is Fackler method. The concept of the Fackler Method is based on Retrospective Method. Benefit of the Fackler Method is very useful to calculating premium reserves for long term. The Fackler method gives a more accurate depiction of the amount of reserve required to ensure the solvency of the insurance provider [2]. There are a several categories of coverage in life insurance including: whole life insurance, term life insurance, pure endowment insurance, and endowment insurance. Whole life insurance requires sufficient reserve for the long term, since the insured remains covered until the insured die. When calculating for whole life insurance, the Fackler Method helps ensure that premium reserve continues to grow as the insured ages, and is sufficient to cover the company's future liabilities.

Another study that discuss premium reserves calculations using the Fackler method. The conclusion of this study is required premium reserve for an endowment life insurance policy is likely to increase as the insured's age increases at the time of enrollment. Premiums at an older age are also higher due to shorter life expectancy, resulting in higher insurance payments over relatively shorter time period [3]. Another research also conducted research on comparison Zillmer method and Fackler method. The Fackler method give higher reserve value, especially early in the policy. However, both methods lead to decrease in reserves as the policy approaches its end, reaching zero when the coverage period is completed. This happen because, over time, the policyholder's premium payments and the insurer's obligation start to reduce as the policy nears its expiration. Near the end of the coverage, there are fewer risks and fewer remaining obligations for the insurance provider, resulting in lower reserve needs [4]. Many of researcher use endowment life insurance as type of insurance and mortality table from 2019. This study uses whole life insurance and newest mortality table from 2023.

Considering long term impact of the Fackler Method in premium reserves calculations for the insurance provider for the provider's solvency and ability to maintain sufficient reserve. Therefore, the author is interested in calculating Whole Life Insurance Premium Reserve using the Fackler Method.

II. Literature Review

A. Interest Rate

Interest refers to the cost incurred by borrower for using funds provided by a lender. Interest plays crucial role in determining premium reserves, which are funds an insurance provider sets aside for future claims by its policyholders. Since insurers collect premiums in advance, they invest the collected money in interest-yielding instruments that yield returns over time [5].

In this research discount factor help to calculate premium reserves. Discount factor is the present value of an investment from the end of the term back to the start of that term [6]. The discount factor denoted by v, and can be expressed as

$$v = \frac{1}{1+i} \tag{1}$$

B. Insurance

Assurance is a form of guarantee or protection [7]. Insurance, on the other hand, is a agreement between the insured and the insurance provider. Insurance companies are responsible for offering protection against unexpected events. The person or company that wants this protection is called the policyholder. The policyholder regularly pays premiums, and in return, the insurance provider provides compensation if certain agreed-upon events take place.

Life insurance is a policy that covers any event that may or may not happen, such as paying out in the case of the policyholder's death due to an accident. Most life insurance contracts are written for a long duration and pay the policyholder's beneficiaries according to the time of failure occur of the insured or policyholder. The term "life assurance" is often used for those contracts that ensure an event that must occur at some time in the future [8].

C. Mortality Table

A mortality table is a statistical tool that shows data on the death patterns within a population. It can usually be applied in actuarial science, demographics, and public health [9]. The mortality table models the number of individuals who survive starting from a specific point, which could be birth or any other defined moment in time.

If an individual is alive at age x, denoted by (x), the likelihood of surviving an additional time t is denoted by ${}_tp_x$ in actuarial symbol [10]. The formula can be expressed as

$$ {}_tp_x = \frac{l_{x+t}}{l_x} \tag{2} $$

Another condition is If an individual is alive at age x, denoted by (x), the likelihood of an individual dies in additional time t is denoted by ${}_tq_x$ in actuarial symbol [10]. The formula can be expressed as

$$ {}_tq_x = \frac{l_x - l_{x+t}}{l_x} \tag{3} $$

Another formula that expressed how many people die at age (x) years old

$$ d_x = l_x - l_{x+1} \tag{4} $$

Where l_x is the amount of people lived that age (x) years old and l_{x+t} is the amount of people lived that age $(x+t)$ years old

D. Net Single Premium

The Net Single Premium (NSP) is the Actuarial Present Value (APV) of the expected benefits from an insurance contract. NSP is the amount of money that the insured or policyholder pay to the insurance provider [7]. Whole life insurance, also known as permanent life insurance. Whole life insurance offers protection for the insured's or policyholder's lifetime. The insurance provider will pay beneficiaries when the policyholder dies within any years [8]. The formula of NSP for whole life insurance is

$$ A_x = \sum_{k=0}^{\omega-x-1} v^{k+1} \, {}_kp_x \, q_{x+k} \tag{5} $$

Where ω is the maximum age in mortality table.

