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TAXATION IN AFRICA

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Principles for Cigarette Taxation in Africa

W. Kip Viscusi *

Abstract

Cigarette taxes are often the highest excise taxes in terms of their percentage share of the product price. The extent of the excess burden imposed by the tax will increase with the elasticity of demand, which is usually estimated to be between -0.4 and -1.0 . Potential rationales for raising the cigarette tax other than as a revenue device include compensation for financial externalities to society, deterrence of irrational risk taking decisions, and prevention of mistaken addictive decisions. Whether such rationales are compelling depends, however, on the empirical context in different countries. Evidence reported for the United States and some other countries suggests that country-specific empirical assessments are needed to determine the validity of such rationales and the extent of the tax that may be warranted. This paper also suggests that cigarette taxes are not the most effective mechanisms for deterring youth smoking or limiting exposures to environmental tobacco smoke, as these are best addressed through more targeted regulatory policies. A cautionary note with respect to cigarette taxes is that they are often extremely regressive taxes that impose substantial burdens on the poor.

Key Words: Cigarettes, smoking, excise taxes, Africa

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Principles for Cigarette Taxation in Africa

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I. INTRODUCTION

Cigarettes are among the most heavily taxed consumer goods. The cigarette tax rate as a percent of the retail price of cigarettes is very high in the United States, where cigarette taxes are relatively low, and in the European Union countries, where cigarette taxes are much higher. In both places, cigarettes are among the most heavily taxed products in terms of the tax as a percentage of the retail price. As a result, the level of these taxes has profound consequences for the parties bearing the tax, the level of revenues to be generated, and the promotion of various social objectives.

Taxing products has long been viewed as a revenue source, but cigarette taxes have had additional rationales as well. Cigarette taxes have usually emerged as a form of “sin tax.” Some religious groups regard smoking and drinking as evil and, as a consequence, have sought to discourage these activities through imposition of taxes. Those espousing the sin tax reference point view all smoking as bad, not simply excessive smoking. Thus, the reliance on a tax rather than a complete ban of smoking stems from the greater political feasibility of a tax.

More recently, a much more diverse set of rationales for taxing cigarettes has emerged, as cigarette taxes have become potentially important components of anti-smoking policies. Higher taxes discourage cigarette consumption, which some tax proponents view as beneficial in that cigarettes are a highly risky consumer product. There has been particular impetus for raising taxes to discourage youth smoking. There

have also been suggestions that cigarette taxes be used to address the financial costs cigarettes are believed to impose on the rest of society as well as the harms caused by environmental tobacco smoke. This paper will examine these and other rationales for cigarette taxes and assess their merits.

The reason cigarette taxes have emerged as a potential policy instrument for addressing these issues is simple. Higher cigarette taxes will in fact decrease cigarette consumption, thus reducing the extent to which smoking affects these various areas of policy concern.

If higher cigarette taxes are always good, why then is the socially optimal cigarette tax not infinite, thus driving the product from the market? There are several rationales for limiting the level of cigarette taxes. One reason is that from the standpoint of maximizing tax revenues, higher tax rates do not necessarily boost tax revenues because the quantity purchased will decline. Second, taxes are not always the sole policy instrument or even the best policy instrument for dealing with the different policy objectives society may have with respect to cigarettes. Third, higher cigarette taxes will lower the welfare of smokers, which entails an efficiency loss to the extent that consumer sovereignty is being overridden. Fourth, cigarette taxes impose financial costs that are extremely regressive in most countries.

This paper will examine how cigarette taxes work from an economic standpoint as well as how one should frame cigarette taxes within the context of smoking policy and tax policy in Africa. Much of the discussion below will be empirical in character and will draw on the experience in the United States and other countries for which we have pertinent data. The results from the U.S. are often instructive in formulating policies in

other countries, particularly insofar as they illustrate how one should conceptualize cigarette taxation issues. The objective of this paper is to establish the appropriate structure for thinking about cigarette taxes. However, because the results are empirical and may vary depending on country-specific factors, one should be cautious in making inferences to quite different economic contexts.

