Analyzing Regional Cigarette Consumption Elasticities in The Philippines

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ABSTRACT

Sin taxes were imposed on cigarettes in the Philippines to mitigate the dangerous effects of tobacco, and to generate a financial resource for achieving improved health outcomes. This research estimated the impact of a change in the price of cigarettes as a result of the Sin Tax Law, on the consumption of tobacco in the Philippines. It used a fixed effect model to determine the demand elasticities of high-, medium- and low-priced cigarettes, as well as the super low or discounted category. The optimal tax level for the Sin Tax in the Philippines has been reached, however the regional effect of the Sin Tax has not surfaced, therefore the computed optimal level of by the Sin Tax remains underperforming regionally.

Keywords: Sin Tax, Philippines, Tobacco, Elasticity

1. Introduction

The Framework Convention on Tobacco Control (FCTC) was formed to focus on the impact brought about by tobacco consumption, and to preserve the global welfare; it considered the tobacco taxation as a powerful yet underused control tool. Truly, imposing taxes or charging higher tax would make tobacco inaccessible to minors and low-income earners, as supported by several studies; thus, resulting to a significant decrease in consumption. The Philippines, being one of the signatories in this treaty, shall act in solving the complications arising from smoking prevalence.

The Philippines has been acting on these; policies were set and laws were being implemented in line with the FCTC's mission. One of which is the Graphic Health Warnings Law. The government has also exerted efforts in amending some provisions of RA 9211, or the Tobacco Regulation Act of 2003, particularly those provisions pertaining to the definition of public places and designated smoking and non-smoking areas as the former executive act failed to clearly define "public places" subject to prohibition of

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smoking.

Anger et al. (2011) proposed that public smoking bans are quite effective in addressing individual behavior of smokers on short term; in addition, Sari (2013) found out that a comprehensive ban would decrease smoking by 4.6% immediately.

Reduced cigarette consumption is not the sole benefit derived from escalating excise taxes; additional revenue has also been generated as the tax rates change (Nargis et al, 2013; Lee et al, 2005; Linegar & van Walbeek, 2017). The Department of Health detailed in their annual report CY 2015 that the ballooning budget is accounted to the Sin Tax.

The World Bank and the World Health Organization encourage nations to raise taxes on sinful goods (Chaloupka, 2013; Zhang et al., 2006). It is considered to be a more feasible approach in reducing unfavorable impacts on health. Most high-income countries tax tobacco and alcohol, not only to reduce prevalence, frequency, and intensity of these products, but also to generate substantial health care cost savings over the short and medium term and revenue for the government (Chaloupka, 2013; Achadi et al., 2005; Gallus & La Vecchia, 2012; Lee, 2008; Contreary et al., 2015). These revenues are expected to exceed any longevity-related increase in health care or pension costs (Contreary et al., 2015). This was also emphasized in the study of Ahmad and Franz (2008) which suggested that raising taxes on cigarettes results to smoking prevalence depletion, further revenue generation, and medical care cost reduction.

Taxing tobacco products can be commonly perceived as beneficial for the health and welfare, but detrimental on tobacco manufacturers' perspective, in terms of maximizing their profits. On one hand, these excise taxes are expected to reduce cigarette consumption in the Philippines and increase the revenues of the government and the Department of Health, and improve social health and welfare; while on the other hand, reduce the profit of tobacco manufacturers as constraint in achieving the entire potential market due to the expected lower cigarette consumption resulting to a drop in sales revenue.

Researching on the impact of Sin Tax Law is timely, and of interest by the economic units in the society, in preparation for the proposed conversion to federalism by the current administration.

Price elasticity of demand, the degree of responsiveness or sensitivity of consumers in price changes, is measured in this study. Using secondary data, this research aims to measure the sensitivity of cigarette consumers to a cigarette price increase as a result of the Sin Tax Law. This paper utilizes cigarette prices and quantities of various brands data,

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distributed per region, and analyses according to respective price category: high-priced/premium brand, medium-priced, low-priced, and discounted/super low-priced brands. Most existing stochastic empirical elasticity studies, in the context of developing economies, are primarily based on aggregate demand analysis and are, therefore, constrained with the lack of periodic price variations. This study is beneficial to policy makers as a basis for future policies, and to tobacco producers in pursuing their best interest.

2. Review of Related Literature

In general, the undesirable effects of smoking encourage government to develop tobacco control policies. Advertising bans and excise taxes however, are always discussed controversially as they may have various consequences affecting people's health and welfare in various ways; as these may have countervailing effects to people, smokers and non-smokers (Odermatt & Stutzer, 2015). State-initiated tobacco programs remain relatively unexplored, since most researches are concentrated on a particular locality (Rhoads, 2012).

Excising taxes that are levied on these products is on way of increasing prices of tobacco; Chaloupka, Yurekli & Fong (2012) stated that improvement in public health manifests due to substantial tax surge.

Tobacco taxes and prices affect the people's decision to smoke (Clemmensen, 2012; Chen and Xing, 2011; Lillard et al., 2013; Chaloupka, 2013; Zhang et al., 2006); this was also emphasized in the study of Chen and Xing (2011) which found that cigarette price is an important aspect and determinant of smoking.

A significant amount of studies also mentioned that taxing tobacco are also expected to increase workplace productivity and social consequences of alcohol drinking such as crimes, violence and road accidents (Chaloupka, 2013; Achadi et al.; Gallus & La Vecchia, 2012; Lee, 2008; Contreary et al., 2015). Many studies measured the effectiveness of tobacco taxes, and mostly determined the ability of tax-induced cigarette price increases to reduce consumption through the price elasticity of cigarettes (Lee, 2008). As much as several studies show a negative effect of cigarette taxes to youth consumption of tobacco, DeCicca et al. (2002), as cited in the study of Carpenter & Cook (2008), found out that youth smoking initiation is statistically unrelated to cigarette taxes. This is similar to the findings of Farrelly et al. (2014) who found out that increases in funding for state tobacco control programs are associated with decreases in current and established smoking, but found no association with past year initiation.

Taxing tobacco has seen to be an effective and important part of tobacco control in intensifying cessation (Mackay, Ritthiphadkee & Reddy 2013; Hyland et al., 2006;

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Chaloupka, Straif, & Leon, 2010; Alamar & Glantz, 2006; Tauras, 2004); to preserve its effectiveness, excise taxes must adjust to annual inflation rate (Hu et al, 2009; Szilágyi, 2007). Moreover, effectiveness of excise tax in reducing consumption is heavily dependent on its influence to retail price (Linegar & van Walbeek, 2017). Increase in prices would result to reduction in purchase by current smokers (Farrelly, Loomis & Mann, 2007; Lee et al., 2005). However, according to Azagba and Sharaf (2011), impact of higher excise taxes varies on different group of smokers.

Brouwer et al. (2007) defined total price elasticity as the sum of reduced smoking that resulted from decline in smoking prevalence and effects on tobacco consumption of continued smokers; in their study, great reduction in the number of smokers was observed in the first year of raising excise tax. Linegar and van Walbeek (2017) examined the smokers' purchasing behaviour, and discovered that people are more responsive to retail price and do not put in consideration the excise tax. The research of Nargis et al. (2013) on smoking prevalence and intensity in Bangladesh measured the negative price elasticity between price increase and cigarette consumption.

The official cigarette sales are widely used to indicate consumption levels, but this is also problematic most especially in developing countries, because the figures can be underestimated since smuggled tobacco products are not taken into account (Bishop et al., 2007). Several authors of elasticity studies adopted micro-level data in measuring sensitivity of buyers in developing countries.

Existing studies suggest that teenagers, young adults, and individuals of low socioeconomic status are more responsive to changes in cigarette prices (Chen et al., 2013; Britton & Bogdanovica, 2013); Brouwer et al. (2007) observed that cessation rates boosted; reflecting smokers' response to price change.

Empirical studies who emphasized on price elasticities usually estimated coefficients using OLS regression (Clemmensen, 2012). DeCicca et al. (2008) show that past decisions regarding smoking initiation and cessation are reflected by smoking participation, the price elasticity of smoking participation is a weighted average of corresponding initiation and cessation elasticities.

Tarantilis & Athanasakis (2013) used Weighted Average Price as a proxy for cigarette price in estimating the price elasticity of cigarettes in Greece. On the other hand, Bishop et al. (2007) calculated price by dividing the household expenditures on cigarettes by the total number of packs (one pack consists of 20 cigarette sticks) consumed in a household. According to Bishop, measuring price this way is more reliable since purchase of cigarettes from the wholesalers with significantly lower prices is ignored.

