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Employee Benefits Program Valuation with Multiple Decrement Model Based on PSAK 24 Post-COVID-19 Pandemic

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ABSTRACT

In this article, we evaluate the post-labor compensation program based on PSAK-24 in the new normal era of the COVID-19 pandemic. In order to create a table multiple decrements based on a single table decrement namely, death, withdrawal, total permanent disability, and retirement. In the new normal era of the COVID-19 pandemic, the benefits of death, death caused by COVID-19, withdrawal, total permanent disability, and retirement were then aggregated. The method used in this study is a quantitative method with a case study approach of COVID-19. The data used is secondary data on the number of COVID-19 positive cases in Indonesia from January 2021 to December 2022. In this study, an actuarial model, the Multiple Decrement Model, was applied to calculate the valuation of the post-labor compensation program based on PSAK-24 using five decrements as the cause of claims consisting of death, death cause of COVID-19, withdrawal, total permanent disability and retirement. The calculation results that can be seen that large annual net premiums multiple decrement cases that provide benefits according to the cause of failure getting bigger as that person gets older.

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A. INTRODUCTION

The pension fund program has become a compulsory one for the entire company for all its employees, which is the right of an employee. The regulatory frameworks of pension fund schemes that are subject to legal scrutiny and are governed by various laws in various countries serve as evidence for this reality. This study will concentrate on post-employment compensation, which is partially funded by corporate contributions. The financial pension institution is in charge of managing the present funds, which consist of contributions made over a certain period of time. It will then be discussed on current valuations related to future pension fund benefits based on calculations as well as actuarial assumptions (Academy of Actuaries, 2004). Therefore, the use of Multiple Decrement Model for the valuation of this program has become crucial. In the new normal era of the COVID-19 pandemic, the evaluation of these programmes has become increasingly complex due to changes in economic and demographic conditions. Complex risk probabilities have been developed to calculate complex risk opportunities and the application of this transformation in probability theory (Ekasasmita et al., 2023) (Ekasasmita et al., 2023). Therefore, the valuation of the post-work remuneration program is very important for the company as it is an important part of its long-term financial obligations. This research is urgent because it will help companies make better financial decisions related to their post-work remuneration programs. The accounting for employee benefits, for pensions in particular, is complex. The liabilities in defined benefit pension plans are frequently material. They are long-term and difficult to measure, and this gives rise to difficulty in measuring the cost attributable to each year. PSAK 24 regulates the accounting of remuneration accounting for employer entities. The purpose of this research is to evaluate the employee benefit program based on PSAK-24 in the new normal era of the COVID-19 pandemic. In order to that goal, first of all, literature related to the payment of unpaid work. Then, by emulating actual conditions, the assumptions are developed so they may be applied to the Multiple Decrement Model. Then calculate the valuation of the Post-Work Remuneration program using the Multiple Decrement Model using the MATLAB software. The COVID-19 pandemic has had a significant impact on the world of work and the well-being of corporate employees. Many companies are forced to terminate employment relationships or relocate employees, one of which is restructuring to reduce operating costs (Wang et al., 2020). The post-work remuneration program is a form of financial protection for employees after they resign from the company or retire (Boado-Penas et al., 2023; Josa-Fombellida & Navas, 2020a; Zhang et al., 2018). However, the evaluation of this program has become increasingly complex in the new normal era of the COVID-19 pandemic. PSAK 24 (Revision 2019) is a financial accounting standard that regulates post-work remuneration. This standard provides guidelines on how companies should calculate the current value and recognising the cost of post-work remuneration.

Valuation of post-employment remuneration programmes is crucial to companies as it is an important part of their long-term financial obligations (Anthropelos & Blontzou, 2023; Walk et al., 2021). How regularization and cross-traffic validation techniques can be used to obtain a coherent prediction model for mortality prediction and analyzed how the effects of the COVID-19 type could affect predictions in the classic one. (Barigou et al., 2020). The relationship between the insurance sector and stock market development have investigated by (Bayar et al., 2022). The government's health-related subsidies and pension fund withdrawals have partially contributed to the formal labor shortage in the construction industry. According to logit model estimates, the likelihood of being rejected rose with job experience, which was correlated with the worker's age (Idrovo-Aguirre & Contreras-Reyes, 2021). In the new normal era of the COVID-19 pandemic, the evaluation of this program has become increasingly complex due to changes in economic and demographic conditions.

