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How did the youth's demand for cigarette products respond to the Sin Tax Reform Act of 2012?

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Abstract

The excise tax on tobacco products in the Philippines has been historically low making the product very accessible even for the youth. In 2012, a Sin Tax Reform Law was passed which increased the excise tax on tobacco products by almost five times its previous value. This price increase is projected to reduce alcohol and tobacco products consumption for all demographic classifications, especially the youth. This study estimated the price elasticity of cigarette demand of the Filipino youth using regression analyses on the pooled Global Youth Tobacco Survey conducted in the Philippines for the years 2004 and 2015. Price elasticity of participation and conditional demand was found to be -0.939 and 0.574 respectively, which corresponds to the total price elasticity of demand of -0.356. The results imply that a 10% increase in price results in a total reduction of cigarette demand by 3.56 %. Findings of the study reveal that stricter compliance with youth access restrictions has to be observed to decrease cigarette consumption of the Filipino youth further.

Keywords: cigarette, elasticity, youth, GYTS

JEL classification: I18, O12

1 Introduction

It is well known that smoking is detrimental to health, not only because of its direct effects on health but also due to the numerous health ailments it may trigger. Smoking directly affects a person's health by increasing the risk for lung diseases such as emphysema, chronic bronchitis, and lung cancer. It also has an added detriment by increasing a smoker's risk of suffering cancers of most organs of the body (Centers for Disease Control and Prevention, 2017). In 2015, the Global Burden of Disease estimated that 25% of the population smoke, which leads to 6.4 million deaths worldwide (Reitsma et al., 2017).

Since 1990, smoking prevalence has decreased globally (Forouzanfar et al., 2016). Despite this, smoking remains one of the leading factors for early death and disability worldwide, especially in less developed countries. Though smoking prevalence decreased across countries, the smoking-attributable disease burden remains high for less developed countries due to population growth and aging (Reitsma et al., 2017). This places a greater need for developing countries to align their policies towards controlling the consumption of tobacco products.

Consumption of tobacco products is especially concerning for the younger consumer because when young people smoke regularly, they tend to retain the habit through adulthood (Elders et al., 1994). This would put the smoking youth at a higher risk of developing the diseases and complications aforementioned than non-smoking youth. Teenage smokers have an increased risk of lung cancer and smoking-related cancers (Elders et al., 1994). It has also been found that smoking at an early age can lead users to seek professional help due to emotional and psychological problems (Arday et al., 1995).

Among strategies for controlling tobacco consumption, raising taxes for the product is widely accepted as the most effective (Chaloupka et al., 2012; Levy et al., 2004; World Health Organization, 2015). In light of this, tax increase as a form of control for teenage smoking should be among the foremost strategies of any government seeking to decrease smoking prevalence. This form of control is especially important for developing countries with a young population because of the increased effectiveness of the strategy on the young and the poor (Chaloupka et al., 2012). The effectiveness of such control can also be augmented if the increased revenue from tobacco tax is utilized in providing services to individuals who wish to quit smoking and intensifying media campaigns on the health damage caused by tobacco (World Health Organization, 2015).

According to the Global Adult Tobacco Survey (GATS), cigarette smoking prevalence significantly decreased from 27.9% in 2009 to 22.5% in 2015 (Department of Health & Philippine Statistics Authority, 2016). This may imply that the price increase of tobacco products had the desired effect on the consumption of adults. Looking at the Global Youth Tobacco Survey (GYTS) which surveyed students of age 13–15 years old, cigarette smoking prevalence increased from 8.9% in 2011 to 12.0% in 2015. (Department of Health, 2015) The report, however, pointed out that the general trend of smoking prevalence in the Philippines is still decreasing because the increase between periods is not significant. Current literature on the effect of price on youth smoking shows mixed results (Ross & Chaloupka, 2003), and this study aims to provide evidence on the matter in the context of the Philippines. Specifically, this study aims to: (a) estimate youth's cigarette price elasticity of demand after the tax reform (b) determine the impact of the tax on youth's smoking participation (c) determine the impact of the tax on youth's smoking intensity.

2 Literature Review

Current literature agrees that low- and middle-income countries tend to be more responsive to price control policies towards tobacco consumption (Chaloupka et al., 2012; International Agency for Research on Cancer, 2011; Jha & Chaloupka, 2000; Kostova et al., 2011; NTCT et al., 2008). Findings by the World Bank indicate that a 10% price increase results in an 8% reduction in tobacco consumption in less-developed countries and a corresponding decrease of 4% in developed economies (Jha & Chaloupka, 2000).

