Introduction and hypotheses

In economic theory, when people make intertemporal de-
cisions, their personal discount rates, which determine as
their measure of impatience how much of their resources to
consume for present gratification and how much to save for
future gratification, are considered to play a key role. Because
our body weight is a result of our past intertemporal choices
on trade-offs between present gratification from eating and
future one from health (and/or beauty), our body mass status
(e.g., normal, obese, or underweight) will depend on our time
discounting. Although the association between the personal
discount rate and body mass status has been discussed in
health economics, needed empirical research did not proceed
so much.

In this paper, we, jointly with Myong-II Kang, exam-
ined how interpersonal differences in the body mass index
(hereafter, BMI), defined as weight in kilograms divided by
height in meters squared (kg/m²), are related to differences
in time discounting, using data from a unique broad survey
of Japanese adults. The novelty is to focus on the associa-
tion of body mass not only with impatience, measured by the
level of discount rates, but also with two behavioral aspects
of time discounting: hyperbolic discounting, where a person
discounts his or her immediate future by a higher rate than his
or her distant future, and the sign effect, where future losses
are discounted at a lower rate than future gains of the same
amount. We hypothesize that body weight is associated posi-
tively with both impatience and hyperbolic discounting, and
negatively with the sign effect.

Results

Consistent with our hypotheses, we find that, the respondents’
BMI is associated positively with both the degrees of impa-
tience and hyperbolic discounting, and negatively with the sign
effect, where the significance levels are higher for the female
sample than for the male sample. Figures 1 through 3 sum-
mulate the results.

Data

The research is based on the Japan Household Survey on
Consumer Preferences and Satisfaction 2005 (hereinafter, JHS05), a
nationwide household survey that the authors con-
ducted in February 2005 as part of the Osaka University COE
program, supported by the Ministry of Education, Culture,
Sports, and Science and Technology.
Figure 1 depicts the means of BMI and attribute-adjusted BMI in the quintiles stratified by the degree of impatience. In either case, the BMI means are shown to be positively correlated with impatience. By sorting the sample by whether predilection toward hyperbolic discounting (HD) is strong or weak, and whether the sign effect is displayed or not, Figures 2(a) and 2(b) compare the BMI means and those means adjusted for other personal attributes. In either figure, BMI is associated positively with the degree of hyperbolic discounting, and negatively with the sign effect.

Based on regressions, Figure 3 estimates the impacts of increases in the time discounting variables on BMI and on the probabilities of being obese, severely obese, and underweight. For example, an increase in impatience by one unit of the standard deviation is associated with an increase in BMI by 1.09% of the BMI mean, a 2.28 percentage-point increase in the probability of being obese, and a 0.83 percentage-point decrease in the probability of being underweight. For example, an increase in impatience by one unit of the standard deviation is associated with an increase in BMI by 1.09% of the BMI mean, a 2.28 percentage-point increase in the probability of being obese, and a 0.83 percentage-point decrease in the probability of being underweight. A one-unit increase in the degree of hyperbolic discounting is associated with a 2.81 percentage-point increase in the probability of being obese and a 0.92 percentage-point decrease in the probability of being underweight. Respondents exhibiting the sign effect show a smaller BMI by 2.17% of the BMI mean, a 1.06 percentage-point smaller probability of being severely obese, and a 4.02 percentage-point higher probability of being underweight than those without the sign effect. These marginal effects are substantial compared with the prevalence rates of the corresponding body status (e.g., 18.92% for obesity and 6.97% for underweight).

Conclusions and policy implications

Analysis of an original nationwide survey of Japanese adults confirms that their body weight is expectedly related to their time discounting via impatience, hyperbolic discounting, and the sign effect. The impacts of these preferences on the probabilities of being obese and underweight are not that small, especially compared with the corresponding prevalence rates. Caloric intake and the resultant body mass formation could thus be taken as determined by intertemporal decision-making with behavioral decision bias toward immediacy and/or aversion of future losses.

Three policy implications follow. First, policies that raise the immediate costs of caloric intake (e.g., greasy food tax) are likely to be effective at reducing the prevalence of obesity. Second, policies that ease self-control problems (e.g., school education, counteracting advertisements that stimulate consumers’ impulsiveness) are also effective. Third, “nudging” policies that change defaults of eaters’ choices would also be effective.

References