

Significances of Taxes on Tobacco and Alcohol

Xuanhao Gu^{1,*}, Zixi Zhang², Zihang Yang²

¹Suzhou International Foundation School, Jiangsu, China

²Dulwich International High School Suzhou, Jiangsu, China

²Golden Apple Jincheng No.1 Secondary School, Chengdu, China

*Corresponding author: 13875990882@163.com

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Abstract: Tobacco and alcohol are two detrimental goods which may affect people's health and social harmony when they are overused. Consequently, the Chinese government levies heavier taxes on the two goods to decrease their amount of consumption volumes. In this paper, the authors made a prediction with the Supply and Demand Curve to figure out whether the heavy taxes have worked and use specific data to test their prediction. Through deliberate analysis of the data, the authors concluded that the taxes on tobacco and alcohol indeed decrease the consumption volumes of these goods, improve people's health conditions and living qualities, and contribute to a harmonious society.

1. Introduction

It is universally acknowledged that tobacco and alcohol are unhealthy for people and can lead to many illnesses. As for smoking, its negative effects are chronic and are related to the increasing quantity and length. The statistics shows that smokers who smoke in a long term and with large amounts have a possibility of more than 50% to early deaths due to related diseases, including hypertension, heart attacks, and lung cancer. Meanwhile, heavy drinking can damage people's hearts and blood vessels. It can make the brain over excited or paralyzed. The disorder of significant organs may cause neurasthenia and intelligence damage, which has a great impact on learning and work. Long term drinking can cause alcoholism and overdrinking at one time can also lead to death.

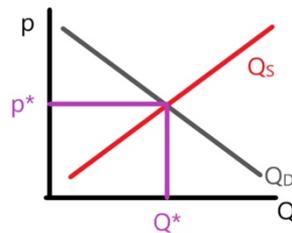
Overdose tobacco and alcohol can not only harm the users but also pose social problems. It can also lead to poverty and other negative effects to those addictive people. Statistics show that families with smokers and drinkers are prone to spend many of their savings on cigarettes and liquors and thus have less money to spend on food, education, clothing and housing. And the poor and the young are the vulnerable groups who are easily affected by the addictive products. Young people usually have weak willpower so they can easily be affected by the cigarettes or liquors and it may be hard to give them up. For the poor, the addiction to the cigarettes and liquors may push them to waste a great deal of money and cause and be easily stuck in economic difficulties.

Therefore, the government is eager to reduce the consumption volumes of tobacco and alcohol to protect people's health and tackle related social problems, and imposing taxes on them may work. In this paper, the authors aim at figuring out whether taxes can influence the consumption volumes of tobacco and alcohol. If it does work, how useful it can be.

2. The Prediction of The Effects on Tobacco and Alcohol

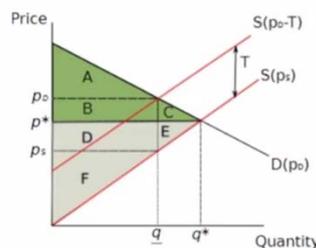
Firstly, we are going to make a prediction about the effect of the taxes on tobacco and alcohol by using the supply and demand model, and then we'll test the credibility of this prediction empirically. In supply and demand model, the demand means how much consumers want to buy the products at different prices. The demand curve has a decreasing relationship with the commodity price. Supply refers to the amount that producers are willing to offer for sale at different prices and the supply curve

is in increasing relationship with the goods price. The intersection of demand curve and supply curve indicates that demand and supply are equal at this point. It shows that both the sellers and the consumers are willing to sell or buy the products at this price. The number of this point is called equilibrium trading volume, and the unit price is called equilibrium price. In the market economy, supply and demand determine the price. In a hypothetically perfect market, all firms have the same size and provide the similar goods, so the goods price is codetermined by them and are interchangeable. In this market, when the goods price reaches the equilibrium price, the supply is equal to demand. And no one wants to break this balance because they don't want to sell goods at a lower price or buy them at a higher price.



(Graph 1)

Therefore, supply and demand model taken into consideration, if the government levies a per unit tax on the seller, the companies need to pay the tax and then the supply curve will ascend because companies will charge higher prices from the consumers for more revenues to cover the taxations. In graph 2, the new equilibrium is the point at PD and q. From the picture we can see that when the price rises, the consumers need to pay more and sellers only gets P_s . The reason is that taxes are contained in the goods price.



