



Cigarettes Demand and Tax Strategy in Malaysia

Norashidah M. N.*, Nik Mustapha R. A. and Mastura Y.

Department of Economics, Faculty of Economics and Management, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

ABSTRACT

Taxation is one of the effective tools to discourage smoking. Increase of cigarette tax has a significant effect in generating additional revenue to the government due to the inelastic nature of the cigarette. In this study, the estimated price elasticity of demand for cigarettes in Malaysia is -0.28 and -0.49 in short run and long run; respectively. Hence, demand for cigarettes is inelastic or less responsive to the changes in price. Therefore, estimating the optimal cigarette tax rate is one of the strategies to ensure that the price of cigarette, after tax, is high enough to reduce consumption of cigarette. At the same time, it generates maximum tax revenue for the government. Using yearly time series data from 1980 until 2009, a Fully Modified Ordinary Least Square (FMOLS) method is applied to estimate the demand elasticity of cigarettes and the optimal cigarettes excise tax. In this study, the estimated optimal real excise tax rate is 0.186 sen per stick which is 27.4% higher than the real excise tax in 2009. The increase in real revenue earned after imposing an optimal excise tax is 24.25% in the short run and 21.89% in the long run. Consequently, the expected reduction in consumption per capita of cigarette is 10.41% in the short run and 12.88% in the long run. Maximum revenues from the optimal cigarettes tax can be earmarked to fund a specific tobacco control policy in Malaysia

Keywords: Elasticity of demand, optimal tax rate, tax revenue

INTRODUCTION

Malaysia enacted Control of Tobacco Products Regulation (CTPR) in 1993, under

the Food Act of 1983. CTPR Act 1993 was officially implemented on 15th May, 1994. Though amended a number of times, these regulations remain the primary legislative mechanism used to regulate tobacco in Malaysia. Cigarettes taxation is one of the important tools for tobacco control in Malaysia. According to Chaloupka *et al.*

ARTICLE INFO

Article history:

Received: 21 May 2012

Accepted: 31 July 2013

E-mail address:

norashidah@upm.edu.my (Norashidah M. N.),

* Corresponding author

(2000), one of the effective methods to deter smoking behavior is through taxation. In addition, Shibuya *et al.* (2003), describes that taxing of tobacco as the most cost effective tobacco control option in all regions.

In Malaysia, cigarette tax is imposed on cigarette manufacturers or cigarette importers. Until 2004, taxes on tobacco were levied according to their weight. Since 2005, Malaysia has been adopting a specific excise tax per stick. This tax structure is easier to administer since it requires only counting the sticks without weighing them. There are two different tax structures for domestic and imported cigarettes. In 2010, excise tax of RM0.26 per stick was levied on locally produced cigarettes sold in Malaysia; while, import duty was levied on imported cigarettes. Imported cigarettes from non-ASEAN countries are subjected to an import duty of RM0.20 (US\$0.05) per stick; while, cigarettes imported from ASEAN countries are levied RM0.10 (US\$0.03) import duty per stick. Both domestic and imported cigarettes are subjected to 25% sales tax added above the factory value with excise tax for domestic or above custom declared value for the imported ones.

Currently, locally produced cigarettes capture over 95% of the market. The excise tax on locally produced cigarettes is RM0.26 per stick which represents about 52% of retail price. This is below the recommendation of Framework Convention on Tobacco Control (FCTC) which is 65% of the price per pack. Table 1 shows the

cigarette taxes imposed by the Malaysia government from 1990 until 2010.

From 1990 until 2004, excise tax on cigarette was imposed on the weight of cigarette (per kg) Following 2004, it has been imposed that measurement based on per stick of cigarette. The excise tax and the import tax imposed on cigarettes have been increasing. However, the sales tax has remained fixed at 15% from 1990 to 1999. It has increased to 25% from 2001 to 2010.

The Malaysian Government earns a large amount of revenue from its involvement in the tobacco industry. In 2010, revenue from the excise tax on cigarette was 2% from the total revenue of excise tax collected by the government. The tobacco industry ranked 5th out of 92 sectors. The total economic output of this industry has reached RM1.7 billion representing about 3% of Malaysia's Gross Domestic Product in 2004.

Fig.1 shows the relationship between the excise tax on cigarette and tax revenue generated by government. The figure reveals that the increase in excise tax on cigarette imposed by the government leads to persistent increase in tax revenue from 1990 to 2009.