In the context of the Philippines, not much work has been done on the price elasticity of demand for tobacco products. Only two studies have been done using household-level data. These are the 2010 article by Quimbo et al. using FIES 2003 and the 2019 article by Austria and Pagaduan using 2009 and 2015 FIES. Quimbo et al. (2010) found that household demand for cigarettes is inelastic ($\epsilon_i = -0.87$) but becomes elastic ($\epsilon_i = -1.09$) when considering the poorest 30 % in the country. Austria and Pagaduan (2019) found that smoking prevalence decreased among adults from 29.7% in 2009 to 23.7% in 2015 and that demand for cigarette products is inelastic ($\epsilon_i = -0.93$) as a result of the Sin Tax Reform of 2012.

Only one study has been done using individual-level data in the Philippines which was authored by Cheng and Estrada (2020). The study used the two-part model developed by Cragg (1971) to estimate cigarette demand. It analyzed the effect of the Sin Tax Reform of 2012 using GATS data from 2009 and 2015. It was found that smoking prevalence decreased from 28% to 23% between periods and the prevalence price elasticity of cigarette demand was elastic ($\epsilon_i = -1.24$). This implies that a 10% increase in price reduced smoking participation by 12.4%. When considering the total price elasticity of cigarette demand, it was found to range from -0.56 to -1.10 . This supports earlier findings that demand for cigarette products is generally price inelastic. Using individual-level data enabled this study to estimate price elasticity for different socio-economic statuses.

Among studies on the youth's elasticity of cigarette demand, it is found that this demographic group has higher elasticity than adults. Ross and Chaloupka (2003) estimated that youth's total

price elasticity range from -0.66 to -1.63 whereas Kostova et al. (2011), using the Global Youth Tobacco Survey, estimated the same measure to be -2.11 .

This literature review reveals a gap in research for price elasticity of the Philippine youth as a result of attempts to control cigarette consumption through taxation. Additional insights can also be drawn if individual-level data is used in the analysis.

2.1 Theoretical Framework

Cigarette smoking has been linked to many health concerns, but this has not stopped a portion of the world's population from consuming such products. A common strategy of governments to control cigarette consumption and hence, reduce smoking-related ailments and mortalities is through price control of the commodity. According to the Law of Demand, "other things being equal, when the price of a good rises, the quantity demanded of the good falls". (Mankiw, 2014) Because of this, it is common for governments to impose taxes on cigarettes as a form of price control to curb consumption and raise revenue. Due to the Sin Tax Reform of 2012, it is expected that the smoking prevalence and smoking intensity of current smokers would decrease due to the price increase. Common findings of past studies are that the price elasticity of demand for cigarette products is highly elastic for youth smokers.

2.1.1 *Anti-Tobacco Campaigns*

In addition to price control through taxation, the government may also improve cigarette consumption control efforts by intensifying state-sponsored anti-smoking advertisements. It has been found that exposure to state-sponsored anti-smoking advertisements increased cessation rates. (Hyland et al., 2005; Terry-McElrath et al., 2007) Common to these studies are respondents pointing to an increased level of information in the media and increased perceived dangers to health due to smoking as reasons for stopping their smoking habits. In terms of its effect on the youth, exposure to anti-tobacco advertisements has the most deterrent effect when the advertisement portrays negative life circumstances associated with smoking. (Sutfin et al., 2008) Several studies have found that youth enrolled in schools are at low risk of developing smoking habits whereas school dropouts are likely to develop the habit during adolescence. (Anantha et al., 1995; Gupta & Ray, 2007) It has also been found that education campaigns on the dangers of smoking lead to a 26.5% cessation rate in males and 36.7% in females. (Anantha et al., 1995) This highlights the importance of reinforcing the health risks of smoking to children while at school.

2.1.2 *Anti-Smoking Sentiment*

Sentiment towards smoking is probably among the more important factors contributing to reducing or stopping dependence on cigarette products. Smoking sentiment can influence cigarette consumption by cultivating an unfavorable "smoking climate" wherein smoking is viewed as deviant behavior (Kim & Shanahan, 2010). Anti-smoking sentiment has also been found to have a significant quadratic association with smoking participation among the working class and on smoking intensity for all smokers (Okechukwu et al., 2012). For the youth, the effect of cigarette price on smoking participation becomes insignificant when differences in anti-smoking sentiment are controlled for (DeCicca et al., 2008).