E. Life Annuity

A life annuity consists of a sequence of payments made either continuously or at fixed periods, such as monthly, quarterly, or annually, for as long as the individual remains alive. These payments can be for a limited time or temporary for the person's entire life. Payments may also be made at the beginning of each interval which be called annuity-due or at the end which be called annuity-immediate [11].

The formula for whole life annuity-due is

$$ \ddot{a}_x = \sum_{k=0}^{\omega-x-1} v^k \, {}_kp_x \tag{6} $$

Another variation of a life annuity-due which is n-year temporary life annuity due, the formula is

$$ \ddot{a}_{x:\overline{n}|} = \sum_{k=0}^{n-1} v^k \, {}_kp_x \tag{7} $$

The Actuarial Accumulated Value (AAV) at the end of the term for n-year temporary life annuity-due, which pays 1 per year as long as person (x) still alive is

$$ \ddot{s}_{x:\overline{n}|} = \frac{\ddot{a}_{x:\overline{n}|}}{{}_nE_x} \tag{8} $$

Where ${}_nE_x = v^n \, {}_np_x$.

F. Net Annual Premium

Net Annual Premium (NAP) is the sum insured is payable at the end of the policy year in which death occurs, and the first premium is payable when the insurance is issues. Subsequent premiums are payable on anniversaries of the policy issue date while the insured survives during the contractual premium payment period. The set of annual premiums form a life annuity-due [10]. The formula for calculating NAP is

$$ P_x = \frac{A_x}{\ddot{a}_x} \tag{9} $$

G. Premium Reserves

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There are two major methods of calculating these reserves: prospective and retrospective methods. The prospective reserve method considers all the expenses that will be incurred in the future minus all the income that will be earned in the future for each policyholder. In other words, it looks ahead at what the company expects to pay and receive in the future. While the retrospective reserve method calculates the reserves based on past income up to the time of the reserve calculation, subtracting the expenses already paid out for each policyholder. It primarily looks back at what has been earned and spent to determine the reserves [10]. The premium reserves formula for retrospective method is

$$ {}_tV_x = P_x \, \ddot{s}_{x:t\rceil} - {}_tk_x \tag{10} $$

Where ${}_tk_x$ is the Accumulated Cost of Insurance (COI) over the age interval $(x, x+t)$. The formula of Accumulated COI is

$$ {}_tk_x = A^1_{x:t\rceil} \frac{1}{{}_tE_x} \tag{11} $$

III. METHODOLOGY

The Fackler method developed by American Actuaries named David Parks Fackler. The concept of the Fackler method adapting from Retrospective Method for Premium Reserve Calculation. The assumption underlying the Fackler method specifies that final reserve value is determined as the reserve at the end of the next year. Therefore, the reserve required is for year $t+1$.

Substitute formula for discount factor from equation (1) and formula from mortality table from equation (2), (3), and (4) into equation (10).

$$ \begin{aligned} {}_1V_x &= \frac{(l_x \, {}_0V_x + l_x \, P_x)(1+i) - d_x}{l_{x+1}} \\ {}_2V_x &= \frac{(l_{x+1} \, {}_1V_x + l_{x+1} \, P_x)(1+i) - d_{x+1}}{l_{x+2}} \\ {}_3V_x &= \frac{(l_{x+2} \, {}_2V_x + l_{x+2} \, P_x)(1+i) - d_{x+2}}{l_{x+3}} \\ &\vdots \\ {}_tV_x &= \frac{(l_{x+t-1} \, {}_{t-1}V_x + l_{x+t-1} \, P_x)(1+i) - d_{x+t-1}}{l_{x+t}} \end{aligned} \tag{12} $$

To calculate the reserve at the of year $t+1$, using equation (13), can be expressed as

$$ {}_{t+1}V_x = \frac{(l_{x+t} \, {}_tV_x + l_{x+t} \, P_x)(1+i) - d_{x+t}}{l_{x+t+1}} \tag{13} $$

Then, substitute equation (1) into equation (13)

$$ {}_{t+1}V_x = \frac{l_{x+t}\,({}_tV_x + P_x)v^{-1}}{l_{x+t+1}} - \frac{d_{x+t}}{l_{x+t+1}} \tag{14} $$

