THE ECONOMICS OF TOBACCO CONTROL IN JAMAICA: WILL THE PURSUIT OF PUBLIC HEALTH PLACE A FISCAL BURDEN ON THE GOVERNMENT?

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EXECUTIVE SUMMARY

The aim of the study is to investigate the factors that determine the demand for cigarettes in Jamaica, and to quantify the likely impact of an increase in the tax on cigarettes on cigarette consumption and government revenue.

In the international literature a number of tobacco control measures have been identified, including, but not limited to, (1) increases in the tax on cigarettes, (2) legislative interventions aimed at reducing smoking in public places and workplaces, (3) restrictions on tobacco advertising and sponsorships, (4) increased awareness about the harmful effects of smoking, including pictorial warnings on packaging and advertising material, and (5) limitations on the tar and nicotine contents of cigarettes.

Of all these interventions, the international empirical literature clearly shows that the most effective and cost-effective intervention is an increase in the tax on cigarettes. An increase in the tax on cigarettes increases the retail price of cigarettes, often, because of monopolistic pricing power, by more than the increase in the tax itself. Despite the fact that nicotine is addictive, an increase in the price will reduce the quantity demanded. The price elasticity of demand for cigarettes is estimated at about –0.4 for developed countries and between –0.4 and –0.8 for developing countries. This implies that a 10 per cent increase in the real (inflation-adjusted) price of cigarettes decreases tobacco consumption by 4 per cent in developed countries and by between 4 and 8 per cent in developing countries.

Using annual data for the period 1975 to 2001, an attempt was made to estimate the price elasticity of demand for cigarettes in Jamaica. The price elasticity could not be determined accurately, because the econometric results are very sensitive to the specification of the demand equation. However, despite this drawback, the evidence indicates that the price elasticity lies between zero and –1.0, which implies that the demand for tobacco is price inelastic but certainly not perfectly inelastic. This is consistent with the international literature.
For any realistic value of the price elasticity of demand it was shown that an increase in the tax on cigarettes (1) reduces cigarette consumption, and (2) increases government revenue. On the assumption that the price elasticity of demand is \(-0.5\) and that the tobacco industry will increase the real retail price of cigarettes by the change in the real tax amount, a 10 per cent increase in the tax on cigarettes would decrease cigarette consumption by 2.1 per cent and increase government revenue from cigarette taxes by 7.7 per cent.

Until 2002 the tax burden on cigarettes was between 40 and 50 percent. This means that between 40 and 50 per cent of the retail price of cigarettes consisted of taxes. Since the levy for the National Health fund was introduced in 2003 the total tax burden has increased to slightly more than 50 per cent. The most recent tax increase (April 2005) has increased the tax burden to approximately 54 per cent. Despite the recent increases, the overall tax burden is relatively low compared to many other countries, and especially the more developed countries. In the European Union the minimum tax burden on cigarettes is 57 per cent of the retail price. Should Jamaica increase its tax burden to 57 per cent of the retail price (and assuming that the industry will keep the real industry price of cigarettes the same), this is expected to increase the real retail price of cigarettes by 12 per cent, decrease cigarette consumption by 6 per cent, and increase real government revenue by 15 per cent, compared to the values after the tax increase announced on 14 April 2005. The maximum amount of government revenue is expected to be achieved if the government sets the tax burden at around 72 per cent of the retail price. Should this happen the real retail price would be expected to increase by 75 per cent, cigarette consumption would be expected to decrease by 37 per cent, and government revenue from cigarette taxation would be expected to increase by more than 50 per cent.

This paper clearly shows that there is no trade-off between the interests of the Ministries of Finance and Health. Both will benefit from an increase in the tax on cigarettes. Given the fiscal pressures in Jamaica, it is important that increases in the excise tax are sustainable, in the sense that golden goose does not get killed in the process of raising the
excise taxes. For the sake of transparency and policy predictability it is proposed that the government publicly announces its excise tax strategy and indicates to all role-players how it intends to achieve the tax target. A piecemeal, rather than a “big-bang” approach to raising the excise taxes is proposed. However, a strategy that simply aims to raise the excise tax in line with the inflation rate will certainly not achieve the target of raising real government revenue and/or reducing cigarette consumption.

International experience has shown that the tobacco industry will strongly oppose any attempt that undermines the profitability of the industry. While their arguments might be perceived by some to be based on sound economic principles, they can be easily countered. The single biggest ingredient of an effective tobacco control strategy is the political will to stand against the interests of a powerful and influential industry.
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1. INTRODUCTION

Tobacco related illnesses resulted in approximately 4 million deaths worldwide in 2003. By 2030 the expected annual death toll is expected to rise to 10 million, of which seven million are expected to be in developing countries (World Bank, 1999). The human suffering caused by smoking is immense.

Tobacco use has been causally linked to a large number of cancers, heart disease and lung disorders (particularly emphysema). Epidemiological research indicates that for every four regular smokers, on average one will be killed by their habit before age 69 and another in old age (i.e. after age 69) (Gajalakshmi, et al, 1999: 34). For those people who die before age 69, it has been estimated that they lose, on average, approximately 20 life years because of smoking.

The addictiveness of nicotine has been well established. Studies in developed countries (USDHHS, 2000: 97 and Jha, et al., 2000a: 158) have shown that a majority of current smokers want to quit the habit, but find it very difficult to do so.

International agencies like the World Health Organisation (WHO) have placed tobacco control high on the agenda. Through its Tobacco Free Initiative, the WHO has initiated the Framework Convention on Tobacco Control (FCTC). The FCTC was unanimously accepted in May 2003 and has recently come into effect with the ratification of the treaty by the fortieth country. In an increasingly integrated world, an integrated response to the challenge of increasing global tobacco consumption is required. The FCTC aims to lay down certain minimum standards in tobacco control that signatory countries would make part of their domestic legislation.

Specifically, the FCTC aims to reduce the consumption of tobacco through the following measures aimed at reducing the demand:

- Price and tax measures;
- Protection from exposure to environmental tobacco smoke;
• Regulation and disclosure of the contents of tobacco products;
• Packaging and labelling;
• Education, communication, training and public awareness;
• A comprehensive ban on tobacco advertising, promotion and sponsorship; and
• Measures to encourage smokers to quit smoking (Shibuya, et al., 2003).

The FCTC aims to curb the supply of tobacco through the following means:
• Eliminating the illicit trade of tobacco products;
• Restricting the sales of tobacco to and by minors; and
• Supporting economically viable alternatives for tobacco growers (Shibuya, et al., 2003).  

The FCTC has been vigorously opposed by the tobacco industry. One can understand their opposition, given that their vested interests are being threatened. In fact, the tobacco control debate sometimes is presented as a struggle between the public health interests of the medical community and the commercial interests of the tobacco and related industries. The tobacco industry often presents itself as an economically important industry, employing many people, and providing the government with much-needed revenue.

While this may be true, the industry tends to ignore the fact that its product causes not only non-economical costs on its users (e.g. pain and suffering and grief of relatives), but because of premature mortality and increased morbidity also places a heavy economic burden on society. Rather than focusing on the gross contribution of the industry on society, a more realistic assessment would be to consider the net contribution. A number of studies (see SAMRC, 1988 and 1992, Chaloupka, Jha and Peck, 1998 and Peck, et al.,

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1. In the tobacco control community there is a growing consensus that demand-side interventions are generally more successful than supply-side interventions (although smuggling control is regarded as particularly important). The reason is that if there is a demand for a product, somebody is going to produce the product to meet the demand. If the demand shrinks, the supply will automatically follow. The aim of the FCTC is not to curb supply, hoping that this would decrease the demand for cigarettes, but rather to have a programme in place to help farmers to switch to other produce once there is a noticeable reduction in tobacco demand.
1999) have performed cost-benefit analyses and the results suggest that the cost of smoking to society outweighs the benefits.

The economic rationale for levying an excise tax on cigarettes is based on the fact that the social costs of smoking are greater than the private costs. According to Townsend (1996: 138) a number of principles underlie the imposition of an excise tax: Firstly, taxes are imposed to correct for externalities (i.e. to increase the private cost of smoking so that it equals the social cost). Secondly, an excise tax on tobacco is a particularly useful way to generate government revenue. Given the relatively low price elasticity of demand (discussed in section 4) the Ramsey rule suggests that cigarettes are more suitable than many other consumer goods as an object of taxation. Thirdly, the tax can be levied to deter tobacco consumption (i.e. the tax is a sumptuary tax). It is a popular tax in many countries, indicated by the fact that a majority of people, including a sizeable proportion of smokers, support excise tax increases.

The aim of this paper is to investigate the economics of tobacco control in Jamaica. The focus will be primarily on the role that an increase in excise taxes has on the price of cigarettes and the demand for cigarettes. Empirical estimates of the sensitivity of the demand for cigarettes to a change in the price of cigarettes will be provided. Also, the implications of a tax increase on the Jamaican government’s revenue will be discussed. As will be pointed out in this paper, the empirical literature is practically unanimous that an increase in tobacco excise taxes is the most effective way of reducing cigarette consumption. A secondary focus of this paper is to investigate other factors that have an impact on the demand for cigarettes. The analysis will draw heavily on the experiences of other developed and developing countries.
2. THE ROLE OF TOBACCO IN THE JAMAICAN ECONOMY

In Table 1 below some macroeconomic and tobacco related trends are shown for Jamaica for the period 1972-2001. From a macroeconomic perspective the past three decades have been difficult for Jamaica. Although the rapid decrease in the GDP per capita during the early and mid-1970s has been stemmed, the period since 1980 has been characterised by economic stagnation, rather than economic growth. Also, the country has been subject to some bouts of high inflation. Fortunately, inflation has been brought under control in the past five years.

Per capita consumption of cigarettes has decreased by between 50 and 60 per cent since the early 1970s. Aggregate cigarette consumption has decreased by about a third, despite the fact that the Jamaican population has increased by 65 per cent between 1972 and 2001.

The prices quoted in the tables in this study are obtained from official sources, and are presumably derived from the list prices of the wholesalers and supermarkets. The true average retail price of cigarettes is likely to be more than the officially quoted price. However, the official statistics are the ones that are used in this study, otherwise the data become untraceable.

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2. The data in this table closely corresponds to the per capita cigarette consumption figures published in the second edition of the Tobacco Control Country Profiles, published in 2003. The per capita consumption figures for 1980, 1990, 1995 and 2000 from the Country Profiles were as follows (this table’s data in parentheses): 952 (940), 879 (865), 742 (732), and 565 (562).
Table 1: Some important macroeconomic and tobacco control related data in Jamaica, 1972-2003

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Annual average growth rate

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<td>1995-2000</td>
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<td>2000-2003</td>
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* 1974-1980

** Estimate, based on extrapolation of population and 11 months of data for 2004

*** Estimate, based on extrapolation of first nine months of 2003

Sources: Data for 1972 to 2001 are taken from the IMF’s International Financial Statistics and Ministry of Finance, data for 2002 and 2003 are taken from Economic and Social Survey Jamaica 2003.
From a tobacco control perspective this long-term decrease in cigarette consumption has been most encouraging. Two questions that arise from this are the following:

1. Why has there been such a rapid decrease in cigarette consumption in Jamaica in this 30-year period?
2. Is it possible that smokers have converted their consumption patterns to other forms of tobacco and to cannabis, rather than cigarettes?

Consider the first issue, i.e. why there has been such a rapid decrease in the demand for cigarettes in Jamaica. In section 4.1 a review of the international empirical literature on the determinants of the demand for cigarettes is provided, in which it will be pointed out that the empirical literature is overwhelming in its conclusion that the two most important determinants of the demand for cigarettes are the price of cigarettes and income levels. In Figure 1 the empirical relationship between Jamaica’s per capita cigarette consumption and per capita income is shown in the form of a scatter plot. The relationship between these two variables is clearly positive. In Figure 2 the relationship between the real price of cigarettes and per capita consumption is shown. The strong negative relationship between cigarette consumption and its real price is demonstrated.