Cigarettes Demand and Cigarette Tax in Malaysia

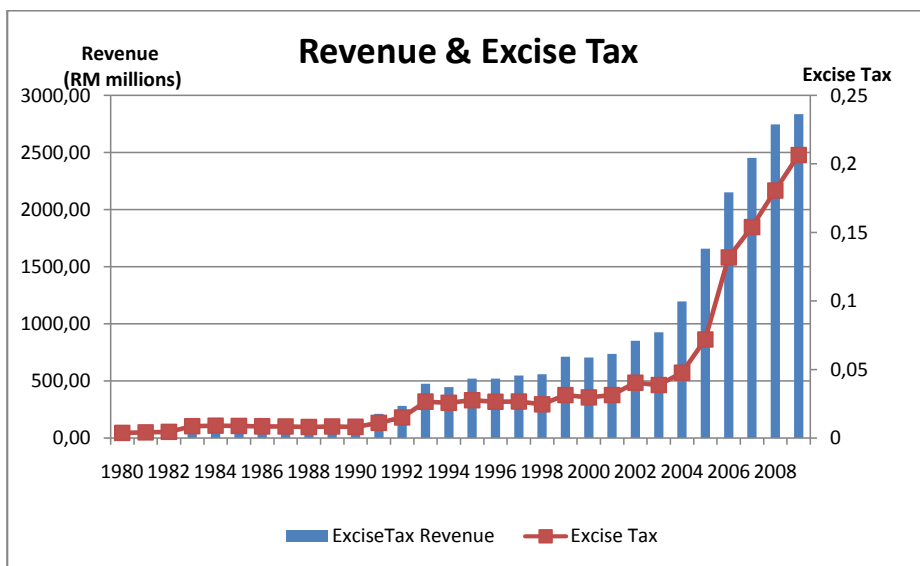
Basically, price elasticity of demand is measures the responsiveness of quantity demanded to a change in price. In this context, it measures the percentage changes in quantity demanded for cigarette due to a change in a price of cigarette. A study

TABLE 1
Cigarette Taxes 1990 – 2010

Year	Import Tax RM/kg or RM/stick	Excise Tax RM/kg or RM/stick	Sales Tax %
1990	85/0.08	13/0.013	15
1991	135/0.12	14/0.014	15
1992-1998	162/0.15	28.60/0.028	15
1999-2000	180/0.16	40/0.039	15
2001	180/0.16	40/0.039	25
2002	216/0.2	48/0.047	25
2003	259/0.24	58/0.056	25
2004	200/0.18	58/0.056	25
2005*	0.20	0.081	25
2006	0.20	0.12	25
2007	0.20	0.15	25
2008	0.20	0.18	25
2009	0.20	0.225	25
2010	0.20	0.26	25

*Specific tax per stick was introduced (1 kg = 1100 sticks)

Source: Royal Custom Malaysia and Confederation of Malaysia Tobacco (CMTM), various years.



Source: Royal Malaysian Custom various years.

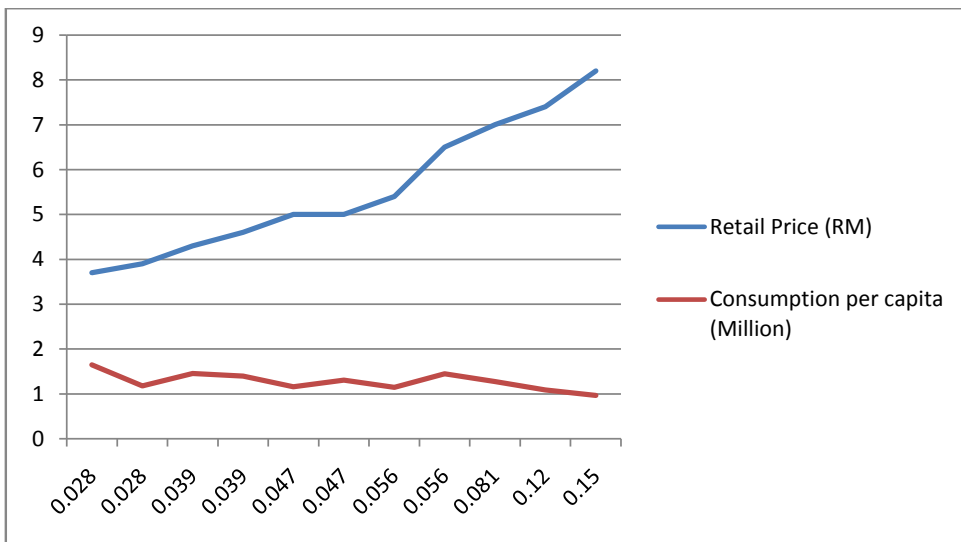
Fig.1: Tax Revenue vs Excise Tax Rate (1990 – 2009)

conducted by Hana and Nabila, (2007) using data on cigarette consumption, cigarette prices and public policies in Malaysia for the period from 1990 to 2004 indicates the estimated long-run and short-run price elasticity of demand was -0.57 and -0.08; respectively. It implies that demand is less responsive to price or inelastic. On the other hand, they have discovered that 25% increase in cigarette tax in 2007 has led to a 5.9% increase in the price of cigarette and 3.37% of reduction in consumption. In view of demand for cigarettes is inelastic, it indicates that lack of awareness on the effect of cigarettes on health, addiction and availability of illegal cigarettes as substitute. The higher excise tax on cigarette leads to only a slight decrease in consumption of cigarettes, as illustrated in Fig.2.