The multi-status model has always been used in determining the transition status in health like a healthy case into a sick one (Ekasasmita, 2015). The Multiple Decrement Model is a mathematical method used to model the risk of death, disability, and retirement in employees (Lee et al., 2019). Using this model, companies can calculate the current value of the post-work remuneration program more accurately. Therefore, this research will combine the PSAK 24 and Multiple Decrement Model to calculate the current value of the post-work remuneration program in the new normal era of the COVID-19 pandemic (Shang et al., 2022). This research is expected to provide a better understanding of the valuation of post-employment remuneration programmes and help companies in making better financial decisions amid uncertain pandemic situations (Jaiswal et al., 2022). As for the formula problem of this research is how to apply the Multiple Decrement Model to calculate the valuation of the post-work remuneration program based on PSAK-24 in the era of new normal pandemic COVID-19.

The study aims to evaluate the post-labour compensation program based on PSAK-24 in the new normal era of the COVID-19 pandemic. To that goal, first of all, literature related to the payment of unpaid work (Marska-Dzioba & Barczak, 2022; Petraki & Zalewska, 2015). The impact the withdrawal may have on people's retirement funds was either under or over-estimated (Bateman et al., 2023). The relevant presumptions are then developed to be applied to the Multiple Decrement Model by emulating actual conditions.

PSAK 24 is a financial accounting standard that regulates post-work remuneration such as retirement, retirement money, and health benefits (Financial Accounting Standards Board, 2010). Evaluation of post-employment remuneration programmes is crucial to companies as it is an important part of their long-term financial obligations (Josa-Fombellida & Navas, 2020a; Strumskis & Balkevičius, 2016; Williams et al., 2018). This valuation is set out in Financial Accounting Standards Statement No. 24 on post-work remuneration of the Indonesian Accounting Union. The calculation of the pension fund program with the system pay as you go is calculated by dividing the amount of money to be paid to the pensioner by the percentage of the salary where the implementation of a fully funded system is done using the method projected units credit (Angkasa et al., 2021; Nur et al., 2022). Retirement benefits obtained at retirement with each method are affected by the accumulation of retirement benefits (Goto & Yanase, 2021). In order to create a table multiple decrement based on a single table decrement namely, death, death caused by COVID-19, withdrawal, total permanent disability, and retirement in the new normal era of the COVID-19 pandemic the benefits of death, death caused by COVID-19, withdrawal, total permanent disability, and retirement were then aggregated.

B. METHODS

The method used in this study is a quantitative method with a case study approach of COVID-19. The data used is secondary data on the number of COVID-19 positive cases in Indonesia from January 2021 to December 2022 (kawalcovid19.id). In this study, an actuarial model, the Multiple Decrement Model, was applied to calculate the valuation of the post-Labor compensation program based on PSAK-24 using five decrements as the cause of claims consisting of death, death cause of COVID-19, withdrawal, total permanent disability and retirement. This study is conducted in the following stages: Data identification: the study of literature is a necessary step before starting research, so that several stages of research preparation can be undertaken. At this stage, the literature study and data collection of COVID-19 cases will be used in conducting data processing. Mathematical Modelling: before performing simulations and calculations, compile multiple decrement tables that will be used to create the mathematical model to be used by preparing the programming code to run according to the plan at the simulation and calculation stages. The model that has been formed is used to calculate the employee benefit program. Simulation and Calculation Stages: this phase will run the entire plan that has been made at the simulation and calculation stages. There are three stages, carrying out data valuation with multiple decrement models and performing simulations using MATLAB Software which then calculates the definitive benefits of the post-work remuneration program, as shown in Figure 1.

