

**Chukyo University Institute of Economics**  
**Discussion Paper Series**

May 2016

No. 1603

**Policy Challenges to Reduce Smoking Rates:  
Japanese Experiences and their Economic Evaluation**

Michio Yuda

# Policy Challenges to Reduce Smoking Rates: Japanese Experiences and their Economic Evaluation<sup>\*†</sup>

Michio Yuda

School of Economics, Chukyo University

## Abstract

In this paper, I overview the recent smoking control policies (SCPs) in Japan and review the empirical economic research evaluating them. In addition, I review the recent Japanese research investigating the demand for smoking and cigarettes from the perspectives of behavioral economics and the economics of well-being. Reviewing these Japanese experiences provides useful policy implications for designing effective SCPs and improving the health status, quality of life, and public health for Japan and other countries in the future.

## Keywords:

Smoking; Smoking control policies; Empirical economic research; Health economics; Japan

---

\* This study is financially supported by the Grand-in-Aid for Young Scientists (B) (#26780180) from the Japan Society for the Promotion of Science. Any remaining errors are my responsibility.

† This paper is forthcoming in the *Internal Medicine Review*. The final version is available at the following website: <http://www.internalmedicinereview.org/>.

## 1. Introduction

It is common knowledge, worldwide, that smoking causes fatal health problems, not only directly for smokers, but also indirectly for nonsmokers via passive smoking. In many countries, various types of smoking control policies (SCPs) have been implemented to reduce the adverse health effects of smoking.<sup>1</sup> For example, various SCPs based on the *Framework Convention on Tobacco Control* (FCTC) guidelines adopted by the World Health Organization (WHO) in 2003 have already been enforced in European countries. Equally strict SCPs have been enforced in the United States in major cities and in other areas where the tobacco industry is not established. In addition, in newly developing countries and areas in Asia, including Hong Kong, India, Iran, Korea, Malaysia, Singapore, Taiwan, Thailand, and Turkey, smoking in public spaces incurs penalties.

In Japan, various SCPs began to be introduced from the 2000s, as summarized in the next section, and have drastically changed the circumstances surrounding smokers over the last 15 years. Figure 1 shows the trends in smoking rates by gender for Japan and the average for the Organization for Economic Co-operation and Development (OECD) countries, excluding Japan. The trends reveal that smoking rates have gradually declined in Japan and around the world. More specifically, in Japan, the smoking rate for males in 1965 was extremely high, 82.3 percent, but, by 2013, it had declined to 32.2 percent. Particularly large decreases are found in 2010 (down 15.7 percent year over year), 1993 (down 10.6 percent), 1989 (down 9.6 percent), and 2005 (down 9.2 percent). Nevertheless, the Japanese smoking rates for males in this period are, on average, 1.6 times larger than the OECD average. For females in Japan, the smoking rate was approximately 15 percent from 1965 to 1989, but, from 1990, it fell sharply, to about 10 percent (down 28.2 percent year over year). After 2010, it fell again, to below 10 percent. Particularly large decreases in the smoking rates are found in 2010 (down 22.9 percent year over year), in 2008 (down 17.3 percent), and in 2001 (down 13.9 percent). Unlike the male smoking rate, the Japanese female rate was, on average, 0.6 times lower than the OECD average.

<Figure 1A & B>

In this paper, I provide an overview of the recent SCPs in Japan and review the empirical economic research evaluating them.<sup>2</sup> In addition, I review the recent research investigating the

---

<sup>1</sup> The World Bank and the World Health Organization (WHO) have released comprehensive reports on health damage from smoking and implementation status of smoking control policies. See the World Bank (1999) and the WHO (2015).

<sup>2</sup> Chaloupka and Werner (2000) and Cawley and Ruhm (2011) offer useful comprehensive surveys on economic

demand for smoking and cigarettes from the perspectives of behavioral economics and the economics of well-being. Reviewing these Japanese experiences can provide useful policy implications to assist in designing effective SCPs and to improve the health status, quality of life, and public health for Japan and other countries in the future.

