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The Effect of Five Key Variables on Cigarette Consumption in the Eight Most Developed Countries

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Abstract

The objective of this work is to investigate the effect of two quantitative (price (taxes included) of cigarettes per pack and personal income) and of three socioeconomic variables (education level, percentage of the population aged 15-24 and unemployment rate) on the quantity of cigarette consumption per capita per year for each of the eight countries: China, India, Japan, Russia, Brazil, USA, Germany and UK. Three different econometric methods were used, namely pooled cross-section time series, fixed and random effects to estimate cigarette consumption at the country level. The three models showed that cigarettes are a normal good (a necessity) and that an increase in income will cause an increase in cigarettes sales per individual age 15 and over. Moreover, the pooled OLS with cross-section specific coefficients model indicated that China, Japan, Russia, USA and Germany present negative cigarette price elasticity, Brazil presents positive price elasticity, while India and UK present price elasticity not significantly different from zero. The results of pooled OLS model for the three socioeconomic variables showed that their coefficient estimates are slightly negative and significantly different from zero. Once country-level unobserved heterogeneity was taken into account the models indicated, that countries with more university graduates have slightly lower cigarette sales per adult, while the other two socioeconomic variables were found to be statistically not significant.

Keywords: cigarette consumption per capita, price of cigarettes per pack, personal income, education level, unemployment rate, pooled OLS.

1. Introduction

The effect of several quantitative and socioeconomic variables on cigarette consumption has been widely studied. A part of studies use aggregated data to estimate the price and income elasticities of cigarette consumption, while others use and a number of socioeconomic variables as also micro data to evaluate the cigarette demand, in order to contribute to the development of specific tobacco control programs. Studies using aggregated data to evaluate cigarette consumption in different countries around the world are limited.

The price of cigarettes in low-income per capita countries is relatively lower compared with prices in many other countries (Guindon et al., 2002 and Tsai et al., 2002). In September 2002, the average price of a pack of cigarettes in the Australia, USA, and Japan ranged between US $ 2 and

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US $ 4 and in the UK, it was US $ 6.93 (Lee, 2008). However, in China and India it was US$ 1.01 and US $ 1.01, respectively. Consequently, cigarettes in low-income countries cost almost the 15 % of the average price per pack in the UK. The price of cigarettes was 6.9 times higher in the UK and 4.0 times higher in the USA than in Brazil (Lee, 2008). A comparison between income levels and cigarette makes the difference even more remarkable.

In low-income countries, the low cigarette prices of in low-income countries prevent the population to reduce the smoking significantly. Many studies have shown that cigarette taxes can reduce cigarette consumption (Hu, Mao, 2002). The Government of many countries has started using them as one of its most important tobacco control tools (Chaloupka et al. 2000 and Hopkins et al., 2001).

Lee J.M. (2008) found that the ability of tax-induced cigarette price increases to reduce consumption in southern Asia countries mainly depends on the price elasticity of cigarettes. The price elasticity of cigarettes in high-income countries is generally in the range of −0.25 to −0.5, while in low-income countries it is in the range of −0.5 to −0.7 (Lee, 2007). That means that low-income countries can maximize its tobacco control results with a high cigarette tax policy.

Gallus S. et al. (2006) found that, on average, in Europe cigarettes consumption decreases 5–7 % for a 10 % increase in the real price. That strongly supports an inverse association between price and cigarette smoking. Lee J. M. et al. (2009) have confirmed in Taiwan that low-income, poorly-educated smokers are most likely to purchase smuggled cigarettes when faced with the rising costs of legal cigarettes.

Iglesiasa R. et al. (2007) studied the smoking situation in Brazil, and the importance of the tobacco control program in reducing smoking in the country. Available evidence indicates that there was a significant drop in smoking in Brazil and total cigarette consumption per adult since the early 1990s. However, smoking is observed among the less cultured classes of the population, which are usually the poorest. The tobacco control program in Brazil is considered very innovative, but it has mainly focused on non-price instruments.

Fagan P. et al. (2007) and Moolchan et al. (2007) have argued that health disparities by tobacco use are created, because it is mostly concentrated among those with low income, those with less education than a college degree and among whites and American Indians. Education above the high school level is associated with less smoking, lower cigarette consumption, and increased likelihood of quitting smoking (Fagan et al., 2007). Higher income is associated with smallest reduction in smoking and lower consumption among current smokers (Tauras, 2006). Blue collar and service workers present bigger probability to smoke than white collar workers (Townsend et al., 1994).

The phenomenon of cigarettes demand and of cigarettes supply was studied by Chaloupka and Warner (2000) as also from Gallet and List (2003) for the U.S. cigarettes market. This has helped governments to impose taxes on cigarettes, which serve both to reduce smoking and to increase tax revenue to fund tobacco control programs (Pieper, 2006). Farrely et al. (2003) have studied separately tax effect and price effect, but in separate models than as two parts of the same model. Baltagi and Goel (1987) have investigated the effect of taxes separately from price. The majority of studies have concentrated on price elasticity rather than tax elasticity. The estimation of price elasticity, which embodies and the tax elasticity, will be one of the objectives of this study.

The 10th World Conference on Tobacco or Health (1998), settled in Beijing, was a landmark in the history of tobacco control as it was unanimously agreed that it is impossible to be enforced one kind of policy in order to reduce the tobacco consumption. Each country has its own characteristics with result the weight of each factor to differ widely. In the Conference, representatives of all countries took part in order to suggest, compare and contrast their proposals.

According to the findings of the 10th World Conference on Tobacco or Health (1998). Research on tobacco control should be more caution and to a greater extent than in the past. Country-specific evidence must be completed detailed and focus on the determinants of tobacco use. Several gaps could be filled quickly and provide the necessary information that could accelerate the development of policy. Five examples are given:

- First, data on children should be collected and the implications of applied policies to be evaluated.

- Second, it will be investigated on how to maintain the presently low-smoking rates among women.
- Third, it should be evaluated the relationship between successful quitting by adults and the initiation of smoking by their children.
- Fourth, it should be assessed the role of litigation and its connection to countries at various stages of development
- Fifth, policy analyses should be conducted to the identification of successful tobacco tax policies to support research initiatives, tobacco control initiatives and to constitute a successful example for other countries.