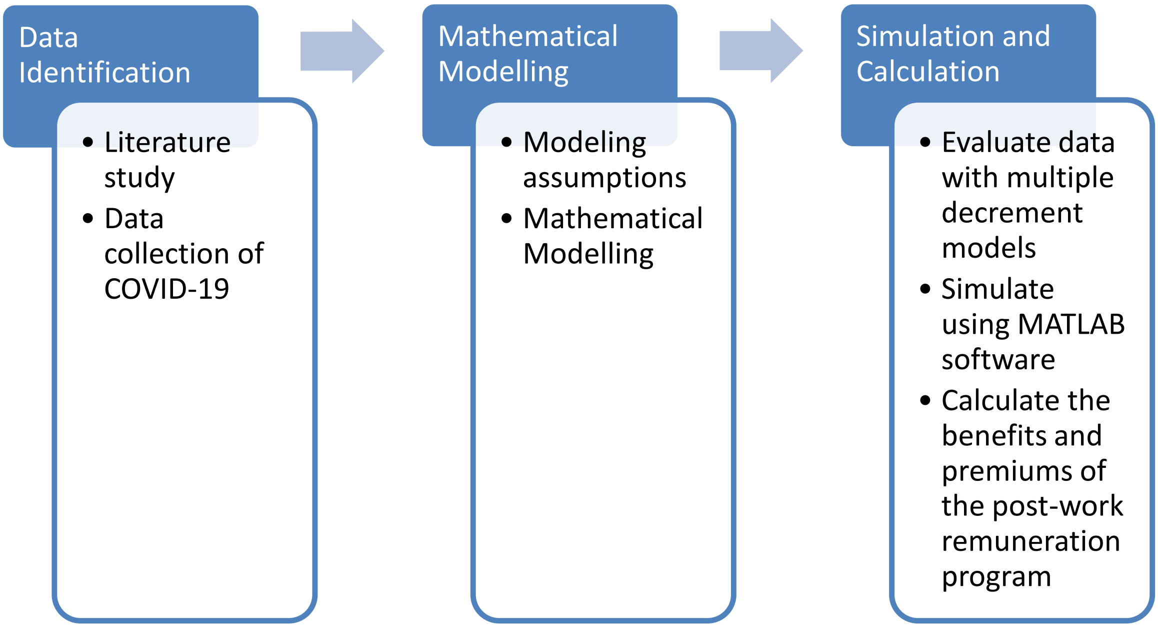

Figure 1. Three Stages of Data Valuation and Simulation for Post-Work Remuneration Program

C. RESULT AND DISCUSSION

1. Multiple Decrement Model

Pension and employee benefit programs must incorporate several decrement models. Employee benefits and pension plans benefit upon termination are dependent on the numerous grounds for termination (Blake et al., 2022). The reason for termination could be retirement, disability, death, or withdrawal. Benefits paid out upon retirement frequently differ from those paid out upon death or disability (Josa-Fombellida & Navas, 2020b). Benefits upon retirement include a monthly life annuity based on the person's talent and service history. The recipient may be entitled to a lump payout if the death happens before retirement age, as shown in Figure 2.

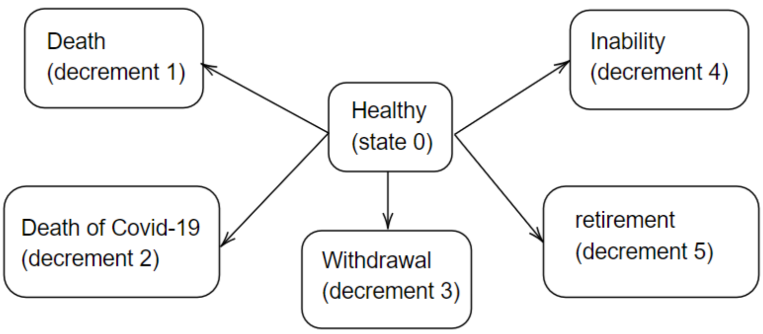

Figure 2. Ilustration of multiple decrement cases with five causes of failure

Figure 2 shows five states, namely state 0, and four failed states: death (decrement 1); death of COVID-19 (decrement 2); withdrawal (decrement 3); total permanent disability (decrement 4) and retirement (decrement 5). A state transfer can only take place from state 0 to state 1, from state 0, to state 2, from state 0 to state 3, from state 0 to state 4, or from state 0 to state 5. Causes of failure due to death, death of COVID-19, withdrawal, disability and subsequent retirement are named cause 1, cause 2, cause 3, cause 4 and cause 5. Here is the data on COVID-19 deaths in Indonesia. Next, we constructed a multiple decrement table based on COVID-19 death data in Indonesia based on mortality rate of COVID-19, as shown in Table 1.

Table 1. Mortality Rate COVID-19

Age Group	Mortality Rate
0-5	0.52%
6-18	0.15%
19-30	0.29%
31-45	1.15%
46-59	4.59%
≥ 60	11.23%

$\eta_x^{(j)}$ is the chance that a person aged x has failed between the ages of x and $x+1$ due to k. The probability that a person aged x has failed between the ages x sampai $x+1$ for any reason is represented by $\eta_x^{(\tau)}$, with $\eta_x^{(\tau)} = \eta_x^{(1)} + \eta_x^{(2)} + \eta_x^{(3)} + \eta_x^{(4)} + \eta_x^{(5)}$. Generally, if there is m cause of failure, then $\eta_x^{(\tau)} = \sum_1^n \eta_x^{(j)}$. Probability x survive until the age of $x+1$ represented by $\xi_x^{(\tau)}$. Dimana $\xi_x^{(\tau)} = 1 - \eta_x^{(\tau)}$.