An analysis of Table 1 indicates that the real price of cigarettes has been increasing steadily throughout the three decades under consideration. From a tobacco control perspective and from the perspective of the Ministry of Finance, it would be interesting to know whether the increase in the real retail price of cigarettes can be ascribed to increases in the real excise tax or to increases in the proportion of the retail price that accrues to the tobacco and related industries. A cursory investigation of cigarette excise duty and consumption duty revenues of the 1970s and 1980s suggests that an increase in the real tax on cigarettes was not primarily responsible for an increase in the real retail price in the 1970s and 1980s. However, no data are available for the period 1990 to 1997, so one

3. The real price is discussed in more detail in section 4.1. To derive the real price of a product one removes the impact of inflation on the price of that product.
4. The Jamaican Ministry of Health supplied some tentative data on revenues obtained from excise duty and consumption duty for the period 1974 to 1990. From these data the average tax per pack of cigarettes was calculated. Given the large changes in the price level during some of these years, the real values are likely to suffer from some distortion. However, keeping these caveats in mind,
cannot say anything about this period. It seems that the main explanation for the increase in the real price of cigarettes in Jamaica is not an increase in taxes, but rather an increase in that proportion of the retail price that is received by the cigarette manufacturing industry and all related industries (such as wholesalers, retailers and distribution agencies). In an industry with substantial market power, it is to be expected that the industry would use this power to increase the profitability per unit sold, in order to compensate for the decrease in demand. This issue is discussed in more detail in section 4.1 (a).

In section 4.2 the relationship between Jamaica’s cigarette consumption and its determinants are investigated more rigorously by means of multiple regression analysis.

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an analysis of the long-term trend in the real tax suggests that the real tax per pack of cigarettes has not shown any long-term upward trend for the period 1974 to 1990. However, there have been some cycles in the real tax in this period as shown in the graph below.
Figure 1: Per capita cigarette consumption vs. per capita GDP, Jamaica, 1974-2001

Figure 2: Per capita cigarette consumption vs. the real price of cigarettes, Jamaica, 1974-2001
While changes in consumers’ income and changes in the real price of cigarettes have had a pronounced impact on the demand for cigarettes, changes in the prices of and demand for substitutes to cigarettes could also have had an impact on the demand for cigarettes. In Jamaica the most common substitutes to cigarettes are marijuana and since recently, bidis. Roll-your-own tobacco, chewing tobacco and snuff are not consumed in significant quantities. Cigars are sometimes smoked at special occasions, but the quantities are limited.

A component of the explanation of the decline in cigarette consumption over the past three decades may well be the increased use of marijuana (ganja) and to a lesser extent, other recreational drugs. Marijuana is illegal in Jamaica and obtaining accurate data on its consumption is very difficult. It is not expensive. According to the National Council of Drug Abuse (NCDA) the smallest quantity of marijuana (approximately equal to the tobacco content of a cigarette) is currently (April 2005) about J$20, whereas single sticks of cigarettes were being sold at J$10 before 15 April 2005, and at J$12 after that date. A NCDA survey among school children (ages 10 - 18 years) found that the usage rate of marijuana increased from 20 per cent in 1987 to 27 per cent in 1997. Over the same period the use of tranquillisers also increased from 3.8 per cent to 5.5 per cent (Spokesperson of the NCDA, personal communication). The survey did not investigate whether changes in the price of tobacco had an impact on the increased use of the other drugs.

5. A recent study by the University of the West Indies, requested by the Jamaican Ministry of Health, concluded that the use of marijuana should be decriminalised. This thinking is not unique to Jamaica. Very credible anti-tobacco lobbyists have argued for the decriminalisation of marijuana in the past. The rationale is apparently that marijuana is less addictive than tobacco, and by decriminalising it the government can control it better. This is a complex ethical and public health matter, and is made more complex by the fact that marijuana use has important religious uses in Jamaica. In order not to remove the focus from tobacco control, the issue of marijuana use is admitted, but is not discussed further in this paper.

6. While the tobacco industry might argue that a reduction in tobacco consumption might “force” people to use other more dangerous drugs, there is evidence that cigarettes are “gateways” to the more dangerous drugs. If this is true for Jamaica as well, by removing the gateway, the usage of other drugs could be curbed as well.
3. **Cigarette Taxes in Jamaica**

As in most countries, cigarettes sold in Jamaica are subject to excise and other taxes. The composition of the tax burden is more complex than in many other countries. In Jamaica domestically produced cigarettes are subject to the following taxes: 7

- **Special Consumption Tax (SCT):**
  - J$128.61 per 100 cigarettes, which was increased to J$ 192 per 100 cigarettes on 14 April 2005;
  - an ad valorem tax of 39.9 % on cigarettes in excess of a benchmark value of J$252.39 per 100 cigarettes. The benchmark value was increased to J$433.81 on 14 April 2005;
- “Excise levy” payable to the National Health Fund: 23 % of the sum of the ex factory price and the SCT, payable by the cigarette manufacturers since April 2003; and
- **General Consumption Tax (GCT):** 15 %, which was increased to 16.5 % on 14 April 2005.

The tax is levied in three stages. The SCT is levied on the ex works price. Although provision is made for both a specific and an ad valorem tax, in practice very little revenue is raised through the ad valorem component of the SCT. With the benchmark value being increased sharply on 14 April 2005, the ad valorem component will become even less significant. The excise tax, payable to the NHF, is levied on the sum of the ex works price and the SCT. The GCT is levied on the total of the ex works price, SCT and excise tax.

A peculiar feature of the Jamaican cigarette market is the large percentage of cigarettes that are sold as single sticks. According to the director of the NHF, around two thirds of cigarettes in Jamaica are sold as single sticks. The retail price, before the tax adjustment announced on 14 April 2005, was a convenient J$10 per stick. In the past the price was

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7. Imported cigarettes are subject to an additional import duty of 30 per cent, as well as all the other taxes listed in this section.
slightly less than J$10 per stick, but “change” was often given in the form of a sweet or two, rather than money. The cigarette retail outlets consist of thousands of informal traders, who buy their cigarettes at industry-operated wholesale outlets or supermarkets. They do not pay GCT on their mark-up. The recommended retail price of single cigarettes increased to J$12 after the tax increase of 14 April 2005.

In Table 2 the implication of the changes in both SCT and GCT, announced on 14 April 2005, on the overall tax structure on cigarettes is presented. For the sake of comparability a wholesale price of J$375 is assumed.

Table 2: The tax structure of cigarettes before and after the tax changes of 14 April 2005

<table>
<thead>
<tr>
<th></th>
<th>Before tax adjustment</th>
<th>After tax adjustment</th>
<th>After tax adjustment with change in base price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base price (100 cigarettes)</td>
<td>375.00</td>
<td>375.00</td>
<td>450.00</td>
</tr>
<tr>
<td>SCT (specific)</td>
<td>128.61</td>
<td>192.00</td>
<td>192.00</td>
</tr>
<tr>
<td>SCT (ad valorem)</td>
<td>48.92</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Subtotal 1</td>
<td>552.53</td>
<td>567.00</td>
<td>642.00</td>
</tr>
<tr>
<td>Excise tax</td>
<td>127.08</td>
<td>130.41</td>
<td>147.66</td>
</tr>
<tr>
<td>Subtotal 2</td>
<td>679.61</td>
<td>697.41</td>
<td>789.66</td>
</tr>
<tr>
<td>GCT (15 % before 14 April; 16.5 % after)</td>
<td>101.94</td>
<td>115.07</td>
<td>130.29</td>
</tr>
<tr>
<td>Tax-inclusive price</td>
<td>781.56</td>
<td>812.48</td>
<td>919.95</td>
</tr>
<tr>
<td>Total tax amount</td>
<td>406.56</td>
<td>437.48</td>
<td>469.95</td>
</tr>
<tr>
<td>Tax burden (Tax/Tax-inclusive price)</td>
<td>52.0</td>
<td>53.9</td>
<td>51.1</td>
</tr>
</tbody>
</table>

Source: Ministry of Finance and Planning: Tax measures 2005/06, 14 April 2005

The tax-inclusive price is the price at which informal retailers will generally buy their goods. At a selling price of J$10 per cigarette they would make a profit of J$2 per cigarette. Keeping the base price the same the tax adjustments are expected to raise the level of the tax by approximately 8 per cent (comparing columns 1 and 2 of Table 2). According to the figures presented here, the tax burden is expected to increase from 52 per cent to 53.9 per cent.
However, the increase in the SCT allowed the tobacco industry to increase the recommended retail price of cigarettes by significantly more than the increase in the amount of the tax. According to an advertisement by Carreras in The Gleaner of 15 April 2005 the recommended retail price of a pack of Craven “A” increased to J$220 per pack, compared to J$180 before. It is evident that the increase in the tax on cigarettes allowed the industry to increase the base price. The public backlash against the increase in the retail price is likely to be muted, since the tobacco industry could easily pass the blame to the government’s decision to raise the tax on cigarettes. The implication of this increase in the recommended retail price of cigarettes was to (1) increase the absolute amount of tax paid per cigarette and (2) decrease the tax as a percentage of the retail price. On the assumption that the base price increased by 20 per cent, column 3 of Table 2 indicates what the impact of this industry move will be on the tax structure of cigarettes. In Appendix B the price impact of the tax increases of 14 April 2005 is discussed in some detail.

Historically cigarette taxation has been an important source of government revenue, responsible for between 2 and 4 per cent of total revenue. Furthermore it is a very easy tax to collect and administer, with a small number of collection points. The tobacco industry, to their credit, has been very prompt in the payment of the taxes. In fiscal year 2002/03 the government of Jamaica raised J$ 2.13 billion in the form of cigarette taxes. Of this amount J$ 1.49 billion (69.9 per cent) was raised in the form of SCT and J$ 0.64 billion (30.1 per cent) in the form of GCT.

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8. In an earlier draft of the paper a table was included which indicated the amount of taxes that had been paid to the Jamaican government by the tobacco industry for the period 1997 to 2001. This data had been supplied to the Ministry of Health by the tobacco industry. An attempt to extend this data to 2002 and 2003, using data obtained by the Ministry of Finance, revealed that the data of the two periods were incompatible. The tax revenue numbers quoted by the tobacco industry for 1997 to 2001 were significantly higher than the tax revenue numbers for the subsequent two years, despite the fact that the tax per cigarette increased sharply and cigarette consumption decreased only modestly. While it is possible that the tobacco industry used a more encompassing definition of tax (e.g. including income tax on employees) than the Ministry of Finance, this discrepancy does underline the point that the tobacco industry has an incentive to emphasise, and even to exaggerate, its fiscal contribution. To prevent unnecessary confusion about trends in government revenue from tobacco taxes, this previously published table has been removed from this report.
The excise tax was introduced in April 2003 and had a profound impact on government revenue. Despite a 14 per cent decrease in local cigarettes production, total tax revenue increased by nearly 50 per cent to J$ 3.19 billion in fiscal year 2003/04. The composition of the tax revenue changed quite considerably, as one would expect. Of the J$ 3.19 billion, J$ 1.42 billion (44.6 per cent) was raised as SCT, J$ 1.01 billion (31.6 per cent) as excise tax and J$ 0.76 (23.8 per cent) as GCT.

