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Abstract

Using individual level data (the Japanese General Social Survey), this paper aims to explore how interaction between genders contributes to the cessation of smoking in Japan, where females are distinctly less inclined to smoke than males. Controlling for various socioeconomic factors and selection bias, I find through a Heckman-type selection estimation that proportions of female employees in workplaces are negatively associated with male smoking but not with female smoking. Furthermore, married males are less likely to smoke than single males, whereas there is no difference in smoking rates between married and single females. These results suggest that smokers are more inclined to cease smoking when they are more likely to have contact with opposite sex nonsmokers.

Overall, this empirical study provides evidence that the psychological effect of the presence of people in one's surroundings has a direct significant effect upon smoking behavior; however, this effect is observed only among males and not females.

1. INTRODUCTION

Compared with Western countries, in general, the prevalence of smoking among females in Asian countries is distinctly lower than that of males. For instance, in 2006, the smoking prevalences for males and females in the United States were 23.9% and 18.0 %, while those in the United Kingdom were 23.0 % and 21.0 %, respectively. On the other hand, smoking prevalences for males and females in Japan were 39.9 % and 10.0 %, respectively (OECD, 2009)[1]. In post World War II Japan, females have risen in social position and hence have a greater influence in Japanese society[2]. Concerning smoking, most Japanese females are nonsmokers, and thought to dislike smoking behavior. As the social status of females has risen, a social atmosphere discouraging smoking seems to have become more prevalent.

Various characteristics of the people we encounter in our daily environments are assumed to affect our utility functions (Becker 1996). For example, the people in one's surroundings are thought to influence individual decision making and hence behavior through social interaction (e.g., Evans et al., 1992; Gaviria and Raphael, 2001, Glaeser et al., 2001., Powell et al., 2005). In some cases, the particular circumstances deter behavior that harms social welfare or goes against social norms (e.g., Becker and Murphy, 2000; Funk, 2005; Huck and Kosfeld, 2007; Posner and Rasmusen, 1999). When one smokes in a public place, others in the vicinity may indicate their annoyance toward the smoker. This causes the smoker to feel embarrassed, thereby generating a psychological cost of smoking. It seems plausible, therefore, to argue that in Asian countries, smokers may make more efforts to quit smoking if they work in workplaces where there are many female employees, since they are more likely to be nonsmokers. That is, we can expect female labor participation to help influence a smoker to quit smoking through social pressure.

The influence of workplace circumstances on smoking behavior has been examined (e.g., Evans et al., 1999; Gottlieb et al., 1990; Morozumi and Ii, 2006). Previous works dealing with cigarette consumption in Asian countries did not consider social pressure caused by females on smoking behavior, despite the fact that the difference in smoking

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[1] In the early 20th century in Western countries, females were far less inclined to smoke cigarettes than males (Waldron, 1991). This gender gap in smoking might be partly explained by the greater social power of males in Japanese society (Waldron et al., 1988).

[2] Japan ratified its "Convention on the Elimination of all Forms of Discrimination Against Women" in 1979 at the United Nations General Assembly. (See http://www.un.org/womenwatch/daw/cedaw/)

ratios between genders is remarkably large in Asian countries (e.g., Haden 1990; Kim and Seldon, 2004; Luo et al., 2003; Yorozu and Zhou 2002; Yuanliang and Zongyi, 2005). Hence, for this study, I use individual level data from Japan to examine the extent to which the ratio of female employees in the workplace contributes to the cessation of smoking.

2. METHODS

2.1 Data and Estimation

3.1. Data

This paper uses Japanese General Social Survey data (hereafter, JGSS), which is individual level data. The JGSS surveys used were conducted throughout Japan in 2000-2003 and adopted a two-step stratified sampling method. The survey asks standard questions concerning the characteristics of an individual and his/her family through face-to-face interviews. The questions cover information related to smoking habits, workplaces, marital and demographic (age and gender) status, income and education levels, number of children, prefecture of residence, and secondary school grade performance at the age of 15[3].

The survey collected data from 12,399 adults between the ages of 20 and 89. This paper aims to explore the effect of female employees on smoking behavior. Therefore, the sample is restricted to those who worked in a workplace at the time of the study. Furthermore, because this paper examines the various abovementioned individual characteristics, the samples used for estimations were reduced to 4,530 for regression estimations, as shown in Table II. In addition, data on past smoking habits were only available for 2002 and 2003; this information is necessary for the estimations shown in Table III, and thus the number of samples used for these estimations was reduced to 2,239. The variables used for the regression estimations are shown in Table I, which shows the mean values. Consistent with the discussion earlier, the rates of smoking (SMOK) are 52 % for males and 17 % for females. The proportions of female employees in the workplace (FWRAT) are 23 % for males and 59 % for females, suggesting that females are more likely to work in workplaces where there is a high ratio of female employees.

