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PROCEEDINGS

The 4th International Conference on Sustainable Innovation (ICoSI) 2020

Cutting Edge Innovations for Sustainable Development Goals

Universitas Muhammadiyah Yogyakarta (Indonesia)
October 13 - 14 2020

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Preface by the Chairperson of the 4th ICoSI 2020

Dr. Yeni Rosilawati, S.IP. S.E., MM.

Assalamu'alaikum Wr. Wb.

All praise is due to Allah, the Almighty, on whom we depend for sustenance and guidance. Prayers and peace be upon our Prophet, Muhammad SAW, his family and all of his companions.

On behalf of the organizing committee, it is my pleasure and privilege to welcome the honourable guests, distinguished keynote & invited speakers, and all the participants.

With the main theme of "Cutting-Edge Innovations on Sustainable Development Goals (SDGs)", the 4th International Conference on Sustainable Innovation (ICoSI) 2020 serves as a forum to facilitate scholars, policy makers, practitioners, and other interested parties at all levels from Indonesia and abroad to present their novel ideas, promote cutting-edge research, and to expand collaboration network. The conference has about 1373 participants participating from more than 8 countries 4 continents all over the world, making this conference a truly international conference in spirit.

This multidisciplinary conference was first held in 2012 and has undertaken various changes and adopted to the current technological trends of our education system. From having this conference with just 175 participants back in 2012 we have come a long way in making the conference a huge success with more than 1373 participants participating in this two-day conference.

Formerly, this conference consisted of only 9 (nine) focal conferences. This year, there are 14 focal conferences from various disciplines, namely: 1) The 2nd International Conference on Pharmaceutical Updates (ICPU), 2) The 6th International Conference on Management Sciences

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(ICoMS), 3) The 9th International Conference on Law and Society (ICLAS), 4) The 4th International Conference Medical and Health Sciences (ICMHS), 5) The 6th International Conference for Accounting and Finance (ICAF), 6) The 2nd International Language and Education Conference (ILEC), 7) The 2nd International Conference on Nursing (ICONURS), 8) The International Conference on Information Technology, Advanced Mechanical and Electrical Engineering (ICITAMEE), 9) The 2nd International Conference of Agribusiness and Rural Development (IConARD), 10) The 10th International Conference on Public Organization (ICONPO), 11) The 2nd International Symposium on Social Humanities Education and Religious Sciences (ISHERSS), 12) The 5th Dental Research and Exhibition Meeting (DREAM), 13) The International Conference on Hospital Administration (ICHA), and 14) The 3rd International Conference on Sustainable Agriculture (ICoSA).

Accordingly, We are proud to announce that this year, the 4th ICoSI 2020 breaks the Museum Rekor-Dunia Indonesia (MURI) record as the Virtual Multidisciplinary Conference with the Largest Number of Area of Fields in Indonesia

In addition, this year, this conference holds special value since this is the first conference in the history of our university where the entire conference is taking place remotely on a digital platform through the use of advance technologies due to the Covid-19 Pandemic.

I would take this opportunity to express my highest respect to the Rector of Universitas Muhammadiyah Yogyakarta, Dr. Gunawan Budiyanto who gave approval and ensured the maximal support from all the faculty members of Universitas Muhammadiyah Yogyakarta (UMY) that made this event a big success. In addition, my appreciation goes to all the support teams who have provided their valuable support and advice from planning, designing and executing the program.

Let me conclude my speech by encouraging the delegates to participate with an increasing number in all the activities and discussions through the digital platforms for the next two days. I wish everyone a successful, safe, and fruitful conference.

Thank you!

Wassalamu'alaikum Wr. Wb.

Yogyakarta, Indonesia, 14 October 2020

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Welcoming Remarks by the Rector of Universitas Muhammadiyah Yogyakarta

Assoc. Prof. Dr. Gunawan Budiyanto

Innovation is the beginning of the development of technology, and technology is a development machine that is expected to provide benefits to humans and provide the smallest possible impact on environmental quality. In the concept of sustainable development, development must improve the quality of human life without causing ecological damage and maintain the carrying capacity of natural resources.

International Conference on Sustainable Innovation (ICoSI) is an international conference which is an annual conference held by the University of Muhammadiyah Yogyakarta (UMY), Indonesia. In 2020 this raises the issue of "Cutting-Edge Innovations on Sustainable Development Goals." Therefore, on behalf of all UMY academics, I would like to congratulate you on joining the conference, hoping that during the Covid-19 Pandemic, we can still provide suggestions and frameworks for achieving sustainable development goals.