At the time of writing this report (April 2005) the tax revenue data for fiscal year 2004/05 were not yet available. However, based on an extrapolation of the first seven months of fiscal year 2004/05 (compared with the same period in FY 2003/04) total tax revenues for fiscal year 2004/05 are likely to be about 10 per higher than the previous year. Using the same methodology, cigarette production (and presumably consumption) is estimated to increase by somewhat less than 10 per cent. The fact that the government of Jamaica did not increase the taxes on cigarettes in fiscal year 2004/05, meant that some of the health gains obtained in fiscal year 2003/04 were lost.

To summarise this section, it is clear that the government of Jamaica (and specifically the Ministry of Finance) has seen the benefit of raising the tax on cigarettes. This has also had beneficial public health consequences. However, the fact that the tax formula is quite complex (especially the two tiers of the SCT) makes it possible for the industry to obfuscate the true level of taxation. This issue is discussed in some detail in Appendix B.
4. DETERMINANTS OF CIGARETTE DEMAND

4.1 An international perspective

So what determines the demand for tobacco products? Standard microeconomic theory typically identifies the following determinants of the quantity demanded of any product:

- Price of the product;
- Income;
- Prices of related products (i.e. substitutes and complements); and
- Tastes and preferences.

In the international tobacco control literature a number of additional demand factors have been identified. These include the following:

- Legislative interventions aimed at reducing smoking in public places and workplaces;
- Advertising expenditure and restrictions on advertising; and
- Increased awareness of the risks of smoking (e.g. the publication of the Royal College of Physicians Report in 1962 and the US’s Surgeon-General Report in 1964, other “health scares”, and counter-advertising).

From a policy perspective it is useful to know which interventions are effective and which are not. In the following sections each one of these determinants of smoking will be discussed, based on a representative sample of international experience.

a) Price of cigarettes

Of all the tobacco control interventions, by far the most effective one is increasing the price of cigarettes. According to the most well-known relationship in microeconomics - the law of demand - the quantity demanded of a typical product will decrease as the price of that product increases. But does the law of demand apply to an addictive product like cigarettes? There was a period where it was believed that addictive goods are not subject
to the law of demand, because people will buy these goods, irrespective of the price (see studies quoted in Chaloupka and Warner, 1999: 4). However, despite its addictive nature, dozens and even hundreds of empirical studies have found that the quantity demanded of cigarettes is negatively related to its price (see Chaloupka and Warner, 1999, Van der Merwe, 1998, Van Walbeek, 2005 and the USDHHS, 2000 for some surveys).

The price elasticity of demand is a useful concept to quantify by what percentage the quantity demanded is likely to decrease in reaction to a 1 per cent increase in the price. There is a growing consensus among economists that the price elasticity of demand for cigarettes is around \(-0.4\) for developed countries and between \(-0.4\) and \(-0.8\) for developing countries (World Bank, 1999). What this implies is that for every 10 per cent increase in the price of cigarettes, the quantity of cigarettes demanded will decrease by about 4 per cent in developed countries and by between 4 and 8 per cent in developing countries.

A proviso is important. If the average price level in an economy is rising at a rate of, say, 10 per cent, and the price of cigarettes also increases by 10 per cent, then cigarettes have not become relatively more expensive. In a case like this, the real price of cigarettes has remained the same, despite the fact that the nominal price has increased by 10 per cent. The quantity demanded is not likely to change, because the affordability of cigarettes has not changed. Thus when considering changes in the price of cigarettes one should consider the real price, rather than the nominal price.

Through what mechanism does an increase in the real price of cigarettes cause a reduction in the quantity of cigarettes consumed? There are basically three ways:

1. Smokers decide to quit,
2. Current non-smokers decide not to initiate smoking, and
3. Smokers smoke less.

The first mechanism (i.e. smokers deciding to quit) applies mainly to adults, while the second mechanism (i.e. non-smokers not initiating smoking) applies more to teenagers.
than adults. The third mechanism (i.e. a reduction in the number of cigarettes smoked by smokers) seems to apply to all smokers. Using data obtained from comprehensive household surveys, researchers in the US, and more recently in a number of East Asian countries have attempted to determine the relative importance of these three mechanisms in using an excise-led price change in decreasing cigarette consumption (Lewit and Coate, 1981, Wassermann, et al, 1991, Chaloupka and Grossman, 1996, Chaloupka and Wechsler, 1997, Mao, et al., 1999, Kyaing, 2003, and Karki, et al., 2003).

There is strong evidence that teenagers are far more price sensitive than adults. In fact, the price elasticity of demand (in absolute terms) of teenagers is about twice that of adults (Chaloupka and Grossman, 1996 and Chaloupka and Wechsler, 1997). The implication for tobacco control is that excise tax increases are thus more effective in preventing teenagers to start smoking, than in causing adult smokers to quit.

In most countries cigarettes are heavily taxed, often through a variety of taxes. In the European Union the minimum tax on cigarettes is 57 per cent of the retail price, but in some countries, notably the United Kingdom, Denmark and Norway, more than 75 per cent of the retail price is comprised of taxes (Chaloupka, et al., 2000: 239-240).

By increasing the tax on cigarettes the government has a direct impact on the retail price of cigarettes. The empirical evidence indicates that an increase in the excise tax is fully passed on to consumers. In fact, in the US there is evidence that a given increase in the excise tax (which is levied as a specific tax, i.e. a certain amount per cigarette) increases the retail price of cigarettes by a greater amount than the initial tax increase (see Chaloupka, et al., 2000: 238-242). The tobacco industry, in order to maintain its profitability, has the incentive to make a larger profit per cigarette, in order to compensate for the decrease in the number of cigarettes sold. Because the tobacco industry is highly concentrated in all countries, it has the economic power to do this. In Jamaica, where the tobacco industry is a virtual monopoly, the Cigarette Company of Jamaica would be able to unilaterally increase the retail price by more than the increase in
the tax on cigarettes. In fact, the most recent tax increase in Jamaica has resulted in a substantially amplified increase in the retail price of cigarettes.

In South Africa a similar trend was found. Between 1993 and 2002 the increase in the real retail price was approximately double the increase in the real (specific) excise tax (ETCSA, 2003). Through this strategy, the profit per cigarette increased dramatically. The result of this strategy is that the cigarette industry in South Africa was more profitable in 2002 than in 1993, despite the fact that the quantity of cigarettes sold decreased by about a third over that period. Thus, to summarise, by increasing the excise tax on cigarettes, governments can increase the retail price by at least the amount of the tax increase, but more generally the effect of the tax increase is amplified. Of course, this has very positive public health consequences.

The tax can be levied in a number of ways. The two most common methods are a specific tax (a tax levied as a specific amount per cigarette) or an ad valorem tax (a tax levied as a percentage of some specified value). Within these two categories a number of refinements are possible, specifically on how the tax authorities define the base on which they wish to levy the tax. The definition of the tax base has an effect on the likely industry behaviour and the public health outcomes. In Table 3 below a number of methods for levying the tax are shown (the categories are not mutually exclusive), together with the impact that it might have on manufacturers and on public health.
Table 3: Different ways of levying taxes on cigarettes

<table>
<thead>
<tr>
<th>Tobacco tax</th>
<th>Effect on industry</th>
<th>Public health impact</th>
<th>Government revenue impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>By weight of tobacco</td>
<td>Manufacturers reduce size of cigarettes</td>
<td>Beneficial</td>
<td>Beneficial, especially if tax is levied as a specific tax</td>
</tr>
<tr>
<td>By cigarette</td>
<td>Manufacturers increase size of cigarettes</td>
<td>Detrimental</td>
<td>Beneficial, especially if tax is levied as ad valorem tax</td>
</tr>
<tr>
<td>Specific tax</td>
<td>Manufacturers influence is limited, but inflation may erode high</td>
<td>Beneficial if high</td>
<td>Beneficial if high, but inflation may erode the tax</td>
</tr>
<tr>
<td>Ad valorem</td>
<td>Manufacturers keep base level low</td>
<td>Limited benefit</td>
<td>Beneficial if high; inflation cannot easily erode the tax</td>
</tr>
<tr>
<td>Low tax on non- cigarette products</td>
<td>Smokers switch to substitutes to cigarettes</td>
<td>Limits benefits of the tax</td>
<td>Detrimental, since smokers will switch to substitutes</td>
</tr>
</tbody>
</table>

Sources: Townsend, 1996, for first three columns; authors’ interpretation for fourth column.

While a specific tax has the potential for the highest public health benefit, it suffers from the distinct drawback that it can easily be eroded in times of inflation. Jamaica has had bouts of high inflation in the past, but even moderate inflation will erode the excise tax quite quickly if the government does not adjust the tax rate on a regular basis. In South Africa the real excise tax decreased by 60 per cent between 1980 and 1990, because the government did not regularly adjust the tax rate in a period when the inflation rate averaged 15 per cent per year (ETCSA, 2003: 52).

Critics of using excise tax increases as a mechanism for tobacco control have argued that the tax falls disproportionately heavily on the poor, implying that the tax is regressive. Regressive taxes are perceived as unfair and socially inequitable. While the empirical evidence shows that this criticism is valid, i.e. the tobacco excise tax is regressive (Townsend, 1987 and Townsend, et al., 1994), tobacco control economists argue that the solution is not a reduction in the excise tax. Quite the opposite. Even though the level of the excise tax is regressive, increases in the excise tax will reduce the degree of
regressivity. The explanation lies in the fact that the poor are much more responsive to price changes than the rich (Chaloupka, 1991, Townsend, et al., 1994 Onder, 2002 and Arunatilake and Opatha, 2003). Thus, a given increase in the price of cigarettes will result in a more pronounced decrease in cigarette consumption among the poor than among the rich. On the other hand, the rich are much less likely to give up smoking as a result of an increase in the price of cigarettes than the poor. The net effect is that the absolute burden of the tax (i.e. the tax amount, expressed as a percentage of household income) may increase for both the poor and the rich, but the increase for the rich will be much greater than for the poor, given that the poor (as a group) are more likely to reduce their consumption.

\[(b) \quad \text{Income}\]

Other than price, consumers’ income is hypothesised to be an important determinant of the demand for any product. Empirical studies on the demand for tobacco, based on time series data, tend to find that income is an important explanatory variable in the demand equation (see survey in Van Walbeek, 2005). Based on time series data, the coefficient in the income variable is practically always positive, indicating that as the average level of income increases, tobacco consumption increases. Thus, tobacco is a normal product. However, there is no consensus in the literature on the magnitude of the income elasticity of demand,\(^9\) other than that it is positive.

The implication of this result is that economic growth has got detrimental tobacco control consequences. Of course, few, if any, would argue that an economy should not be allowed to grow because of the impact that economic growth has on the demand for cigarettes. Nevertheless, this aspect should be borne in mind, especially in countries that are experiencing rapid economic growth. Governments that are serious in curbing the consumption of tobacco can prevent an increase in the demand for tobacco (caused by a growth in average income levels) by making cigarettes less affordable. In order to keep

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\(^9\) The income elasticity of demand is defined as the percentage change in the quantity demanded as the result of a one per cent increase in people’s (real) income.
per capita cigarette consumption constant, the government should, by raising the excise tax, cause an increase in the real price of cigarettes using the following formula:

$$\%\Delta P = \%\Delta Y \times \varepsilon_Y / \varepsilon_P$$

where $\%\Delta P$ is the percentage change in real price, $\%\Delta Y$ is the percentage change in per capita income, $\varepsilon_Y$ is the income elasticity of demand and $\varepsilon_P$ is the price elasticity of demand.

For example, if per capita income is growing by 5 per cent in real terms, the income elasticity of demand is 0.6 and the price elasticity of demand is –0.5, then the real price would have to increase by 6 per cent to neutralise the impact of the economic growth on tobacco demand.