The rest of this paper is organized as follows. In the next section, I provide a brief policy background, with an overview of recent smoking control policies in Japan. In Section 3, I review recent empirical health economic studies on the smoking behaviors of Japanese people and, in Section 4, I provide concluding remarks.

## 2. Recent Major Smoking Control Policies in Japan

Table 1 summarizes the Japanese SCPs introduced after 2000,<sup>3</sup> which have drastically changed the environment for Japanese smokers over the last 15 years. One of the major changes was increases in cigarette prices in 2003, 2006, 2010, and 2014. As a result, the consumer price index for cigarettes increased by 70.5 percent from 2000 to 2015. Another drastic change for Japanese smokers was the implementation of the Health Promotion Law in May 2003, with article 25 of this law being the first written rule to regulate smoking in public spaces in Japan. In addition, in 2005, the Japanese government required cigarette companies to enlarge the warning labels printed on both sides of cigarette packages to comply with the WHO's FCTC. In particular, cigarette companies are obliged to print warnings, including the health risks of smoking, the risk of nicotine addiction, and the risk of premature birth, on more than 30 percent of the front and back of the packages. In 2006, smoking cessation outpatient services and prescriptions for nicotine patches are newly covered by the universal public health insurance. In 2008, new cigarette vending machines, with built-in age verifiers using identification card cards, known as the *Taspo* (Tobacco Passport), commenced operations.

<Table 1>

The SCPs in Japan are enforced on the basis of the WHO's FCTC and two policies of the Ministry of Health, Labor, and Welfare (MHLW) in Japan, the "*National Health Promotion Movement in the 21st Century (Health Japan 21)*" and "*Health Japan 21: the second term*".<sup>4</sup> *Health Japan 21*,

---

research on smoking behavior around the world.

<sup>3</sup> The regulations made by local governments are not included in this paper.

<sup>4</sup> See the website of the MHLW in Japan for more detailed explanations: [http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou\\_iryuu/kenkou/kenkounippon21/en/index.html](http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryuu/kenkou/kenkounippon21/en/index.html).

promoted from 2000 to 2012, aimed to reduce the number of deaths of people in their prime of life, prolong the healthy years of life, and improve people's quality of life to ensure Japan became a vigorous society in which all citizens could live in good health, both physically and mentally.<sup>5</sup> Regarding smoking, the Japanese government attempted to achieve a decrease in the risk of disease and death from smoking. *Health Japan 21: the second term* is a 10-year plan that commenced in 2013, with the aim of making a vibrant society in which citizens can live physically and mentally sound lives, and ensuring a sustainable social security system in the future. In relation to smoking, the Japanese government has set several specific targets to achieve lower smoking rates by 2022. For example, the aim is that the adult smoking rate declines from 19.5 percent in 2010 to 12.0 percent by 2022, and that the smoking rates of pregnant women and minors decline to zero.

### 3. Recent Empirical Health Economic Studies on the Effects of Smoking Control Policies and Smoking Behaviors in Japan

In this section, I survey recent health economic studies on the smoking behaviors of Japanese people.<sup>6</sup>

#### 3.1 The effect of cigarette tax and price increase

Table 2 summarizes the empirical studies on the effect of an increase in cigarette taxes and prices on smoking behavior.<sup>7</sup> All studies find that these policies significantly reduced the demand for smoking and cigarettes.

<Table 2>

---

<sup>5</sup> More specifically, it summarized the concepts, current status, targets, and measures for nine lifestyle diseases and their contributing factors: nourishment and dietary habits, physical activity and exercise, rest and mental health, tobacco, alcohol, dental health, diabetes, cardiovascular disease, and cancers.

<sup>6</sup> Most of the economic analyses of smoking behaviors are based on the rational addiction model of Becker and Murphy (1988). This model investigates a rational representative individual's smoking behavior, and it is assumed that the individual decides whether to smoke by using all information in the past, present, and future.

<sup>7</sup> In Japan, cigarette retail prices can be changed only when the Minister of Finance approves an application from the tobacco companies.