Let ${}_m\omega_x^{(j)}$ be the number of people who quit the group between ages x and $x+m$, due to a specific cause ${}_m\omega_x^{(\tau)}$ is the expected number of people who suffer from cause due to k in time period x to $x+1$. If $\omega_x^{(\tau)}$ indicates the overall expected value of many people who have failed for all reasons, then, $\omega_x^{(\tau)} = \sum_1^m \omega_x^{(j)}$. If the expected value of the number of people who failed because of k is sum up at the interval x until $x+m$ is noted with ${}_m\omega_x^{(j)}$ which can be calculated by:

$$ {}_m\omega_x^{(k)} = \sum_{k=1}^{n} {}_m\omega_x^{(j)} \quad (1) $$

The formula can be used to determine the total expected value of numerous individuals who encounter failure due to all factors between x and $x+n$:

$$ {}_m\mathcal{D}_x^{(\tau)} = E\left({}_m\omega_x^{(\tau)}\right) = \sum_{k=1}^{n} {}_m\omega_x^{(j)} = \iota_x^{(\tau)} {}_m\eta_x^{(\tau)} \quad (2) $$

Eq. (2) denotes the expectation value of many people at the age x who will fail as a result of j at some point after age x. If there is only one reason for failure, then follows that the majority of people's overall expectation to reach age x, denoted by $\phi_x^{(\tau)}$, with

$$_{m}\phi_x^{(\tau)} = \sum_{k=1}^{n} {}_{m}\phi_x^{(j)} \tag{3}$$

the other hand, given $\mathcal{D}_x^{(j)}$, for $j = 1,2,\dots,m$ and $\iota_x^{(j)}$, we discover for $j = 1,2,\dots,m$;

$$\eta_x^{(j)} = \frac{{}_{m}\mathcal{D}_x^{(j)}}{\iota_x^{(\tau)}}, \qquad j = 1,2,\dots,n, \qquad \xi_x^{(\tau)} = 1 - \sum_{k=1}^{n} \eta_x^{(j)}, \tag{4}$$

In employee benefits, a multiple decrement table that specifies the expected number of active member reductions is called a service table. This service table describes the situation of reduction of employees in a Company due to death, accelerated pension, pension for inability to work, pension at the normal retirement age or other reason.

2. Employee Benefit

a. Multiple Decrement Table Construction

Multiple decrement table basically shows a chance of population decline due to various causes of failure. In this study, the multiple decrement table was formed from an illustrative service table provided by the software library R. The illustrative data of the service table contain COVID-19 about the number of people living up to the age of x quoted with $\iota_x^{(\tau)}$. Also available is the number of people who have failed in the age range x to $x+1$ denoted by $\iota_x^{(j)}$. There are four causes of failure: $\iota_x^{(1)}$: death, $\iota_x^{(2)}$: death cause of COVID-19, $\iota_x^{(3)}$: withdrawal, $\iota_x^{(4)}$: total permanent disability, and $\iota_x^{(5)}$: retirement (normal pension). indicate the number of people who suffer failure due to death, death due to COVID-19, resignation, total permanent disability, and retirement between the ages x and $x+1$. Compulsory pension age is 65 years. Based on the data of $\iota_x^{(1)}, \iota_x^{(2)}, \iota_x^{(3)}, \iota_x^{(4)}, dan\ \iota_x^{(5)}$ in the illustrative service table, can be calculated using the equation $\eta_x^{(j)}$and $\eta_x^{(\tau)}$ using an equation (1), and $\xi_x^{(\tau)}$ using equation (2). So obtained the Multiple Decrement Table for the age of 30 up to the retirement age of 65 years, as shown in Table 2 and Table 3.

Table 2. Service Table

x	$l_x^{(\tau)}$	$\mathcal{D}_x^{(1)}$	$\mathcal{D}_x^{(2)}$	$\mathcal{D}_x^{(3)}$	$\mathcal{D}_x^{(4)}$	$\mathcal{D}_x^{(5)}$
30	100000	99	1	19900	0	0
31	80000	78	1	14466	0	0
32	65454	70	1	9858	0	0
33	55524	59	1	5702	0	0
34	49761	58	1	3971	0	0
35	45730	62	1	2693	46	0
36	42927	62	1	1927	43	0
…	…	…	…	…	…	…
63	15130	241	30	0	0	1350
64	13509	228	29	0	0	2006

Table 3. Decrement and Survival Probabilities

x	$\eta_x^{(1)}$	$\eta_x^{(2)}$	$\eta_x^{(3)}$	$\eta_x^{(4)}$	$\eta_x^{(5)}$	$\eta_x^{(\tau)}$	$\xi_x^{(\tau)}$
30	0.000990	0.000010	0.199000	0.000000	0.000000	0.199990	0.800010
31	0.000975	0.000013	0.180825	0.000000	0.000000	0.181800	0.818200
32	0.001069	0.000015	0.150610	0.000000	0.000000	0.151679	0.848321
33	0.001063	0.000018	0.102694	0.000000	0.000000	0.103757	0.896243
34	0.001166	0.000020	0.079801	0.000000	0.000000	0.080967	0.919033
35	0.001356	0.000022	0.058889	0.001006	0.000000	0.061251	0.938749
36	0.001444	0.000023	0.044890	0.001002	0.000000	0.047336	0.952664
…	…	…	…	…	…	…	…
63	0.015929	0.001983	0.000000	0.000000	0.089227	0.105155	0.894845
64	0.016878	0.002147	0.000000	0.000000	0.148494	0.165371	0.834629

Based on Table 3, it can be seen that $\xi_x^{(\tau)}$ is 0.800010 represents the probability that employees will survive or have not experienced a certain event until the time stage (τ). The results from this table can be used to analyse the changes in the probability of decrement over time and how it affects individual survival probabilities. A decrease in the decrement probability corresponds to a reduced probability of an event happening during that specific period, leading to an increased probability of survival, as shown in Figure 3.