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[3] Data for this secondary analysis, "Japanese General Social Surveys (JGSS)" by Ichiro Tanioka, was provided by the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo.

With respect to the habit of smoking, all respondents from the years 2000 to 2003 were asked, “Do you smoke?” The possible responses to this question were "yes" and “no" in the 2000-2001 version of the questionnaire. For the 2002-2003 questionnaire, however, the possible responses increased to "yes", I used to smoke, but have stopped”, and “no". Hence, while data on whether individuals smoked currently can be obtained from all of the data from 2000-2003, data on whether individuals had quit smoking is only available for 2002-2003.

2.2 Estimation method

A cursory examination of Figure I reveals a negative relationship between proportions of female employees in the workplace and smoking rates. This suggests that social pressure from female employees may help deter smoking.

For the purpose of exploring smoking behavior, a dummy variable which takes a value of 1 when one currently smokes is used as the dependent variable; accordingly a probit model is employed. Nevertheless, because it is plausible that nonsmokers prefer to work in workplaces with few smokers, the result of the probit model could also indicate that workplace conditions have the effect of attracting non-smoking employees rather than actually deterring smoking behavior. Hence, to clarify this issue of causality, it is necessary to examine whether those who previously smoked have quit. As mentioned earlier, based on the 2002-2003 data, respondents can be categorized into smokers, those who used to smoke but have quit, and nonsmokers. This information allows me to conduct selection models such as the Heckman and Heckman probit models. In the first stage, I used the probit model to select those who had past experience smoking regardless of their current smoking habits. In this stage, I used school grade at the age of 15 as an independent variable because previous smoking habits are determined by previous conditions rather than current conditions. Then, in the second stage, I examine whether those who had smoked in the past had quit.

The function for the estimation takes the following form:

(First stage estimation)

$$SMOKEXP_i = \alpha_0 + \alpha_1 GRAD15_i + u_i ,$$

(Second stage estimation)

$$SMOK_i = \beta_0 + \beta_1 FWRAT_i + \beta_2 MARR_i + \beta_3 CHILD\_6_i + \beta_4 AGE\_6_i + \beta_5 MALE_i + e_i,$$

where $SMOKEXP_i$ and $SMOK_i$ represent the dependent variable in person i. SMOKEXP, which takes 1 if one has previous smoking experience, is the dependent

variable. The α values represent the regression parameters. u_i and e_i represent the error terms. In addition to the estimation using the full sample, I also divided the sample into male and female respondent groups to compare the effects of the independent variables.

Assuming that females are more likely to be nonsmokers based on the OECD (2009) data, FWRAT is expected to take a negative sign if female employees increase the psychological cost of smoking. Concerning marital status, MARR is predicted to take a negative sign in the male sample if a married male's smoking behavior is influenced by his wife. Furthermore, the younger a person is, the greater the damage from smoking on that person's health. Accordingly, the negative externality of smoking on a family member is greater when the family has a child. CHILD_6 is thus predicted to take a negative sign.

Several control variables were included to capture individual characteristics: age, gender, household income captured by dummies, level of education captured by dummies, and prefecture of residence dummies. The price of cigarettes does not vary among prefectures and thus prefecture of residence dummies controlled for any price effects.

3. RESULTS

Table II presents the results of the probit model. The results using the total sample, only the male sample, and only the female sample are exhibited in columns (1), (2), and (3), respectively. Table III shows the results of the Heckman model in columns (1)-(3) and the Heckman probit model in columns (4)-(6). Columns (1) and (4) show the results using the total sample, while columns (2) and (5) show the results using only the male sample, and columns (3) and (6) show those using only the female sample.

From Table II, it can be seen that FWRAT takes a negative signs in columns (1) and (2). However, it is statistically significant only in column (2). On the other hand, in column (3) the sign of FWRAT is positive. These results imply that higher proportions of female employees in the workplace help deter smoking among males but not among females. With respect to MARR, its coefficient shows negative signs in all estimations and is statistically significant in columns (1) and (3). Contrary to the expected result, this finding suggests that while husbands deter wives from smoking, wives do not deter their husbands from smoking.