Currently, Malaysia does not have any clear tobacco tax policy objectives.

Although there have been several increase on cigarette tax in the past decade, their purpose was mainly to raise government revenue (Hana & Nabilla, 2007). Some aspects of the tobacco tax policy are driven by economic interests of tobacco farmers and cigarette producers. Despite these concerted effort to curb smoking through the enforcement of tobacco control policies, Malaysian efforts are still lagging behind neighboring countries such as Singapore and Thailand. The lack of effective coordination among the agencies involved in tobacco control often leaves obvious violations of CTPR unpunished.

The reasons of raising cigarette excise taxes, are to increase government revenue, to protect children and youth, to improve public health and to correct externalities. The entire reasoning further poses a question as to what extent the optimal tax should be



Source: Royal Custom Malaysia and Confederation of Malaysia Tobacco (CMTM), various years.

Fig.2: Retail Price of Cigarette and Consumption Per Capita vs Excise Tax Rate (1990 – 2008)

imposed on cigarette. From the economic perspective, the optimal tax can be achieved when the marginal cost of the last cigarette consumed equals to its marginal social benefits. However, according to Warner, Chaloupka and Cook (1995) and Chaloupka *et al* (2000), evaluation and identification of the negative externalities associated with direct smoking and direct environmental effect from tobacco smoke are abundant and complicated. Therefore, in order for a country to set the optimal level of tax, it should take into account the national health objectives. Such objectives depend on societal value such as the extent to which the children should be protected from the effect of smoke polluted environment. Apart from the health and social objectives of imposing tax on cigarettes, some governments may levy taxes with the intention of maximizing revenues. An empirical evidence from a study in South-East Asia reports on the potential revenue generated from tobacco taxes, Arunatilake (2003). This study assumes that the real GDP per capita in the region is growing at 4% annually. With that assumption, a 5% increase in real cigarette prices induced by higher taxes would generate substantial additional revenue for the region by 2010. Hence, this paper estimates the price elasticity of demand for cigarette and evaluates the effect of cigarette excise tax on cigarette consumption. The determination of the optimal excise tax rate is essential to ensure maximum tax revenue is generated. Thus, it can be channeled towards tobacco control programs with the aim to reduce prevalence of smoking and

ultimately change the consumption behavior of smoking.

LITERATURE REVIEW

The estimation on demand for cigarette has been of great interest to many economists since the Surgeon General's warning in 1964 on the causal relationship between cigarette smoking and smoking related diseases. Smoker's responsiveness to changes in cigarette price has been estimated in many studies from different countries over varying time periods. Price is only one of several factors which may influence demand. Analyses usually attempt to assess simultaneously the effect of price and other major potential influences such as income, public information policies and cigarette advertising. The extent to which demand for cigarettes responds to changes in price can be measured using price elasticity of demand. Majority of the empirical evidence available are based on studies of populations in developed countries. They suggest that 10% increase in cigarette prices will result in 2.5% to 5% reduction in cigarette demand (Chaloupka & Warner, 2000). In low and middle-income countries, the study on demand for cigarette has utilized the national-level aggregate consumption data and individual or household-level survey data. Hu and Mao (2002) estimates the aggregate time series data for China. The finding is that the price elasticities of demand range from -0.54 to -0.64. The same study has been conducted, in Malaysia, using data on cigarette consumption, cigarette prices and public policies for the period

from 1990 to 2004 (Hana & Nabila, 2007). The study employs time-series regression analysis applying the error-correction model (ECM). The estimated long-run and short-run price elasticity of demand are -0.57 and -0.08; respectively. It indicates that demand is less responsive to price in the short-run. Similar studies have been conducted in other countries including Vietnam and Myanmar. It has been reported that Vietnam's price elasticity has reached -0.53 (Eozenou & Fishburn, 2009) and Myanmar with -0.128 (Nyo *et al.*, 2003). Although different countries may have used different methods and data set to estimate the impact of cigarette price on cigarette demand, those studies have shown that increase in the price of cigarettes will lead to significant reductions in cigarette smoking.

Cigarette consumption imposes externalities through greater health care expenditure, negative effects on second hand smokers and loss of productivity. In view of these externalities, smokers make socially inefficient consumption decisions which lead to social welfare loss. Efficient government intervention might be better to facilitate the internalization of externalities through Pigouvian taxes (Pigou, 1962). Thus, bringing consumption closer to the Pareto-efficient level by raising the price (Holcombe, 1996). Pigouvian taxes are known as "sin taxes" imposed on goods such as alcohol and tobacco.