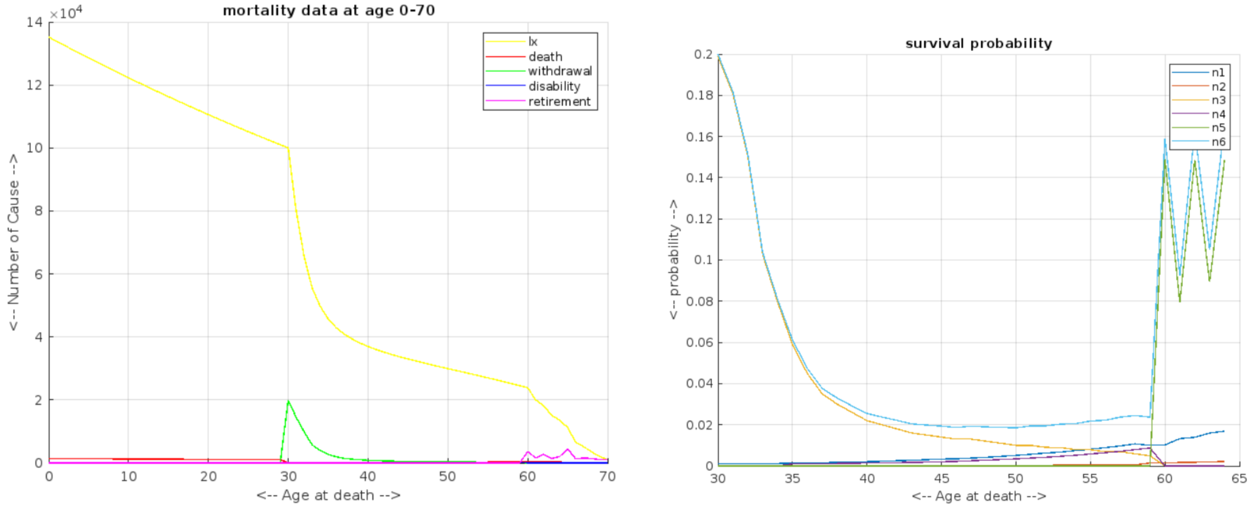

Figure 3. Number of Deaths and Survival Probability

b. Actuarial Present Value of Employee Benefit

When the amount of benefit payout is dependent on the method of leaving the group of active insureds, various decrement models have actuarial applications. The objective is to determine the actuarial present value of benefits that are payable either at the time of death or at the end of the year of death using different decrement models. Assume that the multiple decrement model with k causes of decrement underlies the mortality model. Inflation, length of service, and wage growth are frequently taken into consideration in the benefit calculation. We consider the typical situation in which the benefit is determined by the cause of the decline. The theory of pension funding in this study will benefit from this strategy. Assume that $\mathcal{B}_{x+t}^{(j)}$ represents the value of a benefit for a reduction at age $x+t$ due to cause k. The benefit that will be paid at the time is death (x), designated generally by $\mathcal{A}$. We arrive at the following formulation in terms of fundamental operations:

$$\mathcal{A}^{D_5} = \mathcal{B}_p \; {}_{p-x}\xi_x^{(\tau)} v^{(p-x)} \ddot{a}_p, \; \square(5)\square \qquad (5)$$

$$\mathcal{A}^{D_5} = \mathcal{B}_p \; {}_{p-x}\xi_x^{(\tau)} v^{(p-x)} \ddot{a}_p,$$

$\mathcal{A}^p$ represents the employee benefit at age p, $\mathcal{B}_p$ the employee benefit at age p , ${}_{p-x}\xi_x^{(\tau)}$ represent the probability that an individual would survive from age x until age p, $v^{(p-x)}$ represent the discount factor for $(p-x)$ years. To determine the employee's auxiliary benefits. The employee's ancillary benefits are calculated using the following formulas. We explained what the death benefit is:

$$\mathcal{A}^{D_1} = \sum_{p=x}^{p-1} {}_{p-x}\xi_x^{(\tau)} v^{(p-x)} \mathcal{B}_p^{D_1}, \qquad \text{and} \qquad \mathcal{B}_p^{D_1} = \mathcal{P}_p^{D_1} \mathcal{B}_p \, \eta_x^{(j)} v \ddot{a}_{p+1} \qquad (6)$$