3 Data and Methods

3.1 Data

The GYTS would be used to estimate the price demand elasticity of youth in the excise tax period. The survey is the global standard for tracking youth consumption of tobacco and key tobacco indicators. Data for the years 2004 and 2015 are pooled to allow the analysis to include both pre-reform and SinTax Reform periods. Data for cigarette prices were obtained from the GYTS survey which is defined as the perceived price of a 20-pack cigarette for each primary sampling unit (PSU). The final data consists of 7,478 responses from the 2004 GYTS and 8,789 responses from the 2015 GYTS.

Smoking participation is defined as a dummy variable equal to 1 if an individual has smoked at least one cigarette in the past month and 0 otherwise. Smoking intensity is calculated from the GYTS by multiplying the average number of smoking days by the average number of cigarettes smoked per day in the past month.

Environmental factors will be included in the model as dummy variables. These variables are the level of anti-smoking sentiment (*Sentiment*), the local prevalence of anti-tobacco media messages (*Anti-tobacco Media*), the active role of schools in educating students of the dangers of cigarette smoking (*Anti-tobacco Education*), and a general measure of ease of purchasing cigarettes (*Youth Access Restrictions*). Individual characteristics will also be controlled for in the model using variables for age (*Age*), gender (*Gender*), and household member smoking habits (*Household smoking*). Descriptions of these variables and summary statistics are outlined in Table 1.

3.2 Methods

A two-part model will be used to isolate the tax effect on an individual's decision to smoke and the decision of how much to smoke. Following Kostova et al. (2010), a logit model will be used to estimate smoking participation, and a generalized linear model with a log link will be used to estimate smoking intensity after the tax is imposed.

The two-part model is summarized below wherein X_1 is a vector of individual characteristics and X_2 is a vector of observed environmental characteristics.

$$\text{Part 1: } Pr(Y_i > 0) = f(\alpha_0 + \alpha_1 Price + \alpha_2 X_{1i} + \alpha_3 X_{2i}) \quad (1)$$

$$\text{Part 2: } (Y_i | Y_i > 0) = f(\beta_0 + \beta_1 Price + \beta_2 X_{1i} + \beta_3 X_{2i}) \quad (2)$$

Two specifications of the model will be used. The first specification serves as a baseline estimate of the effect of price without controlling for environmental factors whereas the second specification would involve the environmental factors as controls.

Table 1. Variable Descriptions and Summary Statistics

Variable	Variable description	Full sample (N=14,846)				Smokers only (N=1,719)			
		mean	sd	min	max	mean	sd	min	max
Current smoker	1 if smoked at least one cigarette in the past month, 0 otherwise	0.03	0.16	0	1	1.00	0.00	1	1
Cigarette demand	Number of cigarettes smoked in the past month	7.88	52.76	0	750	63.29	137.38	0.75	750
Age	Age in years	14.64	1.46	11	17	14.95	1.55	11	17
Gender	1 if male, 0 otherwise	0.43	0.49	0	1	0.65	0.48	0	1
Pocket Money	Amount of pocket money received monthly	148.19	259.02	0	1500	146.12	270.80	0	1500
Household smoking	Number of days a member of the household has smoked for the past week	0.55	0.50	0	1	0.65	0.48	0	1
Anti-Smoking Sentiment	1 is supports public smoking bans, 0 otherwise	0.90	0.30	0	1	0.77	0.42	0	1
Anti-Tobacco Media	1 if recently exposed to anti-smoking media messages, 0 otherwise	0.81	0.39	0	1	0.80	0.40	0	1
Anti-Tobacco Education	1 if recently been taught about the dangers of smoking at school, 0 otherwise	0.70	0.46	0	1	0.65	0.48	0	1
Cig. Advertisement exposure	1 if respondent was exposed to cigarette advertising	0.63	0.48	0	1	0.67	0.47	0	1
Youth Access Restrictions	1 if tried to buy cigarettes but was turned away due to age	0.10	0.31	0	1	0.34	0.47	0	1

4 Results and Discussion

4.1 Smoking Participation

The results of the two-part model are summarized in Tables 2 and 3. The first part summarized in Table 2 shows the result of the estimation for smoking participation. The baseline model which consists of individual characteristic controls is compared with an inclusive specification that accounts for environmental factors such as anti-smoking sentiment, exposure to cigarette advertising, exposure to anti-tobacco education and anti-tobacco media, and youth access restriction. The baseline model demonstrates the law of demand because the price has a statistically negative coefficient. The comparison reveals that the inclusion of the environmental variables decreased the statistical significance of price on the probability of smoking. This result is consistent with the findings of DeCicca et al. (2008). The estimated price elasticity of participation in the baseline model is -1.551 and -0.937 for the inclusive specification. This implies that a 10% increase in price would correspond to a 15.51% decrease in smoking participation when

controlling for individual characteristics and a 9.37% decrease in smoking participation when controlling for both individual and environmental factors.