Evidence from developed and developing countries show that price increase on cigarette are highly effective in reducing demand (Chaloupka *et al.*,

2000). These findings suggest that raising taxes on cigarettes can be an effective policy in reducing smoking. Higher taxes cause higher price of cigarettes. Hence, induce some smokers to quit and deter others to start smoking. The higher price of cigarettes reduces the number of ex-smokers returning to cigarettes and decreases the amount of cigarettes consumption among existing smokers. Ahmad and Franz (2008) concludes that a higher cigarette price through taxes reduces smoking prevalence, improves the population health, reduces medical cost and net gain in tax revenue for the government.

Raising cigarette tax is advantageous to governments in terms of increasing revenue. In an estimate by Sunley, Yurekli and Chaloupka (2000), an increase of 10% in cigarette taxes leads to an increase of almost 7% on average in cigarette tax revenues. An effective tax policy by the government is to set taxes on products that create the least economic distortion. Ramsey (1927) designs an optimal tax theory which identifies distortion minimizing tax policy and the second best levels of taxes. The "Ramsey Rule" states that tax rate should vary inversely with the elasticity of demand for products by holding the elasticity of supply constant. Given the evidence that demand for cigarette is relatively inelastic in developed and developing countries (Chaloupka *et al.*, 2000), the Ramsey Rule on cigarettes taxes hold.

As dictated in "Ramsey Rule" (Ramsey, 1927), the level of taxes is inversely related to the price-elasticity of demand by holding

the supply elasticity constant. Thus, an increase in tax minimizes the welfare loss. At the same time, it leads to a significant increase in tax revenue. Townsend (1996) indicates that for every one percent increase in the excise tax, government revenue in UK is expected to increase between 0.6 and 0.9%.

The rate of cigarette excise tax that maximizes revenue is illustrated using the Laffer curve. An economist, Arthur Laffer (1986), suggests that beyond some tax rate, higher tax rate will reduce the tax base so much that revenues will actually decline.

The following Laffer Curve illustrates the relationship between tax revenue and the tax rate.

Using the Laffer Curve model to derive the relationship between the excise rate and budget revenue in Ukrainian tobacco industry, Krasovsky *et al.*, (2001), it is estimated the revenue maximizing excise rate to be approximately 11.3% in constant 1997 Hryvnias currency. The excise rate, in Ukraine, in 2001, shows an upward sloping portion of the Laffer Curve. Therefore, budget revenues can be significantly increased if the excise rate is increased. A study in South Africa by Van Walbeek, 2000, using a Laffer Curve theory for years 1998 and 1999, shows that if the government had set the tax at the revenue maximizing levels, an additional revenue of R700 million and R300 million for those two years could be generated. Theoretically, there is a trade off in raising cigarette taxes. Government gets more revenue on the packs of cigarettes sold. However, there is likely to be fewer packs

sold as the tax rates increase. Eventually, tax revenue declines. Apart from taxes, other effective tobacco control measures include information campaigns, comprehensive bans on advertisement and promotion, prominent warning labels, and clean indoor air restrictions (Kenkel & Chen, 2000; Woolery *et al.*, 2000).

MODELS AND METHODOLOGY

Following the methodology considered by Townsend, Roderick and Cooper (1994), a single equation model with an assumption that the consumption function is a log-linear function is employed. The log linear demand model that is estimated in this study:

$$\begin{aligned} \ln C_t & \\ &= \beta_0 + \beta_1 \ln P_t + \beta_2 \ln GDP_t + \beta_3 T_t \\ &\quad + \beta_4 \ln Rg_t + \varepsilon \end{aligned} \quad [1]$$

where C_t is the quantity or number of cigarette sticks consumed per capita in year t , P_t is the real pre-tax price of cigarettes in year t , GDP_t is real GDP per capita in year t , Rg_t is the tobacco regulation and T_t is the cigarette excise tax rate.

All the variables are in natural logarithms. However, Rg_t is represented by dummy variable (DMY) to allow the estimates of model parameters to be interpreted as elasticities. Consumption per capita is the total quantity of domestic cigarettes plus imported cigarettes, measured by number of cigarette sticks, divided by the size of population aged 18 years and above. P_t is the pre-tax price of cigarettes equivalent to current price of cigarettes minus the excise cigarettes tax and GDP per capita is the real

GDP divided by the number of population. T is an excise tax in the form of per unit tax levied on locally produced cigarettes sold in Malaysia and Rg is non-price instruments. The ‘*TakNak*’ or ‘*Don’t Want*’ national anti-smoking campaign is considered as a regulation dummy, DMY . The ‘*TakNak*’ anti-smoking campaign was launched on 9 February, 2004. The campaign was a 5 year program with initial budget allocation of RM20 million. This campaign is considered in this study since the total budget for this 5 year program is RM100 million. Given the vast expenditure dedicated to this mass media campaign, an empirical estimation of its effectiveness is important to discern how it influences demand for cigarettes.