### 3.2 The effect of spatial smoking bans

Table 3 summarizes the empirical studies on the effect of spatial smoking bans on smoking behavior. The studies find that public and private spatial smoking bans significantly reduced the demand for smoking and cigarettes.

<Table 3>

### 3.3 The effect of other smoking control policies

Table 4 summarizes those empirical studies that have examined the effect of other types of smoking control policies on smoking behavior. It is found that information dissemination regarding the health hazard of smoking (Yorozu and Zhou, 2002) and utilization of nicotine alternative therapy (Ogura et al., 2004) significantly reduced the demand for smoking and cigarettes. In addition, Sugawara and Ohkusa (2006) and Igarashi et al. (2016) find that participation in smoking cessation program results in obtaining good health status and lower medical expenditures. However, Kanda et al. (2011) find that the introduction of the *Taspo* has not been sufficient to stop minors smoking.

<Table 4>

### 3.4 Behavioral economics factors and smoking behavior

The rational addiction model, on which many economic analyses of smoking behaviors are based, has been criticized for being unable to explain some specific smoking behaviors, such as the failure to stop smoking, and for not taking into account psychological influences on smokers. In recent years, many theoretical and empirical economic researchers have used the behavioral addiction model, which uses the knowledge of behavioral economics to enhance the rational addiction model (Bernheim and Rangel, 2005). Ii and Ohkusa (2002), Sato and Ohkusa (2003), Goto and Ida (2009a), Ida (2010), Kamimura and Noda (2011), and Ida (2014) find that the time preference rate (the discount rate) and risk preferences significantly affect smoking behaviors. In addition, Ogura, et al. (2005) find that longer smoking experience significantly increases nicotine intake, and Goto and Ida (2009b) find that interrelationships occur among addictive behaviors, smoking, alcohol addiction, and gambling. Moreover, Yamamura (2011) finds that not only formal rules but also tacitly formed informal norms are effective deterrents to smoking.

### 3.5 Smoking behavior, smoking control policies, and well-being

The last group of Japanese studies on smoking that examines the effects of smoking and SCPs on well-being. Subjective well-being is used as a proxy for an individual's utility in some recent econometric analyses. Tsutsui, Ohtake, and Ikeda (2009), using their original 2004 survey data, and Oshio and Kobayashi (2009), using the Japan General Social Survey (JGSS) from 2000 to 2006, find that people who habitually smoke are significantly unhappy, *ceteris paribus*. In addition, Yuda (2012) uses the JGSS from 2000 to 2008 to examine the effects of SCPs on well-being, following the methodology of Gruber and Mullainathan (2005), who use American and Canadian General Social Surveys. Yuda (2012) finds that increases in the cigarette tax and the implementation of the Health Promotion Law in Japan significantly adversely affected the well-being of male smokers, but did not have a significant effect on the well-being of male nonsmokers or females.

## 4. Concluding Remarks

In this paper, I provided an overview of the recent SCPs in Japan and reviewed the empirical economic research that evaluates them. Most of the studies find that the recent SCPs contributed to reducing the smoking rates of the Japanese people.

However, the current SCPs in Japan are less severe or strict than those in other countries because the Japanese regulations do not yet meet the global standards of the WHO's FCTC. To respect the WHO's FCTC and reach the international standard, the Japanese government needs to consider improvements in the following areas: (1) at present, there are no punishments for smoking specified in the Health Promotion Law; (2) Japan has a lower cigarette tax rate and price than those specified in the international standards; and (3) Japan has widely available cigarette vending machines. A further policy option is to adopt regulations to reduce cigarette production. While these may contribute to reducing smoking rates, there are many political, economic, and international difficulties in effectively controlling for cigarette supply.<sup>8</sup> The experiences and policy evaluations of the European countries and the United States provide useful lessons for Japan in formulating its future health policy, designing effective SCPs and improving health status, quality of life, and public health.

---

<sup>8</sup> Yuda (2015) examines the potential effect of unexpected supply shocks on the cigarette industry caused by these huge changes in smoking behaviors.