2. Literature Review

Smoking constitutes for a lot of decades the main cause of death and illnesses in the world. Various tobacco control programs have been placed in application in most countries for big time interval without they have brought the desirable results. Many studies were worked out in different countries which have examined the use of tobacco and moreover have analyzed the impact of various factors on total tobacco consumption. They showed that the larger part of these studies have examined price elasticity than tax elasticity with alone exception the work of Baltagi V. and Goel R. (1987), that studied the effect of prices separately from the effect of taxes. Farrely et al. (2003), as is mentioned above, have studied separately tax effect and price effect, but in separate models rather than as two parts of the same model. Pieper D. (2008) report that Control programs in the U.S.A are often funded by cigarette taxes and constitutes an important policy tool for tobacco control.

Various methodologies have been used to estimate cigarettes price elasticity. A part of them using data on individuals and others is using aggregate consumption data. Various studies using aggregate U.S. data have estimated that the price elasticity range from -0.14 to -1.12, with a mean of -0.40; more than half of the studies report an estimation in the range of - 0.30 to -0.50 (Pieper, 2008). Goel R. and Nelson M. (2006) report that cigarette consumption is becoming more price inelastic over time. Chaloupka F. and Warner K. (2000) cite evidence that a lot of studies in USA estimated price elasticity to be around -0.40. Gallet and List (2003) found many studies (86) that estimate the cigarettes price elasticity in USA and found a mean of – 0.48 with a standard deviation of 0.43. In the same studies the mean of income elasticity was found +0.42 with a standard deviation of 0.49.

Lee J.M. (2008) cite evidence that the cigarettes price elasticity in low-income countries is generally in the range of −0.5 to −0.7 while it is in the range of −0.25 to −0.5 in high-income countries. Lee J.M. (2008) used the estimates of cigarette price elasticity to assess the possible effects of a large increase in cigarette tax on cigarette consumption in Taiwan. Moreover, he investigated the responses to the cigarette tax increase among smokers with different smoking characteristics and from different socio-economic backgrounds (Lee, 2008). A price elasticity of −0.29 was estimated in connection with a 44 % increase in the cigarettes price. This means that such an event will have relatively little response to smokers (Lee, 2007).

Estimation results yielded a cigarette price elasticity of −0.29 in connection with a 44 % increase in the price of cigarettes. This suggests that smokers will have relatively little response to such an event. In contrary, low-income smokers, smokers who regularly purchase low-price cigarettes, moderately addicted smokers and women showed significant response to the cigarettes price increase.

Hu. T.W. et al. (2010) used estimates of cigarettes price elasticities, data and epidemiology to estimate the impact of a tobacco tax increase on government tax revenue, cigarette consumption, employment and revenue loss in the cigarette industry and tobacco farming and lives saved. Their results showed that, if the recent Chinese tax adjustment passed to the retail cigarettes price, would reduce the number of smokers by 630,000 saving 210,000 lives, at a price elasticity of −0.15.

Lance P. et al. (2004) investigated cigarette consumption in China and Russia using micro-level household data and community surveys. Developing-countries cigarette price elasticity estimates of around −0.75 have relied on aggregate data. In contrast, the micro-level cigarette price elasticity estimates in Russia and China range from 0 to −0.15. This means that raising cigarette prices in developing-countries may not reduce smoking to the degree as previously was suggested.

Gallus S. et al. (2006) examined the variation in cigarette demand according to price across the Europe. The estimated price elasticities for cigarette consumption were −0.74 (95 % CI −1.13 to −0.35) and −0.46 (95 % confidence interval (CI) −0.74 to −0.17) for foreign and local brand, respectively. The inverse relation between price and cigarette consumption was weaker in countries in the European Union (price elasticity for foreign brand of −0.4) as compared to not in the European Union countries (price elasticity of −0.8) (Gallus et al., 2006). The result that in Europe cigarette consumption, on average, decreases 5–7 for a 10 % increase in the real cigarette price strongly supports an inverse relationship between price and cigarette smoking (Gallus et al., 2006).

Iglesiasa R. et al. (2007) studied the smoking situation in Brazil, and the role of the tobacco control program in curbing smoking in the country. Available evidence indicates that there was a significant smoking decline and total cigarette consumption per adult since the early 1990s. Iglesiasa R. et al. (2007) report that smoking is observed more among the uneducated categories of the population, which usually are the may also poorer. The tobacco control program in Brazil is considered very innovative, but it has mainly focused on non-price instruments. Price instruments may be used far more effectively, to build on the substantial program that has been implemented based on non-price instruments

In their British and US studies Graham H. et al. (2006) found that in smokers age 20 and over, smoking related disparities arise from quitting patterns, since so few people start smoking after that age. Native Americans/Alaska Natives and whites (especially white males) have the highest prevalence and Intensity of smoking and earliest age of initiation (LaVeist et al., 2007 and Tauras, 2006), while Asians and Latinos have the lowest smoking trend and intensity (Trinidad, 2004). Fagan P. et al., (2007) refer that Blacks present lower smoking trend than whites and that Latinos, Blacks and Asians have lower smoking intensity than whites and Native Americans.

Thomas S. et al. (2008) report that the recent tobacco control literature suggests that workplace smoke free policies do not have differential effects by education, income and ethnicity. Thomas S. et al. (2008) as also Townsend J. et al. (1994) have found increased sensitivity of cigarette prices smoking status and cigarette consumption among the poor. Kandel D.B. et al. (2004) found also increased sensitivity of cigarette prices and cigarette consumption among blacks and Latinos, although Thomas S. et al. (2008) found no evidence of differential effects of smoking in adults by ethnicity. Franks P. et al. (2007) found that cigarette price elasticity did not depend on socioeconomic status. Regidor E. et al. (2007) suggest that smoking and cigarette consumption may be insensitive to price and Thomas S. et al., (2008) cite evidence that some studies suggest that individuals with higher education may be more sensitive to the cigarette prices.

Dinno A. and Glantz S. (2009) used US cross sectional survey data and found that cigarette prices and clean indoor air laws are independently related with reductions in smoking. They also argue that established patterns of income, education and ethnic disparity in smoking are almost unaffected by either price or clean indoor air laws in terms of both mean effects and variance. Moreover, they argue that cigarette prices and clean indoor air policies are generally neutral with regard to health disparities.

3. Research hypotheses

In the present study the research hypotheses is to test the effect of the five explanatory variables (price (taxes included) of cigarettes per pack, personal income, education levels (university level), proportion of the population in the 15-to-24 age group and unemployment rate) on the quantity of cigarette consumption per capita per year for each of the eight countries: China, India, Japan, Russia, Brazil, USA, Germany and UK. Namely, to estimate the regression coefficients for each of the eight countries that reflects elasticities of cigarette demand.