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Mamun (2012) identified that lobby groups' reaction and government considerations impact federal cigarette tax effects; which, consequently, address well-being of society. Gospodinov and Irvine (2009) specified that the findings on different provinces vary depending on federal excise taxes. In the study of Huang, Chaloupka & Fong (2014), weighted average by location and population are assumed to be the Canadian federal tax rate in capturing the impact of taxes. However, Licht et al. (2011) have seen high federal taxes as means in scaling down price gap between premium and discounted brands. Pesko, Licht and Kruger (2013) suggested that price reduction strategies are being applied in response to federal and state tax increases.

3. Research Methodology

The study has estimated the impact of a change in the price of cigarettes, as a result of the Sin Tax Law, on consumption of the following categories: 1) high-priced cigarettes, 2) medium-priced cigarettes, and 3) low-priced cigarettes, and 4) super low or discounted. This study utilized data coming from Euromonitor, such as monthly price and volume of cigarettes before and after sin tax implementation. Panel regression analysis was used to measure the impact of the result of Sin Tax by estimating the relationship of the cigarette price increase to smoking prevalence; fixed effect model was used over random effect model as the impact of the variable, price elasticity of demand for cigarettes, varies over time.

It was preferable to use fixed effect model as there is an assumption that price, the predictor variable, is correlated with cigarette brand's error. The utilization of fixed effect model is further explained in the regression interpretation and analysis as supported by Redundant Fixed Effects Tests, which is consistent on all models.

To estimate the relationship of the cigarette price change brought by Sin Tax Law to smoking prevalence, equation 1 is provided below:

$$\ln(Q_{ijg}) = \beta_0 + \beta_1 \ln(Pijg) + e \qquad \text{eq. 1}$$

Equation 1 estimates the relationship of cigarette price change as a result of Sin Tax Law to regional smoking prevalence in the Philippines, wherein Q*ijg* is the cigarette consumption as measured by the volume of *i* category (high, medium, low, or discounted price) of cigarettes in region *j* at the time *g*, *Pijg* is the price of *i* category (high, medium, low, or discounted price) of cigarettes in region *j* at the time *g*. This model was applied in the following regions: Greater Manila Area (GMA), Northern Luzon (NLUZ), Central

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Luzon (CLUZ), Southern Tagalog (STAG), Bicol (BIC), Western Visayas (WEVIS), Central Visayas (CEVIS), Northern Mindanao (NMIN), and Southern Mindanao (SMIN).

The coefficient estimated in the software Eviews 9, denoted by β_1, is the price elasticity cigarettes, which can be interpreted as elastic or inelastic depending on its value. The data of the monthly cigarette consumption as measured by the cigarette volume per region were collected and are expected to change whenever price changes. This measures the price elasticity of cigarette demand.

Before the regression analysis, a series of battery tests was used to ensure the integrity of the data set and stability of the model. The normality test was used to determine if the data set is normally distributed and to ensure that the data set is not biased and can be used for analysis. Stationarity test and serial correlation test were used to support the assumption that the data in the time series has the property that the mean, variance, and autocorrelation structures do not change over time. The test for heteroskedasticity was used to check the variability of the variable is unequal across the range of values in the data set. The breakpoint test was used to test the structural stability of the data in case there are differences in the definition or data collection in the variables. The specification test was used to determine if the model is correctly specified.

For panel regression analysis, a series of tests was conducted to ensure the integrity of the data set and stability of the model. The normality test was used to determine if the data set is normally distributed, and to avoid bias in data that can be used for analysis. The actual, fitted, residual graph was used as an alternative to test for heteroskedasticity which checks the variability of the variable is unequal across the range of values in the data set.

The integrity of the data was tested using the methods mentioned; interpolation was used in case of missing data points.

The researcher likewise attempted to use Random Effect Model and Seemingly Unrelated Regression (SUR) Model in order to differentiate other models' result from the ones generated through Fixed Effect Model. Random effect model was not used as the cigarette brand's error term and price is correlated, making this type of model inconsistent, as supported by the results of Hausman test. Seemingly Unrelated Regression (SUR) model is also a feasible model for estimating price elasticity of demand for cigarettes, but due to limited periods with respect to the number of cases, this model was not performed.

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4. Data Presentation and Analysis

Price Segmentation/ Region	HIGH	MEDUIM	LOW	SUPER LOW/ DISCOUNTED	Price Elasticity Per Region Across Price Segments
GMA	-2.41693	-0.87511	-1.866	-1.211688	-1.831538667
NL	-1.23826	-1.13484	-0.4313	-1.431136	-1.334697
CL	-0.71761	0.750351	-1.15326	-0.774904	-0.4738555
STAG	-0.86264	-1.45796	-0.05867	-0.640033	-0.986879667
BICOL	-1.93164	-1.73681	-0.97543	-1.490471	-1.465848333
WESVIS	-0.01235	0.86957	-0.22304	-0.457211	-0.457211
CEVIS	0.036233	-0.84228	-0.62984	-0.745315	-0.687576
NMIN	-0.09497	0.410431	-0.75699	-0.806686	-0.7818395
SMIN	-0.96271	0.037121	-0.58764	-0.476647	-0.675663333
Price Elasticity Per Region Across Price Segments	-1.63738	-0.81481	-0.99486	-0.892676778	-1.002679688

Table 1 Summarized Price Elasticity of Demand for Cigarette by Price Segmentations and By Regions
*Figures are based on Fixed Effect (FE) panel regression runs conducted that are shown in appendix I.
** Highlighted cells are insignificant at 5% alpha/significance level.

Price Segmentation/Region	HIGH	MEDUIM	LOW	SUPER LOW/ DISCOUNTED
GMA	0.0000	0.1107	0.0009	0.0000
NL	0.0000	0.0717	0.0967	0.0000
CL	0.0465	0.0188	0.0002	0.0000
STAG	0.0123	0.0202	0.8395	0.0000
BICOL	0.0000	0.0311	0.0000	0.0000

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WESVIS	0.9559	0.086	0.0605	0.0001
CEVIS	0.8409	0.073	0.0001	0.0000
NMIN	0.7353	0.4917	0.0000	0.0000
SMIN	0.0001	0.9445	0.0024	0.0000

Table 2 T-statistic probability for each Price Elasticity of Demand
*** Figures are based on Fixed Effect (FE) panel regression runs conducted that are shown in appendix I.

5. Interpretation

5.1.1 HIGH-PRICED/PREMIUM CIGARETTES

Based on the fixed effect panel regression results, the price elasticity of demand of high priced/premium cigarettes per region are -2.41693 for Greater Manila Area (GMA), -1.23826 for North Luzon (NL), -0.71761 for Central Luzon (CL), -0.86264 for Southern Tagalog (STAG), -1.93164 for BIC, -0.01235 for Western Visayas (WESVIS), 0.036233 for Central Visayas (CEVIS), -0.09497 for Northern Mindanao (NMIN), -0.96271 for Southern Mindanao (SMIN). WESVIS, CEVIS, and NMIN are insignificant at 5% alpha.

The price elasticity of demand of high priced/premium cigarettes in GMA, NL, and BIC are relatively elastic; CL, STAG, and SMIN are relatively inelastic.

For GMA, the demand for high/premium cigarettes would decrease by *2.41693 percent* for every one percentage increase in the price for high/premium cigarettes. For NL, the demand for high/premium cigarettes would decrease by *1.23826 percent* for every one percentage increase in the price for high/premium cigarettes. For BIC, the demand for high/premium cigarettes would decrease by *1.93164 percent* for every one percentage increase in the price for high/premium cigarettes. The effect of change in price on the 3 mentioned regions are relatively elastic which could mean that high priced/premium cigarette consumption in the regions are affected by the price change due to the Sin Tax. It can also imply that the smokers will now reduce their consumption of these types of brands due to the sin tax being levied.

The main goal of the sin tax which is to reduce consumption and to prevent new smokers is effective in the regions mentioned. It implies that the government are taxing these types of brands heavily in the regions mentioned as they are prevented from

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consumption of the good and as the degree of elasticities indicate, especially in GMA where it is highest. The optimal tax for the good is reached as the goal of the tax is to reduce consumption, and not only to generate revenue. However, if the case was to also maximize government revenue, it should be, in theory, close to or at unit elastic which at that point, we can tell that the tax is optimal for the region. The same interpretation goes with other price elasticities of demand that exhibits inelastic behavior.