## References

- Becker, Gary S. and Kevin M. Murphy (1988) "A theory of rational addiction", *Journal of Political Economy*, Vol.96(4), pp.675-700.
- Bernheim, Douglas B. and Antonio Rangel (2005) "Behavioral public economics: Welfare and policy analysis with non-standard decision making", *NBER Working Paper Series*, No.11518.
- Cawley, John and Christopher J. Ruhm (2011) "The economics of risky health behaviors", in Mark V. Pauly, Thomas G. McGuire, and Pedro P. Barros (eds.) *Handbook of Health Economics*, Vol.2, pp.95-199, Elsevier.
- Chaloupka, Frank J. and Kenneth Werner (2000) "The economics of smoking", in Anthony J. Culyer, and Joseph P. Newhouse (eds.) *Handbook of Health Economics*, Vol.1B, pp.1539-1627, Elsevier.
- Goal, Rajeev K. and Xingyuan Zang (2013) "Gender dynamics and smoking prevalence in Japan", *Journal of Economics and Finance*, Vol.37(4), pp.622-636.
- Gruber, Jonathan H. and Sendhil Mullainathan (2005) "Do Cigarette taxes make smokers happier?", *Advances in Economic Analysis & Policy*, Vol.5, Article 4.
- Ida, Takanori (2010) "Anomaly, impulsivity, and addiction", *Journal of Socio-Economics*, Vol.39(2), pp.194-203.
- Ida, Takanori (2014) "A quasi-hyperbolic discounting approach to smoking behavior", *Health Economics Review*, Vol.4, Article 5, pp.1-11.
- Ida, Takanori and Rei Goto (2009a) "Simultaneous measurement of time and risk preferences: Stated preference discrete choice modeling analysis depending on smoking behavior", *International Economic Review*, Vol.50(4), pp.1169-1182.
- Ida, Takanori and Rei Goto (2009b) "Interdependency among addictive behaviours and time/risk preferences: Discrete choice model analysis of smoking, drinking, and gambling", *Journal of Economic Psychology*, Vol.30(4), pp.608-621.
- Igarashi, Ataru, Rei Goto, Kiyomi Suwa, Reiko Yoshikawa, Alexandra J. Ward, and Jörgen Moller (2016) "Cost-effectiveness analysis of smoking cessation interventions in Japan using a discrete-event simulation", *Applied Health Economics and Health Policy*, Vol.14(1), pp.77-87.
- Ii, Masako and Yasushi Ohkusa (2002) *Economic Analysis on the Demand for Health Care*, pp.184-194, Nihon Keizai Shinbunsha.
- Ishii, Kayoko and Hiroki Kawai (2006) "How efficient are increase in cigarette tax and implementation of the Health Promotion Law?" in Yoshio Higuchi (eds.), *Dynamism of Household Behavior in Japan II*, pp.211-236, Keio University Press (in Japanese).
- The International Bank for Reconstruction and Development/The World Bank (1999) *Curbing the Epidemic: Government and the Economics of Tobacco Control*, Available at <http://documents.worldbank.org/curated/en/1999/05/437174/curbing-epidemic-governments->