The basic unit root tests are performed in this analysis to determine the order of integration of the series. The classical unit root tests, namely the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1981, Said and Dickey, 1984), Phillips and Perron (PP) (1998) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) (1992) test have been carried out on the variables at levels and in first differences, with the optimal lag lengths for each test chosen automatically by the E-views 6 software. In order to examine the long run relationship among the variables, this study employs the method of Fully Modified Ordinary Least Square (FMOLS) developed by Phillips and Hansen (1990). In applying the FMOLS, the existence of co-integration relation between a set of $I(1)$ variables must be satisfied. The FMOLS estimator corrects the demand model’s variables for endogeneity due to

co-integration and modifies least square to account for serial correlation effects. FMOLS yields t-ratios that is asymptotically normally distributed and independent of the correct choice of lag length of the underlying vector auto-regression. According to Borland and Quliaris (1994), the FMOLS estimator permits inference based on normal distribution theory ‘by means of a non-parametric correction’ to the data that effectively eliminates any long-run dependence between the true residuals of the co-integrating regression and the innovations of the explanatory variables. Residuals generated from each co-integrating relations represent deviations from the long-run equilibrium. It can be used to estimate the short run dynamics of demand models using the Error- Correction Model:

$$\begin{aligned} \Delta C_t = & \beta_t - \lambda_t ecm_{t-1} + \sum_{j=1}^{k_t} \pi_j \Delta p_{t-j} \\ & + \sum_{j=0}^{k_t} \mu_j \Delta m_{t-j} + \sum_{j=0}^{k_t} \pi_j^* \Delta p_{t-j}^* + \beta_1 D1 \\ & + \beta_B DB + \beta_T D_T + v_t \end{aligned}$$

Where ecm_{t-1} is the residual from estimating demand models using FMOLS. The estimation of the error correction parameter in the model, λ is to measure the speed of adjustment of the system to disequilibrating shock. The coefficients with negative and larger values indicate faster adjustment to economic shocks. Bannerjee *et al.*, (1993) shows that a highly significant error correction term with a negative coefficient is a further proof of the existence of stable long run relationship and relatively

more efficient method of establishing Co-integration.

The optimal excise tax rate is estimated based on a basic equation of Laffer Curve: $R(T) = \alpha T - \beta T^2$ where $R(T)$ is tax revenue and T is tax rate, the estimated regression of optimal cigarette excise tax:

$$R_t = \alpha_0 + \delta_1 T_t + \delta_2 T_t^2 + \delta_4 GDP_t + \varepsilon_t, \quad [2]$$

where t indicates years, R is real tax revenue from cigarettes, T is the real excise tax on per stick of cigarette measured in Ringgit, GDP is real income per capita and transformed into natural logarithm, and ε_t is the error term. T^2 is real excise tax squared. The inclusion of both tax rate and its square in the regression equation is to allow the relationship between revenue and tax rate to be non-linear as depicted by Laffer curve model. Both R and T are adjusted for the inflation using the consumer price index (CPI) with year 2000 as the base year.

All the variables of the Laffer Curve in equation 1 are also tested for their stationarity and FMOLS is applied to estimate the parameters. All the standard diagnostic tests are applied for these time series data

In order to estimate the impact of increase excise tax rate of cigarette on the expected government revenue, the following mathematical relationship between the changes in the excise tax rate and government revenue is applied:

$$\frac{d(TR)}{TR} = \frac{d(T)}{T} \left[1 + \left(\mu_\mu \times \frac{T}{P} \right) \right] \quad [3]$$

where $\frac{d(TR)}{TR}$ is the percentage change in government revenue. $\frac{d(T)}{T}$ is changes in the excise tax rate, μ_μ is the price elasticity of demand, and $\frac{T}{P}$ is the tax proportion of the retail price of cigarette.

Equation 3 shows that an increase in government revenue, as a result of an increase in the tax rate, is inversely proportional to the absolute size of the price elasticity. A relatively inelastic demand implies greater revenue potential and vice versa.

The empirical analysis for price elasticities and optimal tax rate in this study use annual data from 1980 to 2009. These data were obtained from the Royal Custom of Malaysia and Department of Statistic Malaysia.