To get the final formula of the Fackler method, needs to substitute equation (8) and (11) into equation (14). First, calculate equation (8) as follows

$$ \begin{aligned} \ddot{s}_{x:t\rceil} &= \frac{\ddot{a}_{x:t\rceil}}{{}_tE_x} \\ \ddot{s}_{x+t:1\rceil} &= \frac{\ddot{a}_{x+t:1\rceil}}{E_{x+t}} \\ &= \frac{\sum_{k=0}^{1-1} v^k \, {}_kp_{x+t}}{v^1 \, {}_1p_{x+t}} \end{aligned} $$

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$$\ddot{s}_{x+t:\overline{1}|} = \frac{v^{0}\,{}_{0}p_{x+t}}{v^{1}\,{}_{1}p_{x+t}} = \frac{l_{x+t}\,v^{-1}}{l_{x+t+1}} \tag{15}$$

Then, calculate equation (11) as follows

$$\begin{aligned} {}_{t}k_{x} &= \frac{A^{1}_{x:\overline{t}|}}{{}_{t}E_{x}} \\ k_{x+t} &= \frac{A^{1}_{x+t:\overline{1}|}}{E_{x+t}} \\ &= \frac{\sum_{k=0}^{1-1} v^{k}\,{}_{k}p_{x+t}\,q_{x+t+k}}{v^{1}\,{}_{1}p_{x+t}} \\ &= \frac{v^{0}\,{}_{0}p_{x+t}\,q_{x+t}}{v^{1}\,{}_{1}p_{x+t}} \\ &= \frac{\frac{d_{x+t}}{l_{x+t}(1+i)}}{\frac{l_{x+t+1}}{l_{x+t}(1+i)}} \\ &= \frac{d_{x+t}}{l_{x+t+1}} \end{aligned} \tag{16}$$

Then the formula for premium reserves calculation using the fackler method is

$${}_{t+1}V_{x} = \ddot{s}_{x+t;\overline{1}|}\,({}_{t}V_{x} + P_{x}) - k_{x+t} \tag{17}$$

Then, below is the flowchart for calculating premium reserves on whole life insurance using the fackler method

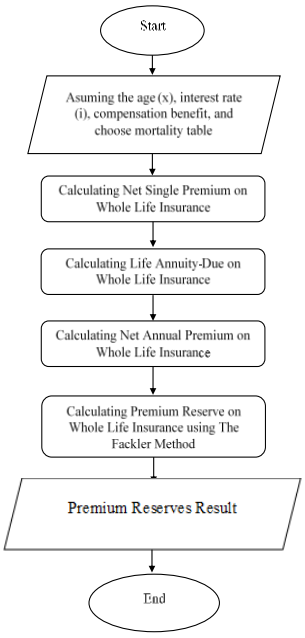

Figure 1 Premium Reserves Calculation Flowchart

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IV. Result and Discussion

A. Data Preparation

In this research, the age of policyholder is 35 years old and applicable for male and female and use whole life insurance as type of insurance. The interest rate is 5.75% obtained from BI-Rate as of February 19th, 2025. The benefit compensation assumes to be IDR 100,000,000.00. The amount of benefit chooses based on average benefit in some of the company in Indonesia. The mortality data used in this study obtained from "Tabel Mortalitas Penduduk Indonesia 2023" published by Badan Penyelenggara Jaminan Sosial (BPJS) Kesehatan. Below is the preview of mortality table.

x	Male		Female	
	p_x	q_x	p_x	q_x
0	0.990209	0.009791	0.992120	0.007880
1	0.997474	0.002526	0.997904	0.002096
2	0.998921	0.001079	0.999100	0.000900
3	0.999299	0.000701	0.999420	0.000580
		.		
		.		
		.		
109	0.461351	0.538649	0.481468	0.518532
110	0.433729	0.566271	0.440316	0.559684
111	0	1	0	1

Table 1 Mortalitas Penduduk Indonesia 2023

For table above, its explain the probability of survive and death for every age from 0 until 111. For example, the probability of male age 2 survive within 1 years is 0.998921. Then, the probability of female age 2 die within 1 year is 0.000900. Also, the table shows that if person age 111, the probability of survive is 0 and the probability of death is 1. Means, the person age 111 will die or not survive within 1 year.