- economics-tobacco-control [April 22, 2016], A World Bank Publication.
- Kadota, Tamotsu, Seiritsu Ogura, and Wataru Suzuki (2005) “Econometric analysis of generational chain of habitual smoking”, in Eiji Tajika and Motohiro Sato (eds.) *Gap in Health Care and Long-term Care Benefits between Different Generations*, pp.221-239, Toyo Keizai Shinpo Sya (in Japanese).
- Kamimura, Kazuki (2014) “An empirical analysis of relationship between degrees of tobacco dependence and price elasticity of smoking amount”, *Japan Society of Household Economics*, Vol.39, pp.55-67 (in Japanese with English abstract).
- Kamimura, Kazuki and Akihiko Noda (2011) “A panel data analysis on the habitual smoking: an examination of the rational addiction model”, in Miki Seko, Hiroshi Teruyama, Isao Yamamoto, Yoshio Higuchi (eds.), *Dynamism of Household Behavior in Japan VII*, pp.91-110, Keio University Press (in Japanese).
- Kanda, Hideyuki, Yoneatsu Osaki, Takashi Ohida, Yoshitaka Kaneita, and Takeshi Munezawa (2010) “Age verification cards fail to fully prevent minors from accessing tobacco products”, *Tobacco Control*, Vol.20(2), pp.163-165.
- Morozumi, Ryoko and Masako Ii (2006) “The impact of smoke-free workplace policies on smoking behaviour in Japan”, *Applied Economics Letters*, Vol.13(9), pp.549-555.
- Ogura, Seiritsu, Wataru Suzuki, and Tamotsu Kadota (2005) “Economic analysis of habitual smoking”, in Eiji Tajika and Motohiro Sato (eds.) *Gap in Health Care and Long-term Care Benefits between Different Generations*, pp.189-220, Toyo Keizai Shinpo Sya (in Japanese).
- Ogura, Seiritsu, Wataru Suzuki, Makoto Kawamura, and Tamotsu Kadota (2004) “Conjoint Analysis on the nicotine replacement therapies”, *JCER Economic Journal*, Vol.49, pp.155-172 (in Japanese).
- Oshio, Takashi and Miki Kobayashi (2009) “The effect of smoking on individual well-being: A propensity score matching analysis based on nationwide surveys in Japan”, *PIE/CIS Discussion Paper No.453*, Institute of Economic Research, Hitotsubashi University.
- Sato, Masayo and Yasushi Ohkusa (2003) “The relationship between smoking initiation and time discount factor, risk aversion and information”, *Applied Economics Letters*, Vol.10(5), pp.287-289.
- Sugawara, Tamie and Yasushi Ohkusa (2006) “The cost-benefit analysis for smoking cessation programs”, *Journal of Health Care and Society*, Vol.15(3), pp.13-21 (in Japanese with English abstract).
- Takizawa, Shohei and Yoshiaki Shimasaki (2014) “The effect on tobacco tax revenue in consideration of the characteristics of the cigarette demand”, *Journal of Behavioral Economics and Finance*, Vol.7, pp.96-99 (in Japanese).

- Tsutsui, Yoshihiro, Fumio Ohtake, and Shinsuke Ikeda (2009) “The reason why you are unhappy”, *Osaka Economic Papers*, Vol.58(4), pp.20-57 (in Japanese with English abstract).
- Wan, Junmin (2006) “Cigarette tax revenue and tobacco control in Japan”, *Applied Economics*, Vol.38(14), pp.1663-1675.
- Yamamura, Eiji (2011) “The effects of the social norm on cigarette consumption: Evidence from Japan using panel data”, *Japan and the World Economy*, Vol.23(1), pp.6-12.
- Yorozu, Isao and Yimin Zhou (2002) “The demand for cigarettes in Japan: Impact of information dissemination on cigarette consumption”, *Contemporary Economic Policy*, Vol.20(1), pp.72-82.
- Yuda, Michio (2012) “Do recent smoking control policies make Japanese people happy?: Empirical evidence from the Japanese General Social Surveys”, in Masatoshi Shirai, Kimiyoshi Kamada, and Michio Yuda (eds.) *Public Economics Studies V*, pp.109-134, Keiso Shobo (in Japanese).
- Yuda, Michio (2013a) “The impacts of recent smoking control policies on individual smoking choice: The case of Japan”, *Health Economics Review*, Vol.3, Article 4, pp1-13.
- Yuda, Michio (2013b) “The impacts of the recently largest cigarette price increase and the unexpected supply shock to the tobacco industry on smoking behavior”, *Japanese Journal of Health Economics and Policy*, Vol.24(2), pp.143-156 (in Japanese with English abstract).
- Yuda, Michio (2015) “The unexpected cigarette supply shock and smoking behaviors”, presented paper at the 11<sup>th</sup> World Congress of the International Health Economics Association.
- The World Health Organization (2015) *WHO Report on the Global Tobacco Epidemic 2015*, Available at [http://www.who.int/tobacco/global\\_report/2015/report/en/](http://www.who.int/tobacco/global_report/2015/report/en/) [April 22, 2016], WHO Press.