(Graph 2)

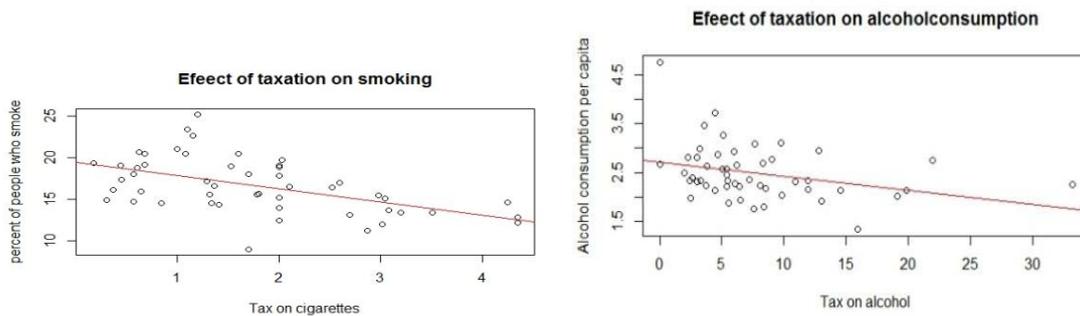
We can figure out the relationship between the demand change and the goods price with the influence of the tax by studying the elasticity of the curves of demand and supply. The elasticity is calculated by the proportional change in quantity or the proportional change in price. On the one hand, the steeper the curves of supply and demand are, the less elastic it has and under this circumstance, a large price change is supposed to have a little effect on the consumers' demand. On the other hand, the flatter the curves are, the more elastic it is, and at this situation, a small price change can lead to a big effect on demand.

The supply and demand model predicts that a tax on tobacco and alcohol will decrease the quantity consumed because the consumers have to spend more to purchase those goods. Nevertheless, it is hard to persuade consumers stop smoking or drinking, because they are all addictive commodities. So, the demand curve of tobacco and alcohol is inelastic, which indicates that the large change in the price may not cause too much demand change, and the incidence of the purchasing lies heavily on consumers' willingness. Hence, we predict that the tax on tobacco and alcohol can help reduce their consumption.

3. The Test of the Effects of Taxes on Tobacco and Alcohol

Next, we are going to test the predictions of the supply and demand model by figuring the data from the graph 3 and 4. In these two graphs, each data point refers to one of the 50 states in the U.S. We

investigated the taxes on alcohol and on cigarettes in each state, as well as the alcohol consumption per capita and the percentage of smokers. There are two control variables in these two graphs: the religious beliefs of the state people and the political party in power in the state. Control variables refer to all variables that affect the experimental results except experimental factors (independent variables). In some religions, alcohol or tobacco are regarded as prohibited products so the religion may also be a factor which influences the consumption of these goods. What's more, the political party in power in different states may adopt different attitudes towards tobacco and alcohol, which can also affect the consumption situations. However, these two factors are not the research focus of this paper, so the author regards them as two control variables.



(Graph 3)

(Graph 4)

Independent variables refer to the variables manipulated and controlled by researchers; Dependent variables refer to the variables observed and / or measured by researchers. People call it dependent variable because it depends on and is influenced by independent variable. In graph 3, the independent variable is the tax on alcohol and the dependent variable is the alcohol consumption per capita. This graph shows that how the alcohol consumption changes accordingly when the tax on alcohol changes. The red line in the graph is the best fitting curve, by using which the parameters can be estimated. In this graph, the best fitting curve has the least square distance and the result shows that the effect of taxation on alcohol consumption is negative. In graph 4, the independent variable is the tax on cigarettes and the dependent variable is the percent of people who smoke, which means that when the tax on cigarettes changes, the percentage of the people who smoke will also change. The red line is also the best fitting curve. From the graph we can see that the effect of taxation on smoking is also negative. Consequently, we can conclude that taxes brought about negative influences to both smokers and alcoholics.

If we regress the percentage of smokers against tax on tobacco, the p-value is $2.476373e-07$. With religions and politics as two control variables, the p-value rises to 0.049, but the result is still significant at the 5% level. If we regress per-capita alcohol consumption against tax on alcohol, the p-value is 0.064. This result is not significant at the 5% level. However, when we regard religion and politics factors as two control variables, the p-value falls to 0.0265 – so the result is still significant at the 5% level.

From the results of the two graphs we can conclude that once the religion and politics factors are controlled for, the tobacco and alcohol taxes can affect their consumption and the effect of taxation on both tobacco and alcohol is significant at the 5% level. Therefore, from the above analysis we can make a conclusion that taxes do decrease consumption of tobacco and alcohol to some extent, as our model of supply and demand predicted in the previous part.

4. The Effects of Tax on Tobacco and Alcohol

From the previous analysis we have proven that the tobacco and alcohol taxes have effects on consumption, and next we are going to introduce what further effects the decreased consumption has brought to the people.

First, as the smokers from low-income families are more sensitive to the price of cigarettes and alcohol, the increase in the tax will reduce the consumption of cigarettes and liquors in low-income families than in high-income families. The report from the 2008 World Health Organization global tobacco epidemic shows that raising tobacco and alcohol tax is particularly significant to curb smoking and drinking among young people and poor people. These are also the groups who benefit most from the reduction of tobacco and alcohol consumption because members of these socio-economic groups are more sensitive to commodity prices. High prices of these goods help encourage them to quit smoking and drinking or not start them at all. South Africa, for instance, raised its tobacco product tax rate by 250% in the 1990s, reaching nearly 50% of the retail price. With every ten percent point increase, tobacco consumption will decrease by 5-7% correspondingly, resulting in a significant reduction in tobacco consumption, especially among young people and poor people.

