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Demonstrating Bonus Malus System (BMS) with Fair Deductibles Amount and Control Mechanism of Claim Amount and Frequency on Medical and Health Insurance Portfolio

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ABSTRACT

This paper presents the preliminary work of implementing the BMS in the Medical and Health Insurance (MHI). The application of the Bonus Malus System (BMS) is common in automobile insurance, but having it on MHI is something innovative. This study aims to demonstrate a system that can control the claim amount and frequency while at the same time imposing fair deductibles amount on the MHI's portfolio. It is believed that, this implementation provides a win-win situation to both insurer and insured. To the insurer, this helps to curb the growth of fraudulent claims and to the insured, this protects the policyholders from being penalised of making necessary claims. This study uses Markov Chain transition models to identify the scale for BMS. The expected claim amount and frequency database were extracted from the Project Oversight Group (POG) research project entitle Group Medical Insurance Large Claims Database Collection and Analysis, and simulated using the Monte Carlo simulation in excel. The fair deductibles amount were defined based on the existing deductibles available in Malaysia. Results show that an ideal scales of the BMS which were demonstrated by equitable claim amount and frequency have produced an effective framework of BMS matrix. Varying deductibles amount ranging from RM2,500 to RM10,000 have given options to the insured to plan for their own claim management. Insureds with lower deductible amounts have the highest probability of being penalised as compared to those with higher deductible amounts. With fair estimations of deductible amounts and effective control of claim system, the BMS framework is seen to be efficient and feasible for the application in the MHI industry.

Keywords: bonus-malus system, deductible, insurance, medical and health, Markov Chain stop loss insurance.

1 INTRODUCTION

The number of people relying on medical and health insurance today are mushrooming since their needs in accessing and leveraging on their healthcare protections become more essentials. Extending from this scenario plus the current issues that most insurers encounter on the fraudulent insurance claims especially, the importance of having prudent and vigilant healthcare framework is crucial. In medical and health insurance (MHI), the claim frequency received in a year are generally large. Aggravatingly, this comes with a large amount too that can reach up to millions of dollars per year. Therefore, the insurers need to allocate huge amount to pay for claims every year. In the meantime,

through the implementation of the Bonus-Malus System (BMS), the insureds feel insecure about their protections as they need to carefully decide on submitting their claims, since the impact of submitting claims would penalise their bonuses or rewards for the following renewals.

Thus, this study focuses on estimating the optimum number of claim frequency and claim amount that would be optimally controlled by the BMS. Subsequently, the estimated amount of these claim amount and claim frequency would be used to arrive at the best fair deductibles amount of the premium charges. The incorporation of deductible amount on the BMS provides mutual benefits to both insureds and the insurers. Although the insureds had to pay high premiums due to the inclusion of deductible, their no-claim bonuses or rewards are protected. Deductibles give a room for the insureds to protect their bonuses or rewards as there will be no claim being reported by the insured. For certain amount of deductible which has been agreed upon by both insurer and insured, the insureds will pay the cost of the loss by themselves without claiming their insurance. Thus, this will protect their no-claim bonuses or rewards. On another hand, deductible from the insurer's point of view, are useful in lessening the expected managerial expenses by excluding the coverage of a small-scale claims and diminishing the moral hazard when the level of insured care cannot be fully observed.

Theoretically, in our paper, we lay out the rationale of applying the BMS on health insurance system in curbing the growth of fraudulent. The ever increased medical inflation coupled with the spike number of claims reporting, have worsened the impact of claim experience to the insured and this also has increased the magnitude of uncertainties to the insurer in managing the claim reporting. At the end, both insurers and insureds around the world are affected by the same problems i.e., the increases of medical inflation that have risen to double-digit from previous years and raising of health insurance premiums to reduce financial deficit.

Therefore, to mitigate this issue, this study demonstrates the implementation of the BMS system by estimating the optimal claim frequency and claim amount made by the policyholders. Next, the fair deductibles amounts are proposed to allow the policyholders to select their risk appetite in securing the insurance. This deductible amount is incorporated in the proposed BMS system. In implementing the BMS, Markov Chain method is being applied by using the data of medical claim from year 1991.