RESULTS AND DISCUSSION

The empirical results of ADF, PP and KPSS show that all the variables in both models are stationary at first difference. Since all the variables are I(1), Fully Modified Ordinary Least Square (FMOLS) is employed to estimate the long run elasticity of the models. Followed by Error Correction Model (ECM) to determine the short run elasticity

From the above estimations, price of cigarettes and real excise tax rate have a negative and significant impact on consumption of cigarettes in long run and

short run. Demand for cigarettes is inelastic in short run and long run. However, price is less sensitive in the short run where an increase in cigarette price by 10% reduces cigarette consumption by 2.8% in short run, and 4.9% in the long run. The coefficient of excise tax is tax elasticity which measures the responsiveness of changes in consumption per capita due to

changes in the excise tax rate. Hence, from the result shown in Table 2 and Table 3, the coefficients of excise tax rate is highly significant at 1% level and gives a negative impact on the cigarette consumption in short run and long run. In this study, real income per capita (GDP) is found to have a negative relationship on cigarette consumption in short run and positive relationship in

TABLE 2
Estimation of Long-run Elasticity

Dependent Variable: lnC		
	Coefficient	T-ratio
Constant	4.5040	6.3804***
lnP	-0.4941	-2.4396**
lnT	-0.4739	-13.466***
lnGDP	0.3753	4.4833***
DMY	0.0584	1.528

Notes: The following notation applies; C= Consumption per capita, P= real pretax price, T=real excise tax rate, GDP = real GDP per capita and DMY represent Rg, non price instrument (Dummy variable) '***' indicates the test statistic is significant at the 1% significance level, '**' indicates the 5% significance level, and '*' indicates the 10% significance level.

TABLE 3
Estimation of Short-run Elasticity

Dependent Variable: ΔlnCPC		
	Coefficient	T-Ratio
Constant	-0.0042	-0.5195
ΔlnP	-0.2808	-2.5340**
ΔlnT	-0.3843	-13.665***
ΔlnGDP	-0.0412	-0.2965
DMY	0.0175	1.5470
ECTC _{t-1}	-0.6814	-7.3003***

R-Squared = 0.717
R-Bar-Squared = 0.647
F-stat = 10.174[0.000]
Standard Error of Regression = 0.055

Notes: The following notation applies; ΔC= Consumption per capita, ΔP= real pretax price, ΔT=real excise tax rate, ΔGDP = real GDP per capita and DMY = Non price instrument (Dummy variable) Δ = first difference. '***' indicates the test statistic is significant at the 1% significance level, '**' indicates the 5% significance level, and '*' indicates the 10% significance level.

long run. It implies that cigarettes are an inferior goods in the short run yet normal goods in the long run. However, real income per capita is only significant in the long run. Finally, the results of dummy variable (DMY) that represent government non-price instrument R_g , indicate that the government campaign is ineffective either in short run or long run. The campaign is successful in increasing the awareness of the anti-smoking messages (Foong, 2005). However, the positive relationship between the variable and consumption of cigarette in this study implies that the government's objective to reduce cigarette consumption is unsuccessful. The coefficient of $ECTC_{t-1}$ is equal to -0.68, which implies that deviation from the long-run equilibrium in demand for cigarette is corrected by 68% over annually at 1% level of significance. The higher significant error correction term, the further is proof of the existence of a stable long run relationship. Bannerje *et al.*, (1993) argues that testing the significance of error correction term with negative coefficient is supposed to be relatively more efficient way of establishing cointegration.

In view of demand for cigarette in short run and long run is inelastic, an increase of tax on cigarette fits into the 'Ramsey Rule' (Ramsey, 1927). Evidently, increases of tax on cigarette leads to significant reduction in cigarette consumption and, at the same time, increases tax revenue. The optimal tax is estimated to ensure a maximum tax revenue to the government. The following Table 4 shows the estimation results from the FMOLS analysis for the optimal tax model. The diagnostic tests show all the variables are I(1) or stationary at first difference. The following Table 4 shows the estimation results from the FMOLS analysis.

The estimated coefficient of T is positive and significant at 1% level. The positive sign of T implies that increases in real excise tax rate will increase the tax revenue. The opposite sign for the tax rate squared (T^2) captures the diminishing effects of the tax in the parabolic equation which is a pattern consistent with the shape of Laffer Curve shape. The estimated coefficients of real GDP which is positive is also highly significant determinant of real excise tax revenue in this model.

TABLE 4
Results of the FMOLS Estimation

$$R = -5.2437 + 19.9882T_t - 53.6910T_t^2 + 1.8609 \ln GDP_t$$

(-2.6953)** (2.8531)*** (-1.2859) (8.3118)***

Notes: The following notation applies; R= Real Revenue, T=real excise tax rate, RGDP = real income per capita and T^2 = real excise tax squared "***" indicates the test statistic is significant at the 1% significance level, "**" indicates the 5% significance level and "*" at 10% significance level. Figures in parentheses () refer to t statistics.

To determine the optimal tax rate that maximizes tax revenue, the real revenue (R) is differentiated with respect to real tax rate (T),

$$R = -5.2437 + 19.9882T_t - 53.6910T_t^2 + 1.8609\ln\text{GDP}_t$$

$$\partial R/\partial T = 19.9882 - 2(53.6910)T_t$$

A necessary condition for revenue maximization is $\partial R/\partial T = 0$.

Therefore, real excise tax rate (T) is 18.6% or nominal excise tax rate is 28.7%.