As for Table III, before discussing the second stage results, an examination of the

first stage reveals that GRAD15 shows significant negative signs in all estimations. This indicates that the higher one's school grades at the age of 15, the lower the likelihood that the person will smoke. One possible interpretation of this result is that high grades lead to greater human capital, and therefore one's expected income increases. Smoking is thought to harm one's health, resulting in a decrease in future income. If one expects to earn a high income in the future, therefore, the person is less likely to smoke because of this expected reduction of income caused by smoking. FWRAT takes a negative sign in all columns, and is statistically significant in columns (2) and (5). These results are similar to those shown in Table II. By combining the results of Tables II and III, I argue that the proportion of female employees in the workplace increases the psychological cost of smoking and thus influences male smokers to cease smoking. Such social pressure from females has, however, no effect on female smokers. As for MARR, its coefficients show a negative sign in all columns and are statistically significant in columns (1), (2), (4), and (5), which is a different result from those shown in Table II; controlling for estimation bias affects the results of MARR. It follows from the results of Table III that wives influence their husband to cease smoking, but husbands do not influence the smoking behavior of their wife.

Concerning the other variables, there were no other significant differences found, with the exception of MALE.

4. DISCUSSION

Circumstances such as one's workplace and home environment are thought to influence smoking behavior. If the proportion of nonsmokers increases in a society, leading to a stronger "anti-smoking" norm, then the psychological cost of smoking increases. In Asian countries such as Japan, there is a large gender gap in smoking rates, and this characteristic of smoking behavior seems to contribute to the cessation of smoking. Using individual-level data, this paper explored how one's surrounding environment tends to lead to smoking cessation in Japan. Controlling for various selection biases and socioeconomic conditions, the major findings are as follows:

(1) Higher proportions of female employees in workplaces influence male smokers to cease smoking, but this influence is not seen in female smokers.

(2) Married males are less likely to smoke than single males, whereas there is no difference in smoking rates between married and single females.

Overall, the current empirical study provides evidence that the psychological effect of

the presence of others in one's surroundings has a direct effect upon smoking behavior, although this effect is observed only among males and not females. These findings will be useful for policy makers when considering the relationship between the female labor market and cigarette demand, which to date has not been accounted for.

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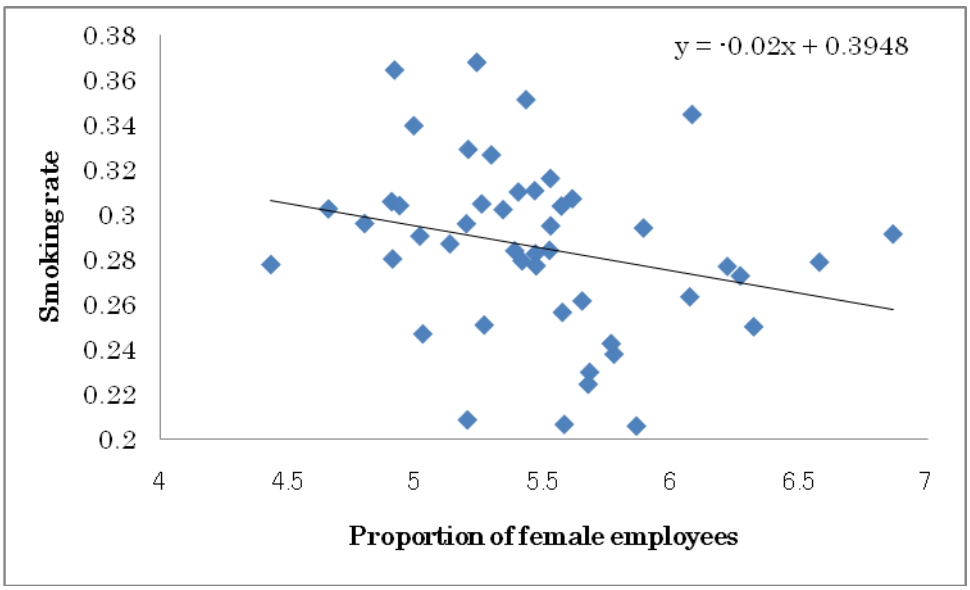

Fig. I.

Proportion of female employees and smoking rates in workplaces.