2 LITERATURE REVIEW

2.1 Medical and Health Insurance

From its origins, insurance has evolved correspondingly to the needs of individuals between mitigating against or diversifying from the risks confronted in their commercial activities, and later been modified into plans that guarantee their personal health and the financial well-being of their families through life and health insurance. Soon after, many countries in the world start to experience population aging, causing an increasing number of people relying on medical insurance to access healthcare resources. Aon, a global professional services firm reported, the global average medical trend rate showed a consistent increment since 2016 from single to double-digit and expected to continue to grow over general inflation in some countries such as those in Europe, Asia Pacific and Middle East and Africa (MEA).

Undergoing with latest healthcare costs, U.S. have been growing in healthcare cost for years and are likely to continue snowballing sooner or later. According to a study by [1], U.S. has spent more than $3.8 trillion only on health care in past 2019, or roughly $11,582 per person. In conjunction to the rising of healthcare cost, medical health insurance premiums also increase, along with higher out-of-pocket or deductibles expenses. Taking Malaysia for an example, Malaysia has been gradually reported by AON of having a double-digit in medical inflation among Asian-Pacific Region (APAC) since 2016. In 2019, Malaysia ranked first in APAC with 13.6 per cent of average medical trend rate.

Seeing today's medical, one would prefer going to a government hospital to save bills. In general, it is common elsewhere in the world, due to high demand of care and limited resources, public health care services would be experiencing intense pressures [2] that driven almost 60 per cent of its people to go and seek for private care [3]. [4] mentioned in his study, in 2016, people have to pay triple from 1997 figure which was from RM3,166 million to RM19,570 million only to wage in for their medical bills. Table 1 shows an estimation of healthcare cost in Malaysia that is suspected to increase in next 20 years times by [4].

Table 1. Healthcare Current Costs vs Healthcare Estimated Costs in 20 Years in Malaysia.

Medical Treatment	Current Cost (RM)	Cost in 20 years (RM)
Cataract	3,500 - 5,000	24,000 - 34,000
Heart Attack	10,000 - 30,000	67,000 - 202,000
Knee Replacement	15,000 - 40,000	101,000 - 270,000
Hip Replacement	18,000 - 50,000	121,000 - 336,000
Cancer	18,000- 300,000	121,000 - 2,018,000
Stroke	35,000 - 75,000	235,000 - 505,000
Kidney Failure	150,000 and above	1,009,000 and above

Corresponding to the medical inflation, [5] stated that the premium paid by insureds for health insurance was viewed as too expensive, inadequate with the coverage provided with its price. Hence, premiums for medical and health insurance should not be a fixed cost for society. Therefore, with today health issues, health care demand has exceeded what it should be given its cost. This price alteration and its consequence may be why many insured who purchase medical and health insurance feel that their premiums are too high and incompetent to their coverage. From this matter, insurance claim fraud would happen when insureds are not able to obtain profit from insurance companies [6].

In [19], Life Insurance Association of Malaysia (LIAM) said to handle medical claims inflation, the insurance company had to revise their premiums/contributions so that they can reduce any undesirable rates increase. Lower claims will result in lower premiums for all insureds. [20] express his views to The Star Online article, wrote that controlling a rising healthcare costs require a lot of care. Following from the recent research, some has debated on the applicability of the BMS on health insurance in curbing the growth of fraudulent claims, triggers serious attention among insurers on social reforms of medical and health insurance holistically.

2.2 Bonus Malus System (BMS)

Bonus Malus is a rating system that distributes the total risk of potential losses amongst insureds in a fairly manner. In motor insurance for example, as an act of responsibility, for one or more accidents, the insureds would either be penalised with premium surcharges (or maluses) if any claim made within the year or be rewarded by receiving discounts (or bonuses) due to claim-free years [7]. [8] stated that BMS is a rating system which is now being in force in many developed countries. It is a system that penalises the insureds who accountable for one or more accidents by imposing extra surcharges (maluses), and that rewards those claim-free insureds by giving them rebates (or bonuses). The insured's policy profile will be moved according to the transition rules and the number of claims reported within the current t year because BMS consists of a finite number of levels where each level has its own relative premium, encouraging insureds to be more careful as to not making small claims into their account, aiming to a better assess individual risks.

However, as pointed out by several authors such as [8], [9], and [10], BMS suffers from considerable drawbacks in motor-insurance:

1. The claim amounts are impractical that a posteriori correction depends only on the number of claims.
2. To avoid penalties, insureds may drop the company after having caused claims.
3. A continuous increase of the average discount will force insurers to raise premiums annually where after a few years, most insured are in the high-discount classes, and there is no significant premium differentiation between good and bad insured.
4. Insured might jeopardize their own and family's future health while seeking to save their bonus.