Table 1. Recent smoking control policies in Japan

Year	Month	
2000	March	Launch of <i>Health Japan 21</i>
2003	May	Implementation of the Health Promotion Law
2003	July	Cigarette tax increase by 1 yen per cigarette
2005	April	Enlargement of health warnings on cigarette packages
2006	April	Smoking cessation outpatient services are newly covered by the public health insurance.
2006	June	Prescription for nicotine patches is newly covered by the public health insurance.
2006	July	Cigarette tax increase by 1 yen per cigarette <sup>(1)</sup>
2008	March- July	Introduction of new cigarette vending machines with built-in age verifiers and <i>Taspo</i>
2008	April	Launch of revised <i>Health Japan 21</i>
2010	October	Cigarette tax increase by 3.5 yen per cigarette <sup>(2)</sup>
2013	April	Launch of <i>Health Japan 21 (the second term)</i>
2014	April	Cigarette tax increase by 3.5 yen per cigarette due to consumption tax increase.

Note: (1) The Japan Tobacco Inc. (JT) additionally increased cigarette prices by 0.5 yen per cigarette.

(2) The JT additionally increased cigarette prices by 1.5 yen per cigarette.

Table 2. The empirical studies on the effect of an increase in cigarette taxes and prices on smoking behavior

Article	Data	Year	Number of observations	Dependent variable	Effect
Yorozu and Zhou (2002)	Prefectural data	1992 and 1997	94	Consumption	-0.986 <sup>c</sup>
Kadota et al. (2005)	Original survey	2001	389 university students	Smoking participation	-0.62 <sup>e</sup>
	Original survey	2001	958smokers aged 20-69	Smoking cessation choice	(Male) 0.61 <sup>m</sup> , (Female) 0.46 <sup>m</sup>
Wan (2006)	Time series data (yearly, quarterly, and monthly)	January 1955 to September 2003		Daily consumption	(No significant effect)
				Consumption (short)	-0.338 <sup>e</sup> to -0.421 <sup>e</sup>
				Consumption (long)	-0.679 <sup>e</sup> to -0.686 <sup>e</sup>
Ishii and Kawai (2006)	Keio Household Panel Survey	2005	1761 smokers	Smoking cessation choice	(Male) 0.021
Yuda (2013a)	Japanese General Social Survey	2000 to 2006	1066	Smoking choice	(Male) -0.01 <sup>m</sup> , (Female) -0.02 <sup>m</sup> to -0.014 <sup>m</sup>
Yuda (2013b)	Original survey	2012	1066	Smoking choice	-0.05 <sup>m</sup>
				Daily Consumption	-0.076 <sup>m</sup> to -0.07 <sup>m</sup>
				Daily nicotine intake (mg)	-0.74 <sup>m</sup> to -0.70 <sup>m</sup>
Goal and Zang (2013)	Aggregated data	1970-2009	200	Consumption	-0.485 <sup>e</sup>
				Consumption	-0.845 <sup>e</sup> to -0.270 <sup>e</sup>
Takizawa and Shimasaki (2014)	Original survey	(Not described)	341	Smoking choice	-2.77 <sup>c</sup> to -0.67 <sup>c</sup>
				Daily consumption	-0.051 <sup>c</sup> to 0.137 <sup>c</sup>
Kamimura (2014)	Japanese Household Panel Survey	2010 to 2011	1371	Nicotine intake	-0.90 <sup>e</sup> to -0.35 <sup>e</sup>

Notes: (1) *c*, *e*, and *m* represent estimated coefficient, elasticity, and marginal effect, respectively.