II. CIGARETTE TAX RATES

As with other commodity taxes, cigarette taxes can take two forms—unit taxes and ad valorem taxes. Unit taxes are in terms of a fixed tax amount, usually on a tax per pack basis. Premium and lower priced cigarettes, such as generic brands, will consequently pay the same tax. In contrast, ad valorem taxes are proportional taxes with respect to the retail price. Premium brands consequently would pay a higher tax amount than lower priced brands. The various smoking policy objectives discussed below generate taxation rationales that are generally more strongly linked to the quantity of cigarettes rather than the amount spent on cigarettes, so that there is a stronger rationale for using unit taxes to the extent that they are more strongly linked to policy objectives. Indeed, ad valorem taxation of cigarettes may have adverse effects to the extent that cheaper brands pose greater risks. Lower priced generic cigarettes in the United States, for example, have higher tar contents than do premium brands.¹

¹ In this article I will not delve into the medical debate as to whether lower tar cigarettes are in fact safer for the smoker. The tar measure has been developed by U.S. government public health officials as a summary index of the riskiness of cigarettes. Smokers of lower tar cigarettes may smoke more cigarettes if they are engaging in compensating behavior to maintain a nicotine level they had before switching to a lower tar cigarette. There have also been suggestions that people may also smoke lower tar cigarettes differently. The existence of compensatory behavior does not necessarily imply complete compensation. Moreover, the compensatory behavior model pertains only to switchers, not people who have only smoked low tar cigarettes. Mulholland (1991) provides a perceptive analysis of low tar cigarette decisions and their consequences.

The structure of taxes ideally should be able to accommodate technological innovations as well. Suppose that the rationale for cigarette taxes is tied strictly to concern with the health hazards of smoking. If companies were able to develop a risk-free cigarette, then the health-related component of the tax should be zero. Such innovative products would presumably be more expensive given the research and development costs entailed. As a result, an ad valorem tax would discourage innovation more than would a unit tax or an ideally structured health risk tax linked to the product-specific hazards. If health is not a matter of concern, then the adverse innovation effect of ad valorem taxes is with respect to product quality, more broadly defined.

Cigarette taxes in the United States include unit taxes imposed by the Federal government, state governments, and local governments, as well as proportional sales taxes that are set by state and local governments. The ad valorem sales taxes are, however, imposed on all products, not simply cigarettes. Such sales taxes are much more modest than are value added taxes in Europe and are often in the 5 percent range for all products. As a consequence, these sales taxes do not alter the relative prices of cigarettes compared to other commodities. For that reason, I place great emphasis on the cigarette excise taxes. However, note that Clossen and Smart (2003) suggest that the total tax is relevant in determining if taxes cover the total social cost of tobacco use. Total taxes are also more relevant in Europe than in the U.S. because of the tax-on-tax effect of the value added taxes (VAT) imposed on other cigarette taxes.

U.S. taxes for the fiscal year ending June 30, 2002 consisted of a \$0.39 per pack Federal tax as well as state taxes that ranged from \$0.025 per pack to \$1.50 per pack, or a

weighted average of \$0.482 per pack.² Federal tax revenues were \$7.5 billion, while total tax revenues from cigarettes were \$16.2 billion, or about \$57 per capita. Overall, Federal and state excise taxes in 2002 comprised 27 percent of the retail price.

An additional tax equivalent emerged from the 1998 Master Settlement Agreement between the cigarette industry and the states attorneys general. That settlement was for a series of state lawsuits pertaining to the medical costs of smoking, which I described in considerable detail in Viscusi (2002). The settlement was for \$206 billion with 46 states and \$36.8 billion with four states, for a total of \$243 billion that would be paid over a twenty-five year period. However, this amount was not to be paid in a lump sum by the industry but instead would be funded by a per pack tax on cigarettes of about \$0.40 per pack. Thus, proper calculation of the tax on cigarettes would include both the explicit excise tax component as well as the penalty associated with the medical cost of cigarette litigation.