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About The 4th International Conference on Sustainable Innovation (ICoSI) 2020

Cutting Edge Innovations for Sustainable Development Goals

The 2030 Agenda for Sustainable Development is enacted by the United Nations as a shared blueprint for peace and prosperity for people and the planet, now and into the future. It consists of strategies to improve health and education, reduce inequality, and spur economic growth while also conserving natures by 2030.

This year, however, at the first one-third of its timeline, the SDG Reports shows that the outbreak of COVID-19 did hinder the achievement, or at least decelerate the progress of achieving the 17 goals. In fact, according to the report, "some number of people suffering from food insecurity was on the rise and dramatic levels of inequality persisted in all regions. Change was still not happening at the speed or scale required", accordingly.

Therefore, in this event of pandemic, the quantity and quality of research, innovation, and more importantly multi-disciplinary collaboration are indispensable. Furthermore, there needs to be clear ends of those works. That is how those research are applicable and benefits directly to the society. That is how those research is incorporated as the drivers of policy making, and used practically in the society. Hence, the stakeholders especially the triple helix of higher education institution, government, and industry must be re-comprehended and supported to reach the common goal of the SGD.

International Conference on Sustainable Innovation (ICoSI) has been essentially attempting to strengthen this regard since its first establishment. One of the goals of ICoSI is to provide primarily a platform where scholars, practitioners, and government could grasp the development and trends of research. Hopefully, meeting these actors altogether would result in stronger collaboration, sophisticated and advantageous research, and brighter ideas for further research. Based on these reasoning, this year, the 4th ICoSI 2020 UMY is themed 'Cutting-edge Innovations for Sustainable Development Goals".

Improving from last year conference which brought nine focal conference, this year ICoSI 2020 UMY brings 14 disciplines, from social sciences, natural sciences, and humanities. ICoSI 2020 received as much as 1005 papers. The paper works submitted in ICoSI 2020 UMY will be published in Atlantis Proceedings, IOP Proceedings, National/International Journals, and ICoSI ISBN-indexed Proceedings.

Nevertheless, ICoSI believes that publication is only the beginning of research dissemination. The publications will enhance the chance of the research known by wider audience, and then used, applied, and incorporated at either system, institutional, or personal level of human lives.

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TRACK ECONOMICS, LAW, EDUCATION, SOCIAL, AND HUMANITIES

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Measuring Urban Self-Payers' WTP for the JKN-KIS Health Insurance: A Choice-Based Conjoint Approach

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ABSTRACT

In this research, we estimate the willingness to pay (WTP) of urban self-payers for the Indonesian JKN-KIS health insurance plans. Unlike the employer-supported and the government-supported members, self-payers choose their insurance plan based on their preferences because they pay for it out of their pocket. Instead of using the popular contingent valuation method, we use the choice-based conjoint which is considered the best method for measuring preferences. An online survey was conducted to collect choice data using randomly generated questionnaires that are designed such that the options available to each respondent are balanced, orthogonal, and have minimal overlap. Individual preferences, which are represented by individual utility values, are estimated using the Bayesian method assuming a mixed multinomial logit model with the multivariate normal distribution. Individual choices are then predicted based on individual utilities using the randomized first choice simulation. The continuous and differentiable demand function for each plan is obtained by aggregating the choices across all respondents and interpolating the result using cubic splines. Based on the demand functions derived from the data of 228 respondents, it is estimated that under the current premium scheme, more than 95% of the urban self-payers will choose the first-class and the second-class plans with preference shares of 62.17% and 34.03%, respectively. We also found that respondents with chronic disease prefer the first-class plan and are willing to pay for it Rp8,483 per month higher, on average, than those without one. Another finding is that even by increasing the monthly premiums up to Rp250,000 for the first-class and Rp200,000 for the second class, the combined share of preference is still greater than 95%.