As mentioned above, under the traditional BMS, the future level can be determined by knowing the current level and the number of claims during the current period. As an alternative approach to counter these drawbacks, [11] theoretically suggested to increase the deductibles borrowed by the insureds. Astoundingly, [8] agreed with [11], combining BMS with varying deductibles that give numerous advantages. Designing BMS with different claim types were also one of the alternatives proposed to eliminate the drawbacks said [8]. By implying a high deductible into BMS, it could eliminate those drawbacks in which; the premium income would not be below profit and the number of claims would not exceed the claim amount [10]. Hence, many researchers had been formulated studies on the applicability of BMS with deductible for motor-insurance.

In medical and health insurance on the other hands, a bonus previously known as cost-sharing had been actively in research and in policy debates since 1978 said [9]. The experience-rated bonuses offered were predicted to continually reduce more demand compared to a rebate offer. Alternatively, a bonus would be resulting in a remarkably high intertemporal stability as it educates insureds in becoming a permanent good risk. Then again, after many years, medical inflation had come across, influencing the claim activity and coverage trends. [12] stated in his article that the continuation rise of calamitous claims in severity and frequency were due to latest high costs and ever-advancing technology in health care systems. The never-ending increase of demand for health insurance had many direct writers to look back and sit to alleviate tension on their capital because of the existing financial crisis. In count, health care reform would presents new uncertainties and risks, not to mention rising of the calamitous claims.

2.3 Deductibles

The popularity of a deductibles policies is well-known in both medical and automobile insurance. A deductible is an amount of money that the insured agrees to pay, either be paying it according to per claim or per accident, the deductible paid will moves toward the full amount of an insured loss. In an insurer's perception, deductibles can be beneficial in reducing the expected managerial expenses by excluding the exposure of small-scale claims as well as lessening the risk when the level of insured's care are not able to be fully observed.

The history of imposing BMS with deductibles has started way back in the 19 centuries. In automobile insurance for instance, having BMS would increase the premium pay by the insured whenever the insured records any claim. Therefore, the insured must carefully decide for which losses the insured should be filing a claim and for which the insured should not said [17]. This demonstrated that these insureds would only file their claim if it were greater than some critical cost and yet they are above average than the positive deductible amount they are paying. [11] on the other hand, investigated the attributes of a deductible insurance policy in the existence of the bonus-malus adjustments then showed that the bonus-malus policies with Pareto optimal cannot be mutually advantageous to both the insured and the insurer. Contradict to what [7] said in her latest research, the BMS with different claim types and varying deductibles can eradicate both drawbacks of the traditional BMS. This should help to decrease bonus hunger among insured and prevent losses towards the insurer even if the insured decide to leave the company after a claim.

3 METHODOLOGIES

In this paper, the numerical example was extract from a specific chapter in one of research project done in 1992 by the Project Oversight Group (POG). The project named, "Group Medical Insurance Large Claims Database Collection and Analysis" was a collaboration of POG with the Director of Research for the Society and practicing actuaries from the Health Section of the Society back in year 1992. The data for 1991 and/or 1992 is in computer-readable format, containing a database that include more than 171,000 large claims for two selected years which are 1991 and 1992. Throughout the findings, they revealed numerous traits of large claims that could be apply for future actuaries and other scholars. Although this study has benefitted its consumers, the database itself may perhaps be revised over time to time, in making its value even greater. However, this paper will be focusing on "Chapter IV: Analysis of Total Charges by Deductible Level", with 36 samples of the total charges that were paid more than the selected deductibles for all plan types and all participants in 1991.

3.1 Deductibles

Deductible amounts recorded by POG were specified as the minimum of each range in those analyses in which all ranges were presented. In other analyses, deductible levels were given in USD by the POG at $25,000, $50,000, $100,000, $150,000, and $250,000, respectively. This paper will only use the data from the first three deductibles amount of $25,000, $50,000, and $100,000. But then, these amounts are adjusted according to the existing deductibles amount imposed in Malaysia. Such deductible amount, d used throughout this paper are the annually deductible of RM2,500, RM5,000 and RM10,000. Considering d as a fixed and 'fair' amount chooses by the insured to pay the first RM2,500 or RM5,000 or RM10,000 of the medical fees in a year before insurers begin to pay for the rest of the medical fees.