Table 3. The empirical studies on the effect of implementation of spatial smoking bans on smoking behavior

Article	Data	Year	Number of observations	Types of bans	Dependent variable	Effect
Ogura et al. (2005)	Original survey	2001 to 2003	1000	private	Nicotine intake	-0.29 <sup>m</sup> to -0.19 <sup>m</sup>
Morozumi and Ii (2006)	Original survey	2001	1498	work place	Smoking choice	-0.1 <sup>m</sup>
					Daily consumption	-4.11 <sup>m</sup> to -1.66 <sup>m</sup>
Ishii and Kawai (2006)	Keio Household Panel Survey	2005	1761 smokers	HPL	Smoking cessation choice	(No significant effect)
Yuda (2013a)	Japanese General Social Survey	2000 to 2006	1066	HPL	Smoking choice	(Male) -0.152 <sup>m</sup> , (Female) -0.119 <sup>m</sup>
Goal and Zang (2013)	Aggregated data	1970 to 2009	200	FCTC	Smoking rate	(Male) -0.109 <sup>m</sup> (-0.08 <sup>m</sup> to -0.305 <sup>m</sup> ) (Female) (No significant effect), (Female aged over 60: -0.229 <sup>c</sup> )

Notes: (1) *c*, *e*, and *m* represent estimated coefficient, elasticity, and marginal effect, respectively.

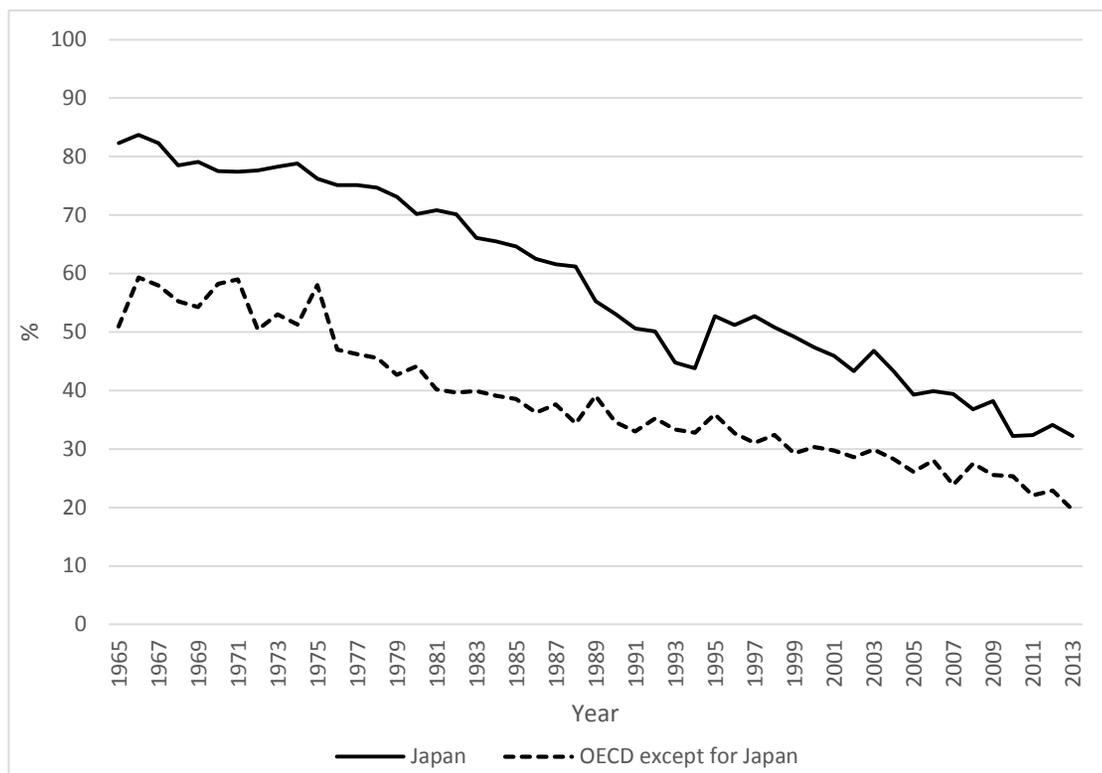
Table 4. The empirical studies on the effect of other types of smoking control policies on smoking behavior