While the relationship between an increase in income and tobacco consumption is positive in general, empirical studies based on household survey data suggests that the income elasticity of demand can vary quite significantly for different income groups (Van Walbeek, 2005). Overall, empirical studies show that poorer people’s tobacco consumption is more sensitive to a change in income than richer people (Nasser, 2003). In fact some studies (see Van Walbeek, 2005) have found that an increase in rich households’ income may, in fact, cause a reduction in cigarette consumption. For households like these, cigarettes are inferior products.

**(c) Prices of related products**

There are a number of potential substitutes for cigarettes. In many countries roll-your-own tobacco, pipe tobacco, snuff and cigars are used as substitutes for tobacco. In many Southern and Eastern Asian countries tobacco can be consumed in the form of *bidis*, *kretaks*, and water pipe, to name a few. There are also illegal substitutes to tobacco, in particular marijuana. The relative popularity of non-cigarette nicotine substitutes is often subject to local customs and traditions. For example, marijuana use is endemic in
Jamaica. As another example, the proportion of roll-your-own cigarettes in total cigarette consumption is much higher in the Netherlands than in other European countries. This difference cannot be ascribed to higher than average cigarette prices or lower than average income levels in the Netherlands. It is simply a Dutch peculiarity.

In specifying an empirical demand equation for cigarettes, one should include the price of substitutes in the regression equation, to account for the fact that a change in the price of a cigarette substitute may have a significant impact on the demand for cigarettes. However, in most econometric studies this is not done. The probable reason is that, because the price of cigarettes is often highly correlated with the price of the cigarette substitute, the regression equation suffers from an unacceptably high degree of multicollinearity. The usual result is than that the highly correlated variable (i.e. the price of the cigarette substitute) gets excluded from the equation.

Intuitively, it is plausible that people will shift to cheaper substitutes if their cigarettes become unaffordable. These substitutes can either be cheaper brands or alternative products like bidis or roll-your-own tobacco. A study on the smoking behaviour of different income groups in South Africa has clearly shown that the poorest 25 per cent of the population have dramatically reduced their consumption of cigarettes in reaction to sharp increases in the price of cigarettes since the mid-1990s. However, there has been a sizeable increase in the consumption of roll-your-own tobacco among these poor households, although not so large as to neutralise the rapid decrease in the consumption of cigarettes (Van Walbeek, 2005).

The policy implications that follow from this discussion are quite clear. When the government decides to increase the excise tax on cigarettes, it should increase the tax rate on cigarette substitutes as well. Given that the price of the substitutes, even after the across-the-board tax increase, will be lower than the price of cigarettes, some substitution is inevitable, but at least the effect is minimised.
One could argue that there are possibly complements to tobacco as well. Research by Jimenez and Labeaga (1994) suggests that there is a close correlation between tobacco and alcohol consumption. Their research suggests that increases in the tax on alcohol may reduce tobacco consumption. However, the causality in their analysis is not clear, and the correlation could possibly be spurious. Nevertheless, in future studies this aspect may become more important.

(d) Tastes and preferences

Although tastes and preferences are generally regarded as important determinants of the demand for a product, they are usually very difficult to model empirically. In practically all developed countries and in many developing countries smoking has become increasingly socially unacceptable among many people. There are a number of reasons for this: the greater awareness of the harmful impact of environmental tobacco smoke, greater awareness about the overall medical impact of smoking, active lobbying of non-smokers’ rights associations for smoke-free air, and the vilification of the tobacco industry, through, amongst others, the filming of The Insider and the publication of incriminating industry documents in the popular press and on the Internet, etc.

In empirical work it is very difficult, if not impossible, to distinguish the impact of changing tastes on the demand for cigarettes, separate from other influences. Studies that incorporate tastes and preferences in their regression equations tend to use a time trend, and assume, rather heroically, that tastes and preferences change slowly but consistently over time (Townsend, 1987, Stewart, 1993b, and Onder, 2002). While this is not very satisfactory, the fact of the matter is that there are usually no better alternatives, other than ignoring tastes and preferences altogether. As a matter of econometric practice, one would only include a variable for tastes and preferences when all other demand determinants have been adequately incorporated in the regression equation.
(e) Legislative interventions

Legislative interventions can take a number of forms, the common ones being the following:

- Restricting smoking in public and work places,
- Restricting the advertising of tobacco and/or sponsorships by tobacco companies (see section (f)),
- Printing health warnings on the packets, and
- Regulating and disclosing the contents of tobacco products.

Studies in the US have found that legislation aimed at restricting smoking in public areas (e.g. shopping malls, restaurants and bars) have had a significant impact on the overall smoking prevalence in places where such laws were enforced (see survey in Chaloupka and Warner, 1999: 37). However, the magnitude of the impact of this intervention on cigarette consumption is nevertheless modest in comparison to, for example, a sizeable increase in the excise tax.

Experience from around the world has shown that measures aimed at restricting smoking in public places and restricting/banning advertising attracts ferocious opposition from the industry. The tobacco and related industries (mainly the hospitality industry) fear that restrictions on smoking in public places will seriously harm the hospitality industry. Studies sponsored by the tobacco industry on the likely impact of such restrictions on the hospitality industry generally paint a very gloomy picture. However, an ex post study by Glantz and Charlesworth (1999) found that the hospitality industry is either unaffected by such restrictions, or may even be positively affected.

10. For example, when the legislation on smoke-free restaurants was debated in South Africa in 1998, the hospitality industry claimed that restaurants would lose as much as 38 per cent of their revenues as a result of this legislation, based on a survey that was done by the industry body (see Malan and Leaver, 2003, for a good chronology of the imposition of tobacco control interventions in South Africa, and the debates that took place between pro- and antagonists). Given that the smoking prevalence percentage among South African adults is between 25 and 30 per cent, this would imply that the clean air legislation would cause all smokers and a substantial percentage of non-smokers to never visit a restaurant again. It does not require great insight to realise that these claims are seriously exaggerated and clearly misleading.
Most countries require the tobacco-manufacturing firms to print health warnings on their packaging and advertising material (where advertising is allowed). The size and wording of these warnings differ from country to country. Recently Canada and Brazil have passed legislation forcing the tobacco industry to place pictorial warnings on the packaging and including a detailed description on the way that smoking impacts health, rather than having a rather bland warning like “Smoking causes cancer” or “Smoking seriously harms your health”. According to Murray Kaiserman, who was involved in implementing the new regulations in Canada, public knowledge on the medical impact of tobacco has improved dramatically as result of these new warnings (personal communication). However, as yet, the impact of these pictorial warnings on the quantity of cigarettes smoked in Canada and/or Brazil has not been established.

Empirically it is difficult to establish the magnitude of the impact of certain legislative interventions on the demand for tobacco. Where estimates of these magnitudes have been obtained, these are generally quite modest, as mentioned above. Does this mean that legislation aimed at reducing tobacco smoking is not worth pursuing? Certainly not.

Even though the impact of tobacco control legislation on the demand for tobacco is limited in econometric studies, the main contribution of such legislation is that it changes societal norms and customs. It helps to denormalise tobacco. Without such legislation, smoking is perceived as acceptable and normal. In such a society there is often an implicit understanding that non-smokers will “put up with” the smoke that is caused by smokers. It would be regarded as bad manners if a non-smoker enforces his rights by asking smokers do extinguish their cigarettes. Legislation that prohibits smoking in public places (and also workplaces) has a significant effect on property rights.  

11. Property rights have a specific meaning in economics. For privately owned goods (not only fixed property) the owner has the property right to those goods, and can do with those goods what he pleases, e.g. rent it out, use it, sell it and even destroy it. For goods that are not privately owned (i.e. belonging to “the community”), like the air around us, parks, mountains, rivers, beautiful views, etc. the issue of property rights is more complex. Has someone got the right to pollute the air and/or rivers? Can someone build a large building in front of someone else’s building and thus ruin the latter’s view? The property rights to such communal properties, unless legislated, are thus potentially open to conflicting claims.
the legislation is passed smokers have the right (implicitly or explicitly) to pollute the air with their tobacco smoke. The legislation explicitly gives non-smokers the right to tobacco-free air. Such legislation does not require an “anti-smoking police force” to enforce the legislation. All that is required is that smokers and non-smokers are aware of the legislation, that appropriate signage is placed in public buildings, and that non-smokers point out to smokers that it is illegal to smoke, if infringements do take place. Few smokers will flaunt the legislation if there is a social consensus that smoking in enclosed public areas is not allowed.

Consider the following example. In South Africa the Minister of Health introduced strong tobacco control legislation that included a ban on smoking in public and workplaces in 1998. The tobacco industry vehemently opposed the legislation, arguing that it would be unenforceable, that hospitality establishments should decide their own smoking policies and that the legislation was unconstitutional. Despite their protests the legislation was passed and became effective in 2001. Smoking in enclosed public places has all but disappeared. The only places where some people still smoke (against the law) are in bars. Smokers have generally accepted the legislation and the degree of compliance is very high. Non-smokers have the benefit of not being exposed to tobacco smoke. A large-scale crackdown on smokers, predicted by the industry, was not necessary, because social pressure, and the fact that property rights had been well established (and were not subject to “good manners” by smokers and/or “putting up with the cigarette smoke” by non-smokers), ensured that smokers willingly complied to the legislation.

Other than a study that investigated the relationship between anti-smoking sentiment and restrictions on smoking in a variety of public places (Chaloupka and Saffer, 1992), no study, to the authors’ knowledge, has specifically investigated the impact of the changing social climate and societal norms on the demand for tobacco. A comprehensive strategy, consisting of strong tobacco control legislation, education and publicity, and rapidly increasing excise taxes, is likely to be more effective than a fragmented approach. It seems plausible that the effects of the various interventions (i.e. consistent increases in
the real tax on cigarettes, together with appropriate and comprehensive legislation) are amplified when a comprehensive strategy is employed.

(f) Restrictions on advertising

In many countries cigarettes are some of the most advertised products. In fact, until recently, cigarette brands were regarded as some of the most recognised and valuable brands in the world.

Does cigarette advertising increase the sales of cigarettes? According to tobacco control economists the answer is a clear yes. They argue that the tobacco industry has a clear incentive to advertise their product. Firstly, they can present an “adult activity” to teenagers as a socially desirable thing to be involved in. By advertising, the tobacco industry can play on teenagers’ insecurities and “trick” them into a habit, which they later regret they started. Secondly, advertising is inherently misleading, in which a deadly product is presented as glamorous, socially acceptable and normal. Thirdly, given the amounts of money involved in cigarette advertising, it must be effective; otherwise firms would not do it.

On the other hand the tobacco industry argues that they do not advertise to “lure” teenagers into smoking, but to maintain existing smokers’ brand loyalty or to persuade smokers of other brands to switch brands. Of course this argument wears thin when the cigarette market is dominated by a monopoly or near-monopoly, as is the case in many developing countries.

Unfortunately the empirical evidence does not provide much guidance. A sizeable empirical literature on the relationship between tobacco advertising and the demand for tobacco products exists, but this literature is not conclusive (Chaloupka and Warner, 1999: 30-34). The gulf between the “tobacco control position” and the “industry position” is huge and insurmountable. Studies that indicate that advertising expenditure has a significant impact on total cigarette demand are often severely criticised by tobacco
industry researchers, sometimes justifiably, but more often out of principle, rather than substance (see, for example, Stewart, 1992 and 1993a, Duffy, 1996 and High, 1999).\textsuperscript{12}

However, even studies that find that advertising expenditure has a significant positive impact on cigarette expenditure, the impact is usually not all that large. For most studies the econometric evidence suggests that a ban on advertising would reduce cigarette consumption by about 6 per cent or less (Chaloupka and Warner, 1999: 30-34).