Table 2. Numerical summary data set on cost per claim by deductible amount.

	d = 2,500	d = 5,000	d = 10,000
maximum cost per claim	4,293.55	7,256.51	12,641.50
minimum cost per claim	2,368.55	1,115.56	-
mean cost per claim	3,164.53	4,739.69	7,984.31
Standard deviation	410.67	1248.40	2651.26
skewness	0.55	-0.60	-0.95

From the observed data sample, Table 2 above shows the numerical summary for each d. For each group, they have their own mean and standard deviation. The standard deviation of d increases as the deductible amount increases. It is said in general, the larger the standard deviation of a data set, the more spread out the individual points are in that set. Based on the skewness of the group data, which is less between -2 and +2, is consider as normal distribution function according to [14] and [15]. Showing that these data are moderately skewed with a normal distribution.

3.2 Claim frequencies

The data associated with above table are from the observed frequency distribution is as follows:

Table 3. Observed frequency distribution.

Number of Claim	*Number of claims that exceed deductibles RM2,500*	*Number of claims that exceed deductibles RM5,000*	*Number of claims that exceed deductibles RM10,000*
0	0	46	802
1	0	328	2328
2	0	1031	2959
3	0	1987	2237
4	0	2478	1177
5	2	2107	380
6	14	1317	102

7	119	521	11
8	794	161	4
9	3290	21	0
10	5781	3	0

The number of claims selected for this paper has a total of 30,000 claims from 108 groups of claimants submitted in 1991.The claims frequency have been counted separately according to the number of claims that exceed the amount of d pay by the insured in 1991.

3.3 Claim amount

Observed claim amount distribution are as follows:

Table 4. Observed claim amount distribution.

3,394	4,182	9,632	2,393	1,998	0	3,266
3,229	5,096	8,138	3,197	4,993	8,906	4,294
2,754	3,945	5,950	3,179	5,186	7,932	4,167
3,240	4,743	4,925	2,369	3,340	10,962	3,163
2,513	4,088	4,824	2,938	3,858	9,022	3,457
2,830	3,750	7,301	3,586	6,082	8,129	3,336
3,002	4,933	8,387	3,456	5,934	12,587	2,985
3,218	4,733	7,996	3,132	3,361	10,516	2,871
3,190	4,806	7,087	2,869	3,346	4,936	3,343
5,325	9,822	3,001	4,502	6,926	4,675	7,895
6,489	11,084	2,849	4,120	7,237	5,445	7,881
6,886	11,429	2,933	4,552	7,739	4,821	9,460
5,609	9,126	3,680	6,171	9,597	3,787	6,822
5,588	9,230	3,031	4,729	7,154	6,201	2,719
7,257	12,642	3,406	5,814	5,370	8,701	3,381
1,116	1,258	3,551				

Originally, BMS will focus on the claim frequency over claim amount in its system. But for this paper, the BMS will work closely with claim amount distribution as in MHI portfolio, the number of claim made is less likely to be used compare to the amount of claims made by an insured.

3.4 Bonus Malus Scale

The treatment of BMS is best to be represent in the framework of Markov chains as BMS is closely related to the memoryless property of the Markov chain. Markov chains said [8], are generally irreducible, signifying all states are always accessible in a finite number of steps from another states under a stationary distribution. Together with numerical illustration, this paper will follow the soft BMS proposed by [8] and [13] with modification that suits the medical and health claim trends. This BMS consumes:

1. A s = 9 bonus-malus levels numbered 0 to 8, with a -1/+2 scale. 0 is the minimum level, 8 is the maximum level, respectively.
2. The starting level for each new or existing insured starts at level 6. A higher level indicates a higher premium an insured shall pay.

The transition rules are as follows; If the insured is reported having a claim amount that are less than the number of deductibles, it will be record as no claim. The bonus per claim-free year is one level, thus the insured level will move one level down. But if the insured made a total of claim amount of n > deductible paid for the insured's claim during year t, the claim reported is considered as one. The penalty per claim will be counted into two levels, where the insured will move $2n_t$ levels up. The transition rules used as per describe in Table 5.

Table 5. Transition rules for the soft BMS with -1/+2 scale.