Keywords: *willingness to pay, JKN-KIS health insurance, choice-based conjoint, mixed multinomial logit*

1. INTRODUCTION

The Indonesian JKN-KIS health insurance system was launched in 2014 as an effort for achieving universal health coverage which targeted at least 95% of the population by 2019. This health insurance system is run under the management of the Social Security Administering Body of the Government of Indonesia, also known as BPJS Kesehatan. The JKN-KIS has three insurance plans based on the type of ward and upgradability. They are the first-class plan which is offered with a 2-4-bed ward and upgradable to the VIP class, the second class plan with a 3-5-bed ward and upgradable to the first class, and the third class plan with a 4-6-bed ward and is not upgradable. Based on who pays the premium, we can categorize the members of the JKN-KIS into three groups, i.e. government-supported, employer-supported, and self -payers. The government and employer-supported members are those whose premiums are fully or partially paid by the government and employer, respectively, while the self-payers pay the premium out of their pocket.

After six years, the progress of JKN-KIS health insurance is not as expected. By the end of July 2020, the coverage was still far less than the target, only 82%. This was worsened by the growing deficit which by the end of 2019 reached Rp32 trillion. Three factors are believed to have contributed to this deficit: (1) late or deferred premium payment, (2) a relatively low premium compared to the cost paid to the healthcare provider, and (3) the adverse selection behavior of the members. In this case, the adverse selection refers to the situation where the buyers have more information than the sellers, i.e. the buyers buy insurance plans when they have an unfortunate health problem, otherwise, they will stop buying.

This research addresses the second factor from the consumers' viewpoint. Specifically, we seek to measure the consumers' willingness to pay (WTP) for the JKN-KIS health insurance plans. The population to be studied is limited to the self-payers that live in the urban area.

A lot of research has been conducted in the past to measure the WTP for health insurance plans. It turns out that the contingent valuation method (CVM) is the most popular approach, using varied elicitation techniques and statistical models. CVM is a survey-based technique for revealing consumer preference and commonly used in the valuation of non-market goods such as environmental goods or healthcare. Some research use bidding game elicitation, such as [1], [2], [3], and [4], while others use open bidding as in [5], payment card as in [6], and the simple yet powerful dichotomous choice as in [7]. Those research use varied models to represent WTP, like logistic as in [3] or Tobit as in [7].

Preference in consumer choice is usually represented using utility values, which in CVM are estimated at an aggregate level. This research aims to measure the WTP of the urban self-payers based on the utility values that are

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estimated at an individual level. A model with individual-level utility should be able to predict consumer choice more accurately than one with aggregate-level utility. The individual utility values are estimated from choice data using the Bayesian estimation method [8]. The choice data will be collected using a choice-based conjoint (CBC) questionnaire. This questionnaire consists of several randomly generated choice tasks, each of which has several product concepts made up of a combination of attribute levels [9]. Based on the individual utility, individual choices will be estimated and aggregated to obtain the share of preference of any product concept being analyzed using the randomized first choice simulation [10]. By simulating the share of preference for different price levels, we will obtain a function that represents consumers' WTP.

2. METHOD

2.1. Questionnaire Design and Data Collection

In this research, the data based on which the individual utility is estimated, are collected using a CBC questionnaire. A CBC questionnaire is made up of several choice tasks (usually 6-18), each of which has 3-4 alternatives or product concepts that represent the product being analyzed. Each product concept consists of a combination of attribute levels that make up the product [9]. For example, mobile broadband services have the following attributes: carrier, maximal speed, quota, and price. Then, a product concept that has the following attribute levels combination: carrier A, 14.4 Mbps, 10 GB, Rp150.000 per month, can be considered as an alternative in a choice task. In practice, the levels of each attribute are predetermined and the number of levels is usually not greater than six. A 'none' option can be added to each choice task to accommodate respondents that are not interested in any alternative available in the choice task.

In the questionnaire design, we set the number of alternatives in a choice task, and the number of choice tasks in a questionnaire. The questionnaire for each respondent is then randomly generated such that there are no two or more respondents that receive the same set of choice tasks. Furthermore, each questionnaire should be generated such that it is balanced, orthogonal, and has minimal overlap [9]. For this reason, the design and administering of the questionnaire should be assisted using computer software. In this research, we use the Lighthouse Studio from Sawtooth Software to design the questionnaire and conduct the online survey. Each respondent responds to the CBC questionnaire by choosing one alternative that best suits her, or the 'none' option, otherwise.

2.2. Estimating the Individual Utility

The system of individual utility consists of a set of values that each respondent attaches to each attribute level that represents how much it is worth and determines how she will choose among alternatives available to her. If n attribute levels are defined in a CBC questionnaire with 'none' option, each respondent will have $n+1$ utility values, one for each attribute level and the 'none' option. We use the mixed multinomial logit choice model, where the individual utility values, denoted as matrix $\boldsymbol{\beta}$, are assumed to follow a multivariate normal distribution with a mean vector of $\boldsymbol{\mu}$ and a covariance matrix of $\boldsymbol{\Sigma}$.

