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IMPACT OF TOBACCO CONTROL POLICIES ON CIGARETTE CONSUMPTION IN MALAYSIA

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ABSTRACT

Raising the cigarettes price is an important measure to reduce the consumption of cigarettes and smoking rate. Besides price, other measures of tobacco control policies also play essential roles in determining the demand for cigarettes in Malaysia. In this study, the impact of tobacco control policies on consumption of cigarettes was examined using the fully modified ordinary least squares (FMOLS) technique. The study found that higher cigarettes price due to excise tax significantly decreased consumption of cigarette in the long run. An increase of 10% in the price of cigarettes reduces 7.69% of its consumption. Other measures of tobacco control policies except the "Tak Nak" campaign were also found to have reduced the consumption of cigarette significantly. The study concludes that the effective ways of reducing the use of cigarettes are by increasing the cigarette tax and strengthening the enforcement of other tobacco policies measures.

***Keywords*:** Tobacco Control Policy; Fully Modified Ordinary Least Square; Elasticity of Demand.

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1. INTRODUCTION

The use of tobacco is the primary cause of preventable deaths, and it imposes a heavy burden on countries in terms of direct medical cost for adults and loss of productivity (WHO, 2015). The World Health Organization (WHO) estimated nearly eight million people die annually due to tobacco-related diseases (WHO, 2019). If the existing smoking trend continues, by 2030, it is

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projected that premature deaths attributable to tobacco-related disease will surpass eight million every year with 80% residing in low and middle-income countries (WHO, 2011).

The prevalence of current smokers in Malaysia was 21.3 percent in 2019 and estimated 18.5 per cent of Malaysian population (Institute for Public Health, 2020). The rising trend of smoking prevalence is worrying, since 45% of all annual deaths in Malaysia are due to smoking-related diseases and estimated to make up more than 17% of total hospitalisations (Tan, Zomer, Owen, Chin, & Liew, 2019). Reduction in cigarette consumption and smoking prevalence would potentially reduce smoking-related diseases and ultimately, cut the costs of treating the related diseases. In 2010, the Malaysian government had spent around RM3 billion for the treatment of the three main smoking-related diseases: coronary heart diseases, lung cancer and chronic obstructive pulmonary diseases (Arumugam, 2017).

1.1. Tobacco Control Policies

In addressing the burden of tobacco-related diseases and deaths, Malaysia is committed to execute national tobacco control policies parallel to the requirements of WHO Framework Convention on Tobacco Control (FCTC). On 23rd September 2003, Malaysia signed FCTC, ratified the treaty on 16th September 2005 and became an official party to the convention on 15th December 2005. Before FCTC, the Malaysian government enacted Control of Tobacco Product Regulation 1993, which was revised in 2004. In 2008, WHO-FCTC introduced six affordable and achievable practical measures of tobacco control policies known as MPOWER. The MPOWER measures include: (M) monitor tobacco use and prevention policies, (P) protect people from tobacco smoke, (O) offer help to quit smoking, (W) warn people about the dangers of smoking, (E) enforce bans on tobacco advertising, promotion and sponsorship and (R) raise taxes on tobacco. To reduce the smoking epidemic efficiently and effectively, all the tobacco control policies should be implemented together since they complement each other. The MPOWER measures had successfully prevented 7.4 billion premature deaths from 2007 to 2010 (WHO, 2013). According to WHO (2015), around 2.8 billion people are protected from tobacco smoke by at least one of MPOWER tobacco control policy measures. The strong smoke-free legislations are the most widely implemented policies and have been able to protect 1.3 billion people from tobacco smoke under such policies (WHO, 2015).