The selected five explanatory variables are those that are largely discussed in the 10th World Conference on Tobacco or Health (1998) and some of them have been reviewed by several investigators. The estimated coefficients of the above variables will help police makers to select appropriate policies which will contribute to reduce smoking.

The study employs three different econometric methodologies to analyze the panel data on cigarette demand, namely pooled cross-section time series, fixed effects, and random effects, to estimate cigarette consumption at the country level (cigarettes were chosen as they are the most widely common kind of tobacco and only a small percentage of population chooses to smoke pipes, cigars, snuffs and other tobacco kinds). With other words, we will utilize the most recent panel data

from eight countries (USA, Japan, Germany, UK, China, India, Russia and Brazil,) to analyse cigarette consumption at the country level. These countries played a significant role during the 10th World Conference on Tobacco or Health (1998) and have one or more of the following characteristics: They are among the top tobacco producers, the top tobacco consumers and have crucial global politic power.

The remainder of this paper is organized as follows. Section 4 referred to tobacco Control in the World, section 5 to tobacco control policies and section 6 to tobacco control conditions in the under study countries. Section 7 explains the methodology used in this study and section 8 describes the data used in the analysis. The results are presented and discussed in section 9. Finally, section 10 presents the conclusions from the analysis and identifies possibilities for further tobacco control interventions.

Smoking and Tobacco Control in the World

Smoking is the major cause of premature mortality. It is estimated that each year more than four million deaths occur prematurely due to smoking, and half of those in developed countries (WHO, 1997). Among persistent smokers, about 50 % would eventually killed by their habit, and among them several at a young age. Due to the increasing prevalence of smoking in many developing countries with rapidly growing populations, has calculated that there could be nearly one billion deaths attributable to tobacco during the 21 century, compared to one hundred million that occurred during 20th century.

Smoking is a leading cause of death worldwide. According to Iglesiasa R. et al. (2007) "Until recently, the Epidemic of chronic illness and premature death due to tobacco mainly affected rich countries, but it quickly shifted to the developing world. Smoking was estimated to kill nearly 5 million people annually by 2000. About half of those deaths were in low income countries. About 60 percent of male deaths and 40 percent of female deaths due to tobacco smoke were middle-aged people".

Current trends suggest that the tobacco epidemic will affect mostly poorer developed countries, which are already struggling to improve the living conditions of their populations. About 1.1 billion people currently smoke worldwide. More than 1 billion of them are men and 231 million are women. Approximately 900 million smokers (84 percent of all smokers) live in developing and transitional economy countries, while only about 16 per cent live in developed countries, where cigarette consumption decreased significantly in recent decades. Jha and Chaloupka (1999) refer that "in developing countries, smoking increased since 1970, particularly among the poor and less educated".

In 1995, the average prevalence rate in the adult population of low and middle-income countries was 29 percent. Two thirds of the poor nations for which data are available have male smoking rates above 35 percent, which is the average prevalence rate in the developed world. There are many low and middle-income countries with large pockets of poverty and high smoking rates (Iglesiasa et al., 2007). Esson and Leeder (2004) report that "Over the next 25 years, total cigarette consumption is forecast to grow by 60 percent in countries with medium levels of human development and 100 percent in countries with low human development".

Smoking rates for females in the developing world are much lower than for males, but this is set to change. Data from the Global Youth Tobacco Survey show that many girls in their early teens are taking up smoking in the developing world. Data from many countries show that the poor are most likely to smoke. Regardless of country income, poorer individuals are those more likely to use tobacco, accounting for much of the mortality gap between rich and poor (Iglesiasa et al., 2007).

Tobacco Control Policies

The scientific community has accepted that smoking is a major cause of morbidity and mortality. In most developed countries measures were taken to combat the smoking epidemic. There is no one key intervention to control smoking. The present consensus about tobacco control programs suggests that the most effective measures to reduce demand are: consumer information, bans on tobacco advertising and promotion, warning labels and restrictions on public smoking (non-price measures), higher cigarette taxes and increasing access to smoking cessation programs.

OECD countries have approved major control programs to reduce tobacco consumption, based on several instruments that interact, reinforcing their individual effect. Countries with successful control policies implement several approaches to reduce demand and control illegal tobacco trade or smuggling. Tobacco control programs generally focus on prevention of initiation,

promoting cessation and reducing exposure of non smokers to exposure of non smokers to smoking. The instruments or mechanisms to reduce demand are: tax and price increases, spreading information about health consequences, non-price restrictions on smoking and regulation of tobacco products.

Health information campaigns, smoking bans, restrictions on youth access to tobacco and legislation to restrict smoking in work places has been proved to be quite effective.

Efforts to decrease smoking implemented in varying degrees in different countries and their application and success is variable. The tobacco control community will maintain its efforts to implement evidence-based interventions which are disseminated as widely as possible. Koh H.K. et al. (2007) refer that "new interventions are needed because even with the best and the most powerful application of the existing interventions smoking persists in society. This clearly demonstrates the need for further and better treatments".

Tobacco Control in USA, EU, Japan and BRIC countries

USA

Tobacco remains the leading preventable cause of death and disease in the USA. Fagan et al. (2004) found that "the difference in the health of U.S. citizens is created from tobacco use, and there is greater among those with less education, low income and between whites and American Indians. Education above a high-school degree is associated with lower consumption, lower smoking prevalence, and increased likelihood of quitting among smoker". Blue collar and service workers are more likely to smoke than white collar workers (Barbeau et al., 2004a,b).

Pieper D. (2008) report that "the cigarettes market in the U.S. is characterized by inelastic demand and an enough elastic supply. This has helped state governments to impose taxes on cigarettes, which are not only an important tool for reducing smoking but also create a significant amount of tax revenue on an ongoing basis to fund a series of tobacco control programs".

EU

According to WHO (2003) "In many European countries, smoking is still fashionable and desirable for men and women, although much of the rest of the developed world considers non-destructive to one's health. Even today in many European countries one can smoke in enclosed public places such as schools, hospitals, theatres, buses, taxis, restaurants, etc". Joossens, L. & Raw, M., (2006) released a smoking control scale report, which takes into account the following factors: consumer information, advertising bans and compliance, bans in workplaces and in public facilities, consumer information and awareness, warning labels on products, access to smoking cessation treatment and price increases due to increased "sin taxes". According to this scale, Ireland, United Kingdom, Norway, Iceland and Malta have the best scores respectively. Conversely, Luxemburg, Romania, Latvia, Austria and Spain had the lowest scores respectively. This scale gives approximately an overview of how well a country is controlling cigarette smoking

Japan

Wan J. (2006) cites evidence that "Cigarette consumption and the prevalence of smoking in Japan have been much higher than comparable rates in other developed countries. The provisions of the Japanese anti-smoking policy have been very lax, compared to those of other developed countries. This observation raises the question of whether Japanese anti-smoking policies, and especially tax-prise increases, will actually reduce cigarette consumption".

