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Rational Addiction and Cigarette in the Context of Health Economics—A Literature Review

Xiaoyu Hu

University of Toronto, Toronto, Ontario M5S 1A1, Canada

Abstract: *As a typical addictive consumption, cigarettes play a special role in socio-economic activities. The dual addictive characteristics of cigarette consumption make it both an income effect and a health loss effect, which has an important impact on the operation of the social economy: on the one hand, the sociable consumption of the group can maintain or strengthen the social network may bring an increase in income, that is, the income effect; on the other hand, excessive smoking makes the body much more likely to suffer from various chronic diseases, increasing the social health expenditure, and there is a health loss effect. This literature review illustrates the relationship between cigarette consumption and rational addiction behavior. I chose the base paper written by Gary S. Becker, Michael Grossman, and Kevin M. Murphy and titled "An Empirical Analysis of Cigarette consumption." The article concentrates on the smoking addiction problem and uses statistical models to collect data in the USA. Since the smoking addiction problems gets more and more serious, the paper plays an essential role in the policy planning by understanding the cigarette demand.*

Keywords: *Cigarette; Rational Addiction; Healthy Economics*

1. Introduction

Smoking is a commonplace and controversial behavior in human society. Since the mid to late twentieth century, scientific developments have made "smoking is harmful to health" a common knowledge message, and political developments have made "strengthening tobacco control" a common action in countries around the world. In 1988, the World Health Organization decided to establish World No Tobacco Day, and the theme of that year was "To smoke or to be healthy, make your choice[1]. The WHO believed that people would rightly choose health over smoking, and therefore set out to achieve a "tobacco-free world. In the real world, however, many people choose to smoke on the balance of health risks. According to statistics, there will be 1.32 billion smokers (including cigarette smokers and other tobacco product users) worldwide in 2020, and the prevalence of smoking among people aged 15 and older will be 22.8%, with 37.5% of men and 8.0% of women. As can be seen, smoking is still a fairly common behavior in the world today, both in absolute numbers and in relative proportions. Due to the large number of smokers, it is bound to pull the formation of a large scale of tobacco consumption market. According to statistics, in 2020, the global consumption of a total of 520 billion cigarettes, cigarillos 31 billion, the total tobacco market consumption of about $ 850 billion, of which $ 717 billion cigarettes, cigarillos $ 42 billion, snuff, oral tobacco, electronic cigarettes and other tobacco products $ 91 billion. But why do people still choose to smoke even though it is known to be "bad for health" and costs a lot of money? Why does the global epidemic of smoking persist despite the many tobacco control measures taken by governments? Becker, Grossman and Murphy point out that individuals decide smoking consumption based on the rational addiction model. The current consumption is related to the consumption in all periods, and the long-run elasticity is much larger than the short-run elasticity. I found two subsequent and related papers to extend the work of Gary S.Becker, Michael Grossman, and Kevin M. Murphy. The first paper written by Frank (1991) illustrates that the rational addiction model and time preferences are different for people with varying levels of education and age. The second paper written by Solan, and Wang (2008) works on a future study of Becker and Murphy model that smoking and quitting smoking are based on an imperfectly rational addiction model.

2. Literature of Rational Addiction and Cigarette

The Rational Addiction Model (RAM) provides a framework for analyzing individual smoking

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behavior and has been widely accepted and cited[2]. Although some people, especially nonsmokers, have difficulty understanding why smokers choose to smoke in spite of the science and to the detriment of their health when "smoking is bad for health" has been scientifically proven. But as Mises says, "Science never tells people how to behave, it just points out how you have to behave if you want to achieve a given goal. Smoking is a conscious act of the thinking human being, and "only smoking distinguishes humans from other animals". For the smoker, he or she makes decisions based on the information he or she has and believes and his or her own preferences, and he or she smokes because he or she believes he or she can achieve greater utility after weighing the pros and cons of smoking and comparing the costs and benefits. That is, although the smoker bears some health risks, pays some financial costs, and incurs some other losses (e.g., environmental losses, time losses, etc.), the smoker believes that these are worthwhile compared to the utility that can be gained from smoking. For this reason, although some people, especially nonsmokers, believe that smoking is "harmful" or even "harmless", for smokers, the benefits of smoking are many and outweigh the losses. In the real world, the choice to smoke provides greater utility, and this is the fundamental rule that determines why smokers smoke. What utility the smoker expects and to what extent it is achieved depends largely on the smoker's personal judgment and may vary from person to person and from time to time. But as a biological person, but also a social person, the pursuit of physiological pleasure, the regulation of psychological and emotional, close social interaction, increase the pleasure of life, the realization of self-recognition, which is the fundamental motivation for individuals to choose to smoke, but also its purpose and utility from the smoking can be achieved.