The term cost of the death benefit for the employee aged p is represented by $\mathcal{B}_p^{D_1}$, while the term cost of the death benefit for the employee aged is represented by $\mathcal{A}^{D_1}$. The probability of surviving in all age increments from x until $x+p$, given by ${}_{p-x}\xi_x^{(\tau)}$, and the discount factor for $(p-x)$ years is given by $v^{(p-x)}$, The percentage of the benefit that a beneficiary will receive in the event that an employee passes away is expressed as $\mathcal{P}_p^{D_1}$ and the likelihood that a person at age j won't live to age $p+1$ is expressed as $\eta_x^{(j)}$. For the COVID-19 death cause's benefit:

$$\mathcal{A}^{D_2} = \sum_{p=x}^{p-1} {}_{p-x}\xi_x^{(\tau)} v^{(p-x)} \mathcal{B}_p^{D_2}, \qquad \text{and} \qquad \mathcal{B}_p^{D_2} = \mathcal{P}_p^{D_2} \mathcal{B}_p\, \eta_x^{(j)} v \ddot{a}_{p+1} \tag{7}$$

$\mathcal{B}_p^{D_2}$ is the term cost of death cause of COVID-19 benefit for employee aged p, and $\mathcal{A}^{D_2}$ is the present value of death cause of COVID-19 benefit. $\mathcal{P}_p^{D_2}$ is the proportion of the benefit that will go to a beneficiary if an employee passes away from cause of COVID-19. ${}_{p-x}\xi_x^{(\tau)}$ is the probability of the survival all decrements from age age x until $x+p$. The likelihood that a person will not live until age $p+1$ at age k is given by the symbol $\eta_x^{(j)}$). For the benefit of withdrawal:

$$\mathcal{A}^{D_3} = \sum_{p=x}^{p-1} {}_{p-x}\xi_x^{(\tau)} v^{(p-x)} \mathcal{B}_p^{D_3}, \qquad \text{and} \qquad \mathcal{B}_p^{D_3} = \mathcal{P}_p^{D_3} \mathcal{B}_p\, \eta_p^{(D_3)} \xi_{p+1}^{(z)} v \ddot{a}_{p+1} \tag{8}$$

$\mathcal{A}^{D_3}$ being the term cost of the withdrawal benefit for the employee aged p , $\mathcal{B}_p^{D_3}$ being the present value of the withdrawal benefit, and $\eta_p^{(D_3)}$ is the likelihood that a person will die from decrement withdrawal between the ages of p and $p+1$, $v^{(p-x)}$ is the discount factor for $(p-x)$ years, $\mathcal{P}_p^{D_4}$ is the percentage of the benefit that a beneficiary will receive if the employee withdraws before retirement, and $\xi_{p+1}^{(z)}$ is the likelihood that a person will live to the age of p. Disability benefit:

$$\mathcal{A}^{D_4} = \sum_{p=x}^{p-1} {}_{p-x}\xi_x^{(\tau)} v^{(p-x)} \mathcal{B}_p^{D_4}, \qquad \text{and} \quad \mathcal{B}_p^{D_4} = \mathcal{P}_p^{D_4} \mathcal{B}_p\, \eta_x^{(j)} v \ddot{a}_{p+1} \tag{9}$$

with $\mathcal{A}^{D_4}$ is the present value of disability benefit, $\mathcal{B}_p^{D_4}$ is the term cost of disability benefit for employee aged p, ${}_{p-x}\xi_x^{(\tau)}$ is the probability of the survival all decrements from age x until $x+p$, $v^{(p-x)}$ is the discount factor for $(p-x)$ years, $\mathcal{P}_p^{D_4}$ is the proportion of the benefit that a beneficiary will receive if the employee disability and $\eta_x^{(j)}$ is theprobability that an individual aged p will not survive untuk age $p+1$. The following is the present value of future typical costs multiplied by the total present value of benefits:

$$\mathcal{A}^{D} = \mathcal{A}^{D_1} + \mathcal{A}^{D_2} + \mathcal{A}^{D_3} + \mathcal{A}^{D_4} + \mathcal{A}^{D_5} \tag{10}$$

A typical form of defined benefit plan is the final salary plan, in which the pension is determined by multiplying the number of years of service by the member's salary at or just before retirement, then by the appropriate fraction. An initial monthly pension of this amount is offered. The average wage at or close to retirement is a consequence of the benefit income rate in this plan. We can write

$$^{x}\mathcal{ES}\,\ddot{a}^{\tau} = \mathcal{A}^{D_1} + \mathcal{A}^{D_2} + \mathcal{A}^{D_3} + \mathcal{A}^{D_4} + \mathcal{A}^{D_5} \tag{11}$$