Starting Level	Level occupied if Claim(s) is/are reported				
	0	1	2	3	≥4
8	7	8	8	8	8
7	6	8	8	8	8
6	5	8	8	8	8
5	4	7	8	8	8
4	3	6	8	8	8
3	2	5	7	8	8
2	1	4	6	8	8
1	0	3	5	7	8
0	0	2	4	6	8

The scale of level will continue to go up and down every year, thus the insured has a choice between two budget constraints referring to previous year premium paid. The amount of claim n made by insured is assumed to be mixed Poisson distributed. Let $\boldsymbol{M(\vartheta)}$ be the transition probability matrix of the Markov chain associated to this BMS as shown in Table 6 with average number of claim amount ϑ with deductible d. Where $\sum$ represents the sum of the elements in columns 1 to 8 in the same row with average number of claim amount ϑ.

Table 6. Transition probability matrix

s	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	$\exp(-\vartheta)$	0	$\vartheta\exp(-\vartheta)$	0	$\frac{\vartheta^2}{2}\exp(-\vartheta)$	0	$\frac{\vartheta^3}{3!}\exp(-\vartheta)$	0	$1-\sum$
1	$\exp(-\vartheta)$	0	0	$\vartheta\exp(-\vartheta)$	0	$\frac{\vartheta^2}{2}\exp(-\vartheta)$	0	$\frac{\vartheta^3}{3!}\exp(-\vartheta)$	$1-\sum$
2	0	$\exp(-\vartheta)$	0	0	$\vartheta\exp(-\vartheta)$	0	$\frac{\vartheta^2}{2}\exp(-\vartheta)$	0	$1-\sum$
3	0	0	$\exp(-\vartheta)$	0	0	$\vartheta\exp(-\vartheta)$	0	$\frac{\vartheta^2}{2}\exp(-\vartheta)$	$1-\sum$
4	0	0	0	$\exp(-\vartheta)$	0	0	$\vartheta\exp(-\vartheta)$	0	$1-\sum$
5	0	0	0	0	$\exp(-\vartheta)$	0	0	$\vartheta\exp(-\vartheta)$	$1-\sum$
6	0	0	0	0	0	$\exp(-\vartheta)$	0	0	$-\exp(-\vartheta)$
7	0	0	0	0	0	0	$\exp(-\vartheta)$	0	$-\exp(-\vartheta)$
8	0	0	0	0	0	0	0	$\exp(-\vartheta)$	$1-\exp(-\vartheta)$

Using all the data provided above, later, a claim probability distribution is construct using the mean and standard deviation from Table 2. Since the data is a normal distribution, a method of using Monte Carlo simulation in excel is used. Using this type of simulation helps to provide solutions for situations that prove uncertain. With 10,000 iterations simulated, this would help a better understanding on how the amount works, and to comprehend the uncertainty in forecasting BMS future level. Originally, in BMS, the future level can be determined by knowing the current level and the number of claims during the current period. But for this paper, the future level is determined by the amount per claim as in medical health trends, the number of claims are larger compare of those in motor-insurance.

4 RESULTS

Recalling, the amount of deductible was classified as the minimum from each range in those studies in which all ranges were presented. The deductible, d is set as the independent variable. Following the earlier transition rules stated, if claims reported have an amount n that are less than the amount of deductibles d, it will be recorded as no claim, then the insured will move one level down. But if the insured made an amount of claims that exceed the insured annual deductible, $n > d$ paid during the year, the claims reported are considered as 1 claim, where then, the insured will move $2n_t$ levels up. Since it is a 9 level BMS, level 6 is the starting level. A higher level one could get is 8, which is the malus. While the lowest level is 0, this is the bonus.

Assume the probability of level transition is run for 10 years with the total claim amount for an individual per year calculated using Monte Carlo with the mean and standard deviation as per in Table 2. For any claim amount, n that exceed the deductible, d it will be classified in the penalized (malus) zone and be rewarded (bonus) zone if the claim amount is below the deductible. A higher level indicates higher premiums to be paid by the insured. The claim amount is randomly simulated with 10,000 iterations before finding the right probability on the number of claim amount that would

exceed the deductible amount. The formula counts the number of "less" and "exceed", finding their average then divided by the total number of events, 10. Since this is a stochastic model, the results will vary a few digits every time the model is run. Results are displayed in Table 7.

Table 7. Simulation results between average number of claims amount, n with deductible, d.