For CL, the demand for high/premium cigarettes would decrease by *0.71761 percent* for every one percentage increase in the price for high/premium cigarettes. For STAG, the demand for high/premium cigarettes would decrease by *0.86264 percent* for every one percentage increase in the price for high/premium cigarettes. For SMIN, the demand for high/premium cigarettes would decrease by *0.96271 percent* for every one percentage increase in the price for high/premium cigarettes. The effect of change in price on the 3 mentioned regions are relatively inelastic which could mean that high priced/premium cigarette consumption in the regions are not much affected by price change due to the Sin Tax. It can also imply that the smokers will still consume these types of brands despite the tax being levied. Although there is a positive effect on government revenue generated through taxing the inelastic good, the main goal of the tax is to reduce consumption and to prevent new smokers. It implies that the government can further tax these types of brands in the regions mentioned to further reduce consumption of current smokers, and to reduce the likelihood for new smokers. The same interpretation goes with other price elasticities of demand that exhibits elastic behavior.

The average price elasticity of demand for high priced/premium cigarettes is -1.63738, being elastic and the highest of all the types. This implies that the government is taxing these types of brands heavily as a whole and the elastic behavior shown indicates that the government is successful as the consumers react in line with the goal of the Sin Tax.

5.1.2 MEDIUM-PRICED CIGARETTES

The price elasticity of demand of medium priced cigarettes per region are -0.87511 for Greater Manila Area (GMA), -1.13484 for North Luzon (NL), 0.750351 for Central Luzon (CL), -1.45796 for Southern Tagalog (STAG), -1.73681 for Bicol (BIC), 0.86957 for Western Visayas (WESVIS), -0.84228 for Central Visayas (CEVIS), 0.410431 for Northern Mindanao (NMIN), -0.037121 for Southern Mindanao (SMIN). GMA, NL, WESVIS, CEVIS, NMIN, and SMIN are insignificant at 5% alpha.

The price elasticity of demand of medium priced cigarettes in STAG, and BIC are

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relatively elastic; CL shows a very unique behavior of relatively inelastic but a positive relationship.

For STAG, the demand for medium priced cigarettes would decrease by *1.45796 percent* for every one percentage increase in the price for medium priced cigarettes. For BIC, the demand for medium priced cigarettes would decrease by *1.73681 percent* for every one percentage increase in the price for medium priced cigarettes. The effect of change in price on the 2 mentioned regions are relatively elastic which could mean that medium priced cigarette consumption in the regions are affected by the price change due to the Sin Tax.

For CL, the demand for medium priced cigarettes would increase by *0.750351 percent* for every one percentage increase in the price for medium priced cigarettes. The effect of change in price on in the aforementioned region is relatively inelastic but is positive which could mean that medium priced cigarettes consumption in the regions are not affected by price change due to the Sin Tax. Also, the effect of the higher price further increased consumption which, in theory, violates law of demand. The reason for this behavior in the region could not be specifically determined by the results generated alone and other variables, aside from price, could be the reason for such behavior.

The average price elasticity of demand for medium priced cigarettes is -0.81481, being inelastic and the lowest of all the types. This implies that the government have not yet reached the optimal tax for these types of brands as a whole, and the inelastic behavior shown indicates that the government can further tax the consumers so that it will reduce their consumption. However, it generates the most potential revenue, on the average, as it has the lowest elasticity among the types of cigarettes.

5.1.3 LOW-PRICED CIGARETTES

The price elasticity of demand of low priced cigarettes per region are -1.866 for Greater Manila Area (GMA), -0.4313 for North Luzon (NL), -1.15326 for Central Luzon (CL), -0.05867 for Southern Tagalog (STAG), -0.97543 for Bicol (BIC), -0.22304for Western Visayas (WESVIS), -0.62984 for Central Visayas (CEVIS), -0.75699 for Northern Mindanao (NMIN), -0.58764 for Southern Mindanao (SMIN). NL, STAG, WESVIS are insignificant at 5% alpha.

The price elasticity of demand of low priced cigarettes in GMA, and CL are relatively elastic; BIC, CEVIS, NMIN and SMIN are relatively inelastic.

For GMA, the demand for low priced cigarettes would decrease by *1.866 percent* for every one percentage increase in the price for low priced cigarettes. For CL, the

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demand for low priced cigarettes would decrease by *1.15326 percent* for every one percentage increase in the price for low priced cigarettes. The effect of change in price on the 2 mentioned regions are relatively elastic which could mean that low priced cigarettes cigarette consumption in the regions are affected by the price change due to the Sin Tax.

For BIC, the demand for low priced cigarettes would decrease by *0.97543 percent* for every one percentage increase in the price for low priced cigarettes. For CEVIS, the demand for low priced cigarettes would decrease by *0.62984 percent* for every one percentage increase in the price for low priced cigarettes. For NMIN, the demand for low priced cigarettes would decrease by *0.75699 percent* for every one percentage increase in the price for low priced cigarettes. For SMIN, the demand for low priced cigarettes would decrease by *0.58764 percent* for every one percentage increase in the price for low priced cigarettes. The effect of change in price on the 4 mentioned regions are relatively inelastic which could mean that low priced cigarette consumption in the regions are not much affected by price change due to the Sin Tax. It can also imply that the smokers will still consume these types of brands despite the tax being levied.

The average price elasticity of demand for low priced cigarettes is -0.99486, being inelastic and fairly close to unit elastic if we round it up. This implies that the government is close in reaching the optimal tax for these types of brands as a whole and the inelastic behavior shown indicates that the government can further tax the consumers so that it will reduce their consumption. The optimal tax for these types of cigarettes is the closest of all the types if we include maximizing government revenue to the goal of Sin Tax.

5.1.4 LOWEST PRICED/DISCOUNTED CIGARETTES

The price elasticity of demand of super low priced/discounted cigarettes per region are -1.211688 for Greater Manila Area (GMA), -1.431136 for North Luzon (NL), -0.774904 for Central Luzon (CL), -0.640033 for Southern Tagalog (STAG), -1.490471 for Bicol (BIC), -0.457211 for Western Visayas (WESVIS), -0.745315 for Central Visayas (CEVIS), -0.806686 for Northern Mindanao (NMIN), -0.476647 for Southern Mindanao (SMIN). For all the regions, the price elasticity of demand of super low priced/discounted cigarettes is significant at 1% alpha.

The price elasticity of demand of super low priced/discounted cigarettes in in GMA, NL, and BIC are relatively elastic; CL, STAG, WESVIS, CEVIS, NMIN, and SMIN are relatively inelastic.

For GMA, the demand for super low priced/discounted cigarettes would decrease by *1.211688 percent* for every one percentage increase in the price for super low

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priced/discounted cigarettes. For NL, the demand for super low priced/discounted cigarettes would decrease by *1.431136 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. For BIC, the demand for super low priced/discounted cigarettes would decrease by *1.490471 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. The effect of change in price on the 3 mentioned regions are relatively elastic which could mean that super low priced/discounted cigarette consumption in the regions are affected by the price change due to the Sin Tax.

For CL, the demand for super low priced/discounted cigarettes would decrease by *0.774904 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. For STAG, the demand for super low priced/discounted cigarettes would decrease by *0.640033 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. For WESVIS, the demand for super low priced/discounted cigarettes would decrease by *0.457211 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. For CEVIS, the demand for super low priced/discounted cigarettes would decrease by *0.745315 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. For NMIN, the demand for super low priced/discounted cigarettes would decrease by *0.806686 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. For SMIN, the demand for super low priced/discounted cigarettes would decrease by *0.476647 percent* for every one percentage increase in the price for super low priced/discounted cigarettes. The effect of change in price on the 6 mentioned regions are relatively inelastic which could mean that super low priced/discounted cigarette consumption in the regions are not much affected by price change due to the Sin Tax. It can also imply that the smokers will still consume these types of brands despite the tax being levied.

The average price elasticity of demand for super low priced/discounted cigarettes is -0.892676778, being inelastic and second to medium priced as lowest. This implies that the government have not yet reached the optimal tax for these types of brands as a whole and the inelastic behavior shown indicates that the government can further tax the consumers so that it will reduce their consumption.

5.2.1 Average Price Elasticity of Demand per Region

The average price elasticity of demand of cigarettes per region are -1.831538667 for Greater Manila Area (GMA), -1.334697 for North Luzon (NL), -0.4738555 for Central

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Luzon (CL), -0.986879667 for Southern Tagalog (STAG), -1.465848333 for Bicol (BIC), -0.457211 for Western Visayas (WESVIS), -0.687576 for Central Visayas (CEVIS), -0.7818395 for Northern Mindanao (NMIN), -0.675663333 for Southern Mindanao (SMIN) at 5% alpha.