The fact that there is no consensus in the econometric literature on the relationship between tobacco advertising and tobacco demand has resulted in an alternative theoretical explanation about the relationship between these two variables (Saffer and Chaloupka, 2000). If one assumes that advertising expenditure is subject to diminishing returns, it follows that the last ten per cent of advertising expenditure is much less effective than the first ten per cent. Given that most econometric studies focus on time series data, where the differences between the various years are often not large, it follows that econometric analysis is not likely to “pick up” the effect of a change in tobacco advertising on tobacco consumption. The fact that a marginal change in advertising expenditure has an insignificant effect on overall consumption does not imply that a large change in advertising expenditure will also not have an insignificant impact on consumption.

Using cross-section data for a number of developed countries, Saffer and Chaloupka (2000) found that countries that have imposed comprehensive bans on tobacco advertising and sponsorship have experienced far more pronounced decreases in tobacco consumption than countries that employed only partial bans. In fact, there is consensus

\textsuperscript{12} The best example of “academic mud slinging” is Stewart’s (1992) criticism of Laugesen and Meads’s (1991) analysis of the advertising-consumption debate in the OECD countries, and the ensuing debate (Stewart, 1993a, and Laugesen and Meads, 1993). Stewart, in trying to discredit Laugesen and Meads’s analysis, nitpicked their data and methodology, without showing what the impact would be on the results obtained. In a subsequent paper, Stewart (1993b) used essentially a similar approach to find an opposite result. Given the amount of effort that Stewart put into his criticism of Laugesen and Meads, it is surprising that his “alternative analysis” seems very sloppy to a casual reader of his paper. This acrimonious debate illustrates the seriousness that the industry places on research that finds a positive relationship between advertising expenditure and tobacco consumption. It also illustrates the more general point that the industry will do everything in its power to create dissenting and alternative views on issues that it perceives as threats to its own profitability.
among tobacco control economists that partial advertising bans are not all that successful in reducing tobacco consumption, because the industry will simply circumvent the partial bans (World Bank, 1999: 50).

(g) **Health publicity**

The first medical and epidemiological reports that linked smoking to lung cancer were published in the 1930s and 1940s. The Royal College of Physicians report of 1962 and the US’s Surgeon-General report of 1964 were the first comprehensive and well-publicised reports on the dangers of smoking. Since then tens of thousands of studies have investigated the relationship between smoking and a variety of illnesses and diseases.

In reaction to these reports, many developed countries have implemented a number of tobacco control measures, amongst others a health publicity drive. A number of studies have investigated the impact that the publicity created by the publication of the 1962 and 1964 reports had on cigarette consumption in the UK and US respectively (Sumner, 1971, Atkinson and Skegg, 1973, Peto, 1974, Witt and Pass, 1981 and Townsend, 1987).

Generally these “health scares” have resulted in a decrease in tobacco consumption, but the effect seems to have been transitory, in that tobacco consumption gradually moved back to the pre-report levels, holding other factors constant (Atkinson and Skegg, 1973 and Witt and Pass, 1981).

### 4.2 The demand for cigarettes in Jamaica: a multiple regression approach

In section 2 two scatter plots indicated a positive relationship between cigarette consumption and per capita GDP and a negative relationship between cigarette consumption and the real price of cigarettes. The aim of this section is to estimate the magnitude and strength (i.e. statistical significance) of the relationship between the demand for cigarettes in Jamaica and those factors that determine it.
Despite the fact that there have been major advances in both theoretical and applied econometric techniques in the past decades (see, for instance Harris, 1995), a more modest approach at estimating the demand for cigarettes is used in this study, given the limited quantity of data available. In the context of this study, using advanced techniques on data that may be subject to measurement and other errors will probably result in an image of sophistication that is unjustified. A standard ordinary least squares (OLS) approach is used, and a number of specifications are presented.

The primary aim of this section is to estimate the price elasticity of demand for cigarettes. A secondary aim is to investigate the income elasticity of demand. The international literature indicates that these two factors are by far the most important determinants of the demand for tobacco. The demand equations are estimated in both aggregate and per capita terms. Where appropriate, a lagged dependent variable is included in the regression equation. This allows one to investigate the magnitude of the short- and long-run price elasticities of demand, respectively. Also, the mathematical form of the regression equation is specified in both linear and loglinear form. For the linear specification, the coefficients have little meaning in themselves (other than indicating a positive or negative relationship), but the elasticities can easily be calculated. The standard approach is followed and the elasticities are calculated at the means. For the loglinear specification, the coefficients are interpreted as (constant) elasticities.

In total eight specifications have been specified and estimated. The regression output is presented in the Appendix, while the summarised results are shown in Table 4.

---

13. Given an equation \( \ln Q_t = \alpha + \beta_1 \ln Q_{t-1} + \beta_2 \ln P_t + \beta_3 \ln Y_t \), with \( Q \) = cigarette consumption, \( P \) = real cigarette price and \( Y \) = real income, the short-run price elasticity of demand is \( \beta_2 \), while the long-run price elasticity of demand is \( \beta_2/(1 - \beta_1) \), with \( 0 < \beta_1 < 1 \). Similarly the short-run income elasticity of demand is \( \beta_3 \), while the long-run income elasticity of demand is \( \beta_3/(1 - \beta_1) \).
Table 4: Price and income elasticity estimates, given different specifications

<table>
<thead>
<tr>
<th>Equation</th>
<th>Mathematical form</th>
<th>Aggregate/per capita consumption</th>
<th>Short-run price elasticity</th>
<th>Long-run price elasticity</th>
<th>Significance of short-run price elasticity</th>
<th>Income elasticity</th>
<th>Significance of income elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Loglinear</td>
<td>Aggregate</td>
<td>-0.48</td>
<td>na</td>
<td>P &lt; 0.001</td>
<td>0.01</td>
<td>P = 0.98</td>
</tr>
<tr>
<td>(2)</td>
<td>Linear</td>
<td>Aggregate</td>
<td>-0.47</td>
<td>na</td>
<td>P &lt; 0.001</td>
<td>0.01</td>
<td>P = 0.94</td>
</tr>
<tr>
<td>(3)</td>
<td>Loglinear</td>
<td>Aggregate</td>
<td>-0.22</td>
<td>-0.38</td>
<td>P &lt; 0.05</td>
<td>-0.05</td>
<td>P = 0.70</td>
</tr>
<tr>
<td>(4)</td>
<td>Linear</td>
<td>Aggregate</td>
<td>-0.22</td>
<td>-0.37</td>
<td>P &lt; 0.05</td>
<td>-0.05</td>
<td>P = 0.70</td>
</tr>
<tr>
<td>(5)</td>
<td>Loglinear</td>
<td>Per capita</td>
<td>-0.98</td>
<td>na</td>
<td>P &lt; 0.0001</td>
<td>0.51</td>
<td>P &lt; 0.1</td>
</tr>
<tr>
<td>(6)</td>
<td>Linear</td>
<td>Per capita</td>
<td>-0.80</td>
<td>na</td>
<td>P &lt; 0.0001</td>
<td>0.89</td>
<td>P &lt; 0.005</td>
</tr>
<tr>
<td>(7)</td>
<td>Loglinear</td>
<td>Per capita</td>
<td>-0.23</td>
<td>-0.97</td>
<td>P &lt; 0.2</td>
<td>-0.05</td>
<td>P = 0.83</td>
</tr>
<tr>
<td>(8)</td>
<td>Linear</td>
<td>Per capita</td>
<td>-0.18</td>
<td>-0.73</td>
<td>P = 0.23</td>
<td>-0.03</td>
<td>P = 0.89</td>
</tr>
</tbody>
</table>

Note: a low P value (P < 0.05) indicates that the coefficient is statistically significant.

A number of observations can be made about Table 4. Firstly, the specification of the regression equation has a very pronounced effect on the results that are obtained. It would be unscientific and misleading to say that “the price elasticity is x”, because any deviation in the specification on which this statement is based would result in a very different price elasticity estimate. Thus rather than presenting only one price elasticity estimate, a number are presented. Secondly, despite the fact that the price elasticity estimates are heavily dependent on the specification of the regression equation, there is strong and consistent evidence that the price elasticity (1) is statistically significant and (2) has a value of between 0 and –1, i.e. the demand for cigarettes is price inelastic, but is certainly not perfectly inelastic.14 Thirdly, where long-run elasticities of demand are calculated, they are between 1.8 and 4 times the magnitude of the short-run elasticities. However, even in the long run, there is no evidence that the price elasticity of demand is greater than one in absolute terms. Fourthly, with the exception for two specifications (equations 5 and 6), the income elasticity of demand is generally small and insignificant. This suggests that changes in income (in these specifications approximated by changes in the

---

14. Where a lagged dependent variable is included in the regression equation (which is necessary to calculate the long-run elasticity of demand), the statistical significance of the price variable is diminished. The primary reason for this is that the lagged dependent variable tends to dominate the regression equation (see the R² values in the Appendix), which means that all other independent variables tend to be “overwhelmed” and lose their statistical significance.
real GDP) have not had a significant impact on the demand for cigarettes in Jamaica. This result is at odds with the bulk of the international literature, which found a positive relationship between income and the demand for cigarettes (see section 4.1 (b)).
5. IMPACT OF A TAX CHANGE ON CIGARETTE CONSUMPTION AND GOVERNMENT REVENUE

The previous section indicated that

(1) the magnitude of the price elasticity of demand is sensitive to the specification of the regression equation,
(2) the real price of cigarettes is an important and statistically significant determinant of the demand for tobacco, and
(3) the price elasticity of demand lies between −0.2 and −1.0, although most specifications suggest an elasticity estimate in the lower range.

The aim of this section is to use perform some sensitivity analyses, based on the current situation in Jamaica, to establish the likely impact of a change in the cigarette tax on (1) cigarette consumption, and (2) total government revenue from cigarette taxes.

The analysis is based on the following assumptions:

(1) The situation in 2004 is taken as the base scenario. The price per single cigarette is set at J$ 8, the average tax is J$ 4.16 per cigarette (resulting in an average tax burden of 52 per cent), aggregate consumption is 912 million sticks, and government revenue from cigarettes is J$ 3794 million.

(2) The real retail price consists of two components: tax and the remainder, which, for lack of a better word, will be called the “industry price”,

(3) When the real cigarette tax increases, it is assumed that the real industry price is unaffected by the change in the tax. The implication of this assumption is that

However, as discussed in section 4.1 (a), and shown in Appendix B, this is not always the best assumption to make, because the tobacco industry may have an incentive to increase the real retail price by more than the increase in the real amount of the tax. Should this happen, the benefit to the Ministry of Finance will be decreas...
the supply curve is perfectly elastic. Thus the increase in the tax is borne exclusively by the consumers, not the tobacco industry.

(4) In this example the real cigarette tax (i.e. the amount of tax per pack of cigarettes) is assumed to increase by 10 per cent. Should the increase be more or less than 10 per cent, the magnitudes of the changes in cigarette consumption and government income will change as well as will be pointed out towards the end of this chapter.

By increasing the real cigarette tax by 10 per cent, the average tax per cigarette increases from J$ 4.16 to J$ 4.58. On the assumption that the real “industry price” is not affected by this change in the tax, the retail price will increase from J$ 8.00 to J$ 8.42 per cigarette.

The interesting issue is what will happen to cigarette consumption and government revenue. Of course this depends crucially on the estimated value of the price elasticity of demand. Rather than using an arbitrary value, the results of a number of simulations, in which different price elasticities of demand are used, are shown in Table 5.