Deductible, d	Average $n < d$	Average $n > d$
2,500	0.05	0.95
5,000	0.58	0.42
10,000	0.78	0.22

Using above simulation data, the average number of claim amount, n found is used as ϑ for finding the numerical data sample in each deductible transition probability matrix group. Below shows Table 8 to Table 10, representing the numerical data for $n > d$, where d = RM2,500, RM5,000 and RM10,000, respectively.

Table 8. Transition probability matrix for n > RM2,500

s	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	0.3867	0	0.3674	0	0.1745	0	0.0553	0	0.0161
1	0.3867	0	0	0.3674	0	0.1745	0	0.0553	0.0161
2	0	0.3867	0	0	0.3674	0	0.1745	0	0.0713
3	0	0	0.3867	0	0	0.3674	0	0.1745	0.0713
4	0	0	0	0.3867	0	0	0.3674	0	0.2459
5	0	0	0	0	0.3867	0	0	0.3674	0.2459
6	0	0	0	0	0	0.3867	0	0	-0.3867
7	0	0	0	0	0	0	0.3867	0	-0.3867
8	0	0	0	0	0	0	0	0.3867	0.6133

Table 9. Transition probability matrix for *n* > RM5,000

s	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	0.6570	0	0.2760	0	0.0580	0	0.0081	0	0.0009
1	0.6570	0	0	0.2760	0	0.0580	0	0.0081	0.0009
2	0	0.6570	0	0	0.2760	0	0.0580	0	0.0090
3	0	0	0.6570	0	0	0.2760	0	0.0580	0.0090
4	0	0	0	0.6570	0	0	0.2760	0	0.0670
5	0	0	0	0	0.6570	0	0	0.2760	0.0670
6	0	0	0	0	0	0.6570	0	0	-0.6570
7	0	0	0	0	0	0	0.6570	0	-0.6570
8	0	0	0	0	0	0	0	0.6570	0.3430

Table 10. Transition probability matrix *n* > RM10,000

s	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	0.8025	0	0.1766	0	0.0194	0	0.0014	0	0.0001
1	0.8025	0	0	0.1766	0	0.0194	0	0.0014	0.0001
2	0	0.8025	0	0	0.1766	0	0.0194	0	0.0015
3	0	0	0.8025	0	0	0.1766	0	0.0194	0.0015
4	0	0	0	0.8025	0	0	0.1766	0	0.0209
5	0	0	0	0	0.8025	0	0	0.1766	0.0209
6	0	0	0	0	0	0.8025	0	0	-0.8025
7	0	0	0	0	0	0	0.8025	0	-0.8025
8	0	0	0	0	0	0	0	0.8025	0.1975

Thus, for our numerical sample, we find;

Table 11. Stationary Distribution of the claim cost

	$\vartheta = 0.95$	$\vartheta = 0.42$	$\vartheta = 0.22$
0	0.3124	0.1651	0.4724
1	0.0554	0.0862	0.1163
2	0.1434	0.1311	0.1449
3	0.0740	0.1303	0.0766
4	0.1386	0.1621	0.0698
5	0.0812	0.1770	0.0437
6	0.1146	0.0912	0.0348
7	0.0555	0.0571	0.0237
8	0.0250	0.0000	0.0178

According to [16], it would not be a problem to work with the transient probabilities if the stationary distribution has not yet been reached.

In medical and health insurance, the number of claims varies depending on the number of coverages provided. Insured can claim numerous times as long as it does not exceed their insurance coverage. The claim on price distortion with/out deductible and its effect told by [5] may be why many health insurance insured feel that their premiums are too high in relation to their coverage. Excluding the medical inflation cost, the deductible alone is unbearable for certain insured to receive their full coverage. Looking from Table 7 above, assume that an insured has one claim reported within a year. If the insured's claim amount reported does not exceed their annually deductible amount, the insured will receive a claim-free year bonus, entitling the insured to moves one level down from the current/starting level. The higher the deductible paid by the insured, the better the chance they stand to lower their levels. From the result in Table 7, those who pay lesser deductible amount of RM2,500 annually has the least chance of 0.05 to receive bonus or lowered down their level, since their average number of claims amount are most likely to exceed their annually deductible amount more with a probability of 0.946, the highest among the group. This condition is not good for insured who has larger, unending claims with high certainty, such as cancers, haemophilia, and dialysis.