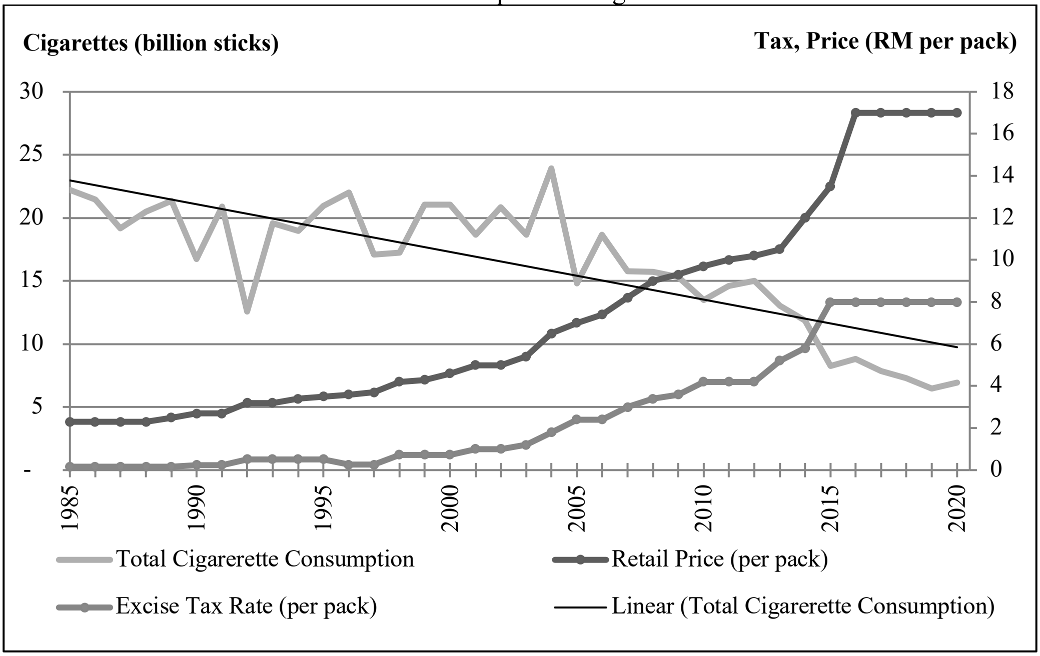
1.2. Taxation and Other Tobacco Control Policies in Malaysia

Among the policies outlined in MPOWER, tobacco tax strategy is the most effective measure to reduce cigarette consumption. Article 6 of WHO-FCTC recommends countries that have legally signed and are bounded by the treaty, to impose tax and price policies on tobacco products in reducing tobacco usage among the population. Chaloupka et al. (2012) in their literature review on tobacco taxes and strategy concluded that significant increase in tobacco taxes is the most effective tobacco control strategy which leads to substantial improvement in public health. Higher taxes will increase cigarette prices which will eventually discourage consumption by continuing users, increase quitting among adult smokers, deter youth uptake of tobacco use, and prevent relapse of former users.

In Malaysia, the cigarette tax is collected from cigarette manufacturers or cigarette importers. From 1990 to 2003, taxes on tobacco were imposed according to their weight. In 2004, Malaysia adopted specific tax or tax per stick, which was easier to monitor. However, in 2005, the *Ad Valorem* tax was introduced, which added complexity to the system. The goods and services tax (GST), which increased the sales tax from 5% to 6%, was introduced in April 2015 but was later repealed in June 2018. In November 2015, the Malaysian government decided to abolish the *Ad Valorem* tax and imposed an increase in per unit taxes by 42.8%. Therefore, the total excise tax per stick from 2014 to 2015 represented a large increase in excise tax since 2004. However, there have been no changes in the tax legislation since then.

Figure 1 shows, how the cigarette excise tax has been successful in reducing cigarette consumption in Malaysia overtime.

Figure 1: Relationship between Excise Tax Rate per Pack, Retail Price and Total Consumption of Cigarettes