With $^{x}\mathcal{ES}$ is wage of an employee at age x at this time, we have the actuarial liability

$$^{x}\mathcal{AL} = \mathcal{A}^{D} - {}^{x}\mathcal{ES}\,\ddot{a}^{\tau} \tag{12}$$

Table 4. Assume Calculation

No	Assume	Value
1	Benefit in case of death	Rp 100,000,000.00
2	Benefit in case of death due to COVID-19	Rp 100,000,000.00
3	Benefit in case of disability	Rp 50,000,000.00
4	Benefit if reach the retirement age	Rp 100,000,000.00
5	Rate of interest	6% p.a

Table 5. Actuarial Present Value

x	$\mathcal{A}^{D_1}$	$\mathcal{A}^{D_2}$	$\mathcal{A}^{D_3}$	$\mathcal{A}^{D_4}$	$\mathcal{A}^{D_5}$	$\mathcal{A}^{D}$
30	2,395,624.92	121,663.50	6,039,634.23	598,284.61	3,082,699.54	12,237,906.80
31	2,369,901.37	129,591.75	4,116,928.92	598,284.61	3,697,948.79	10,912,655.44
32	2,297,086.63	128,658.23	2,766,495.46	598,284.61	3,697,948.79	9,488,473.71
33	2,233,947.92	127,756.24	1,877,322.06	598,284.61	3,697,948.79	8,535,259.62
34	2,182,528.76	126,844.73	1,380,386.41	598,284.61	3,697,948.79	7,986,033.30
35	2,133,688.50	126,042.66	1,045,998.98	598,284.61	3,697,948.79	7,601,963.54
36	2,083,243.23	125,229.03	826,887.55	579,571.04	3,697,948.79	7,312,879.64
...	...	...	...	...	...	...
63	228,698.63	28,864.65	-	-	1,923,475.60	2,181,038.88
64	146,261.95	18,396.50	-	-	1,042,842.56	1,207,501.02

Table 5 lists the actuarial present values of the employee benefits and annuities as well as the related premiums for entry ages. Assume the premium is payable by x as an n-year temporary life annuity. To get the premiums, the following commands are then appended to the set above after the command for $\mathcal{P}$.

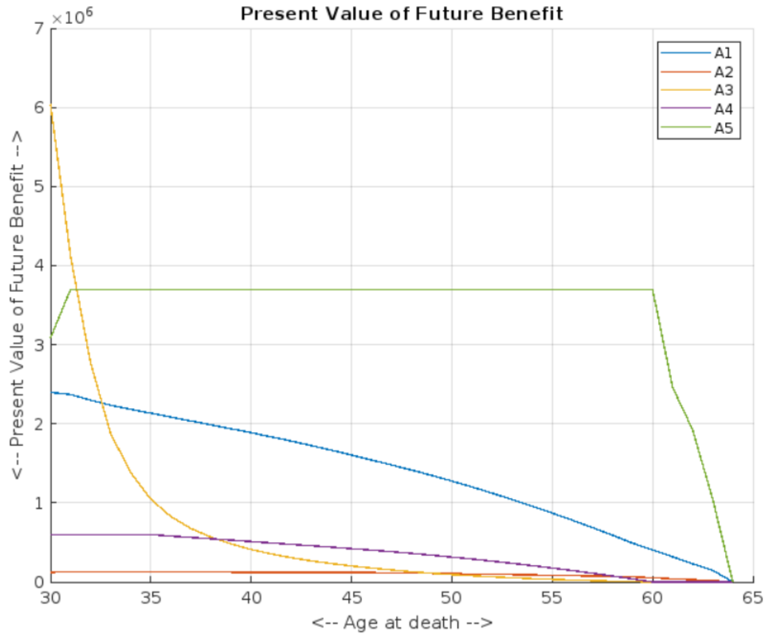

Figure 4. Present value of Employee Benefit

c. Defined Premium of Employee Benefit

Retirement plans are categorized as either defined benefit or defined contribution plans. A defined benefit pension plan guarantees a certain payout after retirement by a predefined formula that frequently depends on the member's salary and the length of time the member has been a part of the plan, or the number of years of service (Deshmukh, 2012).

Consider the following scenario: An employee has n years of service (i.e., is a participates in the employee benefit plan) and a pensionable salary of $\mathcal{S}$ when they retire. The pension schemes are then divided into defined benefit and defined contribution categories. A defined benefit pension plan guarantees a specific payout after retirement by a predefined formula that frequently considers the member's salary and the length of time the member has been a part of the plan, or the number of years of service.