The prevalence of smoking among Japanese adults and youth has been very high. Japan has been regarded as a 'smokers' heaven,' largely as a result of the lack of tobacco controls and the high prevalence of smoking.

The empirical results of Wan J. (2006, p. 1673) showed that "the short-run and long-run price elasticities range from -0.338 to -0.421, and from -0.679 to -0.686, respectively. Thus, increases in tax revenues in the long run are likely to be smaller than those in the short run. As a result, tax increases would be an effective means of curbing smoking and reducing its social cost".

Russia

Russia counts 40 million smokers and has one of the highest rates of smokers in the world. Smokers are predominantly male. Foreign companies control 70 % of the Russian market after the collapse of communism invested in local production units. The government has not taken significant measures to control smoking, cigarette advertising spread everywhere, and Russia has one of the lowest cigarette tax rates in the world (Lance et al., 2000).

Recently, after Russia's accession to the World Health Organization it proceeded in reception of measures to reduce tobacco use. These measures include: Ban tobacco advertising and promotions, health warnings on tobacco products, Bans on smoking in public places and workplaces, raise the price of tobacco products (increasing tobacco taxes) and fund tobacco prevention and cessation programs. Current health warnings on cigarette packs cover just 5 percent of the package and are often difficult to read (Karsten Lunze et al., 2013)

China

M Lance P. et al. (2004) have argued that "China as Russia constitutes ideal case for the analysis of cigarette demand. Both are big and diverse countries that present almost all economic circumstances that may be encountered in today's developing world. China presents the greatest demand for cigarettes. The Chinese market dominated for decades by the state tobacco company of China National (CNTC), with more than a thousand brands. The consumption of cigarettes increased impressively the last decades, with the female smoking rates to constitute a negligible percentage".

Smoking in China is a serious public health problem. There are more than 300 million smokers and almost 500 million non-smokers, exposed to second hand smoke. So, urgent actions should be taken for tobacco control. Hu T.W. and Mao Z. (2002) report that "the Chinese policy makers have not implemented reliable tobacco-control policies. Sporadic attempts were made by local governments to discourage smoking, but no coordinated effort to raise consciousness and to deter it. Taxes amount in the 35% of the price of cigarettes, constitute one important revenue, with result governing do not discourage the smoking. This percentage is relatively low compared to the other countries".

India

The tobacco problem in India presents a peculiar complexity since it is produced, exported and consumed. Portuguese were first introduced tobacco to India four hundred years ago. Ever since, sixty five per cent of all men and thirty three per cent of all women use tobacco in various forms. Tobacco causes over 20 categories of fatal and disabling diseases including oral cancer. More than 20 categories of fatal and harmful diseases caused by tobacco use in India and it is predicted that up to 2020 that tobacco will constitute 13% of all deaths in the country. Gupta PC. (2006) have argued that a major initiative have to be taken to control the smoking epidemic that has grown rapidly in developing countries.

There are many in India "The tobacco lobby" who argue that tobacco control measures will adversely affect the economy and the employment with the loss of a significant number of jobs. The net impact of tobacco control has not been adequately researched in the Indian economy and is therefore difficult to assess the precise impact of tobacco control measures. Studies from other developing countries have shown that job losses occur in the sectors of industrial and agricultural production. Jacobs R. (2000) states that these losses can be covered by employment growth in all other industries, particularly those of labour-intensive as well as the service industry. Jobs lost in retailing tobacco products are possible to be replaced by jobs in retailing other products that people can purchase with the money formerly spent on tobacco (Jacobs, 2000).

Shimkhada R. & Peabody J. (2003, p. 51) have argued that the future national tobacco control legislation in India will need better understanding of the political economy, as the one of the largest agricultural tobacco producer, slowing this industry down will require careful investigation of the involved stakeholders, as also concerted political will and sustained commitment.

Shimkhada R. & Peabody J. (2003, p. 51) refer that "Tobacco use in various forms India is forecasted to have irreversible damage to human health. The Indian government recently has begun to understand and act on the seriousness of the situation, and to combat this social ill it initiate a legislative process. This legislation to be successful, should be tested and include measures such as: tax increases on tobacco products, bans on advertising and promotion, smoking cessation Interventions, sales and distribution restrictions, intense education of the population and information about health risks of smoking".

Brazil

Smoking is one of the most important risk factors for non communicable diseases (NCD), the main cause of death and disease in Brazil. The proportion of deaths by NCD increased more than

three times in the country between the 1930s and 1990s. In 2004, non communicable diseases (NCD) were responsible for about 63 percent of mortality by known causes.

Brazil has developed tobacco control interventions since 1985. A recent study of non-communicable diseases (NCD) in Brazil found that the cornerstone of Brazil's program is sweeping legislation which started in 1996 by restricting tobacco use in public places.

It includes, for example, bans on smoking in public places (schools, theatres, government offices) and on public transportation, warnings on cigarette packs, bans on advertising, information about health risks of smoking and extensive mass media campaigns. Danel et al. (2005) report that "'Brazil is one of a few countries that regulates tobacco products including warning labels, regulation of tobacco product marketing, bans on advertising and promotion and distribution restrictions. Taxes make up about 74 percent of cigarette prices but they are still relatively low in Brazil, despite fairly high taxes".