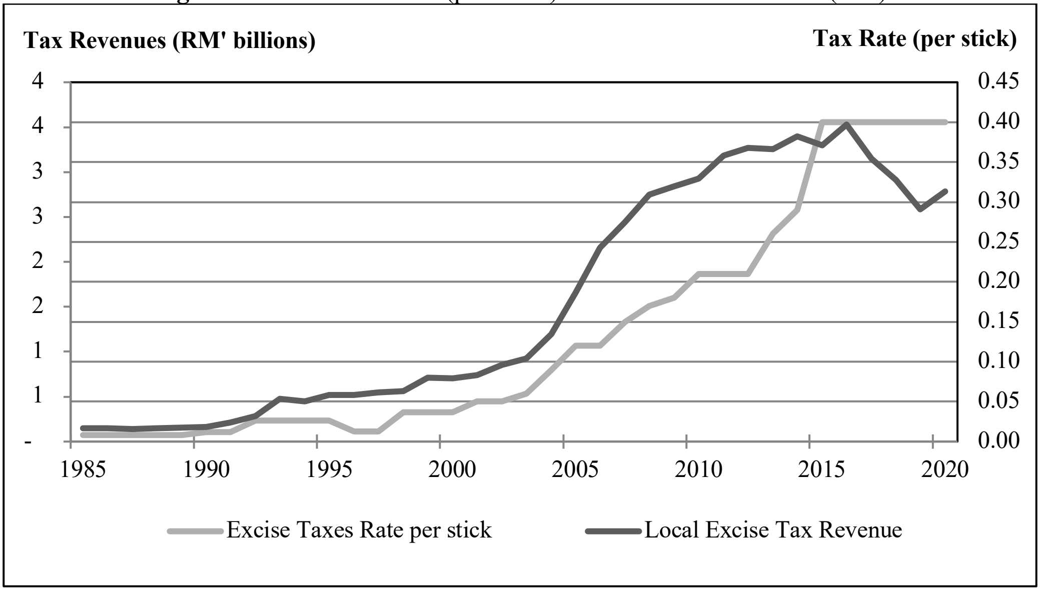


***Source**:* Royal Customs Malaysia (various years).

Although Figure 1 above shows ~~a~~ fluctuation in total consumption of cigarettes starting from 1985 until 2020, it can be observed that a downward linear trend line plotted through the consumption graph indicates a decrease in the consumption of cigarettes as excise tax increases. Demand for cigarettes in Malaysia is relatively inelastic, which means a large increase in cigarettes price due to higher taxes will lead only to a small decrease in the quantity of cigarettes demanded. People who smoke will become addicted, making it hard for them to reduce their consumption. In a study by Ross and Al-Sadat (2007), Norashidah et al. (2013) and MOH (2016), they further confirmed the inelastic demand for cigarettes in Malaysia. The cigarettes excise tax is also a source of revenue to the government. Ross and Al-Sadat (2007) predicted an increase of 20.8% cigarette tax revenue will be generated if the excise tax increases 25%. MOH (2016) recommended an optimal excise cigarette tax rate to increase to 61% of the retail price which will potentially bring in a maximum excise tax revenue of RM6.2 billion to the government.

Figure 2 illustrates the relationship between excise revenue and excise tax rate in Malaysia.

Figure 2: Excise Tax Rate (per Stick) vs. Excise Tax Revenue (RM)



Source: Royal Customs Malaysia (Various years).

Besides taxation, Malaysia also implemented several tobacco control policies as part of the MPOWER strategy. The Malaysian government has introduced regulations on smoke-free public places and workplaces since 1993, which includes regulations such as prohibiting indoor smoking in public spaces, air-conditioned restaurants, and public transport. In 2004, the regulations were extensively revised by including smoking bans in religious places, government institutions, etc. These regulations continued to be improved in the years 2008 and 2010, and some declarations of non-smoking areas (2011–2015) have been issued by the MOH to include additional specific buildings and places as smoke-free spaces. As of 2017, there were 23 types of places that have been gazetted as smoke-free areas with public parks being the latest addition (MOH, 2017). On 1st January 2020, the Health Ministry gazetted all food and beverage outlets in Malaysia as smoke-free areas, and those found smoking in prohibited areas would be charged a compound of MYR250.

Restriction on the advertising of cigarettes is an important focus for a more comprehensive tobacco control agenda. In Malaysia, the advertising bans include bans on national broadcast and mass media as well as on some (but not all) other forms of direct and/or indirect advertising which started in year 2004. Even though all modes of tobacco sponsorship are prohibited, it is essential to ban advertising at point of sale in retail stores, including all forms of product displays and signage. A comprehensive ban on all direct and indirect forms of advertising cigarettes are highly likely to be effective in reducing smoking among people of all income and education levels. According to Levy et al. (2013) in their study comprising 41 countries, smoking prevalence was successfully reduced to 5% within three years in countries that bans on direct and indirect marketing, while 3% of the reduction was related to direct advertising bans and only 1% was associated with the partial ban.

Educating public through mass media campaign on the health dangers of tobacco use as well as second-hand smoke can influence an individual's decision to initiate or continue smoking. In Malaysia, mass media campaigns were moderately funded by the government. On February 9, 2004, the Malaysian government launched a grand scale comprehensive national anti-smoking campaign called '*Tak Nak*' (Say No). The key objective of this campaign was to reduce the number of smokers, particularly among adolescents, by providing them with accurate information to create awareness and provide knowledge on the danger of smoking. The campaign last for 6 years but it was reported that the campaign did not achieve some of its objective.