Considering $\partial^2 R/\partial T^2 = \text{negative}$, it confirms that $T = 18.6\%$ which is the optimal real excise tax rate that maximizes tax revenue. The calculated optimal real excise tax rate is 27.4% higher than the real excise tax rate of 14.6% in 2009.

From the above estimated price elasticity of demand for cigarette and the applied mathematical relationship between changes in tax revenue and changes in the excise tax rate derived in Equation 3, the expected increase in government revenue will be 24.25% in the short run and 21.89% in the long run. It is due to 27.4% increase in real excise tax rate. It should also note that the excise tax proportion of the retail price of cigarette is 41% in 2009. At the same time, using the estimated tax elasticity of demand, -0.38 in the short run and -0.47 in the long run, 27.4% change in the excise tax rate will reduce cigarette consumption by 10.41% and 12.88% in the short run and long run; respectively.

CONCLUSION

Demand for cigarettes in Malaysia is inelastic in both short run and long run. Price is highly significant determinant of demand. It is consistent with the theory that the long run price elasticity of demand is higher than the short run. Excise tax is one of the instruments frequently used as a government policy tool to reduce consumption of cigarettes. The significant and negative impact of excise tax rate on consumption of cigarettes, both in short run and long run shows that the policy of increasing excise tax rate on cigarettes is an effective measure to reduce consumption of cigarettes. Although tax has a significant effect in reducing cigarette consumption, the inelastic demand for cigarette will continue to generate additional tax revenue. As the tax rate is increased, the quantity of cigarette purchased will decline less than increase in price. Thus, the tax revenue is derived from people who continuously purchase cigarettes. Determining the optimal cigarette excise tax rate is one of the cigarette tax strategies that the government should pursue. The current excise tax rate provides ample opportunities for the government to increase excise tax with the objectives of generating maximum tax revenue and reducing cigarette consumption.

The estimation of optimal cigarette tax is done using the Laffer curve model. It is estimated that the optimal real excise tax is 0.186 sen per stick or 0.287 sen nominal excise tax per stick. That is about 27.4% higher than the excise tax rate in 2009. Based on the findings of this study, Malaysian

government should continue increasing the excise tax rate until the optimal level of tax rate is achieved. Imposing the optimal tax on cigarettes will increase tax revenue to the government. The expected increase in government revenue in short run is 24.8% and long run 21.89%. Higher excise tax rate on cigarette will be passed to the consumer in terms of higher price of cigarette. The negative relationship between price and demand of cigarette will further decrease consumption of cigarettes. It is estimated at 10.41% and 12.88% in the short run and long run, respectively.

In the attempt to maximize the taxation effect and reduce smoking, government should efficiently allocate the tax revenue towards tobacco control program and strategies. According to Hanna and Nabila (2007), there is no tax or pricing policy in Malaysia that aims to contribute towards health objectives. It is timely that the government considers having a specific tobacco control policy funded from earmarking of revenues, cigarette tax increases or "sin tax". The policy funded by earmarked fund should be targeted to increase awareness about the consequences of smoking habits, to reduce larger proportion of tobacco consumption and to reduce tobacco-related illness and death. The collected revenue from the "sin tax" can be channeled to more comprehensive programs addressing the issues of health resulting from tobacco usage, increasing the awareness and educate the public on the danger of smoking, implementing educational strategies to prevent smoking

and other related activities. The source of funding for those health programs through earmarking of tax revenue will eradicate any conflict of interest between non-smoker taxpayers and smokers since the earmarked revenue is generated from the tobacco consumers.

Although the result of this study shows that anti-smoking campaigns in Malaysia is ineffective, there are evidence that the anti-smoking campaigns in America have proven to be an effective tools in reducing cigarette consumption and encouraging people to quit smoking (Siegel, 1998). Further supported by a report from National Cancer Institute, USA (2008), it also concludes that anti-tobacco media campaigns are effective in reducing smoking among youths and adults. Despite the insignificance of "*TakNak* or "*Don't Want*", anti-smoking mass media campaign must continue. The general public in Malaysia gives high support towards the implementation of anti-smoking campaign in the community (Halimah, 2005). The five years duration of "*TakNak*" campaign may not be sufficient to see the positive impact of the campaign. Levy and Friend (2001) suggests that the duration of campaign must be long enough to allow the effects of the campaign in changing social norm where smoking should be viewed as unacceptable. Siegel (1998) suggests that the campaigns need a consistent source of funding to ensure that the message is transmitted from various sources, consistent and repeated over a long period. Therefore, to maintain continuous running of the campaigns, it is recommended that earmarking of cigarette tax revenue is

vital to ensure sustained funding. The campaign must also be protected from any political attempts to divert funding or limit their scope from delivering the message. In the “*TakNak*” campaign, the message is to increase awareness among public, especially youths, on why they should not smoke and why they should quit smoking. However, some studies highlight that the combination messages of ‘why to quit’ and ‘how to quit’ are more effective in changing smoker’s behavior (Wilson, 2005; Hammond et al., 2006). Thus, besides the “*TakNak*” message in the anti-smoking mass media campaign, the ‘how to quit’ message should be integrated into the campaign.