Available evidence indicates that there was a significant decline in smoking in Brazil between 1989 and 2006. About two decades ago, the government launched a tobacco control program, with a marked acceleration of efforts since 1990, focusing on non-price interventions such as bans on advertising and promotion, restrictions on smoking in public places, intense education of the population, information about health risks of smoking and other activities. Evidence gathered by the study of Iglesiasa R. (2007) indicates that in Brazil:

- Smoking is significantly decreased between 1989 and 2006. In 2006, about 20 percent of males and 13 percent of females smoked in the main Cities.
- Smoking is more remarkable among the low-educated groups of the population, which probably be the poorer.(4) There is a 1.5-2 fold higher prevalence of smoking among those with little or no education as compared to those with more years of schooling.
- Total cigarette consumption per adult is significantly decreased, but has stabilized in recent years. Legal and illegal sales of cigarettes decreased from 1,700 cigarettes per year in 1990 to 1,175 in 2003-2005.
- The percentage of families with smokers decreased from 34 percent in 1995-96 to 27 percent in 2002-2003(4). The proportion of tobacco expenditures in total household expenditures also decreased from 3 percent in 1995-96 to 2 percent in 2002-03.
- Lung cancer rates during early adult life decreased among males between 1980 and 2004, but increased among females, which may be related to smoking cessation among men, and increased smoking among women.
- From 1996 to 2005, there were over 1 million hospitalizations attributable to smoking. Tobacco-related hospitalizations cost about US$0.5 billion, or 1.6 percent of the hospitalization budget between 1996 and 2005.

Cigarette consumption per capita, even at its pick in the 1980s, was always much lower in Brazil than in OECD countries such as the US, Canada, France, Germany, and Italy. Brazil smoking prevalence rates and cigarette consumption among adults has also been lower than those in several neighbouring countries, which may be the result of domestic tobacco control policies implemented in the 1990s. However, consumption has remained stable in Brazil in recent years.

4. Methodology

The three econometric models

Three different econometric methods were used, namely pooled cross-section time series, fixed and random effects, to estimate cigarette consumption at the country level. There are 104 data points for estimation from eight countries and 13 years (1997-2009). A log model is used to estimate regression coefficients that reflect elasticities of cigarette demand. We followed the same process as Pieper D. (2008, p. 8) for his model. The dependent variable in the regressions is the natural log of the quantity of cigarettes per pack sales per individual age 15 and over per year for each country (*q*). The independent variables are the natural log of the price of cigarettes per pack in cents (p) (taxes included) and the natural log of real per capita personal income in dollars (pi). The socioeconomic variables are not logged, because they are measured in percentage. The three socioeconomic variables which are included in the model are the percentage of university graduates (univ.), the rate of unemployment (unemp.) and the percentage of the population aged 15 to 24 (pop 1524).

All the explanatory variables which are used are the most common and important factors to control tobacco as discussed in the 10th World Conference on Tobacco or Health (1998).

The model for the three econometric methodologies is specified as follows:

Pooled OLS*:

$$logq_{ct} = b_o + b_1 logp_{ct} + b_2 logpi_{ct} + b_3 univ_{ct} + b_4 unemp_{ct} + b_5 pop1524_{ct} + e_{ct}$$

Fixed or Random Effects:

$$logq_{ct} = b_o + b_1 logp_{ct} + b_2 logpi_{ct} + b_3 univ_{ct} + b_4 unemp_{ct} + b_5 pop1524_{ct} + a_c + e_{ct}$$

All variable are measured for each country (c) and each year (t). The unobserved country-specific fixed effects are represented in the fixed effects model with term a_c that do not change over time. The observed explanatory variables are assumed to be correlated with the term a_c. In the random effects model the term a_c represents unobservable country specific effects. These effects are uncorrelated with the independent (explanatory) variables and are randomly distributed. e_{ct} is the term representing random errors (Eviews 5, Pooled Time Series, Cross-Section Data).

According to the 10th World Conference on Tobacco or Health the following variables are the most important for the tobacco control:

The price of cigarettes per pack in cents (p): As there is a lack of data for taxation, the real price of cigarettes per pack is used, which adapt the tobacco tax and each increase or reduce in the price usually implies an amendment in the tobacco taxation. Taxation is the most crucial factor for tobacco control, as the governments can use this measure to protect the population, independently of its educational level, its income, its unemployment etc.

The real per capita personal income of population (pi) plays a significant role for the cigarettes consumption as people who have ensured their basic needs, can consume more money for other activities as for cigarettes.

The percentage of university graduates (univ): The knowledge of the negative effects of smoking are more effective to people of high level education as showed the results of recent researches in the field of health-tobacco.

The unemployment rate: The more unemployed people the bigger cigarette consumption we have. People who have lost any hope to find a job end up harming themselves.

The percentage of population in the age of 15-24 (population aged 15-19 + population aged 20-24): This population age-period is very crucial, because most people start smoking in this period of their life.

There were also thoughts of using variables which will show the rate of corruption in politics, the influence of advertising in the population, the life expectancy etc., but the differences between years were almost the same. For that reason, we decided that it is better to include these factors in the intercept b_o and in the country-specific effects a_c of our model.

The limited numbers of independent variables in the models create country specific effects and if they are ignored, may cause heterogeneity in the model. This can result from the following reasons: tobacco usage may be treated differently by different countries, the tobacco control programs or the laws restricting tobacco usage may be differentiated among the countries, the growth level of the country, the culture of the population, the degree of economic dependence of the country on the tobacco industry (such as India and China), the intervention of WHO etc. (Pieper, 2008: 10).

If the observed independent (explanatory) variables are correlated with the unobserved effects, the OLS estimates will be inconsistent. The appropriate method in this situation is fixed effects estimation (see Eviews 5, Pooled Time Series). In the case that the unobserved effects are random and moreover uncorrelated with the independent (explanatory) variables explanatory variables, the OLS estimates will be inefficient (Eviews 5, Pooled Time Series). The appropriate method in this situation is random effects estimation. In the omission of any time-invariant variables the fixed effect method is robust and produces consistent estimators (Pieper, 2008).

From the other side, if the random effects assumption is correct, the random effects method produces efficient estimators (Pieper, 2008: 10). The application of fixed effects or random effects method to the panel data is more appropriate from the standpoint of econometric theory when is given the unobserved heterogeneity among countries (Pieper, 2008: 10).

* Ordinary Least Squares (OLS) or linear least squares

Moreover, the application of pooled OLS with cross-section specific coefficients methodology is also appropriate and gives a model with better goodness of fit (R^2) and better specification (Akaike info criterion and Schwarz criterion) as the simple pooled OLS.

Expected relationships

According the existing theory, the expected relationships among the dependent variable and the explanatory variables would be as follows: the price elasticity of cigarette demand would expect to be negative and income elasticity may be either negative or positive, depending on whether cigarettes are an inferior or a normal good.

Chaloupka and Warner (2000) have argued that the expected sign of the coefficient on the explanatory variable "percentage of university graduates" would be negative, if smoking is more prevalent among people with less education.

The sign of the coefficient of the explanatory variable "percentage of population aged 15 to 24") would depend on whether the trend for smoking in that age group is upward or downward. The sign of the coefficient of the explanatory variable "unemployment rate" might be positive because of stress created by unemployment, since the stress of unemployment might increase smoking.