Besides the mass media campaign, the content and graphic presentations on tobacco packaging have been a cost-effective method of advertising on the danger of tobacco use. Malaysia's first pictorial health warnings was implemented in January 2009. The second set of warnings was adopted in 2014 with an increase in the size of the adverts from 40% to 50% for the front side and 60% on the back side of all cigarette packages. Well-designed media campaigns and implementation of smoke-free places, counter-marketing and pack warnings can generate substantial free media coverage on the dangers of smoking. Following the positive momentum of these campaigns, the Malaysian government continues the struggle to kick smoking habit among Malaysians through the imposition of the minimum price of RM7 per pack of 20 sticks on 1 August 2009 and was later increased to RM10 per pack. The 14 sticks pack (kiddie pack) was banned in July 2010.The following Table 2 illustrates the summary of tobacco policies in this study.

Table 1: Summary of the Tobacco Control Policies in this study

Year	Event	
1990	Introduced regulations on smoke-free public places and work-places. Imposed cigarette excise tax MYR0.013 per stick.	1
1992	Increased 100% excise tax on cigarettes from MYR0.014 per stick in 1991 to MYR0.028 per stick.	2
2002	Imposed MYR0.047 excise tax on cigarettes and increased from 15% to 25% of sales tax.	3
2004	Prohibited most forms of direct and indirect tobacco advertising and promotion.	4
2004	The Malaysian government launched a grand scale comprehensive national antismoking campaign called '*Tak Nak*' (Say No) for 5 years duration. The key objective of this campaign was to reduce the number of smokers, particularly among adolescents, by providing them with accurate information to create awareness and knowledge on the danger of smoking.	5
2007	Increased excise taxes on cigarettes by 25%.	6
2009	A set of six rotating pictorial health warning labels was printed in both Malay and English, covering 40% of the front and 60% of the back of all cigarette packs.	7
2010	Banned ~~on~~ small packs or the 14 sticks kiddie packs cigarettes.	8
2011	Banned smoking in all air-conditioned workplaces.	9
2015	Ministry of Health announced that smoking will be banned at tea stalls, coffee shops and food courts as well as public parks, which previously only air-conditioned restaurants, shopping centres and sheltered footpaths and highway rest-stops were restricted smoking areas.	10
2015	The government increased cigarette excise tax by more than 40 % on 3 November 2015 and Ad Valorem tax was abolished.	11
2017	23 types of places have been gazetted as smoke-free areas.	12
2020	Smoking ban introduced at all eateries and restaurants	13

The objective of this study is to investigate the impact of tobacco control policies on cigarette consumption in Malaysia which could provide some policy directions to the government in regulating the country's tobacco industry.

2. METHODOLOGY

The fundamental principles of economics suggest a downward-sloping demand curve, implying higher price leads to a lower quantity demanded and *vice versa*. The cigarette demand model in this study investigates the relationship between the quantity of cigarette consumed and the price of cigarette, income and tobacco control policies. The demand model is adopted from Townsend, Roderick, and Cooper (1994), comprising a single equation model with the assumption that consumption is a log-linear function.

The equation for the cigarette demand model is represented by:

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t},, \mathrm{DMY}_t) \tag{1}$$

where, $\mathrm{QC_t}$ = consumption of legal cigarettes per capita;
$\mathrm{RBP_t}$ = real retail price of most sold cigarettes brand (price after excise tax);
$\mathrm{RY_t}$ = real GDP per capita;
DMY_t = tobacco control policy (non-price tobacco policy).

The fully modified ordinary least squares (FMOLS) technique was utilised to analyse the cigarette demand model in Malaysia. This FMOLS approach was developed by Phillips and Hansen (1990). To apply the FMOLS, the existence of the cointegration relation between a set of *I*(1) variables must be satisfied. This study applied the Engle-Granger Cointegration test to investigate if the formulated equation is indeed integrated.

Before the application of FMOLS, the unit root tests were performed on the variables at level and first difference, with optimal lag lengths for each test to be determined automatically by the E-views 8 software. The objective of performing the unit root test (non-stationary of the univariate series) on the variables is to determine whether the estimated equations are spurious or otherwise. We employed the Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (1979, 1981) and the Phillips-Perron (PP) test by Phillips and Perron (1988).