B. Calculating Net Single Premium (NSP)

To calculate NSP on whole life insurance, first need to calculate discount factor. Discount factor is denoted by v with the following formula

$$v = \frac{1}{1+i}$$

Substitute $i = 5.75\%$ into the formula

$$v = \frac{1}{1+0.0575}$$
$$= 0.945626$$

So, the value of discount factor is 0.945626. This value use to calculate premium reserve in this research.

In this research, the insured age used is 35 years old applicable for male and female. Since the research used mortality table, then it has the maximum age. According to Tabel Mortalitas Penduduk Indonesia 2023, the maximum age is 111. Therefore, the value of $\omega = 111$. The NSP on whole life insurance calculation is using equation (5). First, calculate the NSP on whole life insurance for male. The calculation is below

$$A_{35} = \sum_{k=0}^{111-35-1} v^{k+1}\, {}_k p_{35}\, q_{35+k}$$

$$= v^1\, {}_0 p_{35}\, q_{35} + v^2\, {}_1 p_{35}\, q_{36} + v^3\, {}_2 p_{35}\, q_{37} + \ldots\ldots + v^{76}\, {}_{75} p_{35}\, q_{110}$$

$$= 0.945626^1\ (1)\ (0.001846) + 0.945626^2\ (0.998154)$$
$$(0001981) + 0.945626^3\ (0.996177)\ (0.002123)$$
$$+\ldots\ldots + 0.945626^{76}\ (0.000133)(0.566271)$$

$$= 0.1375858468$$

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The insured can choose whether the payment made by once in the beginning of the contract or every year until the insured dies. NSP is the amount of money that the insured or policyholder pay to the insurance provider. The payment is only once in the beginning of the contract if the insured choose NSP for payment method. Since, the benefit is IDR 100,000,00.00. Then multiply the value above with the benefit.

$$\begin{aligned} A_{35} &= b_{k+1}\ (0.1375858468) \\ &= IDR\ 100{,}000{,}000.00\ (0.1375858468) \\ &= IDR\ 13{,}758{,}584.68 \end{aligned}$$

So, the amount of money that the male insured pay if using NSP for payment method is IDR 13,758,584.68

C. Calculating Whole Life Annuity-Due

The formula for calculating whole life annuity-due can be seen in equation (6). Then, apply the calculation for male with 35 years old. The formula is below

$$\begin{aligned} \ddot{a}_{35} &= \sum_{k=0}^{111-35-1} v^k\ {}_k p_{35} \\ &= v^0\ {}_0 p_{35} + v^1\ {}_1 p_{35} + v^2\ {}_2 p_{35} + \ldots\ldots + v^{75}\ {}_{75} p_{35} \\ &= 1\ (1) + 0.945626^1\ (0.998422) + 0.945626^2\ (0.996177) \\ &\quad + \ldots\ldots + 0.945626^{75}\ (0.000133) \\ &= 15.860906 \end{aligned}$$

D. Calculating Net Annual Premium (NAP)

After knowing the value of NSP on whole life insurance and whole life annuity-due. Then, the value of those two calculation can be used to calculate NAP. Apply benefit compensation with the amount of IDR 100,000,000.00 into the calculation. Then, using the equation (9) to calculate NAP. First, calculate the NAP for male. The calculation is below

$$\begin{aligned} P_{35} &= \frac{A_{35}}{\ddot{a}_{35}} \\ &= \frac{0.1375858468}{15.860906} \\ &= 0.0086745264 \end{aligned}$$

There are 2 type of payments. NAP is the amount of money that the insured or policyholder pay every year during the contract to the insurance provider. So if the insured used NAP as type of payment, means the insured have to pay every year. Since the types of insurance is whole life insurance. The insured have to pay net annual premium until the insured die. Since, the benefit is IDR 100,000,00.00. Then multiply the value above with the benefit.

$$\begin{aligned} P_{35} &= b_{k+1}\ (0.0086745264) \\ &= IDR\ 100{,}000{,}000.00\ (0.0086745264) \\ &= IDR\ 867{,}452.64 \end{aligned}$$

So, the amount value that the male insured pay every year is IDR 867,452.64

E. Calculating Premium Reserves Using The Fackler Method

After calculating NAP. The amount of NAP can be used to calculate premium reserve using the Fackler method. Premium Reserve is the amount of money that insurance provider keeps. The money come from net annual premium paid every year from the insured. The formula can be seen in equation (17). The premium reserve calculation can be seen below

$${}_{0+1}V_{35} = \ddot{s}_{35+0:\overline{1}|}\left({}_0V_{35} + P_{35}\right) - k_{35+0}$$

