

Careful Consideration from Smokers to Non-Smokers

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Abstract : This note suggests a 'careful consideration' index taking account for the differences between satisfactions of smokers and non-smokers on the situation of passive smokes. Using the empirical data of Hayakawa et al. (2011), this note found that smokers of Soka University highly consider non-smokers, compared to the average of Japan.

1. Introduction

In 1960s, a half of adults in Japan were smokers. As they recognize that smoking increase the risk of lung cancer, the population of smokers has been decreasing rapidly in the world. Recently, the ratio of smokers in Japan is approximately 25%. After Japanese government issued the Health Promotion Law in 2003, workplaces and public places including restaurants are required to separate areas for smokers and non-smokers.

Turing to universities, most of them separate areas for smokers and non-smokers, but there are universities which completely ban smoking on campus. Medical schools obviously have incentives to forbidden smoking, but there are many composite reasons for universities that decided to ban smoking. Some universities which started banning without agreements of students are far from success.

Now, Soka University is going to forbidden smoking from the fiscal year of 2013. This is motivated by the health of students. The ratio of smokers in Soka University is 11.5% (See Soka University (2009)). Hence, the ratio of smokers is smaller than that of Japan. In detail, only 3% of first year students smoke, while the ratio of smokers in fourth year students is 19%. Hence, they started smoking after they enter the university. In other words, the university is trying to prevent 16% of potential smokers from smoking and to protect non-smokers from secondhand smoke. In Soka University, they held public hearings three times before they decide to ban smoking, and they are going to taking four years for the promotion and preparation before getting started.

The purpose of the note is to suggest an index which measures 'careful consideration' from smokers to non-smokers on passive smokes. The organization of the note is as follows. Section 2 suggests the careful consideration index, and Section 3 presents empirical results

for the cases of Soka University and Japan. Section 4 gives concluding remarks.

2. Careful Consideration Index

The note considers the situation of the passive smoke, which is the inhalation of smoke by persons other than the intended 'active' smoker. Let R_s be the ratio that smokers think that they care for non-smokers, and let R_{NS} be the ratio that non-smokers feels that smokers considers them. As R_s and R_{NS} are ratios, they take values between zero and one. We may define an index

$$CCI = wR_s + (1-w)R_{NS} + f(R_s, R_{NS}),$$

where w is a weight with $0 \leq w \leq 1$, and $f(R_s, R_{NS})$ is a function which examines the interactions between the smokers and non-smokers. We may set $w = N_1 / (N_1 + N_2)$, where N_1 is the size of samples from smokers, while N_2 is the size of samples from non-smokers.

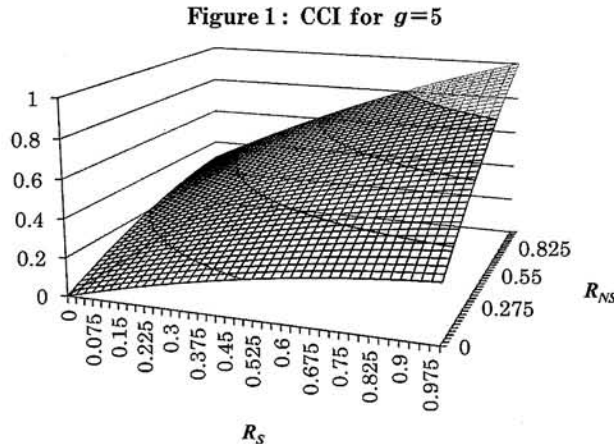
Regarding the functional form of the interaction, this note suggests a quadratic function given by

$$f(R_s, R_{NS}) = -\frac{1}{g}(R_s - R_{NS})^2,$$

where g is the 'Gap Tolerance'. Figure 1 shows the CCI with $g=5$ and $w=0.5$. The function gives a penalty on CCI when the gaps of feelings of smokers and non-smokers are large. Also, the more the gap tolerance increases, the flatter the curve becomes, indicating that the community of smokers and non-smokers can endure the gap more.

The idea behind CCI is the utility function suggested by Sharp (1987) for asset allocation. He derived the utility function for an investment to a portfolio, which is given by

$$U = \mu_p - \frac{1}{RT} \sigma_p^2,$$



where μ_p is the expected portfolio return, σ_p is the portfolio risk, and RT is the risk tolerance. While risk decreases the utility of investor, the gap between the feelings of smokers and non-smokers decreases the new index.

3. Empirical Results

This note works with the R_s and R_{ns} for Japan and Soka University, respectively. The former is from the survey of Huma Group (2009), based on the research of 5022 persons for the period from September to November in 2009. On the other hand, the latter is the outcomes of the questionnaire collected by Hayakawa et al. (2011), based on 287 students among almost 8000 students. The period for the survey was from June to August in 2011. It should be noted that the ratios of smokers for the different ages under 60 years old have no major difference. Hence, the note may consider that the results for Japan are very close to the characteristics of 20s.