Among the environmental variables, the logit model reveals that assuming a sentiment against smoking decreases the probability of smoking. It also reveals that higher exposure to cigarette advertisements and youth access contribute to a higher smoking probability. With the use of the logit model, it is estimated that if all youth assume a negative sentiment towards smoking from the current 88.60%, smoking prevalence will drop by an additional 0.051% per 10% increase in cigarette price. Similarly, if all youth are exposed to a form of cigarette advertisement from the current 64.56%, smoking prevalence would increase by an additional 0.043% per 10% increase in the price of cigarettes.

Table 2. Logit Model of Smoking Participation

	Baseline†	Inclusive of environmental factors†‡
Price	-1.564*** (0.429)	-0.945** (0.464)
Anti-smoking sentiment		-1.196*** (0.128)
Cigarette advertising		0.544*** (0.132)
Anti-tobacco education		-0.102 (0.128)
Anti-tobacco media		0.105 (0.158)
Youth access		2.048*** (0.121)
Price elasticity of smoking participation	-1.551*** (0.425)	-0.939** (0.461)

Standard errors in parentheses

** $p < 0.05$; *** $p < 0.01$

†All specifications include Age, Age Squared, Gender, and Household Smoking

†‡Inclusive specifications include the following environmental controls: Anti-Smoking sentiment, Cigarette Advertising, Anti-Tobacco Media, Anti-Tobacco Education, and Youth Access

Counterintuitively, more students reporting that being refused the sale of cigarettes lead to an increase in smoking prevalence. The logit model estimates that if the portion of smokers who report being refused the sale of cigarettes increase to 100% from the current 34.4%, smoking prevalence would increase by 0.897% per 10% increase in price. This result may imply that youth smokers are persistent in acquiring cigarette products despite being refused the sale at least once. This may also imply that not all points of sale for cigarette products strictly comply with guidelines restricting cigarette purchase of the youth.

4.2 Smoking Intensity

The second part of the model uses a generalized linear model with a log link to estimate changes in smoking intensity as a result of a price change. The model reveals that price contributes positively towards smoking intensity, both in the baseline and inclusive model. Of the environmental factors considered in the model, anti-smoking sentiment is the only factor that influences smoking intensity. When a Filipino youth assumes a negative sentiment towards smoking, cigarette consumption of current smokers decreases. The elasticity of anti-smoking sentiment with respect to smoking intensity is -0.311 significant at a 1% significance level. This implies that a 10% increase

in anti-smoking sentiment among Filipino youth would lead to a 3.11% decrease in the number of sticks smoked. This supports previous studies citing the importance of anti-smoking sentiment to smoking behaviors. On the other hand, price has a significant positive effect on smoking intensity both in the baseline model and inclusive model. Its elasticity in the model inclusive of environmental factors is 0.574 which indicates that a 10% increase in price would lead to a 5.74% increase in the number of sticks smoked.

Table 3. Generalized Linear Model With Log Link for Conditional Cigarette Demand Estimation

	Baseline†	Inclusive of environmental factors†‡
Price	0.038*** (0.006)	0.041*** (0.007)
Anti-smoking sentiment		-0.392*** (0.140)
Cigarette advertising		-0.029 (0.117)
Anti-tobacco education		0.099 (0.116)
Anti-tobacco media		0.006 (0.147)
Youth access		-0.067 (0.107)
Price elasticity of smoking participation	0.526*** (0.611)	0.574*** (0.097)

Standard errors in parentheses

*** $p < 0.01$

†All specifications include Age, Age Squared, Gender, and Household Smoking

†‡Inclusive specifications include the following environmental controls: Anti-Smoking sentiment, Cigarette Advertising, Anti-Tobacco Media, Anti-Tobacco Education, and Youth Access

The GYTS Country Report for 2015 cited an observed increase in the number of youth reporting that they are able to buy cigarettes by themselves from several points of sale despite legal prohibition. (Department of Health, 2015) The positive relation between price and cigarette consumption that we found may be due to lax observance of the law prohibiting the sale of cigarette products to minors.