The estimation of $\boldsymbol{\beta}$, $\boldsymbol{\mu}$, and $\boldsymbol{\Sigma}$ can be done using the Bayesian approach [8]. Unlike traditional estimation that tries to maximize some likelihood function, the Bayesian approach uses the Monte Carlo simulation and utilizes the steady-state property of a stochastic parameter. The estimation of those three parameters is conducted iteratively by conditioning on each other using the data obtained from the CBC questionnaire. Hence, in each iteration, we estimate the value of $\boldsymbol{\beta}|\boldsymbol{\mu},\boldsymbol{\Sigma}$, $\boldsymbol{\mu}|\boldsymbol{\beta},\boldsymbol{\Sigma}$, and $\boldsymbol{\Sigma}|\boldsymbol{\beta},\boldsymbol{\mu}$ until they converge. The convergence is guaranteed by the Bernstein-von Mises theorem [8]. Specifically, at iteration t, $\boldsymbol{\mu}_t$ is drawn from $N\left(\widehat{\boldsymbol{\beta}}_{t-1}, \boldsymbol{\Sigma}/n\right)$ where $\widehat{\boldsymbol{\beta}}_{t-1}$ is the estimate of $\boldsymbol{\beta}$ from the previous iteration and n is the number of data. Accordingly, matrix $\boldsymbol{\Sigma}$ is estimated using the Cholesky decomposition of the inverse of the following matrix

$$\mathbf{H} = p\mathbf{I} + \sum_n (\boldsymbol{\mu}_t - \boldsymbol{\beta}_{t-1})\,(\boldsymbol{\mu}_t - \boldsymbol{\beta}_{t-1})^{-1} \quad (1)$$

where p is the likelihood of the current estimates. Meanwhile, matrix $\boldsymbol{\beta}$ is estimated based on the value of $\boldsymbol{\mu}_t$ and $\boldsymbol{\Sigma}_t$ using the Metropolis-Hastings algorithm [11].

2.3. Estimating Share of Preferences

Let $\boldsymbol{\beta}_j$ is the jth row of matrix $\boldsymbol{\beta}$ that represents the utility values of respondent j. If respondent j is given a choice task Ω, she will choose alternative i where $i \in \Omega$ if alternative i gives the greatest total utility compared to other alternatives in Ω. Suppose alternative i has a combination of attribute levels denoted as vector $\mathbf{X}_i$, then for respondent j, alternative i will have a total utility of $\mathbf{X}_i{}'\boldsymbol{\beta}_j$ if $\boldsymbol{\beta}$ is deterministic. Since $\boldsymbol{\beta}$ is probabilistic, we need to add random elements to the total utility. According to the randomized first choice method, the total utility of alternative i for respondent j, denoted as U_{ij}, can be represented as [10]

$$U_{ij} = \mathbf{X}_i{}'\left(\boldsymbol{\beta}_j + \mathbf{E}_j\right) + E_i \quad (2)$$

where $\mathbf{E}_j$ represents product variability while E_i represents individual taste variability. Both random elements are assumed to follow a double exponential distribution and are obtained from the Bayesian estimation. The proportion of respondents that will choose alternative i, or the share of preference of alternative i, can be estimated by aggregating individual choices across all respondents.

Suppose we set that there are five price levels in our CBC questionnaire, i.e. $p_1, \ldots, p_5$, and suppose that alternative i is offered with price p_1. Suppose that we run the randomized first choice simulation at this price level and come up with the share of preference $s_i(p_1)$. We can repeat the procedure for all price levels and we will obtain five data pairs as follow: $[p_1, s_i(p_1)]$, $[p_2, s_i(p_2)]$, $[p_3, s_i(p_3)]$, $[p_4, s_i(p_4)]$, and $[p_5, s_i(p_5)]$. To obtain a continuous and differentiable function, we can interpolate between data

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pairs using cubic splines [12]. The resulting function represents the cumulative WTP for the price range $[p_1, p_5]$.