<table>
<thead>
<tr>
<th>Price elasticity of demand</th>
<th>Percentage change in aggregate cigarette consumption</th>
<th>Percentage change in government revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>0.0</td>
<td>0.00</td>
<td>10.00</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.52</td>
<td>9.43</td>
</tr>
<tr>
<td>-0.2</td>
<td>-1.04</td>
<td>8.86</td>
</tr>
<tr>
<td>-0.3</td>
<td>-1.56</td>
<td>8.28</td>
</tr>
<tr>
<td>-0.4</td>
<td>-2.08</td>
<td>7.71</td>
</tr>
<tr>
<td>-0.5</td>
<td>-2.60</td>
<td>7.14</td>
</tr>
<tr>
<td>-0.6</td>
<td>-3.12</td>
<td>6.57</td>
</tr>
<tr>
<td>-0.7</td>
<td>-3.64</td>
<td>6.00</td>
</tr>
<tr>
<td>-0.8</td>
<td>-4.16</td>
<td>5.42</td>
</tr>
<tr>
<td>-0.9</td>
<td>-4.68</td>
<td>4.85</td>
</tr>
<tr>
<td>-1.0</td>
<td>-5.20</td>
<td>4.28</td>
</tr>
<tr>
<td>-1.1</td>
<td>-5.72</td>
<td>3.71</td>
</tr>
<tr>
<td>-1.2</td>
<td>-6.24</td>
<td>3.14</td>
</tr>
<tr>
<td>-1.3</td>
<td>-6.76</td>
<td>2.56</td>
</tr>
<tr>
<td>-1.4</td>
<td>-7.28</td>
<td>1.99</td>
</tr>
<tr>
<td>-1.5</td>
<td>-7.80</td>
<td>1.42</td>
</tr>
</tbody>
</table>
In Table 5 the price elasticities range between 0 (i.e. perfectly inelastic) and –1.5 (i.e. relatively elastic). Given the regression results in the previous section and the vast empirical literature that was touched on in section 4.1, it is most probable that the true value of the price elasticity of demand is in this range. In fact, the likely range for the true value of the price elasticity of demand is between –0.3 and –0.6.

Table 5 clearly illustrates the fact that if the price elasticity of demand is low in absolute terms, an increase in the tax will have a limited impact on the consumption of cigarettes, but the impact on government revenue will be large. On the other hand, if the demand for the product is relatively price elastic, an increase in the tax will result in a sharp decrease in consumption, but the increase in government revenue will be less pronounced.

However, Table 5 clearly indicates that for any price elasticity of demand for cigarettes between 0 and –1.5 an increase in the tax on cigarettes will result in a decrease in tobacco consumption and an increase in government revenue. There is no trade-off. The interests of both the Ministry of Finance and the Ministry of Health are served. The only “trade-off” is to determine the relative magnitudes of the gains to be achieved by the two ministries. All else the same, the Ministry of Health would want the price elasticity to be high, because a given increase in the tax will then cause a larger decrease in smoking. On the other hand, the Ministry of Finance might wish for a lower price elasticity, because this would mean that a given increase in the tax would result in a relatively greater increase in government revenue.

Can the government increase the tax on cigarettes indefinitely? Presumably not. However, given Jamaica’s current cigarette tax burden of about 50-52 per cent, there is ample room for a significant increase in the tax burden. In Figure 3 the relationship between the tax burden and the expected percentage increase in government revenue is shown, assuming a price elasticity of demand of -0.5. This curve is an adaptation of the Laffer curve, which indicates the relationship between tax rate and total tax revenue. Point A is the starting position in 2004. According to the graph, if the tax burden stays at 52 per cent and the industry price does not change, real government revenue is not expected to change. A decrease in the tax burden is likely to decrease government
revenue quite sharply. Similarly, an increase in the tax burden is predicted to increase
government revenue, up to a point. This turning point is predicted to be at a tax burden of
about 70 per cent of the retail price. Thus, according to Figure 3, should the government
decide to set the tax burden at 70 per cent (and the real industry price stays the same) it
can expect to raise government revenue from cigarette taxes by more than 50 per cent
compared to the 2004 levels. Point B indicates the impact of the tax increase of 14 April
2005 on the expected change in government revenue. While this tax increase is predicted
to raise government revenue, it is clear that it is not testing the upper limits of the Laffer
curve.

Figure 3: Impact of changes in the tax burden on cigarettes on the percentage
change in government revenue obtained from cigarette taxation

![Figure 3](image_url)

Source: Derived from own calculations

Some further simulations are shown in Table 6. Other than indicating the impact of
changes in the tax burden on cigarettes on government revenue, it shows the likely impact
on the retail price of cigarettes and the consumption of cigarettes. Like the Laffer curve
shown in Figure 3, this table is compiled on the assumption that the price elasticity of
demand is \(-0.5\), and that the industry keeps the real industry price at the same level. As
was discussed in a previous footnote, should the industry decide to increase the industry
price in line with the increase in the tax the public health benefit will be enhanced, while the government revenue benefit will be tempered from the values shown in Table 6.

As was pointed out in Figure 3, Table 6 suggests that the government of Jamaica can increase its revenues from cigarettes by more than 50 per cent from the 2004 levels if it increases the tax burden from the current level of 52 per cent to around 72 per cent. The public health implication of such a move would be immense. Tobacco consumption would be expected decrease by nearly 40 per cent from current levels. Cigarette prices would increase by about 75 per cent in real terms.

Is such a high tax burden realistic and sustainable? If one considers the experience of other countries, this clearly seems to be the case. In countries like the UK and some Scandinavian countries the government has imposed taxes as high as 75 per cent of the retail price (Chaloupka, et al., 1999: 239-240). In fact, the minimum tax burden on cigarettes in the European Union is currently 57 per cent of the retail price.

Should Jamaica decide to impose a cigarette tax equal to the minimum EU tax, it would have to increase the current tax by nearly 25 per cent, again assuming that the tobacco industry will keep the real industry price constant. Assuming a price elasticity of \(-0.5\), the result of such a tax increase would be to decrease cigarette consumption by 6 per cent and increase real government revenue by 16 per cent.
Table 6: Implications of raising the tax on cigarettes

<table>
<thead>
<tr>
<th>Tax burden (tax as percentage of retail price)</th>
<th>Percentage change in the specific tax per pack of cigarettes</th>
<th>Predicted change in retail price per cigarette (in constant 2004 prices)</th>
<th>Percentage change in cigarette consumption (compared to 2004)</th>
<th>Percentage change in government revenue (compared to 2004)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.0</td>
<td>-24.5</td>
<td>-12.7</td>
<td>6.4</td>
<td>-19.67</td>
</tr>
<tr>
<td>47.5</td>
<td>-16.5</td>
<td>-8.6</td>
<td>4.3</td>
<td>-12.90</td>
</tr>
<tr>
<td>50.0</td>
<td>-7.7</td>
<td>-4.0</td>
<td>2.0</td>
<td>-5.85</td>
</tr>
<tr>
<td>52.5</td>
<td>2.0</td>
<td>1.1</td>
<td>-0.5</td>
<td>1.49</td>
</tr>
<tr>
<td>55.0</td>
<td>12.8</td>
<td>6.7</td>
<td>-3.3</td>
<td>9.06</td>
</tr>
<tr>
<td>57.5</td>
<td>24.9</td>
<td>12.9</td>
<td>-6.5</td>
<td>16.81</td>
</tr>
<tr>
<td>60.0</td>
<td>38.5</td>
<td>20.0</td>
<td>-10.0</td>
<td>24.62</td>
</tr>
<tr>
<td>62.5</td>
<td>53.8</td>
<td>28.0</td>
<td>-14.0</td>
<td>32.31</td>
</tr>
<tr>
<td>65.0</td>
<td>71.4</td>
<td>37.1</td>
<td>-18.6</td>
<td>39.59</td>
</tr>
<tr>
<td>67.5</td>
<td>91.7</td>
<td>47.7</td>
<td>-23.8</td>
<td>46.00</td>
</tr>
<tr>
<td>70.0</td>
<td>115.4</td>
<td>60.0</td>
<td>-30.0</td>
<td>50.77</td>
</tr>
<tr>
<td>72.5</td>
<td>143.4</td>
<td>74.5</td>
<td>-37.3</td>
<td>52.65</td>
</tr>
<tr>
<td>75.0</td>
<td>176.9</td>
<td>92.0</td>
<td>-46.0</td>
<td>49.54</td>
</tr>
<tr>
<td>77.5</td>
<td>217.9</td>
<td>113.3</td>
<td>-56.7</td>
<td>37.78</td>
</tr>
<tr>
<td>80.0</td>
<td>269.2</td>
<td>140.0</td>
<td>-70.0</td>
<td>10.77</td>
</tr>
</tbody>
</table>

Note: it is assumed that the real industry price is unaffected. All percentage changes are taken from the base situation in 2004.

Table 6 does not necessarily suggest a “big bang” once-off tax increase. A phased approach can be equally successful. In South Africa the government phased in the tax increases over a period of four years. In 1994 the South African government announced that it would increase the tax on tobacco from 34 per cent of the retail price to 50 per cent. This increase was to be phased in over some years. Between 1994 and 1998 (the year in which the government-set target of 50 per cent tax burden was achieved in South Africa) the real retail price had increased by 57 per cent, aggregate cigarette consumption had decreased by 15 per cent, per capita consumption had decreased by 20 per cent and real government revenue from tobacco taxes had increased by 75 per cent (ETCSA, 2003: 52).

If tobacco control is an important policy and public health goal, the government of Jamaica would do well to announce “tax burden target” and take active steps to achieve the target within a number of years.
6. POLICY IMPLEMENTATION

While the analysis presented here clearly indicates the beneficial health and fiscal impact of raising the excise tax on cigarettes, a possible concern is that of sustainability. Given Jamaica’s fragile fiscal position, relative certainty of tax revenue over both the short and the long term should be paramount in the minds of the Ministry of Finance. If taxes get raised to significantly higher levels, would that not kill the goose that lays the golden eggs? Stated differently, would a rapid increase in the excise tax allow the government and the country to enjoy the benefits of increased revenue for some years, but destroy the tax base in the long term?

The concern that an increase in the tax rate could diminish total tax revenues is discussed in more detail in the following section. International experience of a number of decades has shown unquestionably that increasing the excise tax on cigarettes does not destroy the goose that lays the golden eggs, despite the protestations by the industry. However, it is understandable that the government would want to move cautiously, because an overhasty move could force them to backtrack later on, with the resultant loss of credibility. Thus a piecemeal approach to implementing an excise tax strategy would, in the context of cautious policy making, be an appropriate strategy.

The South African experience is instructive here. The government announced that it would set the (specific) excise tax on cigarettes at a certain level of the retail price, and that it would increase the level of the excise tax annually to achieve the target in five years. At the presentation of each budget after the initial announcement, the Minister of Finance increased the excise tax rate, reminding the nation that these were the steps taken to achieve the long-term target. Between 1994 and 1998 (the year in which the government-set target of 50 per cent tax burden was achieved in South Africa) the real retail price had increased by 57 per cent, aggregate cigarette consumption had decreased by 15 per cent, per capita consumption had decreased by 20 per cent and real government revenue from tobacco taxes had increased by 75 per cent (ETCSA, 2003: 52).
For the Jamaican government a similar strategy is proposed. The government should set a target and implement the target in a consistent and predictable way. The advantage of such a strategy is that it creates more certainty. The government can plan its revenue some years in advance and the industry is not faced with surprises. A piecemeal strategy will also allow the government to evaluate the impact of the strategy and to make changes if necessary.

What strategies could be employed? It is important to point out that a strategy that increases the excise tax to keep up with inflation is not a tobacco control strategy, and will not increase the real revenue from cigarettes in any meaningful way. Cigarettes would not be taxed any differently from any other consumer product subject to GCT. The tax would have to increase by more than the inflation rate.

One way of doing this is for the government to commit to an increase in the excise tax equal to the inflation rate, plus a certain percentage. The World Bank recommends an annual increase in the excise tax of 5 per cent over the rate of inflation (see preface in Arunatilake and Opatha, 2003). This would be a consistent and predictable policy.