The average price elasticity of demand of cigarettes per region in GMA, NL, and BIC are relatively elastic; CL, STAG, WESVIS, CEVIS, NMIN, and SMIN are relatively inelastic. It can be observed that the same set of behavior is seen in super low priced/discounted cigarettes, but the figures still differ.

For GMA, the average demand for cigarettes would decrease by *1.831538667 percent* for every one percentage increase in the average price for cigarettes. For NL, the average demand for cigarettes would decrease by *1.334697 percent* for every one percentage increase in the average price for cigarettes. For BIC, the average demand for cigarettes would decrease by *1.465848333 percent* for every one percentage increase in the average price for cigarettes. The effect of change in price on the 3 mentioned regions are relatively elastic which could mean that average cigarette consumption in the regions are affected by the average price change due to the Sin Tax.

For CL, the average demand for cigarettes would decrease by *0.4738555 percent* for every one percentage increase in the average price for cigarettes. For STAG, the average demand for cigarettes would decrease by *0.986879667 percent* for every one percentage increase in the average price for cigarettes. For WESVIS, the average demand for cigarettes would decrease by *0.457211 percent* for every one percentage increase in the average price for cigarettes. For CEVIS, the average demand for cigarettes would decrease by *0.687576 percent* for every one percentage increase in the average price for cigarettes. For NMIN the average demand for cigarettes would decrease by *0.7818395 percent* for every one percentage increase in the average price for cigarettes. For SMIN, the average demand for cigarettes would decrease by *0.675663333 percent* for every one percentage increase in the average price for cigarettes. The effect of change in price on the 6 mentioned regions are relatively inelastic which could mean that average cigarette consumption in the regions are not much affected by average price change due to the Sin Tax. It can also imply that the smokers will still consume, on the average, cigarettes despite the tax being levied.

The average price elasticity of demand for cigarettes is -1.002679688. It is relatively elastic but if we round it down, it is unit elastic. This implies that the government have reached the optimal tax at the national level on the average, and the elastic behavior shown indicates that the government is successful as the consumers react in line with the

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goal of the Sin Tax. Again, if we round down the average price elasticity of demand for cigarettes, we can say that the optimal tax is reached in such a way that maximizing revenue is also part of the goal of Sin Tax.

6. Conclusion and Recommendation

The Sin Tax Law is seen to be performing well and effective especially in some regions and brand types. The optimal tax is reached on the average, as the government created the policy regardless of region. However, with the results shown in the paper, it can be observed that despite the optimal tax for Sin Tax is reached, if it it's effect by region will be further seen and examined, it still underperforms and is yet to be effective.

The policy recommendation is to have a regional Sin tax. Elasticities, or consumers' response to price change, vary per region. Likewise, the reaction of different consumers according to price categories differs, or Sin Tax by brand/price segment. The findings in this study can be useful in crafting specific regional policies such as taxation of manufactured cigarettes. Having a modified tax according to region, adapted to either by location, by price segment, or both, will result to a more regulated taxing schedule, anchored to the behavior of consumers.

Similarly, this will attend to the increasing tobacco consumption concerns, by the threat of price increase, due to tax—above the actual cost, to new smokers; and hoping to pop the ballooning smoking prevalence. With tailored taxing policy, current smokers would be induced to cease, while new smokers will be prevented.

As seen in the behavior of price elasticity of medium priced cigarette in Central Luzon, it is highly recommended that future research should also take into account other elasticities, aside from price elasticity, to further observe which really affect the consumption of cigarettes and reshape the policy on Sin Tax based on its findings. Another recommendation for future studies is to include the future data to be generated under the Sin Tax Law as more periods are needed in order to utilize models like SUR model, etc., for analysis of the impact of price to cigarette consumption.

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APPENDIX

I. High/Premium Price Cigarettes Regression Runs per Region

a. GMA

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:39

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 9

Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.21945	0.402210	32.86701	0.0000
LOG(PRICE)	-2.416926	0.328386	-7.360008	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.958498	Mean dependent var	10.26120
Adjusted R-squared	0.956831	S.D. dependent var	1.094223
S.E. of regression	0.227349	Akaike info criterion	-0.082867
Sum squared resid	11.57800	Schwarz criterion	0.064796
Log likelihood	19.69543	Hannan-Quinn criter.	-0.023329
F-statistic	574.8190	Durbin-Watson stat	0.388999
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Cross-section F	341.084977	(8,224)	0.0000
Cross-section Chi-square	603.444441	8	0.0000

b. NL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:36

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 9

Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.33031	0.317889	32.49658	0.0000
LOG(PRICE)	-1.238258	0.257861	-4.802044	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.931144	Mean dependent var	8.805957
Adjusted R-squared	0.928378	S.D. dependent var	0.967323
S.E. of regression	0.258878	Akaike info criterion	0.176878
Sum squared resid	15.01203	Schwarz criterion	0.324541
Log likelihood	-10.69473	Hannan-Quinn criter.	0.236416
F-statistic	336.5749	Durbin-Watson stat	0.585082
Prob(F-statistic)	0.000000		

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Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	341.084977	(8,224)	0.0000
Cross-section Chi-square	603.444441	8	0.0000

c. CL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:45

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 7

Total panel (balanced) observations: 182

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.78987	0.431517	25.00451	0.0000
LOG(PRICE)	-0.717614	0.357833	-2.005446	0.0465

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.934290	Mean dependent var	9.925148
Adjusted R-squared	0.931646	S.D. dependent var	0.869407
S.E. of regression	0.227303	Akaike info criterion	-0.082108
Sum squared resid	8.989974	Schwarz criterion	0.058728
Log likelihood	15.47179	Hannan-Quinn criter.	-0.025015
F-statistic	353.4266	Durbin-Watson stat	0.361097
Prob(F-statistic)	0.000000		

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Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	295.234545	(6,174)	0.0000
Cross-section Chi-square	439.379182	6	0.0000

d. STAG

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:46

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 9

Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.14910	0.424890	26.23999	0.0000
LOG(PRICE)	-0.862644	0.341620	-2.525156	0.0123

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.921638	Mean dependent var	10.07748
Adjusted R-squared	0.918489	S.D. dependent var	1.115514
S.E. of regression	0.318480	Akaike info criterion	0.591280
Sum squared resid	22.72020	Schwarz criterion	0.738944
Log likelihood	-59.17979	Hannan-Quinn criter.	0.650818

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F-statistic	292.7250	Durbin-Watson stat	0.196511
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	304.699522	(8,224)	0.0000
Cross-section Chi-square	579.158246	8	0.0000

e. BICOL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:51

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 9

Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.33950	0.495296	20.87539	0.0000
LOG(PRICE)	-1.931641	0.405380	-4.765019	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.867789	Mean dependent var	7.981530
Adjusted R-squared	0.862477	S.D. dependent var	0.867430

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S.E. of regression	0.321678	Akaike info criterion	0.611263
Sum squared resid	23.17877	Schwarz criterion	0.758926
Log likelihood	-61.51775	Hannan-Quinn criter.	0.670801
F-statistic	163.3630	Durbin-Watson stat	0.552867
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	129.944041	(8,224)	0.0000
Cross-section Chi-square	404.828491	8	0.0000

f. WESVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:53

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 7

Total panel (balanced) observations: 182

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.194198	0.273077	30.00695	0.0000
LOG(PRICE)	-0.012349	0.222828	-0.055418	0.9559

Effects Specification

Cross-section fixed (dummy variables)

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R-squared	0.957797	Mean dependent var	8.179099
Adjusted R-squared	0.956099	S.D. dependent var	1.183949
S.E. of regression	0.248068	Akaike info criterion	0.092733
Sum squared resid	10.70756	Schwarz criterion	0.233568
Log likelihood	-0.438692	Hannan-Quinn criter.	0.149826
F-statistic	564.1293	Durbin-Watson stat	0.467520
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	548.323120	(6,174)	0.0000
Cross-section Chi-square	544.381343	6	0.0000

g. CEVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:57

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 6

Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.082899	0.223946	36.09308	0.0000
LOG(PRICE)	0.036233	0.180176	0.201100	0.8409

Effects Specification

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Cross-section fixed (dummy variables)

R-squared	0.976434	Mean dependent var	8.127822
Adjusted R-squared	0.975485	S.D. dependent var	1.260192
S.E. of regression	0.197311	Akaike info criterion	-0.364241
Sum squared resid	5.800790	Schwarz criterion	-0.227389
Log likelihood	35.41081	Hannan-Quinn criter.	-0.308658
F-statistic	1028.953	Durbin-Watson stat	0.760757
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1233.453472	(5,149)	0.0000
Cross-section Chi-square	584.522234	5	0.0000

h. NMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 19:59

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 10

Total panel (balanced) observations: 260

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.961852	0.333618	23.86520	0.0000
LOG(PRICE)	-0.094972	0.280610	-0.338450	0.7353

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Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.911557	Mean dependent var	7.849122
Adjusted R-squared	0.908005	S.D. dependent var	1.010055
S.E. of regression	0.306357	Akaike info criterion	0.513253
Sum squared resid	23.36974	Schwarz criterion	0.663897
Log likelihood	-55.72286	Hannan-Quinn criter.	0.573814
F-statistic	256.6367	Durbin-Watson stat	0.770720
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	280.256470	(9,249)	0.0000
Cross-section Chi-square	626.501688	9	0.0000

i. SMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:01

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 9

Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.