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Above formula is to calculate the premium reserve at the period $(0 + 1)$ year.

$$
\begin{aligned}
{}_1V_{35} &= \ddot{s}_{35:\overline{1}|}\left({}_0V_{35} + P_{35}\right) - k_{35} \\
&= \frac{1}{v^1\, p_{35}}\left({}_0V_{35} + P_{35}\right) - \frac{q_{35}}{p_{35}} \\
&= 1.059456\ (0 + IDR\ 867{,}452.64) - 0.001849 \\
&= IDR\ 919{,}027.69
\end{aligned}
$$

So, the amount of premium reserve that insurance provider keep from male insured at the period 1 year is IDR 919,027.69.

F. Discussion

The preview in total amount of premium reserve using the Fackler method can be seen in table below.

Period $(t + 1)$	Premium Reserves			
	Male		Female	
0	IDR	-	IDR	-
1	IDR	919,027.69	IDR	751,064.90
2	IDR	1,892,952.88	IDR	1,546,732.46
3	IDR	2,925,339.32	IDR	2,389,834.27
4	IDR	4,020,051.25	IDR	3,283,423.78
5	IDR	5,181,322.86	IDR	4,230,837.05
6	IDR	6,413,775.42	IDR	5,235,681.17
7	IDR	7,722,378.51	IDR	6,301,850.44
8	IDR	9,112,642.62	IDR	7,433,644.47
9	IDR	10,590,753.60	IDR	8,635,838.60
10	IDR	12,163,468.88	IDR	9,913,615.98
11	IDR	13,838,070.31	IDR	11,272,508.95
12	IDR	15,622,799.16	IDR	12,718,774.81
13	IDR	17,527,199.00	IDR	14,259,531.89
14	IDR	19,562,107.09	IDR	15,902,645.89
15	IDR	21,739,544.59	IDR	17,656,605.64
16	IDR	24,073,657.78	IDR	19,531,075.14
17	IDR	26,580,907.32	IDR	21,537,069.23
18	IDR	29,279,203.05	IDR	23,686,302.54
19	IDR	32,186,958.84	IDR	25,990,762.19
20	IDR	35,324,427.67	IDR	28,464,018.36
21	IDR	38,714,412.57	IDR	31,121,680.09
22	IDR	42,381,831.41	IDR	33,980,541.45
23	IDR	46,353,312.21	IDR	37,057,882.82
24	IDR	50,660,865.13	IDR	40,373,698.14
25	IDR	55,343,766.75	IDR	43,951,563.30
26	IDR	60,447,026.92	IDR	47,817,337.14
27	IDR	66,019,634.93	IDR	51,997,991.42
28	IDR	72,117,829.52	IDR	56,523,603.29

29	IDR	78,804,118.64	IDR	61,427,246.41
30	IDR	86,144,594.18	IDR	66,743,449.28
31	IDR	94,207,832.58	IDR	72,507,806.51
32	IDR	103,074,447.11	IDR	78,761,979.40
33	IDR	112,841,028.76	IDR	85,554,735.07
34	IDR	123,619,554.98	IDR	92,940,246.63
35	IDR	135,539,326.46	IDR	100,978,738.07
36	IDR	148,757,675.17	IDR	109,742,362.84
37	IDR	163,459,606.97	IDR	119,316,059.84
38	IDR	179,846,587.04	IDR	129,792,960.73
39	IDR	198,129,788.58	IDR	141,270,846.20
40	IDR	218,547,248.37	IDR	153,861,398.66
41	IDR	241,375,412.62	IDR	167,695,298.19
42	IDR	266,934,078.13	IDR	182,922,481.64
43	IDR	295,594,700.11	IDR	199,714,507.30
44	IDR	327,823,123.16	IDR	218,282,979.81
45	IDR	364,227,847.71	IDR	238,898,485.78
46	IDR	405,599,651.30	IDR	261,898,294.35
47	IDR	452,965,572.63	IDR	287,691,069.14
48	IDR	507,665,758.20	IDR	316,768,230.55
49	IDR	571,433,594.87	IDR	349,716,392.89
50	IDR	646,499,643.40	IDR	387,243,068.56
51	IDR	735,748,788.76	IDR	430,220,358.66
52	IDR	842,970,866.35	IDR	479,757,681.78
53	IDR	973,235,898.66	IDR	537,305,873.91
54	IDR	1,133,464,742.59	IDR	604,797,169.56
55	IDR	1,333,277,347.97	IDR	684,852,693.45
56	IDR	1,586,285,432.51	IDR	781,078,673.29
57	IDR	1,912,064,652.30	IDR	898,499,216.58
58	IDR	2,339,237,379.26	IDR	1,044,191,469.31
59	IDR	2,910,386,457.71	IDR	1,228,241,284.25
60	IDR	3,690,096,272.24	IDR	1,465,220,071.01
61	IDR	4,778,442,301.46	IDR	1,776,546,842.83
62	IDR	6,334,150,543.10	IDR	2,194,332,716.33
63	IDR	8,615,419,822.06	IDR	2,767,835,993.24
64	IDR	12,053,740,506.99	IDR	3,574,573,365.81
65	IDR	17,391,411,241.11	IDR	4,740,018,095.55
66	IDR	25,945,588,495.59	IDR	6,473,576,646.94
67	IDR	40,132,012,240.60	IDR	9,136,649,158.56
68	IDR	64,540,761,424.52	IDR	13,376,167,816.96
69	IDR	108,228,474,963.72	IDR	20,397,608,337.02
70	IDR	189,794,803,277.60	IDR	32,548,787,518.06
71	IDR	349,100,886,535.60	IDR	54,631,452,051.71