More recently, several states and localities have raised their taxes. Indeed, the price of cigarettes in New York City now exceeds \$7 per pack, more than double the national average of between \$3 and \$4 per pack. Moreover, this tax structure created enormous price discrepancies between New York City and adjacent parts of New York state as well as the adjacent states of Connecticut and New Jersey.

Differences in tax rates across jurisdictions have led to evasive behavior to avoid paying the tax. Consumers frequently travel to nearby states with lower taxes to stockpile cigarette supplies. Substantial differences in tax rates have also stimulated illegal smuggling behavior by private parties, not the industry. Such smuggling has led to illegal street sales of cigarettes not unlike sales of illegal drugs. Indeed, studies of U.S.

² The data in this paragraph are from Orzechowski and Walker (2002).

cigarette demand routinely make provision for “border effects” arising from tax rate discrepancies. Counterfeit cigarettes have also become matters of concern. Indeed, many of the same kinds of smuggling problems and counterfeit cigarettes that have become salient policy concerns among African nations have also become prominent U.S. policy issues as well. The difference is that tax and price differences across countries in Africa create the incentives for smuggling, whereas in the U.S. it is the tax differences across states that are instrumental. Higher levels of taxes that lead to higher retail prices create incentives for selling counterfeit cigarettes.

The experience in the European Union countries examined by Cnossen and Smart (2003) is much more diverse in terms of the structure of the taxes. In particular, there has been an effort to foster harmonization of cigarette tax rates so as to eliminate the use of tax rates as protectionist trade barriers. The structure of taxes has become the object of policy debate, as ad valorem taxes tend to affect higher priced brands to a greater extent, thus putting American cigarettes and other high quality tobaccos at a disadvantage relative to lower cost brands. Current directives now establish tax guidelines of a 57 percent minimum total excise tax burden, which cannot be less than 60 Euros per 1,000 cigarettes.

Despite these efforts at harmonization, considerable differences remain in the tax structure, particularly with respect to the reliance on specific excise taxes as opposed to ad valorem taxes.³ The total tax burden ranges from 68 percent of the retail price in Luxembourg to 82 percent of the retail price in Denmark. There are larger differences in the structure giving rise to these tax rates, which average about 75 percent. Countries such as the United Kingdom emphasize specific excise taxes, with excise tax rates of 3.05

³ The data below are drawn from Table 3 of Cnossen and Smart (2003).

Euros per pack, an ad valorem excise tax of 22 percent, and a VAT of 14.89 percent.⁴ At the other extreme, Spain has a specific excise tax of 0.08 Euros per pack, an ad valorem excise tax of 54 percent, and a VAT of 13.79 percent. Northern European countries rely more on the per pack excise taxes, while Southern European countries, which tend to have more local cigarette manufacturing, place greater reliance on ad valorem taxes that will fall primarily on imported high quality tobaccos.

Estimates throughout the world indicate that there is a substantial problem due to smuggling and sales of contraband cigarettes.⁵ In the U.K. such activities equal the value of 42 percent of all tax-paid sales of cigarettes. In Poland, smuggling accounts for 20 percent of the market. Contraband cigarettes account for 20 percent of cigarettes sold in the Philippines and over 20 percent of the market in Malaysia. One-third of all cigarettes consumed in Hong Kong are smuggled. The potential costs of smuggling go beyond the foregone tax revenues and losses to producers and retailers. There are also costs of associated criminal activity.

Tax discrepancies exist among Southern African countries as well. These tax discrepancies have led to substantial smuggling and cross-border purchases.

There are two available sources of information that can be used to assess the level and differences in taxes in these countries. First, the British American Tobacco Company has compiled consistent tax and price data across countries for locally manufactured cigarettes. These data form the basis for Table 1. For comparability, I have converted all these data into South African Rand. In addition, the treasury

⁴ Note that for the EU tax rates, the VAT is included, whereas for the U.S. general product sales taxes are not. Exclusion of the VAT would make the UK tax percentage still more than double the U.S. tax rate excluding the costs of the Master Settlement Agreement.