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C	9.958646	0.294177	33.85258	0.0000
LOG(PRICE)	-0.962705	0.243659	-3.951040	0.0001

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.934666	Mean dependent var	8.798282
Adjusted R-squared	0.932041	S.D. dependent var	0.997150
S.E. of regression	0.259947	Akaike info criterion	0.185114
Sum squared resid	15.13618	Schwarz criterion	0.332777
Log likelihood	-11.65832	Hannan-Quinn criter.	0.244652
F-statistic	356.0592	Durbin-Watson stat	0.834898
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	391.511641	(8,224)	0.0000
Cross-section Chi-square	633.411503	8	0.0000

II. Medium Price Cigarettes Regression Runs per Region

a. GMA

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:04

Sample: 2014M01 2016M02

Periods included: 26

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Cross-sections included: 4

Total panel (balanced) observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.55442	0.530355	19.90065	0.0000
LOG(PRICE)	-0.875106	0.543667	-1.609637	0.1107

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.964189	Mean dependent var	9.701181
Adjusted R-squared	0.962742	S.D. dependent var	0.902532
S.E. of regression	0.174209	Akaike info criterion	-0.610234
Sum squared resid	3.004545	Schwarz criterion	-0.483100
Log likelihood	36.73216	Hannan-Quinn criter.	-0.558728
F-statistic	666.3790	Durbin-Watson stat	0.376613
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	879.624700	(3,99)	0.0000
Cross-section Chi-square	345.260986	3	0.0000

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b. NL

Dependent Variable: LOG(QUANTITY)
Method: Panel Least Squares
Date: 01/16/15 Time: 20:05
Sample: 2014M01 2016M02
Periods included: 26
Cross-sections included: 2
Total panel (balanced) observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.244942	0.587264	15.74240	0.0000
LOG(PRICE)	-1.134839	0.616486	-1.840818	0.0717

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.931387	Mean dependent var	8.165564
Adjusted R-squared	0.928586	S.D. dependent var	0.879964
S.E. of regression	0.235156	Akaike info criterion	-0.001178
Sum squared resid	2.709609	Schwarz criterion	0.111394
Log likelihood	3.030624	Hannan-Quinn criter.	0.041980
F-statistic	332.5753	Durbin-Watson stat	0.881863
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	591.790602	(1,49)	0.0000
Cross-section Chi-square	133.685886	1	0.0000

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c. CL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:06

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 2

Total panel (balanced) observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.941346	0.286016	27.76534	0.0000
LOG(PRICE)	0.750351	0.308878	2.429282	0.0188

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.913523	Mean dependent var	8.633248
Adjusted R-squared	0.909994	S.D. dependent var	0.628853
S.E. of regression	0.188663	Akaike info criterion	-0.441751
Sum squared resid	1.744086	Schwarz criterion	-0.329180
Log likelihood	14.48554	Hannan-Quinn criter.	-0.398594
F-statistic	258.8130	Durbin-Watson stat	1.183346
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	453.698641	(1,49)	0.0000

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Cross-section Chi-square	121.064870	1	0.0000

d. STAG

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:08

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 4

Total panel (balanced) observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.969838	0.572109	17.42647	0.0000
LOG(PRICE)	-1.457962	0.617809	-2.359890	0.0202

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.861893	Mean dependent var	8.621748
Adjusted R-squared	0.856313	S.D. dependent var	0.842614
S.E. of regression	0.319402	Akaike info criterion	0.602152
Sum squared resid	10.09976	Schwarz criterion	0.729286
Log likelihood	-26.31190	Hannan-Quinn criter.	0.653658
F-statistic	154.4585	Durbin-Watson stat	0.344522
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

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Effects Test	Statistic	d.f.	Prob.
Cross-section F	154.412196	(3,99)	0.0000
Cross-section Chi-square	180.627500	3	0.0000

e. BICOL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:09

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.788368	0.778317	12.57632	0.0000
LOG(PRICE)	-1.736813	0.790274	-2.197736	0.0311

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.901963	Mean dependent var	8.080549
Adjusted R-squared	0.897988	S.D. dependent var	1.212385
S.E. of regression	0.387227	Akaike info criterion	0.990307
Sum squared resid	11.09589	Schwarz criterion	1.111164
Log likelihood	-34.62199	Hannan-Quinn criter.	1.038689
F-statistic	226.9387	Durbin-Watson stat	0.481871
Prob(F-statistic)	0.000000		

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Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	327.867194	(2,74)	0.0000
Cross-section Chi-square	178.512011	2	0.0000

f. WESVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:10

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.165954	0.465347	15.39916	0.0000
LOG(PRICE)	0.869570	0.499665	1.740304	0.0860

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.945357	Mean dependent var	7.974234
Adjusted R-squared	0.943142	S.D. dependent var	1.070933
S.E. of regression	0.255364	Akaike info criterion	0.157666
Sum squared resid	4.825594	Schwarz criterion	0.278523
Log likelihood	-2.148977	Hannan-Quinn criter.	0.206047
F-statistic	426.7476	Durbin-Watson stat	0.985136
Prob(F-statistic)	0.000000		

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Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	632.228453	(2,74)	0.0000
Cross-section Chi-square	225.826191	2	0.0000

g. CEVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:11

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.14565	0.447105	22.69187	0.0000
LOG(PRICE)	-0.842279	0.463069	-1.818906	0.0730

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.979254	Mean dependent var	9.333949
Adjusted R-squared	0.978413	S.D. dependent var	1.655398
S.E. of regression	0.243222	Akaike info criterion	0.060237
Sum squared resid	4.377618	Schwarz criterion	0.181094
Log likelihood	1.650757	Hannan-Quinn criter.	0.108618

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F-statistic	1164.296	Durbin-Watson stat	0.571053
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1746.181400	(2,74)	0.0000
Cross-section Chi-square	302.268442	2	0.0000

h. NMIN

Dependent Variable: LOG(QUANTITY)
Method: Panel Least Squares
Date: 01/16/15 Time: 20:14
Sample: 2014M01 2016M02
Periods included: 26
Cross-sections included: 4
Total panel (balanced) observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.569472	0.570995	15.00796	0.0000
LOG(PRICE)	0.410431	0.594614	0.690248	0.4917

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.932108	Mean dependent var	8.963178
Adjusted R-squared	0.929364	S.D. dependent var	1.014127
S.E. of regression	0.269528	Akaike info criterion	0.262596
Sum squared resid	7.191901	Schwarz criterion	0.389730

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Log likelihood	-8.654969	Hannan-Quinn criter.	0.314101
F-statistic	339.7969	Durbin-Watson stat	0.957803
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	405.429791	(3,99)	0.0000
Cross-section Chi-square	269.015981	3	0.0000

i. SMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:14

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 2

Total panel (balanced) observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.204452	0.491147	16.70469	0.0000
LOG(PRICE)	0.037121	0.530660	0.069952	0.9445

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.304102	Mean dependent var	8.238754

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Adjusted R-squared	0.275698	S.D. dependent var	0.235044
S.E. of regression	0.200036	Akaike info criterion	-0.324678
Sum squared resid	1.960706	Schwarz criterion	-0.212106
Log likelihood	11.44162	Hannan-Quinn criter.	-0.281520
F-statistic	10.70632	Durbin-Watson stat	1.169894
Prob(F-statistic)	0.000139		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	19.528856	(1,49)	0.0001
Cross-section Chi-square	17.442600	1	0.0000