Table 2: Results of Unit Root Tests

	ADF test	**PP test**
Level		
$\ln \mathrm{QC_t}$	1.254	0.2942
$\ln \mathrm{RBP_t}$	1.195	1.257
$\ln \mathrm{RY_t}$	0.283	0.679
First Difference		
$\Delta \ln \mathrm{QC_t}$	-11.309***	-13.752***
$\Delta \ln \mathrm{RBP_t}$	-4.644***	-4.644***
$\Delta \ln \mathrm{RY_t}$	-7.032***	-7.186***

Table 2: continued

Notes: '***' 1% significance level, '**' 5% significance level and '*' 10% significance level. The model includes constant without trend.

The empirical results of the ADF and PP tests for all the variables indicated that the variables are non-stationary at level, but stationary at first difference, $I(1)$. Since all the variables are $I(1)$, the FMOLS is utilised to estimate elasticity in the long-run. The Engel-Granger cointegration test confirmed that the equation is integrated for applying FMOLS. The following table presents the result of Engle-Granger cointegration test. The significant p-value denotes that there is a long-run equilibrium between the model variables

Table 3: Engle-Granger Cointegration Test

	Value	Probability***
Model: $\ln QC_t = f(\ln RBP_t, \ln RY_t)$		
Engle-Granger tau-statistic	−6.248	0.0003
Engle-Granger z-statistic	−36.593	0.0001
Model: $\ln QC_t = f(\ln RBP_t, \ln RY_t, KP_t)$		
Engle-Granger tau-statistic	−7.300	0.0001
Engle-Granger z-statistic	−41.161	0.0000
Model: $\ln QC_t = f(\ln RBP_t, \ln RY_t, AIR_t)$		
Engle-Granger tau-statistic	−7.241	0.0001
Engle-Granger z-statistic	−40.772	0.0001
Model: $\ln QC_t = f(\ln RBP_t, \ln RY_t, TN_t)$		
Engle-Granger tau-statistic	−7.175	0.0001
Engle-Granger z-statistic	−39.980	0.0001
Model: $\ln QC_t = f(\ln RBP_t, \ln RY_t, PHW_t)$		
Engle-Granger tau-statistic	−7.192	0.0001
Engle-Granger z-statistic	−41.011	0.0000
Model: $\ln QC_t = f(\ln RBP_t, \ln RY_t, FREE_t)$		
Engle-Granger tau-statistic	−6.684	0.0004
Engle-Granger z-statistic	−38.370	0.0002

Notes: '***' MacKinnon (1996) p-value.

This study estimated two models due to constraints in the degree of freedom. Model 1 only includes price and income (basic model), while Model 2 is the basic model that controls non-price policies. The calculated results from the long run and short run models are discussed according to the two models. It utilised the time-series data for the period ~~of~~ from 1985 to 2017. The consumption of cigarettes per year is calculated using the excise tax and import duties data from the Ministry of Finance. Per capita consumption is obtained by dividing the total consumption (in sticks) by the size of the adult population defined as above 15 years old. There are many premium brands of cigarettes in Malaysia such as Dunhill, Marlborough, Bensons, Pall Mall and others. However, in this study, the price of cigarette is the average retail price of the among most sold brands in Malaysia, which is Benson and Hedges, obtained from the Royal Malaysian Custom and the Confederation of Malaysian Tobacco Manufacturers (CMTM). Income is measured by Real GDP per capita, where the real GDP per capita is the real GDP divided by the population. Both price and GDP were adjusted for inflation using the consumer price index (CPI) with 2010 as the base year to obtain the real price and real GDP.

Five different non-price tobacco control policies were used in this study to estimate their impact on demand for cigarettes such as the ban of kiddie packs introduced in 2010, no smoking in air-conditioned workplaces as of 2011, the '*Tak Nak*' campaign launched in 2004, different coverage areas for smoke-free policies as of 1993, and the pictorial health warnings on cigarette packs that was introduced in 2009. These non-price tobacco control policies were included into the demand model by dummy variables, as shown in *Model 2*. The reason for using dummy variables is to evaluate the effect of these policies towards ~~to~~ cigarette demand in Malaysia.