⁵ Data in this paragraph are from the International Tax and Investment Center (2003).

departments of many of the countries themselves have provided summary tax information for the Conference on Excise Taxation, but unfortunately these data often are not often comparable across countries or complete. Nevertheless, the two sets of information provide considerable insight into the tax levels and structure.

Consider first the data in Table 1 for South Africa. The average recommended retail price was 10.8 Rand, of which 48.3 percent is taxes—12.3 percent VAT/Sales tax and 36 percent excise tax. The most popular price class brand is Peter Stuyvesant cigarettes.

That cigarette is also the most popular price class in Botswana, Lesotho, Namibia, and Swaziland. Interestingly, the retail price of cigarettes is very similar to the South African retail price except in Swaziland, where the retail price is 4.59 Rand. This lower price does not often stem from lower excise taxes, as the total cigarette tax rate is 71 percent, which is higher than in South Africa. Rather, a different mix of lower priced cigarettes among cigarettes sold in Swaziland apparently accounts for the difference.

Indeed, countries in which the principal cigarette sold is a locally manufactured brand or an off brand often have much lower prices of cigarettes. For example, cigarette prices average 3.95 Rand in Uganda, where Safari cigarettes are representative of the most popular price class.

In terms of the different taxes, there are three principal tax rates of interest: VAT/Sales taxes, cigarette excise taxes, and total cigarette taxes. The level of the VAT/general sales tax ranges from zero in Swaziland and Zimbabwe to a high of 16.7 percent in Tanzania. Countries with low cigarette excise taxes of under 10 percent include Tanzania (3.3 percent) and Kenya (2.8 percent). At the high end with cigarette

excise taxes above 40 percent are Swaziland (42.2 percent), Zimbabwe (41.4 percent), Mauritius (130.1 percent), Zambia (60.1 percent), Uganda (46.8 percent), and Mozambique (41.8 percent).

Given this wide variation in taxes, total taxes on cigarettes display considerable variation as well, ranging from a low value of 16.6 percent in Kenya to a high of 143.2 percent in Mauritius. The median tax value is the 48.3 percent rate for South Africa, with 8 of the 13 countries having overall cigarette taxes ranging from 30 percent to 61.3 percent.

Tax harmonization remains an important policy issue in Africa for two reasons. First, tax differences may create trade barriers if taxes fall disproportionately on higher priced cigarettes, which are often imported, or if there is a specific tax levied on imported cigarettes, as there is, for example, in Swaziland. Second, tax differences across countries may generate incentives for smuggling cigarettes across borders. However, it should be noted that the overall harmonization objective with respect to smuggling should be in terms of harmonization of prices for a given mix of cigarette brands. Suppose that firms set different prices across countries only for cost reasons such as differences in shipping and marketing costs, then harmonization of taxes will be the pivotal concern. However, if firms set prices oligopolistically to price discriminate across different markets, then these pricing differences must be taken into account as well.

The tax information provided by specific countries which participated in the conference is also instructive.⁶ The data for South Africa is particularly extensive. In

⁶ The discussion below is based on the country report questionnaires returned by the participants from the different countries represented at the 2003 South African Conference on Excise Taxes.

2001/2002, tobacco taxes raised \$4.0 billion Rand (R), where the exchange rate between SA Rand and the U.S. dollar was 10.5 in 2002. Tobacco taxes accounted for 41.3 percent of excise tax revenue, 1.7 percent of total tax revenue, and 0.44 percent of GDP.

Cigarettes were taxed then at 388.5 cents per pack. There are also taxes on cigarette tobacco, cigars, and pipe tobacco, but for concreteness the discussion below focuses on cigarettes. It should be noted, however, that it is generally believed that throughout Southern Africa the tax structure for cigarette tobacco is less onerous than for manufactured cigarettes, providing an incentive for individuals to roll their own cigarettes rather than purchase manufactured cigarettes.