III. Low Price Cigarettes Regression Runs per Region

a. GMA

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:15

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.57723	0.402501	26.27880	0.0000
LOG(PRICE)	-1.866002	0.541244	-3.447621	0.0009

Effects Specification

Cross-section fixed (dummy variables)

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

R-squared	0.967862	Mean dependent var	9.198275
Adjusted R-squared	0.966559	S.D. dependent var	2.174563
S.E. of regression	0.397660	Akaike info criterion	1.043483
Sum squared resid	11.70190	Schwarz criterion	1.164340
Log likelihood	-36.69584	Hannan-Quinn criter.	1.091864
F-statistic	742.8522	Durbin-Watson stat	0.602211
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1096.584514	(2,74)	0.0000
Cross-section Chi-square	266.933325	2	0.0000

b. NL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:17

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.26937	0.195953	57.51056	0.0000
LOG(PRICE)	-0.431304	0.256336	-1.682572	0.0967

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Effects Specification

Cross-section fixed (dummy variables)			
R-squared	0.691283	Mean dependent var	10.94297
Adjusted R-squared	0.678768	S.D. dependent var	0.431658
S.E. of regression	0.244652	Akaike info criterion	0.071962
Sum squared resid	4.429248	Schwarz criterion	0.192819
Log likelihood	1.193477	Hannan-Quinn criter.	0.120343
F-statistic	55.23403	Durbin-Watson stat	0.155434
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	81.790169	(2,74)	0.0000
Cross-section Chi-square	90.982378	2	0.0000

c. CL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:19

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.00471	0.215512	51.06322	0.0000
LOG(PRICE)	-1.153255	0.293711	-3.926500	0.0002

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.983687	Mean dependent var	10.16527
Adjusted R-squared	0.983026	S.D. dependent var	1.843621
S.E. of regression	0.240195	Akaike info criterion	0.035193
Sum squared resid	4.269346	Schwarz criterion	0.156050
Log likelihood	2.627473	Hannan-Quinn criter.	0.083574
F-statistic	1487.443	Durbin-Watson stat	0.852011
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1684.056135	(2,74)	0.0000
Cross-section Chi-square	299.502489	2	0.0000

d. STAG

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:20

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

C	11.13563	0.213943	52.04947	0.0000
LOG(PRICE)	-0.058670	0.288686	-0.203230	0.8395

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.961191	Mean dependent var	11.09255
Adjusted R-squared	0.959618	S.D. dependent var	1.267640
S.E. of regression	0.254737	Akaike info criterion	0.152749
Sum squared resid	4.801924	Schwarz criterion	0.273606
Log likelihood	-1.957212	Hannan-Quinn criter.	0.201130
F-statistic	610.9241	Durbin-Watson stat	0.540548
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	866.146070	(2,74)	0.0000
Cross-section Chi-square	249.207378	2	0.0000

e. BICOL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:21

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 2

Total panel (balanced) observations: 52

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.22259	0.069661	161.1021	0.0000
LOG(PRICE)	-0.975433	0.099202	-9.832751	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.824738	Mean dependent var	10.54615
Adjusted R-squared	0.817584	S.D. dependent var	0.184924
S.E. of regression	0.078981	Akaike info criterion	-2.183251
Sum squared resid	0.305664	Schwarz criterion	-2.070680
Log likelihood	59.76454	Hannan-Quinn criter.	-2.140094
F-statistic	115.2907	Durbin-Watson stat	1.254517
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	129.910333	(1,49)	0.0000
Cross-section Chi-square	67.343351	1	0.0000

f. WESVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:22

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.15467	0.081188	125.0763	0.0000
LOG(PRICE)	-0.223039	0.117026	-1.905902	0.0605

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.994963	Mean dependent var	10.00231
Adjusted R-squared	0.994759	S.D. dependent var	1.729285
S.E. of regression	0.125194	Akaike info criterion	-1.267979
Sum squared resid	1.159848	Schwarz criterion	-1.147122
Log likelihood	53.45117	Hannan-Quinn criter.	-1.219598
F-statistic	4872.371	Durbin-Watson stat	1.114840
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	6939.807683	(2,74)	0.0000
Cross-section Chi-square	408.675448	2	0.0000

g. CEVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:23

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 4

Total panel (balanced) observations: 104

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.37258	0.110036	94.26569	0.0000
LOG(PRICE)	-0.629837	0.153495	-4.103319	0.0001

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.976539	Mean dependent var	9.927649
Adjusted R-squared	0.975591	S.D. dependent var	1.221423
S.E. of regression	0.190828	Akaike info criterion	-0.428006
Sum squared resid	3.605116	Schwarz criterion	-0.300872
Log likelihood	27.25631	Hannan-Quinn criter.	-0.376500
F-statistic	1030.183	Durbin-Watson stat	0.882703
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1373.558137	(3,99)	0.0000
Cross-section Chi-square	390.248914	3	0.0000

h. NMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:23

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 5

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Total panel (balanced) observations: 130

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.94064	0.105778	103.4302	0.0000
LOG(PRICE)	-0.756993	0.150215	-5.039400	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.944285	Mean dependent var	10.41390
Adjusted R-squared	0.942038	S.D. dependent var	0.769228
S.E. of regression	0.185193	Akaike info criterion	-0.489779
Sum squared resid	4.252771	Schwarz criterion	-0.357431
Log likelihood	37.83564	Hannan-Quinn criter.	-0.436002
F-statistic	420.3225	Durbin-Watson stat	0.421898
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	524.396346	(4,124)	0.0000
Cross-section Chi-square	375.140323	4	0.0000

i. SMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:24

Sample: 2014M01 2016M02

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Periods included: 26

Cross-sections included: 4

Total panel (balanced) observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.68375	0.134772	86.69248	0.0000
LOG(PRICE)	-0.587638	0.188575	-3.116208	0.0024

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.918869	Mean dependent var	11.26747
Adjusted R-squared	0.915591	S.D. dependent var	0.626787
S.E. of regression	0.182102	Akaike info criterion	-0.521617
Sum squared resid	3.282951	Schwarz criterion	-0.394483
Log likelihood	32.12410	Hannan-Quinn criter.	-0.470111
F-statistic	280.3123	Durbin-Watson stat	0.383641
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	373.284804	(3,99)	0.0000
Cross-section Chi-square	261.096871	3	0.0000

IV. **Super Low/Discounted Price Cigarettes Regression Runs per Region**

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

a. GMA

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:31

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 5

Total panel (balanced) observations: 130

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.768215	0.133779	73.01778	0.0000
LOG(PRICE)	-1.211688	0.286950	-4.222643	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.882937	Mean dependent var	9.239335
Adjusted R-squared	0.878217	S.D. dependent var	1.535777
S.E. of regression	0.535946	Akaike info criterion	1.635490
Sum squared resid	35.61758	Schwarz criterion	1.767837
Log likelihood	-100.3068	Hannan-Quinn criter.	1.689267
F-statistic	187.0523	Durbin-Watson stat	0.163767
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	202.112371	(4,124)	0.0000
Cross-section Chi-square	262.279343	4	0.0000

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

b. NL

Dependent Variable: LOG(QUANTITY)
Method: Panel Least Squares
Date: 01/16/15 Time: 20:32
Sample: 2014M01 2016M02
Periods included: 26
Cross-sections included: 9
Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.34928	0.061513	168.2445	0.0000
LOG(PRICE)	-1.431136	0.107329	-13.33411	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.924077	Mean dependent var	9.562216
Adjusted R-squared	0.921027	S.D. dependent var	0.942462
S.E. of regression	0.264852	Akaike info criterion	0.222503
Sum squared resid	15.71282	Schwarz criterion	0.370166
Log likelihood	-16.03287	Hannan-Quinn criter.	0.282041
F-statistic	302.9306	Durbin-Watson stat	0.737049
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	334.052512	(8,224)	0.0000
Cross-section Chi-square	598.942832	8	0.0000

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

c. CL

Dependent Variable: LOG(QUANTITY)
Method: Panel Least Squares
Date: 01/16/15 Time: 20:33
Sample: 2014M01 2016M02
Periods included: 26
Cross-sections included: 6
Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.06467	0.073703	150.1242	0.0000
LOG(PRICE)	-0.774904	0.132512	-5.847801	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.893280	Mean dependent var	10.65169
Adjusted R-squared	0.888982	S.D. dependent var	0.790760
S.E. of regression	0.263476	Akaike info criterion	0.214125
Sum squared resid	10.34352	Schwarz criterion	0.350978
Log likelihood	-9.701777	Hannan-Quinn criter.	0.269709
F-statistic	207.8622	Durbin-Watson stat	0.231466
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Cross-section F	219.400350	(5,149)	0.0000
Cross-section Chi-square	331.304812	5	0.0000

d. STAG

Dependent Variable: LOG(QUANTITY)
Method: Panel Least Squares
Date: 01/16/15 Time: 20:34
Sample: 2014M01 2016M02
Periods included: 26
Cross-sections included: 7
Total panel (balanced) observations: 182