An alternative approach would be to decide what the tax burden (i.e. the total tax expressed as a percentage of the retail price) on cigarettes should be in five years time, and to adjust the excise tax over time accordingly. For example, if the current tax burden is 50 per cent and the government decides to increase the burden to 60 per cent in five years, it would have to adjust the excise tax in such a way so that the tax burden increases by two percentage points each year.

The advantage of the second approach is that if the tobacco industry decides to change the industry price, the excise tax increases in the following year take this into consideration. Thus a rapid increase in the industry price will result in a rapid increase in

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16. One could ask the question: for how long? The World Bank is unclear on this, but presumably this would have to be evaluated over time. Given that most governments are elected for periods of about five years, a five-year time horizon seems appropriate, after which the policy could be re-evaluated.
the excise tax in the following year, because the retail price (which is the denominator in the determination of the tax burden) would have increased as well.

In addition to the tax effect it should also be borne in mind that tobacco control legislation will have a synergistic effect on the reduction in consumption, thus potentially maximising the public health impact over and above that resulting from the increased taxation. Furthermore, in the long term a successful tobacco control strategy is likely to result in a decrease in governmental expenditure on tobacco-related illnesses – again a mutually acceptable outcome for both the Ministry of Finance and the Ministry of Health.
7. POSSIBLE CONCERNS

From an economic point of view, the policy prescriptions for an effective tobacco control strategy are clear-cut. Of all the interventions available - and there are many - by far the most effective and most cost-effective intervention is an increase in the tax on cigarettes. The experiences of other countries and the simulation exercises presented in this paper clearly indicate that an increase in the tax on cigarettes will reduce the consumption of cigarettes and will increase government revenue. It is a win-win situation; there is no trade-off.

However, the crucial element is the political will to stand against the vested interests of the tobacco industry. International experience has shown that the tobacco industry will aggressively fight any intervention that will reduce their profitability. The tobacco industry will say that they support “sensible legislation” and interventions like educational campaigns to warn school children against the dangers of smoking, but that “draconian” legislation goes too far. While one should not dismiss educational campaigns out of hand, the fact of the matter is that such campaigns are not nearly as effective in curbing smoking, compared to interventions such as clean indoor air legislation, advertising bans, and (especially) tax increases. As a rule of thumb, the more vigorously a tobacco control intervention is opposed by the tobacco industry, the more effective that intervention is likely to be.

The industry will typically fight an increase in tobacco taxation on the following grounds:

a) It will stimulate the smuggling of cigarettes;

b) The decrease in consumption will result in a decrease in government revenue;

c) Jobs will be lost; and

d) The increased tax will hurt the poor, because smoking prevalence is generally higher among the poor than the rich.

While all these concerns have an element of truth, they do not nullify the policy proposals made in this paper. In the following sections these concerns are analysed in more detail.
a) *Smuggling issues*

There is some evidence that differences in prices between states (especially in the US) and countries (e.g. between France and the UK) encourage some people to smuggle cigarettes from the low-price area to the high-price area. However, this is not the main problem. The far more serious issue concerns the smuggling of large quantities of untaxed cigarettes by crime syndicates. Often these cigarettes are exported tax-free, only to be smuggled into the original exporting country.

While certainly not all cigarette smuggling is orchestrated by the tobacco industry, there is substantial evidence that the tobacco industry has been actively involved in the smuggling of cigarettes. Internal documents by the industry clearly indicate that the industry was often aware of smuggling activities and, in fact, often played an active role in smuggling in order to open up new markets (see Hammond and Rowell, 2001).

The solution to the smuggling problem is not a reduction in tax rates, but better law enforcement. This is one of the key recommendations of the Framework Convention for Tobacco Control.

b) *A decrease in government revenue?*

It is true that if tobacco disappears completely, then government revenue from the taxation of tobacco will decrease to zero. While this might be the long-term public health aim, this is clearly not going to happen overnight. In fact, given the addictive properties of nicotine, cigarettes will be around for at least the next 50 years, simply because some people are unable to quit.

Even in areas where a variety of stringent anti-smoking measures have been in place for a long time, such as British Columbia, California and New York State, smoking prevalence rates are still above 15 per cent. This suggests that there is some “threshold percentage”
of smokers that would continue to smoke, despite all tobacco control interventions. The tobacco industry will certainly not disappear, even if taxes are increasing rapidly, despite the industry’s claims that the taxes are excessive and will eventually lead to a decrease in government revenue.

Also, given the fact that the demand for tobacco is relatively inelastic, an increase in the price is going to cause a less than proportional decrease in the quantity consumed. Talk by the industry that an increase in taxes on cigarettes is going to reduce government revenue is aimed at garnering public disapproval of the tax increase. It certainly does not have any empirical backing. The simulation results presented in this paper clearly indicate that, irrespective of the price elasticity of demand, an increase in the excise tax will increase government revenue and decrease cigarette consumption at the same time.

c) Employment issues

It is sometimes argued that a cigarette tax increase will cause a decrease in employment. While this statement sounds plausible at first, it focuses on only one sector of the economy, namely the tobacco sector. It is true that a large reduction in the demand for tobacco is likely to result in jobs being lost in the tobacco sector.

However, an important aspect, and one that the tobacco industry does not emphasise, is that the money that was previously spent on tobacco products does not disappear from the economy, but is used to buy other goods and services. The increased demand for such goods and services will increase the demand for labour in these sectors. Unfortunately it is virtually impossible to say precisely which jobs have been created when consumers switch away from tobacco to other goods and services. However, a number of studies (see survey in Van der Merwe, 1998b: 203-206) using macroeconomic models, input-output tables and social accounting matrices, have investigated what would happen to overall employment should the tobacco sector disappear and people divert their expenditure to other goods and services. They all found that overall employment would be enhanced because more people would be employed in other sectors of the economy.
than the number of employment opportunities lost in the tobacco and related industries. The reason is quite intuitive: relative to other industries the tobacco industry is more capital intensive. The goods and services to which ex-smokers would shift their expenditure are relatively more labour intensive, which means that the gains in employment in these industries exceed the loss of employment in the tobacco and related sectors.

d) Do taxes hurt the poor?

It could be argued that increasing the tax on cigarettes will hurt the poor because, firstly, the poor tend to smoke more than the rich, and secondly, the poor spend a relatively higher percentage of their disposable income on tobacco products than the rich. This implies that the tax on cigarettes is regressive, i.e. the tax burden is heavier on the poor vis-à-vis the rich. While this is generally not disputed, tobacco control economists would argue that the solution to the regressivity of the tax on cigarettes is not to decrease the tax, but rather to increase it. As was pointed out in section 4.1 (a) there is ample empirical evidence to indicate that the poor are generally more price sensitive than the rich, and would thus reduce their consumption by a greater percentage in reaction to a given increase in the tax.

The implication is that an increase in the tax on cigarettes decreases the degree of regressivity. Also, by cutting back on their smoking, the poor reduce their risk of incurring a range of diseases, each of which carries a high cost, specifically in terms of increasing the smokers’ morbidity and mortality risk.
7. CONCLUSION

The aim of this paper was to investigate the economics of tobacco control in Jamaica. Despite the fact that tobacco consumption has been decreasing consistently over the past 30 years, this paper pointed out that increases in the tax on tobacco would decrease cigarette consumption further and result in a significant increase in government revenue.

It was impossible to obtain a precise estimate of the price elasticity of demand, but all econometric specifications indicate that the price elasticity for cigarettes is relatively inelastic, but certainly not perfectly inelastic. Given the current cigarette tax regime and the price elasticity estimates, an increase in the tax on cigarettes will result in a decrease in cigarette consumption and an increase in government revenue. In fact, should the government of Jamaica decide to increase the tax by 10 per cent, consumption is likely to decrease by 2.6 per cent and government revenue will increase by 7.1 per cent, assuming that the price elasticity of demand is –0.5.

The analysis indicates that the government can increase its revenues by raising the tax burden to about 72 per cent of the retail price. Given the current tax burden of about 52 per cent, this gives the government of Jamaica much scope to increase the cigarette tax.

An increase in the tax on cigarettes is by no means the only way to reduce cigarette consumption. A number of additional methods exist, such as a ban on advertising, restrictions on smoking in public places, more awareness of the risks associated with smoking, restrictions on the tar and nicotine content, etc. However, none of these legislative interventions are as potent as an increase in the tax.

However, despite the clear economic benefits of increasing the tax on cigarettes, many governments are slow to change their tax policies, often because of pressure exerted by the industry. The arguments that the industry presents are often flawed and can be easily countered. The single most important ingredient in an effective tobacco control strategy is the political will to stand against a powerful and influential industry. It is hoped that this
study will persuade the Ministries of Health and Finance that they fight a common cause, and can both win, by increasing the tax on cigarettes.
BIBLIOGRAPHY


APPENDIX A:
Regression results for different specifications of the demand for cigarettes in Jamaica

The following variables are used:

CIGCONSUMPTION: Aggregate cigarette consumption, expressed in thousands of units;

PC_CIGCONSUMPTION: Per capita cigarette consumption, where the population is defined as all people aged above 15 years, expressed in units per person above age 15;

GDP95: Gross domestic product, expressed in millions of constant 1995 Jamaica dollars;

PC_GDP95: Per capita GDP, where the population is defined as all people aged above 15 years, expressed in constant 1995 Jamaica dollars; and


Equation 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>1.602324</td>
<td>9.893859</td>
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<tr>
<td>LOG(CIGPRICE95)</td>
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<td>0.103070</td>
<td>-4.642898</td>
<td>0.0001</td>
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<tr>
<td>LOG(GDP95)</td>
<td>0.003696</td>
<td>0.144469</td>
<td>0.025582</td>
<td>0.9798</td>
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</tbody>
</table>

R-squared 0.518456 Mean dependent var 14.04056
Adjusted R-squared 0.479933 S.D. dependent var 0.107930
S.E. of regression 0.077835 Akaike info criterion -2.167504
Sum squared resid 0.151456 Schwarz criterion -2.024768
Log likelihood 33.34506 F-statistic 13.45818
Durbin-Watson stat 1.071700 Prob(F-statistic) 0.000108
Equation 2

Dependent Variable: CIGCONSUMPTION
Method: Least Squares
Sample(adjusted): 1974 2001
Included observations: 28 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<td>CIGPRICE95</td>
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<td>0.078970</td>
<td>0.9377</td>
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R-squared 0.522208 Mean dependent var 1259437.
Adjusted R-squared 0.483985 S.D. dependent var 136052.9
S.E. of regression 97732.47 Akaike info criterion 25.91881
Sum squared resid 2.39E+11 Schwarz criterion 26.06155
Log likelihood -359.8634 F-statistic 13.66203
Durbin-Watson stat 1.023284 Prob(F-statistic) 0.000098

Equation 3

Dependent Variable: LOG(CIGCONSUMPTION)
Method: Least Squares
Sample(adjusted): 1975 2001
Included observations: 27 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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R-squared 0.588836 Mean dependent var 14.03222
Adjusted R-squared 0.535206 S.D. dependent var 0.100361
S.E. of regression 0.068422 Akaike info criterion -2.390297
Sum squared resid 0.107675 Schwarz criterion -2.198321
Log likelihood 36.26901 F-statistic 10.97957
Durbin-Watson stat 1.937476 Prob(F-statistic) 0.000113
Equation 4

Dependent Variable: CIGCONSUMPTION
Method: Least Squares
Sample(adjusted): 1975 2001
Included observations: 27 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
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<td>0.921734</td>
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R-squared: 0.599507
Mean dependent var: 1247977.
Adjusted R-squared: 0.547269
S.D. dependent var: 124109.7
S.E. of regression: 83507.56
Akaike info criterion: 25.63922
Sum squared resid: 1.60E+11
Schwarz criterion: 25.83119
Log likelihood: -342.1294
F-statistic: 11.47641
Durbin-Watson stat: 1.931565
Prob(F-statistic): 0.000084