3. RESULT AND DISCUSSION

3.1. CBC Questionnaire Design

Since our research aims to investigate the WTP of the current health insurance plans offered by the JKN-KIS, most of the attributes and levels are set according to those currently available in the current products. We set four attributes, i.e. (1) class of service, (2) type of ward, (3) service-class upgradability, and (4) monthly premium. The levels of the class of service and upgradability are set as they are now, i.e. the first, second, and third class for the class of service attribute, and upgradable and not upgradable for the upgradability attribute. For the type of ward attribute, in addition to those available in the current plans i.e. 2-3-bed, 3-4-bed, and 4-6-bed, we add a 1-bed level to see if the respondents are willing to pay a significantly higher premium for a more convenient ward.

For the monthly premium or price attribute, we set the levels starting from the current lowest to the highest level that we consider reasonable. The current lowest premium is Rp42,000 per month for the third-class plan. We do not consider price levels below Rp42,000 because this is the lowest level that everyone is willing to pay, otherwise, the premium will be paid by the government. The current monthly premium for the first and second class plans is Rp100,000 and Rp150,000, respectively. We set five price levels up to twice as high, they are Rp42,000, Rp110,000, Rp160,000, Rp250,000, and Rp300,000. This is motivated by the deficit problem faced by BPJS Kesehatan. By setting these price levels, we can explore the opportunity to increase the premiums to alleviate this deficit problem.

In our CBC questionnaire, each respondent will be given seven random choice tasks and one fixed choice task. While the random tasks are randomly generated that there are no two or more respondents will get the same set of choice tasks, the fixed choice task will be given to all respondents. This fixed task will be used to test the internal validity of the utility model. Each choice task in our questionnaire consists of four alternatives and one 'none' option. This is to accommodate respondents that are not interested in buying any of the JKN-KIS plans. Some prohibitions are set on random choice tasks to prevent unrealistic alternatives from occurring, such as the first-class plan with a monthly premium of Rp42,000.

The questionnaire is electronically circulated among people living in the urban area around Bandung and Jakarta who are self-payers, or potentially being self-payers should they buy the JKN-KIS health insurance plans. We conducted an online survey during February-March 2020 and managed to collect 228 completed questionnaires.

3.2. Estimation of Individual Utility

The Bayesian estimation on the data from 228 completed questionnaires resulted in a utility matrix with a root likelihood value of 0.603. This means that predicting respondents' choices using these utility values is 0.603/0.2 = 3.015 better than a random guess. The denominator of 0.2 is used because there are five alternatives in a choice task which means that a random guess has a 0.2 probability of being right.

A part of the individual utility obtained from the Bayesian estimation is presented in Table 1.

Table 9. Individual and average utility values

Attributes and Levels	Respondents				Average
	1	*2*	*...*	*228*	
Service class			…		
First	-0.173	0.999	…	1.738	1.126
Second	1.268	2.600	…	1.427	1.385
Third	-1.094	-3.598	…	-3.164	-2.511
Type of ward			…		
1-bed	1.551	2.147	…	1.613	1.749
2-3-bed	1.219	3.276	…	1.164	1.782
3-4-bed	0.563	0.167	…	-0.125	-0.128
4-6-bed	-3.333	-5.591	…	-2.651	-3.403
Upgradability			…		
Upgradable	1.318	0.513	…	0.524	0.591
Not upgradable	-1.318	-0.513	…	-0.524	-0.591
Monthly premium			…		
Rp42,000	0.957	2.109	…	0.286	1.028
Rp110,000	0.358	1.259	…	0.513	0.649
Rp160,000	0.814	-0.779	…	0.586	-0.108
Rp250,000	-1.343	-2.210	…	0.330	-1.014
Rp300,000	-1.786	-1.379	…	-2.714	-1.554
None	-6.589	-8.279		-5.969	-6.431

The utility values in Table 1 are in interval scale and zero-centered. Level with greater utility value is preferred than those with lower values. Since they are zero-centered, we cannot compare utility values between levels from different attributes. It is obvious from Table 1 that most of the respondents prefer the first and second class. The individual utility was validated using the fixed choice task and we came up with a mean absolute error of 3.49%. This error is the discrepancy between the actual share-of-preference based on the respondents' actual choice on the fixed choice task with those estimated using the individual utility. With a relatively small sample size, this is a good result.

Based on the individual utility values, the importance of each attribute can be estimated. In general, the greater the range of the utility values of an attribute, the more important the attribute. Based on the individual utility, the estimated importance is 42.81%, 33.19%, 8.23 %, and 15.74% for the class of service, type of ward, upgradability, and monthly premium, respectively. We can see that, in general, the respondents are not price-sensitive.