Becker, Grossman, and Murphy (1994) examine whether the current cigarette consumption will increase or not if the past and future price decrease. In the previous literature in the cigarette area, some researchers use the single-period model to check the price effect on consumption, which ignores the dynamic change of consumption. Also, some researchers have worked on the two-period model that cannot capture the price effect on a specific good. So, the Becker and Murphy model has analyzed the demand for smoking in America using a multi-period model from 1955 to 1985 to illustrate that smoking is rational addictive.

In the Becker and Murphy model, the authors have set up an assumption that individuals make the decisions by maximizing the total utility during their lifetime. The every-period utility is dependent on the every-period consumption and every period prices, which means they are not separate from each other. The model's bias is that the current consumption is correlated with the past consumption, the future consumption, the current price, and other factors like income, tax, ete. Becker, Grossman, and Murphy (1994) have compared the Myopic model and the rational addiction model. The myopic model assumes that the past consumption reinforces the current consumption, but it is independent of the future consumption. For an adiction behavior, the rise of the past consumption will increase the marginal utility of the consumption of the next period then the consumer will keep consuming as long as the marginal utility is higher than the marginal cost. This paper tests the myopic model at first then checks the future price effect on current consumption to reject the Myopic model because that rational consumer will change their recent decisions based on the expectation of future outcomes.

In the Becker and Murphy model, there are 1581 observations collected from 50 states in the US from 1955 to 1985. The outcome variable is the per capital cigarettes consumption in packs in yeart. The treatment variables are past consumption, future consumption, average retail price of cigarettes per pack in year t, and other factors. The nature of the variation of the treatment variables is that average price and tax are exogenous variables. The coefficients present the relationships between the outcome variable and the treatment variables. The positive coefficient demonstrates that once the treatment variable increases, the outcome variable also increases simultaneously. The negative coefficient presents that once the treatment variable decreases, the outcome variable also goes down simultaneously. According to the empirical results, the negative coefficient between the current price and the positive coefficient between the per capita income led to smoking being positively related to income but negatively associated with price. Besides, the coefficient between past consumption and current consumption is positive, which means the Myopic model is addictive. People who consumed more cigarettes in the past will consume more and more in the future.

Becker, Grossman and Murphy (1994) have used the 2SLS model and OLS model further to study the rational addiction model from the Myopic model. [3] By checking the relationship between the expected future price and the current consumption, we found the coefficient is negative, which means current consumption depends on the future price. Besides, the expected future price affects future consumption directly. In other words, the future consumption is related to the current consumption. So, the Myopic model is rejected. Combing these empirical results, past consumption, and future

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consumption both importantly affect the decisions of the current consumption. To provide objective evidence of the rational model, the author tests the price elasticity by comparing the percentage of the current and future consumption change with the variation of the prices because rational consumer will concentrate on future consumption. According to the gap of the percentage change, the authors have concluded that long-run price elasticity is much larger than short-run elasticity. After applying a federal tax, the long-run tax revenue will be much smaller than the short-run tax because there will be a more significant decrease in future demand than the current demand.

There are some limits to the rational addiction model. The first one is Becker, Grossman, and Murphy use the previous prices and taxes to predict the future price. The rising uncertainty of future consumption makes it difficult to deal with the relationship between current consumption and past consumption. The second one is that the tax in every state is different. It is likely to smuggle from a low tax rate to a state with a high tax rate. The third one is that people own more information about the harm of smoking in recent years. The fact influences the people's choices but is not included in the model.

Becker, Grossman and Murphy (1994) also argue that smoking is addictive gives monopoly power to the cigarette industry. With the implication of the rational model, firms set up prices based on the relationship between rational addiction and price. If smoking is addictive, firms can set up a lower price at present to increase the current consumption to make more people addicted to smoking. Firms increase prices in the future to raise revenue with increasing future demand.

3. The extension from the subsequent papers

Chaloupka(1991) [4] states that addiction and preferable time varies with a variation of age and the level of education based on the rational addiction problem.The younger consumers with less education are more accessible to an addict than the older consumers with a higher level of education.The less addictive group is more sensitive to prices and more elastic to an exact price change.To resolve the limit of information of harm in the Becker and Murphy model, Chaloupka (1991) introduced health and benefits from smoking like stress reduction,as new factors.To solve the limitation of the possibility of smugling in the Becker and Murphy model, Chaloupka(1991)used a minimal price of cigarettes per pack in within 25 km of where they live. The authors are the first to test the Becker and Murphy model using the individual data and estimate demand elasticity for individuals. This paper uses data from a national health survey that collects around 28 thousand observations of people from 6-month-old to 74years old,covering 1976 to 1980.According to the empirical results, the cigarette demand function is consistent with the rational addiction model. Considering the effect of the information, Chaloupka(1991]points out that the people who continue to smoke after a wild separation of the harmful information are less rational than those who quit smoking. Besides, Chaloupka (1991] examines addiction behavior with different preferable times in the Becker and Murphy model. The author tests the demand model with a variation of age and the level of education. The older people with more education seem to be more rational and lesslikely to be addicted than the younger people with less education—the reason is that the easier addicted group focuses more on the present than the future.