As a preliminary analysis, we will test several kinds of hypothesis. For this purpose, we denote $p_s^{(i)}$ as the population ratio that smokers think that they care for non-smokers in population i , and we also denote $p_{ns}^{(i)}$ as the population ratio that non-smokers feels that smokers considers them. Here, we set $i=1$ for Japan, while $i=2$ for Soka University. The hypotheses to be tested are as follows,

- (a) $H_0 : p_s^{(1)} = p_{ns}^{(1)}$ vs $H_1 : p_s^{(1)} > p_{ns}^{(1)}$
- (b) $H_0 : p_s^{(2)} = p_{ns}^{(2)}$ vs $H_1 : p_s^{(2)} > p_{ns}^{(2)}$
- (c) $H_0 : p_s^{(1)} = p_s^{(2)}$ vs $H_1 : p_s^{(1)} \neq p_s^{(2)}$
- (d) $H_0 : p_{ns}^{(1)} = p_{ns}^{(2)}$ vs $H_1 : p_{ns}^{(1)} \neq p_{ns}^{(2)}$
- (e) H_0 : Two populations are independent.

Note that $p_s^{(i)}$ are expected to be higher than $p_{ns}^{(i)}$, in general. The last hypothesis examines whether or not students of Soka University behave differently from the averages smokers and non-smokers of Japan.

Table 1 shows the summary of their datasets. As noted before, the ratio of smokers in Japan is approximately 25%, while it is 11.5% for Soka University. For both cases, the values

Table 1 : Summary of Datasets for Soka University and Japan

Data	Japan	Soka Univ.
Smoker (R_s)	56.5%	82.0%
Non-smoker (R_{ns})	18.2%	70.6%
Weight (w)	0.2280	0.1220
Sample Size	5022	287

Table 2: Preliminary Test Statistics

Null Hypothesis	Test	P-Value
$H_0 : p_S^{(1)} = p_{NS}^{(1)}$	24.076*	0.000
$H_0 : p_S^{(2)} = p_{NS}^{(2)}$	1.606	0.054
$H_0 : p_S^{(1)} = p_S^{(2)}$	-3.830*	0.000
$H_0 : p_{NS}^{(1)} = p_{NS}^{(2)}$	-17.847*	0.000
H_0 : Two populations are independent	17.662*	0.000

Note: '*' denotes significance at five percent level. The first four statistics have the asymptotic normal distribution, while the last test follows the chi-squared distribution, with degree of freedom one.

of weights are close to the population ratios.

Table 1 indicates that 56.5% of the smokers in Japan think that they consider carefully for the non-smokers, while only 18.2% of the non-smokers think that smokers do so. Surprisingly, smokers of Soka University think that they highly care for non-smokers, and non-smokers also feel so.

Table 2 shows the preliminary tests results for the above five kinds of null hypotheses. The first four tests for difference of ratios rejects the null hypothesis with 5% significance level, except for the case that $H_0 : p_S^{(2)} = p_{NS}^{(2)}$ for Soka University. Within the university, the feelings regarding careful considerations between the provider (smoker) and receiver (non-smoker) are close. Furthermore, the ratio for the students of Soka University is statistically higher than average of Japan.

Table 3 presents the results of CCI for Soka University and Japan, and their ratio, depending on the value of the gap tolerance. The CCI for Japan takes the values from 0.12 to 0.26, while the value of Soka University varies 0.71 to 0.72. As g increase, the second term

Table 3: Careful Consideration Index

Gap Tol.	Soka Univ.	Japan	CCI _{SU} /CCI _{JP}
1	0.7069	0.1226	5.7644
2	0.7134	0.1960	3.6402
3	0.7156	0.2204	3.2463
4	0.7167	0.2327	3.0804
5	0.7173	0.2400	2.9890
6	0.7177	0.2449	2.9310
7	0.7180	0.2487	2.8911
8	0.7183	0.2510	2.8618
9	0.7185	0.2530	2.8395
10	0.7186	0.2547	2.8219
20	0.7193	0.2620	2.7454

of the CCI approaches zero. Hence, the cases for $g > 20$ are omitted. By construction, the second term of the CCI index is a penalty for the difference of the two feelings between the smokers and non-smokers, implying that the gap for Soka University is relatively very small. The CCI indicates that students of Soka University considers each other carefully, and the level is 5.76 (2.75) times of the average Japanese for $g=1$ ($g=20$).

4. Conclusion

The note examines the careful consideration from smokers to non-smokers on the situation of passive smoking. For this purpose, the note develops the careful consideration index. Empirical results for the students of Soka University show that the level of the careful consideration is at least 2.75 times of the average Japanese.

It is necessary for the smokers to behave prudently in order to stop smoking on campus. In the Soka University, smokers carefully think about non-smokers, and the latter also feel so. The evidence found in the note will be an additional support for the decision of the university.

References

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