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3.2. Estimating the Share of Preference

Function per segment of Figure 1
1: $s_1(p_1) = 0.89 - 1.70 \times 10^{-7}\, p_1 + 6.60 \times 10^{-12}\, p_1^2 - 5.24 \times 10^{-17}\, p_1^3$
2: $s_1(p_1) = 0.69 + 5.15 \times 10^{-6}\, p_1 - 4.17 \times 10^{-11}\, p_1^2 + 9.41 \times 10^{-17}\, p_1^3$
3: $s_1(p_1) = 1.23 - 5.08 \times 10^{-6}\, p_1 + 2.22 \times 10^{-11}\, p_1^2 - 3.91 \times 10^{-17}\, p_1^3$
4: $s_1(p_1) = -0.12 + 1.12 \times 10^{-5}\, p_1 - 4.29 \times 10^{-11}\, p_1^2 + 4.76 \times 10^{-17}\, p_1^3$

We run the randomized first choice simulation using the individual utility values obtained from the Bayesian estimation. Using a scenario that represents the current plans, we came up with shares of preference as in Table 2.

Table 10. Estimated shares of preferences of the current JKN-KIS plans

Alternatives	Shares of Preferences
First-class; 2-3-bed ward; upgradable, Rp150,000	61.87%
Second-class; 3-4-bed ward; upgradable; Rp100,000	34.32%
Third-class; 4-6-bed ward; not upgradable; Rp42,000	2.68%
None	1.12%

It is obvious in Table 2 that with the current plans, more than 95% of respondents will choose the first and the second-class plans. This is consistent with the average utility in Table 1 and the corresponding attribute importance. Under the same scenario as in Table 2, we derive the share-of-preference function for the first-class plan by simulating under five different price levels set in the CBC questionnaire. The result is then interpolated using cubic-splines and the function is depicted in Figure 1 and specified in Table 3.

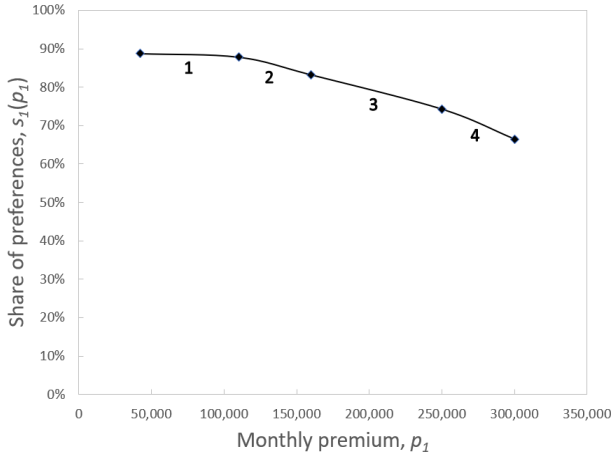

Figure 6. The share-of-preference function of the first-class plan

Referring to [13], Figure 1 can be considered as a cumulative WTP function of the first-class plan. It tells us what proportion of respondents would buy the first-class plan under the current competitive setting.

Table 11. The cubic-spline functions of Figure 1

Replicating the same procedure for the second-class plan results in the function in Figure 2 that is specified in Table 4.