Note: Proportion of female employees in workplaces is the average rate within a prefecture. Smoking rate is the average rate of smoking among employees within a prefecture.

Table I
Variable definitions and mean values across genders.

Variable	Definition	MALE	FEMALE	ALL
SMOK [a]	Those who smoke take 1, otherwise 0. (%)	52	17	36
FWRAT[a]	Proportion of female employees in a workplace. (%)	23	59	39
MARR[a]	Those who have a spouse take 1, otherwise 0. (%)	76	70	73
CHILD_6[a]	Those who have children under 6 years old take 1, otherwise 0. (%)	12	7	10
AGE	Age of respondents.	46	45	46
MALE[a,b]	Those who are male take 1, otherwise 0. (%)	——	——	55
GRAD15	Respondents' school grades at the age of 15, ranging from 1 (poor) to 5 (excellent).	3.2	3.3	3.2

Note: Numbers are mean values and numbers in parentheses are standard deviations.
a. Rate reported rather than mean value; thus standard deviation is not reported.
b. Rate for males is reported.

Table. II. Regression results on smoking (probit estimation).

	All observations.		
Variable	(1) ALL	(2) MALE	(3) FEMALE
FWRAT	-0.03	-0.11**	0.02
	(-1.19)	(-2.68)	(0.98)
MARR	-0.05**	-0.04	-0.05**
	(-2.52)	(-1.44)	(-2.48)
CHILD_6	0.05*	0.06*	0.02
	(2.05)	(1.87)	(0.88)
AGE	-0.005**	-0.004**	-0.004**
	(-6.61)	(-4.26)	(-5.57)
MALE	0.38**		
	(18.4)		
INCOME[a]	YES	YES	YES
EDUCAT[a]	YES	YES	YES
PREFEC[a]	YES	YES	YES
Sample size	4530	2447	1987

Notes: Numbers represent marginal effects. Numbers in parentheses are z-statistics obtained by robust standard error. * and ** indicate significance at the 5 and 1 percent levels, respectively (one-sided tests). A constant is included in all estimations but not reported to save space.

a. YES means that dummy variables are included to capture the level of income, level of education, and current prefecture of residence. Prefecture dummies controlled for the price of cigarettes. A constant is included in all estimations but not reported to save space.

Table. III. Regression results on smoking (Heckman model and Heckman probit model).

	Heckman			Heckman Probit		
Variable	(1) ALL	(2) MALE	(3) FEMALE	(4) ALL	(5) MALE	(6) FEMALE
FWRAT	-0.12*	-0.13*	-0.17	-0.31	-0.40*	-0.08
	(-1.90)	(-1.79)	(-1.35)	(-1.57)	(-1.85)	(-0.41)
MARR	-0.12**	-0.14**	-0.005	-0.36*	-0.54**	-0.007
	(-2.64)	(-2.58)	(-0.07)	(-2.25)	(-2.72)	(-0.07)
CHILD_6	-0.01	-0.001	-0.005	-0.01	0.01	-0.17
	(-0.29)	(-0.02)	(-0.05)	(-0.12)	(0.06)	(-1.01)
AGE	-0.004*	-0.005**	-0.001	-0.01*	-0.01**	-0.007
	(-2.31)	(-2.46)	(-0.24)	(-2.00)	(-2.55)	(-1.49)
MALE	0.13**			0.32*		
	(2.44)			(1.99)		
	First stage			First stage		
GRAD15	-0.11**	-0.07*	-0.18**	-0.11**	-0.07**	-0.14**
	(-4.19)	(-1.99)	(-3.58)	(-4.48)	(-2.46)	(-3.64)
INCOME[a]	YES	YES	YES	YES	YES	NO
EDUCAT[a]	YES	YES	YES	YES	YES	NO[b]
PREFEC[a]	YES	YES	YES	NO	NO	NO
Sample size	2239	918	1321	2253	918	1335

Notes: Numbers represent marginal effects. Numbers in parentheses are z-statistics obtained by robust standard error. * and ** indicate significance at the 5 and 1 percent levels, respectively (one-sided tests). A constant is included in all estimations but not reported to save space.

a. YES means that dummy variables are included to capture the level of income, level of education, and current prefecture of residence. Prefecture dummies controlled for the price of cigarettes. In cases where convergence was not fulfilled when the income, education, and prefecture dummies were incorporated, the results without these dummies are reported.

b. Convergence was not fulfilled when all education dummies were included; hence the result using only the university graduate dummy is reported.