Data

Initially there was an attempt to gather annual data for a period over than 30 years for all used variables and for each country. But it was impossible because annual data for all variables were only available from 1997 onwards. Then we tried to find quarterly data on all used variables and for each country. Quarterly data were found only for USA and UK. We also ran the analysis with quarterly data only for these two countries as a robustness check.

Data for this analysis came from the Euromonitor International from national statistics and the International Monetary Fund (IMF), International Financial Statistics. In table 2 are given details for the data sources. The data concern each from the 8 countries for the time period 1997 to 2009. The data of the independent variables "cigarette prices" and "gross income" are converted from nominal to real values using constant 2000 national currencies. The National Consumer Price Index for each country is used to convert nominal values to real values based on 2000 national currencies for all countries. Real values based on 2000 are converted from national currencies to dollars using the rate of Jun 3, 2010.

The dependent variable "Cigarette consumption per individual" is calculated by dividing total cigarette consumption by the population age 15 and over in each country. The independent variables "per capita income", "education level (university level)" and the "percentage of the population aged 15 to 24" are calculated by dividing by the total country population. Unemployment rate is calculated by dividing the unemployed population by the country population aged 15-to-65. In table 3 are given the descriptive statistics for the dependent and the independent variables.

5. Results

The results of the estimation for the pooled OLS, the fixed effects, and the random effects methods are given separately in the columns of Table 4. The standard pooled OLS estimates show a price elasticity of -1.10, significantly different from zero at the 1 % level. This means that the cigarette consumption will fall 11 % by a price increase of 10 %, assuming the other factors (independent variables) remain constant. The estimated income elasticity for the pooled OLS model is +0.96 and is significantly different from zero at the 1 % level. This means that cigarettes are a normal good (something that one needs) and that the quantity of cigarettes sold per individual age 15 and over will be increased to 9.6 % for a 10 % increase in incomes.

The results are inconsistent with estimates from previous studies done for developed and developing countries. This result may be biased and due to the heterogeneity that presents each country and is not accounted for in the pooled OLS model.

The fixed effects and random effects models yield different estimates from the pooled OLS model because do account for the unobserved heterogeneity for each country. The estimated price elasticities from the fixed and random effects models are -0.03 and -0,01, respectively, which are not significantly different from zero at the 10 % level. The estimated income elasticities from the fixed and random effects models are essentially different from this of the pooled OLS model. They are 0,26 and 0,31 for the fixed and random effects models, respectively, and both are significantly

different from zero at the 1 % level. Consequently, when the unobserved heterogeneity is accounting for, cigarettes are presented to be a normal good too. All three models, however, show that countries with higher incomes overall sell more cigarettes per individual age 15 and over (adult for smocking).

The results of pooled OLS model the results showed some interesting things about the three socioeconomic variables. The coefficient estimates for the proportion of university graduates is -0.07, small and negative but statistically significant at the 1 % level. This shows that countries with higher rates of university graduates have slightly lower sales of cigarettes, which confirms previous studies that showed that cigarette consumption declines with increasing education. The pooled OLS model shows that countries with more young adults aged 15-24 have lower cigarette sales per adult, elasticity -0.16, and it is statistically significant at the 1 % level. The coefficient estimates for the unemployment rates is -0.07, statistically significant at the 5 % level, but not economically significant. This indicates that unemployment rate has a small negative effect on cigarette sales, which means that business cycles do not play a key role in determining cigarette sales.

The fixed effects and random effects model, show that when the unobserved heterogeneity of the countries is taken into account the effect of more university graduates in a country remain the same, but the percent of young adults aged 15-24 and the unemployment rate were found to be statistically not significant at the 10 % level.

Better results, according R^2 criterion, Akaike info criterion, Schwarz criterion and Durbin-Watson statistic, are received with application of pooled OLS with cross-section specific coefficients methodology, which are about in line with the estimation results reported in previous studies. Cross-section specific coefficients methodology list variables with different coefficients for each country (member of the pool). EViews determine a different coefficient for each country (cross-sectional unit), and label the output using a combination of the series name and the cross-section identifier (Eviews 5, Pooled Time Series). The country-level heterogeneity (fixed effects or random effects) is at a large percentage accounted for in the pooled OLS with cross-section specific coefficients approach, with the cross-section specific independent variables logp and logpi. The results of the estimation according this approach are reported in Table 5, separately for the country price elasticities and the country income elasticities.

The country price elasticity and the country income elasticity are as follows:

1. China: The price elasticity is -0,88, significantly different from zero at the 1 % level and the income elasticity is 0,39, significantly different from zero at the 1 % level too.

2. India: The price elasticity is -0,30, not significantly different from zero at the 10% level and the income elasticity is -0,40, significantly different from zero at the 1 % level.

3. Japan: The price elasticity is -0,90, significantly different from zero at the 1 % level and the income elasticity is 0,49, significantly different from zero at the 1 % level too.

4. Russia: The price elasticity is -0,50, significantly different from zero at the 1% level and the income elasticity is 0,18, significantly different from zero at the 1 % level too.

5. Brasil: The price elasticity is 0,13, significantly different from zero at the 1 %
Level and the income elasticity is -0,31, significantly different from zero at the 1 % level too.

6. USA: The price elasticity is -0,48, significantly different from zero at the 1 %
Level and the income elasticity is 0,22, significantly different from zero at the 1 % level too.

7. UK: The price elasticity is 0,08, not significantly different from zero at the 10 % level and the income elasticity is -0,15, not significantly different from zero at the 1 % level too.

8. Germany: The price elasticity is -0,94, significantly different from zero at the 1 % level and the income elasticity is 0,48, significantly different from zero at the 1 % level too.

These results indicate that cigarettes are a normal good (a “necessity”) for the countries China, Japan, Russia, USA and Germany. Namely, an increase in income will cause an increase in cigarettes sales per individual age 15 and over. For the countries India and Brazil cigarettes are an inferior good and for UK cigarettes are an inelastic good. The countries China, Japan, Russia, USA and Germany present negative price elasticity, significantly different from zero at the 1 % level. Brazil presents positive price elasticity, significantly different from zero at the 1 % level, while India and UK present price elasticity not significantly different from zero at the 10 % level.

The pooled OLS with cross-section specific coefficients model shows that countries with more university graduates have slightly lower cigarette sales per adult, elasticity -0.034, and this is

statistically significant at the 1 % level. The percent of young adults aged 15-24 and the unemployment rate were found to be statistically not significant at the 10 % level.