3. RESULTS AND DISCUSSION

3.1. Model 1 (Basic Model)

The basic cigarette demand equation is:

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t}) \tag{2}$$

where, $\mathrm{QC_t}$ = consumption of legal cigarettes per capita
$\mathrm{RBP_t}$ = real retail price of premium cigarette
$\mathrm{RY_t}$ = real GDP per capita.

For this study, a linear cigarette demand model was chosen:

$$\mathrm{QC_t} = \alpha_0 + \propto_1 \mathrm{RBP_t} + \propto_2 \mathrm{RY_t} + \varepsilon_t \tag{3}$$

Then, the equation is transformed into a log-log form to allow the model estimated parameters ∂_1 and ∂_2 to be interpreted as elasticities:

$$\ln \mathrm{QC_t} = \beta_0 + \partial_1 \ln \mathrm{RBP_t} + \partial_2 \ln \mathrm{RY_t} + \varepsilon_t \tag{4}$$

The model is estimated with the FMOLS procedure to determine the long-run elasticity. The estimated lag length used for FMOLS estimation is based on a Bartlett window width of lag length equal to two, where the results obtained are robust to other lag lengths and window. Table 4 shows the long-run result for Model 1.

Table 4: Long-run Elasticity from FMOLS Estimation

Dependent Variable: $\ln \mathrm{QC_t}$	**Coefficient**	**T-ratio**
$\ln \mathrm{RBP_t}$	−0.769***	−3.640
$\ln \mathrm{RY_t}$	−0.299**	−1.630
Constant	11.334***	7.968

Notes: '***' 1% significance level, '**' 5% significance level and '*' 10% significance level.

The estimated variables, RBP and RY, are significant at the 5% level. The real retail price of cigarette (RBP) has a negative sign, and the coefficient of −0.594 indicates demand for cigarette is inelastic in the long run. An increase in 1% of the real retail price of cigarettes decreases consumption per capita by 0.594%. We used the estimated price elasticity of demand to calculate the impact of an increase in cigarette excise tax by 38% in 2015. The increase in excise tax is from 0.29 cents per stick to 0.40 cents per stick of cigarettes. We assumed the industry passed all the tax increase to consumers; hence, cigarette prices increased by about 17.4%. We applied the price elasticity of demand, −0.594, and estimated that the consumption of cigarette will be reduced by

10.3%. However, in our estimation, we did not control for any smuggling activities or consumption of illicit cigarettes.

The coefficient of real GDP per capita (RY) is −0.442 which shows that cigarette is an inferior good, and higher income earner will tend to reduce demand for cigarettes. A 1% increase in income will reduce demand by 0.4%, meaning that the income elasticity of demand is inelastic.

After establishing the long run relationship, the residual of the equation is saved and then the ADF at level is tested. The result shows that the null cointegration is rejected at 1% level. Therefore, it can be concluded that the error term is stationary, and the equation is integrated, implying the variables are cointegrated.

3.2. Model 2 (Basic Model And Non-Price Tobacco Control Policy)

Apart from price and taxation policy, other effective non-price tobacco control policies or measures can also have an impact on demand for cigarettes. These non-price tobacco control policies include information campaigns, comprehensive bans on advertising and promotion, prominent warning labels, smoke-free areas and others. In this study, a variable D_t, a group of dummy variables is introduced to represent various non-price tobacco control policies implemented in Malaysia, where

a) D_1 (KP)–ban of 14-cigarette packs or 'Kiddie Pack' introduced in 2010 and assigned a value of 1 from 2010 until 2017;

b) D_2 (AIR)–Air-conditioned workplace banned in 2011 and assigned a value of 1 from 2011 to 2017;

c) D_3 (TN)–Variable '*Tak Nak*' assumes the value of 1 for 2004 when the national media anti-tobacco campaign '*Tak Nak*' was launched until 2011;

d) D_4 (PHW)–Pictorial Health Warnings introduced on 1 January 2009 and assigned a value of 1 from 2009 until 2017;

e) D_5 (FREE)–Variable 'FREE' designed with a value of 1 start the year 2005 to 2017, which represent that smoke-free policies were amended to be more comprehensive after 2004 by expanding more places protected by the smoke-free legislation.