REFERENCES

- Ahmad, S. , & Franz, G.A. (2008). Raising taxes to reduce smoking prevalence in the USA: Assimilation of the anticipated health and economic impacts, *Public Health*, 122, 3-10.
- Arunatilake, N. (2003). An economic analysis of tobacco demand in Sri Lanka, *Economic Journal*, 3(1), 96-120.
- Banerjee, A, Dolado, J. J., Gailbraith, J. W., & Hendry, D. F. (1993). Co-integration, error-correction, and the econometric analysis of non-stationary data, *Advanced Texts in Econometrics*. Oxford University Press.
- Chaloupka, F. J., Hu T., & Warner, K. E., et al. (2000). The taxation of tobacco products. In P. Jha & F. J. Chaloupka (Eds), *Tobacco Control in Developing Countries*. Oxford University Press.
- Chaloupka, F. J., Hu, T., Warner, K. E., Jacobs, R. & Yurekli, A. (2000). The taxation of tobacco products. In P. Jha & F. J. Chaloupka (Eds) *Tobacco Control in Developing Countries*, Oxford University Press.
- Chaloupka, F. J., Warner, K. E. (2000). The Economics of Smoking. In: Culyer A. J., Newhouse J. P. (Eds), *Handbook of Health Economics*. Amsterdam: North-Holland, pp.1539-1627
- Eozenou, P., & Fishburn, B. (2009). Price Elasticity Estimates of Cigarette Demand in Vietnam, *The DEPOCEN Working Paper Series*, 2009/05, Vietnam
- Foong, K., Maizurah, O., Razak, L., Rahmat, A., Tan, Y. L., & Yong, C. Y. (2005). Report: Evaluation of the national anti-smoking campaign in Malaysia. *Clearing house and research network for tobacco control*, National Poison Center of Malaysia, USM, Malaysia.
- Hana, R., & Nabilla, A. M. (2007). Demand Analysis of Tobacco Consumption in Malaysia, *Nicotine & Tobacco Research*, 9(11), 163-1169.
- Holcombe, R. G.(1996). *Public Finance: Government revenues and expenditures in the United States economy*. Minneapolis: West Publishing Co.,
- Hu, .W., & Mao, Z. Z. (2002). *Economic analysis of tobacco and options for tobacco control: China case study*. HNP discussion paper, economics of tobacco control paper No. 3.
- Kenkel, D., & Chen, L. (2000). Consumer information and tobacco use. In *Tobacco Control in Developing Countries*, Oxford, England: Oxford University Press.
- Krasovsky, K., Andreeva, T., Krisnov, D. Masliakivsky, M., & Rud, G. (2001). *Economics of tobacco control in Ukraine from the public perspective*. Alcohol and drug information centre (ADIC), Ukraine.
- Nyo Nyo, K., Zaw, K. K., & Naing, K. K. (2003). *The economics of tobacco control in Myanmar*. HNP Discussion Paper, Economics of Tobacco Control Paper No. 14, Washington: World Bank.
- Pigou, A. C. (1962). *A study in public finance*. 3rd Edition. Macmillan and Co., London

- Ramsey, F. P. (1927). A contribution to the theory of taxation. *Economic Journal*, 37, 47-61.
- Van Walbeek, C. P. (2000). *The economics of tobacco control in South Africa*. Paper presented at 11th conference on Tobacco OR Health. Applied Fiscal Research Centre, Cape Town
- Shibuya, K., Ciecierski, C., Guindon, E., Bettche, D. W., Evans, D. B., & Murray C. J. (2003). WHO framework convention on tobacco control: Development of an evidence based global public health treaty, *British Medical Journal*, 327(7407), 154-157.
- Sunley, E. M, Yurekli, A. A., & Chaloupka, F. J. (2000). The design, administration and potential revenue of tobacco excises. In Jha, P and Chaloupka, F. J. (Eds.), *Tobacco control in developing countries*, Oxford, England: Oxford University Press.
- Townsend, J. (1996). Price and consumption of tobacco. *British Medical Bulletin*, 52(1), 132-142.
- Warner, K. E., Chaloupka, F. J., & Cook, P. J. (1995). Criteria for determining an optimal cigarette tax, *Tobacco Control*, 4, 380-6.
- Woolery, T., Asma, S., & Sharp, D. (2000). Clean indoor-air laws and youth access. In Jha P, Chaloupka F. J., (Eds.), *Tobacco control in developing countries*. Oxford, England: Oxford University Press. pp.273-286.