The results of the estimation for the pooled OLS and the fixed effects estimation methods, using quarterly data for USA and UK, are given separately in the columns of Table 5. Random effects estimation was impossible, because it requires number of cross- section > number of coefficients (see Eviews 5).The coefficients estimated for the corresponding variables in the model of D. Pieper (2006), using annual data for the fifty states of USA and for the time period 1989 – 2005, are in the brackets. We show that the estimated coefficients for all variables and for both techniques have the same sign and are not very different. Consequently, we could say that it is a robustness check.

The results of the estimation using quarterly data for USA and UK according the pooled OLS with cross-section specific coefficients approach are reported in Table 6, separately for the country price elasticities and the country income elasticities.

6. Conclusion

The first three econometric models, namely pooled cross-section time series, fixed effects and random effects indicated that cigarettes are a normal good (a "necessity") and that an increase in income will cause an increase in cigarettes sales per individual age 15 and over. The pooled OLS with cross-section specific coefficients model indicated that cigarettes are a normal good (a "necessity") for the countries China, Japan, Russia, USA and Germany, an inferior good for the countries India and Brazil and an inelastic (indifferent as for income) good for UK.

The pooled OLS with cross-section specific coefficients model showed that the countries China, Japan, Russia, USA and Germany present negative cigarette price elasticity, significantly different from zero at the 1 % level. This means that a cigarette price increase would cause consumption to fall. Namely, price and tax politic could be used for tobacco control to these countries. Brazil presents positive price elasticity, significantly different from zero at the 1 % level, while India and UK present price elasticity not significantly different from zero at the 10 % level. For the last three countries other intervention for tobacco control should be devised.

The results of pooled OLS model for the three socioeconomic variables education, age and unemployment showed that their coefficient estimates are slightly negative and significantly different from zero at the 5 % level. This indicates that countries with a greater proportion of university graduates, with more young adults aged 15-24 and higher unemployment rate have lower cigarette sales per adult.

The other three econometric models, namely the fixed effects, random effects and the pooled OLS with cross-section specific coefficients showed that once unobserved heterogeneity of countries is taken into account the effect of more university graduates in a country remain about the same. Namely, countries with more university graduates have slightly lower cigarette sales per adult and this is statistically significant at the 1 % level. The percent of young adults aged 15-24 and the unemployment rate were found to be statistically not significant at the 10 % level.

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Appendix

Table 1. Data Sources - Expected Relationships

Variable	Description	Expected relationship with dependent variable	Source
Cigarette Quantity (*q*)	Cigarette Retail Sales in millions of sticks		Euromonitor International from national statistics
Price (*p*)	Cigarettes - Retail Value in millions of national currency	Negative	Euromonitor International from national statistics
Personal Income (*pi*)	Annual Gross Income in millions of national currency	Unknown	Euromonitor International from national statistics

Per cent university graduates (*univ.*)	Population by Higher Educational Attainment in thousands	Negative	National statistical offices/Euromonitor International
Unemploy-ment rate (*unemp*)	Unemployed Population in thousands	Positive	International Labour Organisation/Euromonitor International
Per cent of population age 15-24 (*pop1524*)	Population Aged 15-24 in thousands	Unknown	Euromonitor International from national statistics/UN

Table 2. Descriptive Statistics of dependent and independent variables

Variable	Country	Observa-tions	Mean	Std. Dev.	Min	Max
Cigarette packs sold per adult per year	CHINA	13	89.60	5.23	85.02	100.66
	INDIA	13	6.84	0.79	5.74	8.44
	JAPAN	13	135.73	16.29	108.21	155.17
	RUSSIA	13	143.72	17.2	115.26	167.98
	BRASIL	13	36.07	4.11	31.28	44.32
	USA	13	88.82	12.99	69.35	113.14
	UK	13	56.22	7.77	45.47	72.76
	GERMANY	13	85.02	18.37	59.05	103.95
	Total	104	80.25	45.34	5.74	167.98
Price per pack (2000 cents)	CHINA	13	0.75	0.07	0.68	0.90
	INDIA	13	0.53	0.04	0.45	0.57
	JAPAN	13	3.08	0.20	2.83	3.33
	RUSSIA	13	0.29	0.06	0.24	0.43
	BRASIL	13	1.69	0.79	0.98	3.04
	USA	13	3.23	0.51	2.17	4.06
	UK	13	5.73	0.23	5.48	6.22
	GERMANY	13	4.03	0.72	3.28	5.09
	Total	104	2.42	1.86	0.24	6.22
Income per Capita (2000 dollars)	CHINA	13	1,084	440	615	1,866
	INDIA	13	447	71	347	554
	JAPAN	13	37,699	846	36,488	39,545
	RUSSIA	13	1,476	503	817	2,308
	BRASIL	13	3,308	396	2,778	4,033
	USA	13	33,188	1,527	29,792	34,801
	UK	13	24,345	2,248	20,325	26,896
	GERMANY	13	28,043	629	26,532	28,677
	Total	104	16,199	15,178	347	39,545
Per cent university graduates	CHINA	13	5.23	1.09	4	7
	INDIA	13	3.62	0.51	3	4
	JAPAN	13	24.62	1.98	21	27
	RUSSIA	13	11.77	0.93	10	13
	BRASIL	13	7.85	0.90	6	9
	USA	13	24.23	1.83	21	27
	UK	13	20.69	2.36	18	24
	GERMANY	13	19.31	1.97	16	22
	Total	104	14.66	8.20	3	27
Unemployment rate	CHINA	13	3.15	0.43	2.50	3.60
	INDIA	13	6.18	0.54	5.30	6.80

	JAPAN	13	3.56	0.47	2.60	4.20
	RUSSIA	13	6.22	1.46	4.50	8.90
	BRASIL	13	6.64	0.45	5.60	7.30
	USA	13	4.02	1.01	3.00	7.00
	UK	13	4.28	0.71	3.50	5.9
	GERMANY	13	6.29	0.53	5.50	7.00
	Total	104	5.04	1.54	2.50	8.90
Per cent of population age 15-24	CHINA	13	14.85	0.38	14	15
	INDIA	13	19.00	0.00	19	19
	JAPAN	13	11.77	1.24	10	14
	RUSSIA	13	16.08	0.86	15	17
	BRASIL	13	19.23	0.83	18	20
	USA	13	14.00	0.00	14	14
	UK	13	12.54	0.52	12	13
	GERMANY	13	11.46	0.52	11	12
	Total	104	14.87	2.94	10	20