4.3 Ordered Logit

To better understand how current smokers responded to the price increase due to the Sin Tax Law of 2012, we present an ordered logit model. With an ordered logit model, we would be able to determine the probability of being a smoker of different intensity classifications. Smokers are classified according to their monthly cigarette consumption as follows: very light smoker (1-15 cigarettes per month), light to medium smokers (15 to 100 cigarettes per month), medium smokers (100 to 300 cigarettes per month), and heavy smokers (over 300 cigarettes per month).

Table 4. Ordered Logit Estimates of the Price Elasticity of the Probability of Being in a Smoker Category

	Cigarettes per month	Baseline	With environmental factors
Very light	1 to 15	0.641*** (0.185)	0.425** (0.203)
Light to Medium	15 to 100	0.129*** (0.040)	0.083** (0.040)
Medium	100 to 300	-0.094*** (0.033)	-0.067* (0.035)
Heavy	>300	-0.590*** (0.171)	-0.396** (0.190)

The ordered logit model shows a similar pattern for the baseline and inclusive specification. For both specifications, an increase in price causes an increased probability of being classified into the “Very light” and “Light to Medium” categories. Meanwhile, both specifications show that an increase in price causes a negative probability of being included in the “Medium” and “Heavy” categories. This implies that an increase in price causes heavy smokers to tone down their consumption to lower intensity classifications.

Interpreting the elasticities, a 10% increase in price causes a 3.96% and 0.67% decrease in the probability of being classified as heavy and medium smokers respectively, whereas the same increase in price causes a 4.25% and 0.83% increase in the probability of being classified as a “Very light” smoker and “Light to Medium” smoker respectively. It should also be observed that the sum of the elasticities of all categories is positive which reflects the positive elasticity derived in the GLM model from the previous section.

5 Conclusion

This study aims to provide evidence to the Filipino youth’s responsiveness to price controls imposed by the government in an effort to ensure better health outcomes for future generations. It follows trends from previous studies which consider environmental factors which may affect smoking behaviors such as sentiment towards smoking, exposure to cigarette advertisements, exposure to anti-tobacco messages through the media, exposure to the dangers of cigarette use while at school, and ease of access to cigarette products.

From the findings of this research, anti-tobacco education has been unsuccessful in decreasing both smoking participation and intensity of the Filipino youth. This may imply that the approach to tobacco education may have to be reinvented. Borrowing findings from Sutfin et al. (2008), incorporating negative life consequences in information dissemination efforts may help discourage smoking behaviors from the youth. The study also supports findings highlighting the importance of assuming a negative sentiment towards cigarette smoking. This factor decreases both smoking participation and intensity of Filipino youth. Although there has been an increase of Filipino youth reporting being exposed to anti-tobacco content through print media, this has not reduced the youth’s cigarette consumption. This can be contrasted to the positive effect of cigarette advertising on the smoking behaviors of the youth. Exposure to tobacco-related advertisements contributes to a 5.4% increase in smoking prevalence per 10 % increase in price.

Perhaps the most worrying finding of the study is the positive significant relationship between access restriction with smoking prevalence. This implies that youth who were refused the sale of cigarettes were still able to find other ways of gaining access, perhaps going to the next nearest store or through the help of an adult. The GYTS Country Report for 2015 has noted that there has been a significant increase in youth reporting that they were able to buy cigarettes from stores by

themselves despite prohibition by law. These imply that non-compliance with the law regarding youth cigarette consumption has been very lax leading to an opposite effect in the face of a persistent Filipino youth smoker.

The two-part model indicates that, for the Filipino youth, the price elasticity of participation is -0.939 whereas the price elasticity of conditional demand is 0.574 yielding a total price elasticity of demand of -0.356. The positive elasticity of conditional demand is due to a significant amount of youth smokers being classified as very light smokers due to a price increase as reflected by the ordered logit model. Finally, we note that exposure to cigarette advertisements and lax compliance to youth access restrictions are significant contributors to less sensitivity of Filipino youth to cigarette price changes. Hence, focusing policy and other efforts on these areas may significantly increase youth sensitivity to price controls on cigarette products imposed by the government.

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