We estimated a few versions of the basic model by controlling ~~for~~ one tobacco control policy at a time. The estimated equations are:
Equation (i):

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t}, \mathrm{KP}, \varepsilon_{1t}) \tag{5}$$

In logarithmic form, the linear demand function will be:

$$\ln \mathrm{QC_t} = \alpha_0 + \beta_1 \ln \mathrm{RBP_t} + \beta_2 \ln \mathrm{RY_t} + \mathrm{KP} + \varepsilon_t \tag{6}$$

The same process will be followed for all other equations:

Equation (ii):

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t}, \mathrm{AIR}, \varepsilon_{1t}) \tag{7}$$

$$\ln \mathrm{Q_t} = \alpha_0 + \beta_1 \ln \mathrm{RBP_t} + \beta_2 \ln \mathrm{RY_t} + \mathrm{AIR} + \varepsilon_t \tag{8}$$

Equation (iii):

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t}, \mathrm{TN}, \varepsilon_{1t}) \tag{9}$$

$$\ln \mathrm{QC_t} = \alpha_0 + \beta_1 \ln \mathrm{RBP_t} + \beta_2 \ln \mathrm{RY_t} + \mathrm{TN} + \varepsilon_t \tag{10}$$

Equation (iv):

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t}, \mathrm{PHW}, \varepsilon_{1t}) \tag{11}$$

$$\ln \mathrm{QC_t} = \alpha_0 + \beta_1 \ln \mathrm{RBP_t} + \beta_2 \ln \mathrm{RY_t} + \mathrm{PHW} + \varepsilon_t \tag{12}$$

Equation (v):

$$\mathrm{QC_t} = f(\mathrm{RBP_t}, \mathrm{RY_t}, \mathrm{FREE}, \varepsilon_{1t}) \tag{13}$$

$$\ln \mathrm{QC_t} = \alpha_0 + \beta_1 \ln \mathrm{RBP_t} + \beta_2 \ln \mathrm{RY_t} + \mathrm{FREE} + \varepsilon_t \tag{14}$$

The same procedures used in Model 1 to determine the long-run and short-run estimates are applied to these models. Table 5 summarises the estimated long-run results for different versions of Model 2. Each model in Table 5 includes price, income and one of the policy variables.

Table 5: Long-run Estimation from FMOLS for Model 2

Non-price tobacco control policies	**Price Coefficient**	**Income Coefficient**	**Non-price tobacco controls policy Coefficient**
Eqn i (KP)	-0.469^{***}	-0.399^{***}	-0.203^{***}
Eqn ii (AIR)	-0.528^{***}	-0.387^{***}	-0.170^{**}
Eqn iii (TN)	-0.756^{***}	-0.346^{***}	0.118^{***}
Eqn iv (PHW)	$\mathbf{-0.455}^{**}$	$\mathbf{-0.406}^{***}$	$\mathbf{-0.212}^{***}$
Eqn v (FREE)	-0.236	-0.908^{***}	0.278^{***}

Notes: '***' 1% significance level, '**' 5% significance level and '*' 10% significance level.

The results in Table 5 show a negative relationship and statistically significant impact of price on cigarette consumption in three (Eqn.i, Eqn.ii and Eqn.iii) out of five equations. The coefficient of income is negative and significant in all models except for Eqn ii that controls for the air-conditioned workplace. In this equation, income is significant at 1% level but has a positive relationship with the policy.

In this study, the non-price tobacco control policies KP, AIR and PHW are significant in reducing the consumption of cigarette except the '*Tak Nak* campaign. The variable for '*Tak Nak*' has a positive relationship with consumption of cigarette which indicates that the government's target to reduce consumption of cigarettes through the '*Tak Nak*' campaign was not successful.

Table 6 summarises all the results.

Table 6: Long-run Elasticity from FMOLS Estimation

Independent variable: Consumption Per Capita (QC)						
Variables	**Model 1**	**Model 2(A): KP**	**Model 2(B): AIR**	**Model 2(C): TN**	**Model 2(D): PHW**	**Model 2(E): FREE**
Real price (RPB)	-0.769^{***}	-0.469^{**}*	-0.528^{***}	-0.756^{***}	-0.455^{**}	-0.236
Real income (RY)	-0.299	-0.399^{***}	-0.387^{***}	-0.346^{***}	-0.406^{***}	-0.908^{***}
Banned on kiddie pack (KP)		-0.203^{***}				
Air-conditioned workplace (AIR)			-0.170^{**}			
'*Tak Nak*' campaign (TN)				0.118^{***}		
Pictorial health warnings (PHW)					-0.212^{***}	
Smoke-free areas (FREE)						0.278^{***}

Notes: '***' 1% significance level, '**' 5% significance level, and '*' 10% significance level.