Table 3. Coefficient estimates for log cigarette packs sold per age 15 and over by country using the three econometric models, namely pooled OLS, fixed effects and random effects

Variable	Pooled OLS	Fixed effects	Random effects
Log price of Cigarettes per pack in cents (*log p*)	-1.10** (0.000)	-0.03 (0.517)	-0.01 (0.788)
Log real per capita Income *(log pi)*	0.96** (0.000)	0.26** (0.000)	0.31** (0.000)
Percent university Graduates (*univ.*)	-0.074** (0.002)	-0.070** (0.000)	-0.070** (0.000)
Unemployment Rate *(unemp)*	-0.094* (0.017)	-0.011 (0.411)	-0.012 (0.344)
Age 15-24 percent (*pop1524*)	-0.161** (0.000)	-0.013 (0.379)	-0.001** (0.955)
b_o = constant	5.33** (0.000)	2.94** (0.000)	2.58** (0.000)
a_c = fixed or random effects		$a_{c\ CHI}$= 0.145 $a_{c\ IND}$=-2.366 $a_{c\ JPN}$= 1.086 $a_{c\ RUS}$= 0.975 $a_{c\ BRA}$=-0.883 $a_{c\ USA}$= 0.642 $a_{c\ UK}$ = 0.057 $a_{c\ GER}$= 0.345	$a_{c\ CHI}$= 0.249 $a_{c\ IND}$=-2.155 $a_{c\ JPN}$= 0.936 $a_{c\ RUS}$= 1.096 $a_{c\ BRA}$=-0.793 $a_{c\ USA}$= 0.526 $a_{c\ UK}$ = -0.069 $a_{c\ GER}$= 0.209
Sample size	104	104	104
R^2	0.6823	0.9919	0.5189

* Statistically significant at the 5% level.
** Statistically significant at the 1% level.

Table 4. Coefficient estimates for log cigarette packs sold per age 15 and over by country using the pooled OLS with cross-section specific coefficients*** methodology for the variables log price (log p) and log real per capita income (log pi)

Variable Pooled OLS	Country	Country variable	Coefficient	Prob
Log price of Cigarettes per pack in cents (*log p*)	CHINA	$logp_{CHI}$	-0.88**	0.0000
	INDIA	$logp_{IND}$	-0.30	0.1929
	JAPAN	$logp_{JPN}$	-0.90**	0.0087
	RUSSIA	$logp_{RUS}$	-0.50**	0.0000
	BRASIL	$logp_{BR}$	0.13**	0.0001
	USA	$logp_{USA}$	-0.48**	0.0000
	UK	$logp_{UK}$	0.08	0.8090
	GERMANY	$logp_{GER}$	-0.94**	0.0000
Log real per capita Income (*log pi*)	CHINA	$logpi_{CHI}$	0.39**	0.0000
	INDIA	$logpi_{IND}$	-0.40**	0.0044
	JAPAN	$logpi_{JPN}$	0.49**	0.0033
	RUSSIA	$logpi_{RUS}$	0.18**	0.0010
	BRASIL	$logpi_{BR}$	-0.31**	0.0000
	USA	$logpi_{USA}$	0.22**	0.0052
	UK	$logpi_{UK}$	-0.15	0.4771
	GERMANY	$logpi_{GER}$	0.48**	0.0000
Percent univerity Graduates (*univer*)			-0.034	0.0000
Unemployment rate (*unemp*)			-0.002	0.8015
Age 15-24 percent (*pop1524*)			-1.081	0.2826
b_0			5.944	0.0000
Sample size	104			
R^2	0.9978			

* Statistically significant at the 5 % level.
** Statistically significant at the 1 % level.
*** List variables with different coefficients for each member of the pool. EViews include a different coefficient for each cross-sectional unit, and label the output using a combination of the cross-section identifier and the series name.

Table 5. Coefficient estimates for log cigarette packs sold per age 15 and over by country (USA and UK) using quarterly data and the two econometric techniques, namely pooled OLS and fixed effects

Variable	**Pooled OLS**	**Fixed effects**	**Random effects*** **
Log price of Cigarettes per pack in cents (*log p*)	-0.79** (0.000) [-0.41]***	-0.26 (0.000) [-0.32]	

Log real per capita Income *(log pi)*	0.27 (0.094) [0.47]	-0.38** (0.002) [-0.57]	
Percent university Graduates (*univ*.)	-0.041** (0.000) [-0.0059]	-0.043** (0.000) [-0.0071]	
Unemployment rate *(unemp*)	-0.029** (0.004) [-0.0045]	-0.006 (0.429) [-0.0071]	
Age 15-24 percent (*pop1524*)	-0.027 (0.454) [-0.039]	0.065** (0.009) [0.016]	
b_o = constant	5.76** (0.000)	7.92** (0.000)	
a_c = fixed or random effects		$a_{c\ USA}$= 0.239 $a_{c\ UK}$ =-0.239	
Sample size	104	104	
R^2	0.9401	0.9741	

* Statistically significant at the 5% level.
** Statistically significant at the 1% level.
*** In the brackets are the coefficients estimated for the corresponding variables in the model of D. Pieper (2006), using annual data.
**** Random effects estimation was impossible, because it requires number of cross-section > number of coefficients.

Table 6. Coefficient estimates for log cigarette packs sold per age 15 and over by country (USA and UK) using quarterly data and the pooled OLS with cross-section specific coefficients*** methodology for the variables log price (log p) and log real per capita income (log pi)

Variable Pooled OLS	Country	Country variable	Coefficient	Prob
Log price of Cigarettes per pack in cents (*log p***)**	USA	$logp_{USA}$	-0.24**	0.0002
	UK	$logp_{UK}$	-0.81**	0.0008
Log real per capita income (*log pi*)	USA	$logpi_{USA}$	-0.69**	0.0005
	UK	$logpi_{UK}$	-0.34**	0.0038

Percent university graduates (*univer*)			-0.035**	0.0000
Unemployment rate (*unemp*)			-0.006	0.3741
Age 15-24 percent (*pop1524*)			-0.045*	0.0760
b_0			10.928	0.0000
Sample size	104			
R^2	0.9756			

* Statistically significant at the 10 % level.
** Statistically significant at the 1 % level.
*** List variables with different coefficients for each member of the pool. EViews include a different coefficient for each cross-sectional unit, and label the output using a combination of the cross-section identifier and the series name.