72	IDR	675,512,670,087.35	IDR	97,012,411,568.24
73	IDR	1,379,152,660,204.33	IDR	183,463,595,889.59
74	IDR	2,979,436,158,209.65	IDR	372,288,865,562.19
75	IDR	6,829,408,963,321.48	IDR	817,699,671,029.47
76	IDR	16,651,182,872,353.60	IDR	1,963,858,120,061.12

Table 2 Premium Reserves Results

Since the category of insurance used in this study is whole life insurance. Means that the insured have to pay net annual premium every year until the year of the insured dies. The parameter for calculating premium reserves on whole life insurance is the premium reserves have to reach promised benefit below life expectancy. This condition is different like other type of insurance since the other insurance have specific time contract like endowment life insurance. The premium reserves achieve the amount with close to the benefit amount of IDR 100,000,000.00 at period 32nd year for male and 35th year for female. Means that is reasonable since according to (Tabel Mortalitas dan Morbiditas Penduduk Indonesia, 2023) life expectancy in Indonesia is around 73 years old for male and 78 years old for female.

Based on the results, the female premium reserves reach the promised benefit longer than male premium reserves. This condition happens because the probability of female survive is higher than male.

However, it is important to note that the insurance benefit of IDR 100,000,000.00 is guaranteed and will be paid upon the death of the insured, regardless of when it occurs. While the individual reserve may not equal the full benefit in the earlier policy years, insurance provider operates under the principle of risk and maintain collective reserves and capital to ensure they can fulfill benefit payments at any time. The reserve buildup over time reflects the insurer's strategy to gradually accumulate sufficient funds for all policies, based on actuarial assumptions and mortality projections. Whole life insurance is useful for insurance provider when the insured dies above life expectancy because the insured still pay net annual premium while the reserves already reach the promised benefit. On the other hands, whole life insurance gives advantage to the insured because the protection is lifetime, means that whenever the insured dies, the insured will get promised benefit.

V. CONCLUSION

Premium reserves calculation using the Fackler method is determined by the age of the insured. Other data also influence the result of the calculation which are mortality data and interest rate. It was observed that the premium reserves values differ between male and female policyholders, due to differences in mortality rates. The concept of the Fackler method can be benefit to the long-term because the assumption of the Fackler method describes that the determined final reserve value is the reserve at the end of the next year. Also for the formula itself, it can be observed that the Fackler method uses the previous year value of premium reserves. Means that, the Fackler provides a more accurate reflection of future obligations over the entire life of the policy. By continuously adjusting the reserve based on the time that has passed and future years, the Fackler method ensures that long-term liabilities are properly accounted for. This makes it an effective approach for ensuring the financial stability of insurers with long-term obligations.

According to the result of this study, this study is limited to the premium reserves using the Fackler method. In further research. the premium calculation can be replaced by using stochastic interest rate estimation and for premium reserves can be use different methods from prospective method. In addition, it can also use the multi-life models like joint life and last survivor.

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