Equation 5

Dependent Variable: LOG(PC_CIGCONSUMPTION)
Method: Least Squares
Sample(adjusted): 1974 2001
Included observations: 28 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<td>LOG(CIGPRICE95)</td>
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<td>LOG(PC_GDP95)</td>
<td>0.510734</td>
<td>0.285528</td>
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R-squared: 0.724176
Mean dependent var: 6.749786
Adjusted R-squared: 0.702110
S.D. dependent var: 0.229830
S.E. of regression: 0.125440
Akaike info criterion: -1.213028
Sum squared resid: 0.393377
Schwarz criterion: 25.83119
Log likelihood: 19.98240
F-statistic: 32.81870
Durbin-Watson stat: 1.931565
Prob(F-statistic): 0.000000
Equation 6

Dependent Variable: PC_CIGCONSUMPTION
Method: Least Squares
Sample(adjusted): 1974 2001
Included observations: 28 after adjusting endpoints

<table>
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<th>Variable</th>
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<th>Std. Error</th>
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R-squared 0.732301  Mean dependent var 876.4263
Adjusted R-squared 0.710886  S.D. dependent var 210.3420
S.E. of regression 113.0995  Akaike info criterion 12.39537
Sum squared resid 319787.6  Schwarz criterion 12.53811
Log likelihood -170.5352  F-statistic 34.19432
Durbin-Watson stat 0.573137  Prob(F-statistic) 0.000000

Equation 7

Dependent Variable: LOG(PC_CIGCONSUMPTION)
Method: Least Squares
Sample(adjusted): 1975 2001
Included observations: 27 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<td>LOG(PC_CIGCONSUMPTION(-1))</td>
<td>0.758793</td>
<td>0.122345</td>
<td>6.202092</td>
<td>0.0000</td>
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<td>LOG(CIGPRICE95)</td>
<td>-0.233615</td>
<td>0.169326</td>
<td>-1.379671</td>
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<td>LOG(PC_GDP95)</td>
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R-squared 0.883281  Mean dependent var 6.731482
Adjusted R-squared 0.868057  S.D. dependent var 0.212396
S.E. of regression 0.077151  Akaike info criterion -2.150158
Sum squared resid 0.136901  Schwarz criterion -1.958182
Log likelihood 33.02713  F-statistic 58.01806
Durbin-Watson stat 2.274532  Prob(F-statistic) 0.000000
Equation 8
Dependent Variable: PC_CIGCONSUMPTION
Method: Least Squares
Sample(adjusted): 1975 2001
Included observations: 27 after adjusting endpoints

<table>
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<tr>
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<th>Prob.</th>
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R-squared 0.890518  Mean dependent var 857.0475
Adjusted R-squared 0.876237  S.D. dependent var 187.1521
S.E. of regression 65.83995  Akaike info criterion 11.34828
Sum squared resid 99702.68  Schwarz criterion 11.54026
Log likelihood -149.2018  F-statistic 62.35983
Durbin-Watson stat 2.308269  Prob(F-statistic) 0.000000
APPENDIX B

The tax increase of 14 April 2005 and subsequent price changes

On 15 April 2005 Carreras placed an advertisement in The Gleaner that, “as a result of the increase in the tax on cigarettes” the recommended retail price of cigarettes would increase with immediate effect. The aim of this appendix is to investigate the tax and subsequent price increase in more detail. Craven “A” cigarettes are used, although the principle applies to other brands as well.

The recommended retail price of Craven “A” was set at J$ 220 per pack after the tax increase. Previously the recommended retail price of cigarettes was J$ 180 per pack. The retail price thus increased by J$ 40 per pack.

Consider the increase in the tax on cigarettes. The Minister of Finance announced two tax increases that had an effect on cigarettes. Firstly, the Special Consumption Tax (SCT) was increased from J$ 126.81 per 100 cigarettes to J$ 192.00 per 100 cigarettes. Secondly, the General Consumption Tax (GCT) was increased from 15 per cent to 16.5 per cent. Because SCT increased, this would have had an impact on the absolute amount of the excise levy, since the excise levy is calculated as a percentage of the base price and the SCT. Importantly, while the specific component of the SCT was increased, the threshold level for the ad valorem component of the SCT was increased as well. The result is that the tobacco industry has to pay less ad valorem SCT.

In Table B.1 the old and new tax structures are shown. To test the sensitivity of the tax changes to differences in the base price, two base prices of cigarettes are used: the first one at J$ 75 per pack and the second one at J$ 90 per pack.\textsuperscript{17}

\textsuperscript{17.} These base values were derived from information received from the Ministry of Finance, which gave information up to September 2004. According to the Ministry’s figures, the cigarette manufacturing industry worked on a base value of about J$ 76 during at that time (i.e. September 2004). It seems reasonable to assume that the base values of J$ 75 and J$ 90 are lower and upper limits respectively.
Table B.1: Impact of the tax adjustments of 14 April 2005 on the overall tax burden on cigarettes

<table>
<thead>
<tr>
<th></th>
<th>Before tax changes</th>
<th>After tax changes</th>
<th>Difference in taxes</th>
<th>Before tax changes</th>
<th>After tax changes</th>
<th>Difference in taxes</th>
</tr>
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<tr>
<td>Base price</td>
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<td>75.00</td>
<td></td>
<td>90.00</td>
<td>90.00</td>
<td></td>
</tr>
<tr>
<td>SCT (specific)</td>
<td>25.36</td>
<td>38.40</td>
<td>13.04</td>
<td>25.36</td>
<td>38.40</td>
<td>13.04</td>
</tr>
<tr>
<td>SCT (ad valorem)</td>
<td>9.78</td>
<td>0.00</td>
<td>-9.78</td>
<td>15.77</td>
<td>1.29</td>
<td>-14.48</td>
</tr>
<tr>
<td>Subtotal 1</td>
<td>110.14</td>
<td>113.40</td>
<td></td>
<td>131.13</td>
<td>129.69</td>
<td></td>
</tr>
<tr>
<td>Excise levy</td>
<td>25.33</td>
<td>26.08</td>
<td>0.75</td>
<td>30.16</td>
<td>29.83</td>
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<tr>
<td>Subtotal 2</td>
<td>135.48</td>
<td>139.48</td>
<td></td>
<td>161.29</td>
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<td></td>
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<tr>
<td>SCT (@ 15 %)</td>
<td>20.32</td>
<td>20.92</td>
<td>0.60</td>
<td>24.19</td>
<td>23.93</td>
<td>-0.27</td>
</tr>
<tr>
<td>GCT (additional 1.5 %)</td>
<td>2.09</td>
<td>2.09</td>
<td></td>
<td>2.39</td>
<td>2.39</td>
<td></td>
</tr>
<tr>
<td>Tax inclusive retail price</td>
<td>155.80</td>
<td>162.50</td>
<td></td>
<td>185.48</td>
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<tr>
<td>Change in taxes</td>
<td></td>
<td>6.70</td>
<td></td>
<td></td>
<td></td>
<td>0.36</td>
</tr>
</tbody>
</table>

It is clear from Table B.1 that the overall tax increase is modest (about 8 per cent, assuming a base price of J$ 75 per pack and less than 1 per cent, assuming a base price of J$ 90 per pack). The increase in the threshold value for the ad valorem component of SCT (which reduces the ad valorem component of the SCT) has largely cancelled out the increase in the specific component of the SCT. The 1.5 percentage point increase in the GCT applies to all taxable goods and services, and does not “discriminate” against cigarettes.

In section 4.1 it was noted that the tobacco industry has often increased the retail price of cigarettes by substantially more than the increase in cigarette taxes. This seems to be the case in Jamaica as well. For any realistic value of the base price, the analysis indicates that the effective tax per pack of cigarettes has not increased by more than J$ 10. The J$ 40 per pack increase in the retail price of cigarettes in response to a less than J$ 10 increase in taxes sounds like very profitable business for the tobacco and related industries. If the increased profitability of the tobacco industry is reflected in an increase in the base price of cigarettes (which it should do) this will, of necessity, increase the absolute amount of tax received by the government. But this increase in the tax received by the state is fully under the control of the tobacco industry. The point of this paragraph is that the tobacco industry is no worse off as a result of the tax increase.
Table B.1 has an important policy implication for the Ministry of Finance. Innocuous-looking and rather technical changes to the SCT can largely nullify increases in the tobacco tax. The rather high percentage (39.9 per cent) at which the ad valorem component of the SCT was levied on cigarettes, previously acted as a disincentive to the cigarette industry to increase the base price of cigarettes and was a very handy source of government revenue. By increasing the threshold level for imposing the (rather high) ad valorem component of the SCT, the government of Jamaica played into the hands of the tobacco manufacturing industry. Because the ad valorem SCT is no longer effective, nothing prevents the industry from raising the base price (i.e. there is no penalty on the industry for increasing the base price). The fact that the government has increased the specific component of the SCT has been well publicised and creates an acceptable and appropriate environment for the industry to raise the price of cigarettes.

It is recommended that, when the Ministry of Finance debates whether to increase the taxes on cigarettes, it keeps the threshold base price applicable to the ad valorem SCT constant, while increasing the specific component thereof.

As pointed out in the paper, an increase in the tax on cigarettes results in a win-win situation for both the Ministries of Health and Finance. What this appendix has shown is that the biggest winner of all, despite all their protestations to the contrary, is the tobacco industry. Possibly they should preamble their next announcement of an increase in the recommended retail price of cigarettes as follows: “as a result of the increase in the tax on cigarettes, and our desire for increased monopoly profits, the price of cigarettes is set to rise”.

APPENDIX C:
The cost of cigarettes to the average smoker

Currently the per capita consumption of cigarettes in Jamaica is approximately 500 cigarettes per adult (aged 15 plus). The smoking prevalence among adults (15 plus) is estimated at about 15 per cent. This implies that out of every six adults, one smokes, while five do not smoke. By implication, the average smoker in Jamaica smokes approximately 3000 cigarettes per year.

Before the tax increase of 14 April 2005 single stick cigarettes were sold at J$ 10 each. After the tax increase, the retail price of single stick cigarettes rose to J$ 12. The total annual cost of cigarettes for the average smoker increased from J$ 30 000 to J$ 36 000 (assuming the same quantity). If, as is expected, per capita consumption decreases to (say) 450 sticks per year (and the consumption per smoker decreases to 2700 sticks per year), the annual cost of cigarettes to the average smoker would still be around J$ 32 400.

While it is acknowledged that the GDP figures of Jamaica might understate the true level of income, given the importance of remittances from abroad, some calculations can nevertheless be done to determine the percentage of income that smokers spend on cigarettes. According to the Ministry of Finance per capita GDP was approximately J$ 160 000 in 2004. If this figure is expressed as an amount per adult, the GDP figure increases to approximately J$ 230 000.

For the adult population as a whole the proportion of gross income spent on cigarettes is about 2.2 per cent (500 cigarettes x J$ 10 divided by J$ 230 000). This number does not look particularly large, and is in line with the experience in a number of other countries. However, the proportion of gross income spent on cigarettes by the average adult smoker is approximately 13 per cent before the tax adjustment and approximately 14 per cent after the tax adjustment. These are significant percentages, and for some smokers they are much higher.
Whereas smoking presumably supplies its users with a degree of satisfaction, the high opportunity cost of cigarettes should be borne in mind. In an educational campaign about the dangers and/or costs of smoking anti-tobacco lobbyists could use these and other “economic” data to highlight the cost of smoking to the typical smoker.