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.78459	0.058891	183.1265	0.0000
LOG(PRICE)	-0.640033	0.106983	-5.982556	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.940345	Mean dependent var	10.45092
Adjusted R-squared	0.937945	S.D. dependent var	1.023931
S.E. of regression	0.255069	Akaike info criterion	0.148398
Sum squared resid	11.32051	Schwarz criterion	0.289234
Log likelihood	-5.504243	Hannan-Quinn criter.	0.205491
F-statistic	391.8258	Durbin-Watson stat	0.265573
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Effects Test	Statistic	d.f.	Prob.
Cross-section F	426.416972	(6,174)	0.0000
Cross-section Chi-square	501.213002	6	0.0000

e. BICOL

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:35

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 7

Total panel (balanced) observations: 182

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.721595	0.059929	162.2192	0.0000
LOG(PRICE)	-1.490471	0.118854	-12.54037	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.930288	Mean dependent var	9.028645
Adjusted R-squared	0.927484	S.D. dependent var	1.162072
S.E. of regression	0.312932	Akaike info criterion	0.557300
Sum squared resid	17.03922	Schwarz criterion	0.698135
Log likelihood	-42.71430	Hannan-Quinn criter.	0.614393
F-statistic	331.7139	Durbin-Watson stat	0.409033
Prob(F-statistic)	0.000000		

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	374.846117	(6,174)	0.0000
Cross-section Chi-square	479.340330	6	0.0000

f. WESVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:36

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 9

Total panel (balanced) observations: 234

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.757847	0.059686	163.4854	0.0000
LOG(PRICE)	-0.457211	0.117433	-3.893371	0.0001

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.918294	Mean dependent var	9.538835
Adjusted R-squared	0.915011	S.D. dependent var	1.046952
S.E. of regression	0.305217	Akaike info criterion	0.506206
Sum squared resid	20.86722	Schwarz criterion	0.653869
Log likelihood	-49.22605	Hannan-Quinn criter.	0.565743

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

F-statistic	279.7253	Durbin-Watson stat	0.278857
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	311.192617	(8,224)	0.0000
Cross-section Chi-square	583.681089	8	0.0000

g. CEVIS

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:37

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 10

Total panel (balanced) observations: 260

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.190586	0.066268	138.6872	0.0000
LOG(PRICE)	-0.745315	0.132695	-5.616758	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.915476	Mean dependent var	8.842062
Adjusted R-squared	0.912082	S.D. dependent var	1.265130
S.E. of regression	0.375123	Akaike info criterion	0.918264
Sum squared resid	35.03869	Schwarz criterion	1.068908
Log likelihood	-108.3743	Hannan-Quinn criter.	0.978825

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

F-statistic	269.6925	Durbin-Watson stat	0.538965
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	298.839760	(9,249)	0.0000
Cross-section Chi-square	641.737541	9	0.0000

h. NMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:39

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 8

Total panel (balanced) observations: 208

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.952088	0.067456	147.5346	0.0000
LOG(PRICE)	-0.806686	0.133032	-6.063868	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.905963	Mean dependent var	9.563378
Adjusted R-squared	0.902183	S.D. dependent var	0.968540
S.E. of regression	0.302918	Akaike info criterion	0.491594
Sum squared resid	18.26006	Schwarz criterion	0.636006
Log likelihood	-42.12575	Hannan-Quinn criter.	0.549987
F-statistic	239.6496	Durbin-Watson stat	0.696319

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Prob(F-statistic)	0.000000

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	273.200311	(7,199)	0.0000
Cross-section Chi-square	491.254966	7	0.0000

i. SMIN

Dependent Variable: LOG(QUANTITY)

Method: Panel Least Squares

Date: 01/16/15 Time: 20:40

Sample: 2014M01 2016M02

Periods included: 26

Cross-sections included: 6

Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.42109	0.057228	182.0987	0.0000
LOG(PRICE)	-0.476647	0.098356	-4.846160	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.938757	Mean dependent var	10.15765
Adjusted R-squared	0.936290	S.D. dependent var	0.885026
S.E. of regression	0.223387	Akaike info criterion	-0.115985
Sum squared resid	7.435383	Schwarz criterion	0.020867
Log likelihood	16.04685	Hannan-Quinn criter.	-0.060402
F-statistic	380.6519	Durbin-Watson stat	0.487546

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Prob(F-statistic)	0.000000

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	456.674984	(5,149)	0.0000
Cross-section Chi-square	435.657626	5	0.0000

REFERENCES

[1] Achadi, A., Soerojo, W., Barber, S. (2005). "The relevance and prospects of advancing tobacco control in Indonesia". *Health Policy*, 72, 333-349.

[2] Adda, J. & Cornaglia, F. (2006). "Taxes, cigarette consumption and smoking intensity". *American Economic Review*, 96 (4) 1013-1028.

[3] Ahmad, S. & Franz, G. (2008). "Raising taxes to reduce smoking prevalence in the US: A simulation of the anticipated health & economic impacts". *Public Health*, 122, 3-10.

[4] Ahmad, S. (2005). "Increasing excise taxes on cigarettes in California: a dynamic simulation of health and economic impacts". *Preventive Medicine*, 41 (1) 276-283.

[5] Alamar, B. & Glantz, S. (2006). "Effect of increased social unacceptability of cigarette smoking on reduction in cigarette consumption". *American Journal of Public Health*, 96 (8) 1359-1363.

[6] Anger, S., Kvasnicka, M., Siedler, T. (2011). "One last puff? Public smoking bans and smoking behavior". *Journal of Health Economics*, 30, 591-601.

[7] Azagba, S. & Sharaf, M. (2011). "Cigarette taxes and smoking participation: Evidence from recent tax increases in Canada". *International Journal of Environmental Research and Public Health*, 8, 1583-1600.

[8] Bishop, J., Liu, H., Meng, Q. (2007). "Are Chinese smokers sensitive to price?" *China Economic Review*, 18, 113-121.

[9] Blecher, E. (2008). "The impact of tobacco advertising bans on consumption in developing countries". *Journal of Health Economics*, 27, 930-942.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[10] Blecher, E. (2015). “Taxes on tobacco, alcohol and sugar sweetened beverages: Linkages and lessons learned“. *Social Science and Medicine*, 136-137, 175-179.

[11] Bogdanovica, I., Godfrey, F., McNeill, A., Britton, J. (2011). “Smoking prevalence in the European Union: a comparison of national and transnational prevalence survey methods and results“. *Tobacco control*, 20, e4.

[12] Britton, J. & Bogdanovica, I. (2013). “Tobacco control efforts in Europe“. *Tobacco Control 3*. 381, 1588-1595.

[13] Brouwer, W., Feenstra, T., Hoogenveen, R. & van Baal, P. (2007). “Increasing tobacco taxes: A cheap tool to increase public health“. *Health Policy*, 82, 142-152

[14] Carpenter, C., Cook, P. (2008). “Cigarette taxes and youth smoking: New evidence from national, state, and local Youth Risk Behavior Surveys“. Journal of Health Economics, 27, 287-299.

[15] Chaloupka, F. (2013). “Maximizing the public health impact of alcohol and tobacco taxes“. *American Journal of Preventive Medicine*, 44 (5) 561-562.

[16] Chaloupka, F., Straif, K. & Leon, M. (2010). “Effectiveness of tax and price policies in tobacco control“. *Tobacco Control*, BMJ Publishing Group, 20 (3) 235.

[17] Chaloupka, F., Yurekli, A. & Fong, G. (2012). “Tobacco taxes as a tobacco control strategy“. *Tobacco Control*, 21, 172-180.

[18] Chen, C., Chang, K., Lin, L. (2013). “Re-examining the price sensitivity of demand for cigarettes with quantile regression“. *Additive Behaviors*, 38, 2801-2804.

[19] Chen, Y., Xing, W. (2011). “Quantity, quality, and regional price variations of cigarettes: Demand analysis based on a household survey in China“. *China Economic Review*, 22, 221-232.

[20] Clemmensen, K. (2012). “Observational Macro Analysis on the aggregate cigarette price elasticity in Denmark 1978-2010“. *Value in Health*, 15, A277-A575.