Some tobacco and alcohol industry officials and other members claim that raising tobacco and alcohol taxes will hurt the poor. However, the truth is that, with the increase of tobacco and alcohol tax, the government revenue increases, and the increased revenue is often used to invest in social projects. As we have studied in the previous part, the supply and demand curve of tobacco and alcohol is of less elasticity, which means that the consumption of these two goods will be affected by the price changes only at a small scale. Therefore, the government can gain more revenue from the tobacco and alcohol taxes and this revenue can be used in social construction or some public service advertisement which can help people give up cigarettes or liquors. Part of the new tobacco and alcohol tax could also be used to support anti-tobacco or anti-alcohol advertising campaigns and provide services to people who want to quit smoking and drinking.

In addition, higher tobacco and alcohol taxes can help poor people stop taking tobacco and drinking, allowing them to spend more money on necessities such as food, shelter, education and health care. Higher tobacco and alcohol taxes can reduce tobacco and alcohol use, thus helping poor families out of poverty and finally get rid of it. And the high price of tobacco and alcohol can also prevent the teenagers from smoking and drinking, because they usually don't have much money to spend on smoking and drinking when the price increased. Therefore, the taxes can benefit the poor and the young.

Second, as the higher taxes on tobacco and alcohol can reduce the consumption of these two goods, the tobacco and alcohol-related diseases such as lung cancer and heart attack can be reduced. Every year there are many people died of tobacco and alcohol overdoes and the country also spends a large amount of money on the treatment related to tobacco and alcohol. If the consumers take less cigarettes and drink less alcohol, the government can save a relatively huge amount revenue from the medical expenditure. With the decreasing of diseases, the productivity and income of poor family members will be improved accordingly and they can spend more money on their development and achievement. Besides, alcohol-related social crimes will also be reduced. The drunk driving is a kind of severe accident which left great pain on the victims, and under the stimulation of alcohol, many people may conduct bold violence or offensive behaviours. Therefore, with controlled overtaking of alcohol, the incidence of drunk driving and drunk violence will be decreased, with which, the society will be more harmonious.

5. Conclusion

From the previous analysis we can see that taxes on tobacco and alcohol can really work to increase the government revenue, promote the living quality of the low-income family, protect the teenagers and help build a healthy and harmonious society.

From the supply-demand curve we know that the taxes on tobacco and alcohol can affect the consumption of the consumers, because the sellers will add those taxes on the price of the products. According to the supply and demand curve, when the price increases, the consumption will decrease. From the specific statistics of the 50 states of the USA, we conclude that the taxes on these two goods affect the consumption to some extent, which means that the taxes really play a role to control tobacco and alcohol by decreasing the consumption.

With taxes on tobacco and alcohol decreasing the consumption, people's health can be promoted and low-income families can save more money to spend on other living expenditure instead of curing tobacco or alcohol-related illnesses. The teenagers can be prevented from the harm of tobacco and alcohol. The life quality of the poor and the young can be promoted, the crimes and accidents will be decreased and the society will be more harmonious.

The taxes on tobacco and alcohol are pretty useful for most of the citizens in their health, living quality and safety, so many governments choose to adopt it in their policy. However, we should also pay attention to the economic problems that the taxes have posed heavily on some poor people who cannot give up smoking and drinking. The increased taxes may leave a heavier burden on them.

References

- [1] Keeler Courtney (2021). The association of California's Proposition 56 tobacco tax increase with smoking behavior across racial and ethnic groups and by income. *Nicotine & tobacco research: official journal of the Society for Research on Nicotine and Tobacco*, vol.34, no.4, pp18-30.
- [2] Bayly Megan, Scollo Michelle, Wakefield Melanie (2021). Evidence of cushioning of tobacco tax increases in large retailers in Australia. *Tobacco control*, vol.2, no.5, pp23-27.
- [3] Hoe Connie, Weiger Caitlin, Cohen Joanna E (2021). The battle to increase tobacco taxes: Lessons from Philippines and Ukraine. *Social science & medicine* (1982), vol.279, no.7, pp35-44.
- [4] Fuchs Tarlovsky Alan, González Icaza María Fernanda (2021). Tobacco taxes for improving welfare and distributional outcomes: the case of Georgia. *European journal of public health*, vol.37, no.6, pp57-77.
- [5] Gallego Juan M., Llorente Blanca (2020). Tobacco taxes and illicit cigarette trade in Colombia. *Economics & Human Biology*, vol.39, no.7, pp46-67.
- [6] Maldonado Norman (2020). Can tobacco tax increases reduce smoking burden in Latin America? *PharmacoEconomics & Outcomes News*, vol.864, no.1, pp89-102.