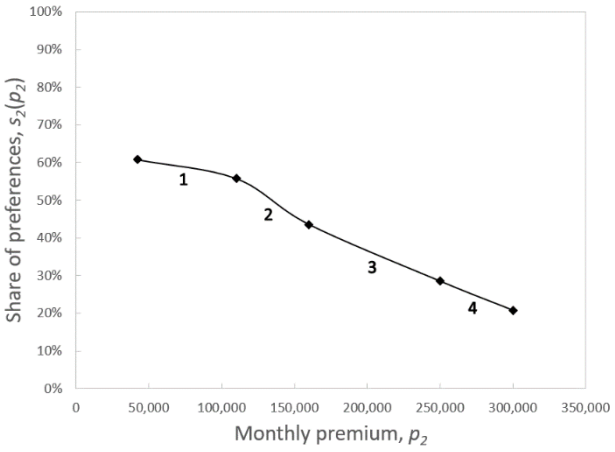

Figure 7. The share-of-preference function of the second-class plan

Table 12. The cubic-spline functions of Figure 2

Function per segment of Figure 2
1: $s_2(p_2) = 0.62 - 8.18 \times 10^{-7}\, p_2 + 1.51 \times 10^{-11}\, p_2^2 - 1.20 \times 10^{-16}\, p_2^3$
2: $s_2(p_2) = 0.13 + 1.27 \times 10^{-5}\, p_2 - 1.08 \times 10^{-10}\, p_2^2 + 2.53 \times 10^{-16}\, p_2^3$
3: $s_2(p_2) = 1.42 - 1.14 \times 10^{-5}\, p_2 + 4.29 \times 10^{-11}\, p_2^2 - 6.12 \times 10^{-17}\, p_2^3$
4: $s_2(p_2) = 0.15 + 3.81 \times 10^{-6}\, p_2 - 1.80 \times 10^{-11}\, p_2^2 + 2.00 \times 10^{-17}\, p_2^3$

From Figure 1 and Figure 2 we can analyze the sensitivity of the share-of-preference of the first and second class plans against the price changes.

It is important to note that the share-of-preference functions in Figure 1 and Figure 2 are not independent. The function in Figure 1 is derived by assuming that the monthly premium of the second-class plan is Rp100,000, while the function in Figure 2 assuming that the monthly premium of the first-class plan is Rp150,000. Considering this interrelationship, we conducted a what-if analysis to find the maximum prices at which the combined share-of-preference of the first and second classes is at least 95% while maintaining the price difference between them of at least Rp50,000. We found that increasing the price of the first and second class to Rp 250,000 and Rp200,000, respectively, the combined share-of-preference is still greater than 95%.

We also investigate if there is a significant association

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between WTP and other variables such as demography, lifestyle, and health condition. The only significant association that we found is between WTP and the health condition. We found that respondents with chronic disease have a higher preference for the first-class plan and are willing to pay for it Rp8,483 per month higher, on average, than those without one. Figure 3 depicts the WTP functions for the first-class plan of respondents with and without chronic disease.

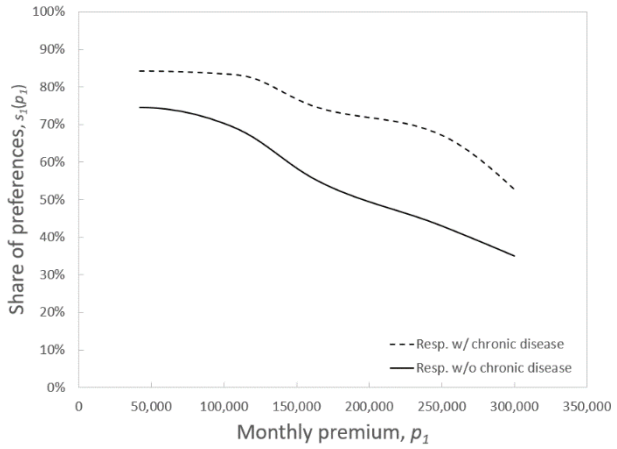

Figure 8. The share-of-preference function for the first-class plan of respondents with and without chronic disease

The result of our research reveals the opportunity for BPJS Kesehatan to increase revenue from the first and the second-class plans. We encourage BPJS Kesehatan to explore the WTP of other consumer segments to see if there is another opportunity to increase revenue by implementing finer price differentiation (more than three service-classes). The self-payers are the most potential segment to be explored because they are relatively independent in making purchase decisions. By the end of July 2020, about 16% of the JKN-KIS members are self-payer. Another potential segment is the employer-supported which comprises about 25% of the JKN-KIS members. But, targeting the employer-supported requires a different approach since the buying decision is partially or fully on the employers.

4. CONCLUSION

We estimate the WTP of urban self-payers for the Indonesian JKN-KIS health insurance plans using the choice-based conjoint method. Individual preferences, represented by individual utility values, are estimated using the Bayesian method assuming a multivariate normal distribution. Individual choices are then predicted based on individual utilities using the randomized first choice simulation. The continuous and differentiable demand function for each plan is obtained by aggregating and interpolating the result using cubic splines. Based on the demand functions derived from the data of 228 respondents, it is estimated that under the current premium scheme, more than 95% of the urban self-payers will choose the first-class and the second-class plans with preference shares of 62.17% and 34.03%, respectively. We also found that respondents with chronic disease prefer the first-class plan and are willing to pay for it Rp8,483 per month higher, on average, than those without one. Another finding is that by increasing the monthly premiums up to Rp250,000 for the first-class and Rp200,000 for the second class, the combined share of preference is still greater than 95%.

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