[21] Congressional Budget Office. Raising the excise tax on cigarettes: Effects on health and the federal budget.

[22] Contreary, K., Chattopadhyay, S., Hopkins, D., Chaloupka, F., Forster, J., Grimshaw, V., Holmes, C., Goetzel, R. & Fielding, J. (2015). “Community Preventive Services Task Force. Economic impact of tobacco price increases through taxation: A Community Guide Systematic Review“. *American Journal of Preventive Medicine*, 49 (5) 800-808.

[23] De Cicca, P. & McLeod, L. (2008). “Cigarette taxes and older adult smoking: Evidence from recent large tax increases“. *Journal of Health Economics*, 27, 918-929.

[24] DeCicca, P., Kenkel, D. & Mathios, A. (2008). “Cigarette taxes and the transition from youth to adult smoking: Smoking initiation, cessation and participation“. *Journal of Health*

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Economics, 27, 904-917.

[25] Department of Health. (2012). National tobacco control strategy (2011-2016). *National Tobacco Control Coordinating Office, National Center for Health Promotion*.

[26] Department of Health. Sin tax law incremental revenue for health. Annual Report CY 2015.

[27] Eriksen, M., Mackay, J. & Ross, H. (2012). "The Tobacco Atlas: Fourth edition". *American Cancer Society*, Atlanta, Georgia, USA.

[28] Evans, W. & Farrelly, M. (1998). "The compensating behaviour of smokers: taxes, tar and nicotine". *RAND Journal of Economics,* 29 (3) 578-595.

[29] Farrelly, M., Loomis, B. & Mann, N. (2007). "Do increases in cigarette prices lead to increases in sales of cigarettes with high tar and nicotine yields? " *Nicotine & Tobacco Research*, 9 (10) 1015–1020.

[30] Farrelly, M., Loomis, B., Kuiper, N., Han, B., Gfroerer, J., Caraballo, R., Pechacek, T. & Couzens, G. (2014). "Are Tobacco Control Policies Effective in Reducing Young Adult Smoking? " *Journal of Adolescent Health*, 54, 481-486.

[31] Giovino, G., Mirza, S., Samet, J. et al. (2012). "Tobacco use in 3 billion individuals from 16 countries: An analysis of nationally representative cross sectional household surveys". *Lancet*, 380, 668-679.

[32] Gospodinov, N. & Irvine, I. (2009). "Tobacco taxes and regressivity". *Journal of Health Economics*, 28, 375–384.

[33] Grebenstein, P, Burroughs, D., Roiko, S., Pentel, P., LeSage, M. (2015). "Predictors of the nicotine reinforcement threshold, compensation, and elasticity of demand in a rodent model of nicotine reduction policy". *Drug and Alcohol Dependence*, 151, 181-193.

[34] Hu, T., Mao, Z., Shi, J., Chen, W. (2009). "The role of taxation in tobacco control and its potential economic impact in China". *Tobacco Control*, 19, 58-64.

[35] Huang, J., Chaloupka, F. & Fong, G. (2014). "Cigarette graphic warning labels and smoking prevalence in Canada: a critical examination and reformulation of the FDA regulatory impact analysis". *Tobacco Control,* 23, i7–i12.

[36] Hyland, A., Borland, R., Li, Q., Yong, H., McNeill, A., Fong, G., O'Connor, R. & Cummings, K. (2006). "Individual-level predictors of cessation behaviours among participants in the International Tobacco Control (ITC) Four Country Survey". *Tobacco Control*, 15(Suppl III), iii83–iii94.

[37] IARC. (2011). "Effectiveness of tax and price policies for tobacco control. IARC Handbooks of Cancer Prevention in Tobacco Control", vol. 14. *International Agency for*

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Research on Cancer, Lyon, France.

[38] Kulick, J., Prieger, J. & Kleiman, M. (2016). “Unintended consequences of cigarette prohibition, regulation, and taxation“. *International Journal of Law, Crime and Justice*, 46, 69-85.

[39] Lee, J. (2008). “Effect of a large increase in cigarette consumption: an empirical analysis of cross sectional survey data“. *Public Health*, 122:1061-1067

[40] Lee, J., Liao, D., Ye, C., & Liao, W. (2005). “Effect of cigarette tax increase on cigarette consumption in Taiwan“. *Tobacco Control*, 14(Suppl I), i71–i75.

[41] Licht, A., Hyland, A., O’Connor, R., Chaloupka, F., Borland, R., Fong, G., Nargis, N. & Cummings, M. (2011). “Socio-economic variation in price minimizing behaviors: Findings from the international tobacco control (ITC) four country survey“. *International Journal of Environmental Research and Public Health*, 8, 234-252.

[42] Lillard, D., Molloy, E. & Sfekas, A. (2013). “Smoking initiation and the iron law of demand“. *Journal of Health Economics*, 32, 114-127.

[43] Linegar, D. & van Walbeek, C. (2017). “The effect of excise tax increases on cigarette prices in South Africa“. *Tobacco Control*, 0:1–7.

[44] Lorenzi, P., Zhang, J. & Friedmann, R. (2010). “Looking for sin in all the wrong places: An empirical investigation of the affluenza construct“. *Institute of Behavioral and Applied Management*, 232-248.

[45] Mackay, J., Ritthiphadkee, B. & Reddy, S. (2013). “Tobacco control in Asia“, 381:1581-87.

[46] Mamun, K. (2012). “A theory of vertical political interaction in cigarette taxation“. *Indian Journal of Economics & Business*, 11 (2) 261-269.

[47] Martinez-Sanchez, J., Fernandez, E., Fu, M. et al. (2010). “Smoking behaviour, involuntary smoking, attitudes towards smoke-free legislations, and tobacco control activities in the European Union“. *PLoS One*, 5, e13881.

[48] Mazur, Grzegorz (2016). “The European Union – Japan FTA Negotiations. Access Barriers for European Business to the Japanese Market”. *Review of Integrative Business & Economics Research*, 5(4), 47-79.

[49] Nargis, N., Ruthbah, U., Hussain, A., Fong, G., Huq, I. & Ashiquzzaman, S. (2013). “The price sensitivity of cigarette consumption in Bangladesh: evidence from the International Tobacco Control (ITC) Bangladesh Wave 1 (2009) and Wave 2 (2010) surveys“. *Tobacco Control*, 0:1–9.

[50] Odermatt, R. & Stutzer, A. (2015). “Smoking bans, cigarette prices and life satisfaction“. *Journal of Health Economics*, 44, 176-194.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

[51] Pesko, M., Licht, A. & Kruger, J. (2013). "Cigarette price minimization strategies in the United States: Price reductions and responsiveness to excise taxes". *Nicotine & Tobacco Research*, 15 (11) 1858–1866.

[52] Rhoads, J. (2012). "The effect of comprehensive state tobacco control programs on adult cigarette smoking". *Journal of Health Economics*, 31, 393-405.

[53] Sari, N. (2013). "On anti-smoking regulations and tobacco consumption". *The Journal of Socio-Economics*, 43, 60-67.

[54] Silvano, G. &La Vecchia, C. (2012). "Tobacco control: Economic aspects of smoking". *Preventive Medicine*, 55, 546-547.

[55] Status of tobacco use and its control: Philippines report card. (2008). *Framework Convention on Tobacco Control, Southeast Asia Tobacco Control Alliance* (SEATCA).

[56] Szilágyi, T. (2007). "Higher cigarette taxes—healthier people, wealthier state: The Hungarian experience". *Tobacco Control*, 15 (3) 122–126.

[57] Tarantilis, F., Athanasakis, K. (2013). "Estimates of price and income elasticity in Greece: Greek debt crisis transforming cigarettes into a luxury good". *Value in Health*, 16:A323-A636.

[58] Tauras, J. (2004). "Public policy and some-day smoking among adults". *Journal of Applied Economics*, 7 (1) 137-162.

[59] World Health Organization. (2003). WHO framework convention on tobacco control. *WHO Document Production Services*, Geneva, Switzerland.

[60] World Health Organization. The economic and health benefits of tobacco taxation. *WHO Framework Convention on Tobacco Control*.
www.cbo.gov/sites/default/files/cbofiles/attachments/smoking_reduction.pdf

[61] Zhang, B., Cohen, J., Ferrence, R. & Rehm, J. (2006). "The impact of tobacco tax cuts on smoking initiation among Canadian young adults". *American Journal of Preventive Medicine*, 30 (6).

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)