4. CONCLUSION

Price, as expected, is an important determinant of cigarette consumption in the long run. The price elasticity of demand is −0.769 in the basic model, and it is comparable with other studies carried out in neighbouring countries, such as India (price elasticity = −0.4; John, 2008), China (price elasticity = −0.5; Bishop et al., 2007) and Thailand (price elasticity = −0.39). This price elasticity of demand is also similar to earlier studies in Malaysia when Ross and Al-Sadat (2007) estimated the price elasticity =−0.57, while Norashidah et al. (2013) obtained a price elasticity of −0.49. The WHO studies, based on the elasticity concept have shown that a tax increase which elevated the tobacco prices by 10% can lead to a decrease in tobacco consumption by about 4% in high-income countries and by up to 8% in low- and middle-income countries. From the calculated elasticity of demand for cigarettes, (-0.769), if the price of cigarettes increases 10%, the consumption of cigarettes will decrease 7.69%, hence demand for cigarettes is inelastic.

Other non-price tobacco control policies are also found to have reduced the consumption of cigarette significantly except for the '*Tak Nak*' mass media campaign and the establishment of the smoke-free area. However, the effect of pictorial health warning (PHW) is found to be stronger than the other non-price tobacco policies in Model 2. The primary objective of health warnings is to inform consumers about the health risks of smoking. Evidently, previous research on pictorial warnings have shown that they are more effective in educating smokers about the health risks of smoking (Li & Grigg, 2009; Thrasher et al., 2007) and these pictorial warnings are associated with increased motivation to quit smoking (Borland et al., 2009; Hammond et al., 2005; Li & Grigg, 2009). Currently, Malaysia's health warnings are required to cover 50% of the front side and 60% of the back side of all cigarette packages, meaning that 50% of the overall package space is covered and six warnings are rotated on the cigarette packages. The government may want to consider increasing the current size of health warning to, for example, 60% of the overall package to improve the effectiveness of the health warnings. The same improvement has been implemented in a few countries, such as Australia, New Zealand and others. In addition, the six rotated PHW should be printed with more informative images and health messages. On the less effective performance of the '*Tak Nak*' campaign, this is perhaps attributed to the five years duration which may not have been sufficiently long enough to reduce cigarette consumption. Levy and Friend (2001) suggested that the period of the campaign has to be long enough to allow the effects of the campaign in changing the social norm for smoking is viewed as unacceptable. Additionally, more stringent enforcements such as heavy penalties for smoking in smoke-free areas is required to deter smokers from violating the regulation.

The impact of income is entirely consistent with Models 1 and 2. The coefficients are statistically significant in the long run with a negative relationship to cigarette consumption. A negative relationship between income and cigarette demand shows that cigarettes have shifted away from being a superior or normal good as in the previous findings of income elasticity in Malaysia (Norashidah et al., 2013; Ross & Al-Sadat, 2007). The negative income elasticity indicates that cigarettes are increasingly more preferred by those in the lower income categories. Less demand for cigarettes among higher income groups can be alluded to better educational level, which increases health awareness and the desirability of abstaining from smoking.

From these estimates, one can conclude that increasing the cigarette tax, strengthening the enforcement of non-price tobacco policies and educating the public about the ill health effects of smoking are effective ways of reducing the consumption of cigarettes. Although, the non-price tobacco control policies provided mixed results and none significantly affected cigarette smoking in the short run, a long-term observation on the effectiveness of the policies would be necessary. Some policies may require a long gestation period before the impact can be realised fully. Nevertheless, continuous campaigns should be carried out to ensure smoking prevalence among population could be reduced to a more acceptable level.

There are several limitations in our study. The possible substitution for alternative forms of other tobacco products such as shisha and vape were not included in this study. Besides that, the availability of illicit cigarettes is assumed constant during the period of study. However, despite these limitations, we believed that our study provides ~~a~~ valuable information to the policy makers in regulating and implementing the tobacco control policies in Malaysia.

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