Opposite from above, insured with higher deductible of RM10,000, has the highest chance to moves one level down every year as this group of insured could maintain their average number of claims amount from exceeding their deductible with a probability of 0.22, indicating the lowest among the group. [12] mentioned in his report, coverage parameters that correlated with the increasing in claims are tackled with higher deductibles, as well as having maximum annual and lifetime, with no

per diem limitations on claims costs. But the possible question on this report is how high the deductible should be imposed?

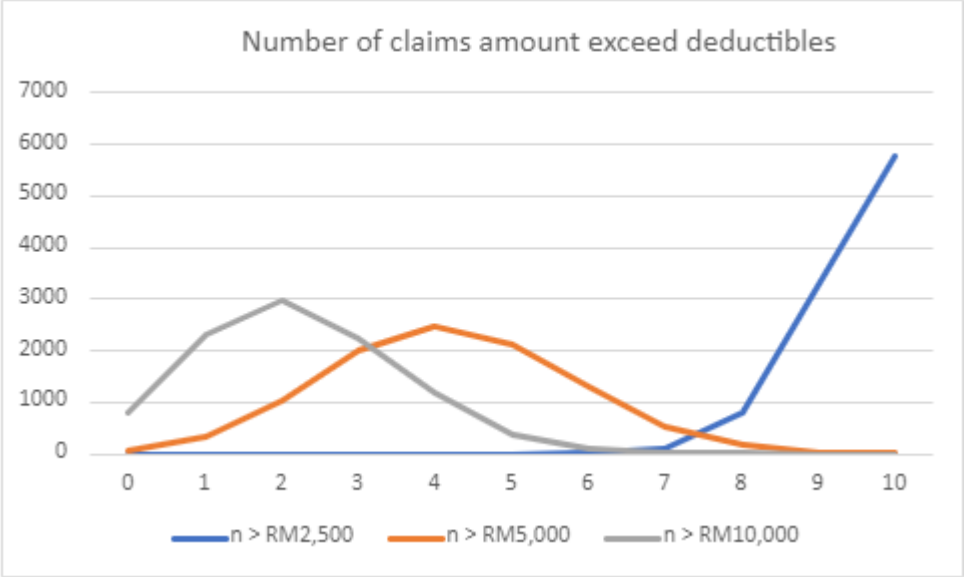

Figure 1. Number of claim amount exceed deductibles.

From Figure 1 above, shows that within a year, insured with lower deductibles has the highest potential to claim more than their annually deductibles, which could affect them falling into penalized claims as they make the most claims that would cost them more than their deductibles within the same year. While insured with higher deductible, who make most claims below their annually deductible, has the very most potential in increasing their chance to reduce their level towards a lower scale and receive the highest bonus rewards. Insurer can reduce and control their amount of loss if all insured has higher deductible for the year.

5 CONCLUSIONS

The alternative of applying BMS in medical and health insurance policies may affect many points of view. Focusing on the insured's point of view, although they had to pay high deductibles, but looking at their chance of getting bonus and rewards, it may be preferable to take the risk. Having a deductible as [7] said, will reduce the number of bonus hunger among insured. The insured could plan beforehand especially on how they should spend their annual deductibles. Having BMS in MHI would be a great help to lessen the premium/contribution made by the insured, thus, there would not be a problem if they choose to have a higher deductible amount. Meanwhile, for insured who choose to pay the lowest deductible amount, the insured can also experience of having BMS bonus throughout the years. It is highly suggested for insured to apply their policies at young age. Therefore, the amount of premium and deductible can be saved much more compared to securing policies at an old age.

While for the insurers' point of view, this BMS could help to control the number of fraudulent and excess claims made within the year. The insured also has the benefits to compensates the reduced penalties with the deductibles paid by the insured who reported claim in the malus zone within the same year. In practice, although deductible helps to reduce bonus hunger, it is necessary to have include the idea of true claim amount and frequency distribution because the hunger of bonus is still there.

Nevertheless, rebates and penalty are relatively defined with the premiums charged. It may affect the lower income group and never be able to give out the 'fair' amount for all. That includes the percentage for each level in BMS, amount of deductibles to be imposed, and the 'fair' premium amount that can be pay by all classes despite of their financial status.

6 RECOMMENDATIONS

For future studies, it is best to define the possible percentage use for each level of scale in the transition matrix. This percentage could help in calculating the insured premium for the future year. Other than that, imposing the fair amount of deductibles corresponding to the current economic status would help insureds with their out-of-pocket payment.

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