Article	Data	Year	Number of observations	Types of the SCP	Dependent variable	Effect
Yorozu and Zhou (2002)	Prefectural data	1992 and 1997	94	Information dissemination	Consumption	-0.165 <sup>e</sup>
Ogura et al. (2004)	Original survey	2001	499	Price decrease by 1,000yen Cigarette price increase by 100 yen Available at vending machines or convenience-stores	Demand for nicotine gum	0.017 <sup>m</sup> 0.042 <sup>m</sup> 0.033 <sup>m</sup>
Sugawara et al. (2004)	Original survey	2004	907	Participation in smoking cessation program	Available at local healthcare center Available at medical facility OTC (gum) OTC (nicotine patch)	0.027 1.44 1.4 1.58
Kanda et al. (2011)	Original survey	2008	3158	Introduction of <i>Taspo</i>	Daily consumption	(No significant effect)
Igarashi et al. (2016)	Original survey	2013	1261	Participation in smoking cessation program	Life years (Benefit/ Cost) Discounted QALYs (Benefit/ Cost) Total discounted cost (yen)	0.25 0.08 -452,909

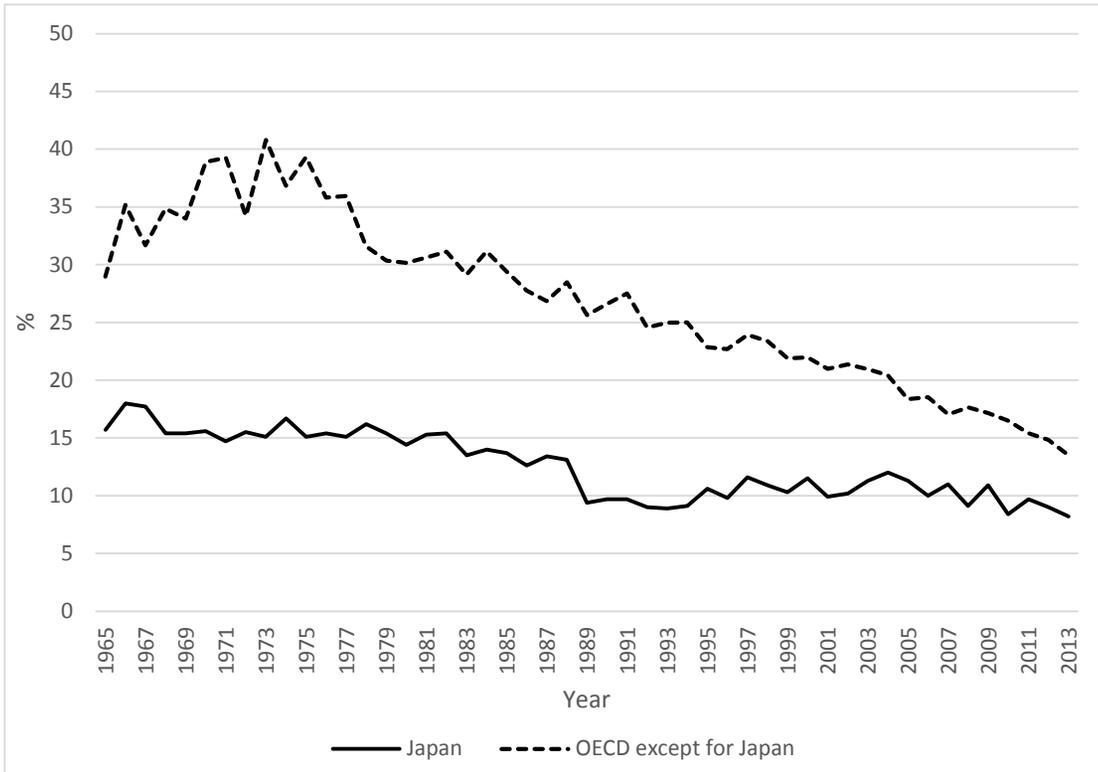
Notes: (1) *c*, *e*, and *m* represent estimated coefficient, elasticity, and marginal effect, respectively.

Figure 1. Trends of smoking rates

(A) Male



(B) Female



Note: Source from the *OECD data*.