When an employee reaches retirement age, they will have n years of service (i.e., be a participant in the pension plan) and a pensionable salary of $\mathcal{S}$. The pensionable wage may be either the average pay earned over the last few months before retirement or the average pay earned overall throughout employment. The final pay plan and career average are the terms used to describe these two situations. The proper replacement ratio is taken into account while determining the accrual rate. The definition of the replacement ratio $\mathcal{R}$ for pension plans is

$$\mathcal{P} = \frac{Actuarial\ Present\ Value\ of\ Employee\ Benefit}{Actuarial\ Present\ Value\ of\ Premium\ Annuity}$$

Table 6. Annuity table

t	${}^{x}_{t}\ddot{a}$	t	${}^{x}_{t}\ddot{a}$	t	${}^{x}_{t}\ddot{a}$
0	8.4694	12	3.0924	24	0.9868
1	7.5123	13	2.8597	25	0.8654
2	6.7808	14	2.6398	26	0.7505
3	6.1697	15	2.4317	27	0.6419
4	5.6689	16	2.2347	28	0.5392
5	5.2352	17	2.0480	29	0.4424
6	4.8501	18	1.8710	30	0.3512
7	4.5008	19	1.7032	31	0.2651
8	4.1793	20	1.5442	32	0.1952
9	3.8804	21	1.3935	33	0.1339
10	3.6011	22	1.2506	34	0.0843
11	3.3391	23	1.1151	35	0.0414

Table 6 lists the premiums for the future employee benefits that are payable as an n-year temporary annuity.

Table 7. Premium of Employee Benefit

x	$\mathcal{P}^x$	x	$\mathcal{P}^x$	x	$\mathcal{P}^x$
30	1,629,053.30	42	2,264,273.34	53	5,416,755.60
31	1,619,250.53	43	2,411,314.20	54	6,060,267.90
32	1,548,309.81	44	2,574,817.00	55	6,857,035.79
33	1,516,720.43	45	2,756,036.30	56	7,872,352.59
34	1,537,622.52	46	2,957,769.41	57	9,215,843.71
35	1,580,891.19	47	3,184,649.87	58	11,083,429.68
36	1,639,889.87	48	3,438,698.79	59	13,870,692.54
37	1,714,638.29	49	3,727,353.75	60	18,564,592.82
38	1,802,725.49	50	4,057,190.27	61	18,324,882.97
39	1,900,547.34	51	4,439,851.84	62	23,583,322.54
40	2,009,743.77	52	4,886,194.13	63	28,158,128.54
41	2,130,857.47				

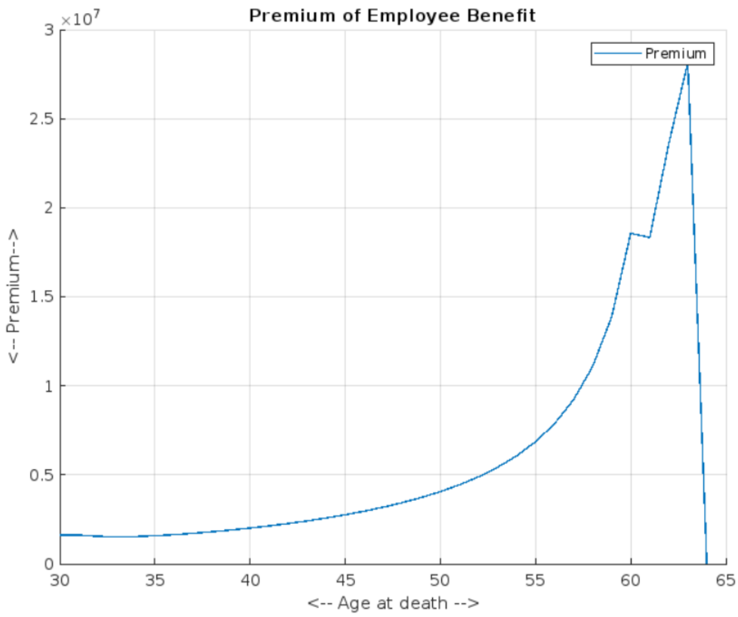

Figure 5. Premium of Employee Benefit

In figure 4 show that as is employee, the n-year term premium of employee benefits is always less than the entire life insurance premium.

D. CONCLUSION AND SUGGESTIONS

Multiple decrement table with five causes of failure namely death, death due to COVID-19, withdrawal, disability, and retirement formed on the basis of Illustrative Service Table is available in the R studio library that has been rebuilt with data on deaths of COVID-19. Based on Multiple Decrement The table simulated the calculation of the case study given with Assume constant interest rates. Based on the Multiple Decrement Table, the premiums are calculated on the basis of the assumptions given in Table 3. The calculation results that can be seen from table 6 obtained large annual net premiums multiple decrement cases that provide benefits according to the cause of failure getting bigger as that person get older. This method is better for the company because it requires less money to be saved up for the employee's pension due to the smaller actuarial responsibility.

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