Solan and Wang(2008) [5] expand the previous article by comparing the rational model,imperfectly rational, and irrational model.The author argues that the imperfectly rational model applies to smoking and quitting smoking with an effect of smoking risk. Consumers are rational if they decide on current consumption based on all the useable future information.In Becker and Murphy's model, the perfect rational model assumes people will quit smoking suddenly. So,stopping smoking step by step is excluded in the perfect rational model. Solan and Wang (2008) have introduced the imperfectly rational model to understand the rational addiction model deceper. In the empirical study, Solan and Wang (2008) assume that individuals may be imperfectly rational because they may have different preferable times and incomplete information of the harm. Solan and Wang (2008)use this discounting rate to illustrate the imperfectly rational model by setting up a hypothesis on the exponential discount rate. The difference between perfectly rational people and imperfectly rational people is the wilingness to consider future consequences. The limit of the prediction of future developments and the personal belief on the possibility of the outcomes in the future both affect the behavior of consumers, which the perfect rational model does not fully explain.

In the latest study, JiaoLong Li and Jisheng Yang constructed an interaction effects nonlinear panel SVAR system to measure the preference changes, explicit income effects and implicit social costs of social-addictive consumption represented by tobacco and alcohol consumption. The results show that

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cigarette consumption is mainly an individual addictive behavior, and the proportion of sociable consumption is about 6%, with no significant changes at different income levels, while alcohol consumption is mainly a group addictive behavior, and the proportion of sociable consumption is about 30% at low income and up to 60% at high income. Both tobacco and alcohol consumption have positive explicit income effects, but after deducting the implicit economic loss, the pure economic effect of tobacco consumption is approximately zero, while alcohol is significantly negative. The explicit income effect creates a self-motivated growth trend for tobacco and alcohol consumption, and price regulation is ineffective, so social-addictive consumption behavior depends on exogenous constraints such as institutional and social cognitive factors.[6]

4. Conclusion

There must be a rationale and a human benefit to the act of smoking that has sustained a global epidemic for more than five hundred years since Columbus discovered tobacco and that there are still more than 1.3 billion smokers. What is certain, however, is that because of the relationship between smoking and health, the practice of smoking has faced persistent and widespread opposition, whether in the past, present, or future, along with persistent and widespread occurrence. in 1604 King James I of England published a diatribe against smoking, "Strongly Opposed to Tobacco," in 1639 the Chongzhen Emperor of the Ming Dynasty of China issued a ban on smoking, in 1761 the English surgeon John Hill published a study on smoking as a carcinogenic In 1761, British surgeon John Hill published a study on smoking as a carcinogenic factor, in 1899 Lucy Gaston organized the National Anti-Tobacco Coalition, and in 1964 the U.S. official report on the health hazards of smoking was released ..... a history of human smoking, but also a history of human opposition to smoking. In a way, smoking behavior is popular in the opposition, the tobacco industry is in control of the development of. Smoking and anti-smoking have formed a seemingly contradictory but unified and long-lasting symbiotic relationship.

With the development of economy and technology, there is growing evidence that smoking is harmful to health, and the Framework Convention on Tobacco Control (FCTC), which was developed under the auspices of the World Health Organization and entered into force in 2005, has turned increased tobacco control into a common global political action and legal requirement. "Historically, however, laws designed to counteract smoking have never counteracted smoking, but may have had the opposite result, a paradox that calls into question the purpose and utility of coercive behavior." To strengthen tobacco control for the sake of health, this undoubtedly has political correctness and value justification. But to learn from history and to guide people not to start smoking or to quit smoking, one should first understand why people smoke or do not quit smoking. In dealing with people's choice of smoking behavior, we should be careful not to fall into the "Tahitian trap," because if we exaggerate the harmful effects of smoking, absolutely deny the benefits of smoking, and use this to develop and implement irrational and excessive tobacco control policies, any good motivation for tobacco control may not achieve the desired effect, and seemingly good tobacco control policies may not be implemented. Currently, few people consider smoking as a healthful behavior, but many people continue to choose to smoke after weighing the health risks of smoking. In this regard, both governments, societies and individuals should further identify the root causes of smoking, change the conditions that cause smoking, create an atmosphere that reduces smoking, and guide and promote a healthier, better and happier life for all while respecting and understanding all actors.

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