Contraband and smuggled cigarettes have emerged as problems associated with cigarette taxation. South African revenue authorities shut down two illegal manufacturing operations in June 2002. There is also evidence of increasing rates of cigarette smuggling in Zimbabwe. Interestingly, the conference discussion of pressing policy problems raised by cigarettes focused more on the role of smuggling and other forms of tax evasion rather than use of taxes to deter external costs of cigarettes or to deter smoking behaviors.

The structure of taxes in those countries creates discrepancies across different cigarette brands. The tax rates in Mauritius in Table 1 understate the extent of variation in taxes by type of cigarette. The excise duty on domestically produced cigarettes containing tobacco was 210 percent of the factory price plus 210 rupees per thousand. The excise duty on imported cigarettes was 360 percent of the value at importation plus 360 rupees per thousand.⁷ In addition, imported cigarettes were subject to an 80 percent

⁷ In 2002, the exchange rate was 3.3 rupees per SA Rand and 29.6 rupees per U.S. dollar.

duty. The result is that there is a price discrepancy between locally produced brands such as Matinee, which sell at 54 rupees per pack, and imported cigarettes such as Dunhill, which sell for 85 rupees per pack. Similar disparities exist in several other countries as well. Rwanda also imposes a series of cigarette taxes that differ based on whether cigarettes are produced domestically. There is a 60 percent excise tax, a 30 percent import duty, and a 15 percent VAT. The most popular cigarette is Impala, which sells for 330 Frws per pack, whereas the price of Marlboros was 1,000 Frws, or more than triple.⁸ The cigarette tax structure in Angola is simpler. Cigarette imports are taxed at 30 percent and exports at 2 percent. Malawi imposes an 80 percent ad valorem excise tax on tobacco products irrespective of whether they are imported or domestic products. There is also an import duty of 30 percent (non MFN), 25 percent (MFN), 0 percent (COMESA), and 25 percent (SADC). Malawi tax officials estimate that contraband production and smuggling of tobacco products accounts for 50 percent of the total market. The Democratic Republic of the Congo imposes a 20 percent import duty. There is a substantial price disparity between imported cigarettes, such as Marlboro, that sell for more than double the price of locally produced brands.

Clearly these countries differ in their tax structure, with different degrees of emphasis on import duties, excise taxes, and VAT. The overall level of taxes across countries is quite different. The subsequent difference in prices creates an incentive for smuggling of cigarettes across borders. The high levels of taxes creates incentives for contraband production. Illegal behavior such as this and foregone tax revenues and profits consequently constitute costs of high cigarette taxes.

⁸ Note in 2003, 70.7 Frw = 1 Rand and 524 Frw = 1 dollar U.S.

III. COMMODITY TAX BASICS

In terms of how the tax affects economic behavior, it does not matter whether the tax rate on a particular product is a unit tax or an ad valorem tax that amounts to the same tax per pack. As noted above, however, ad valorem taxes will impose higher total taxes on higher priced cigarettes so that the per pack cigarette taxes will not be the same, and consumers will have an incentive to shift toward the lower priced, lower quality cigarettes, given such differential taxation.

How the tax is positioned also is irrelevant from an economic standpoint. Thus, the tax could be a tax imposed on the product and paid by consumers, or it could be a per pack tax that the producer or retailer would pay. While these situations may differ symbolically, as a practical matter the distinction is irrelevant because the ultimate price paid by consumers will be identical in either case. Moreover, the sharing of the tax between the consumers and the sellers of the product will be unaffected as well.

Regardless of who is formally responsible for paying the tax, who actually pays it will hinge only on the respective elasticities of supply and demand. The elasticity of demand (supply) for cigarettes is the percentage change in the quantity of cigarettes demanded (supplied) divided by the percentage change in the price. Increases in the elasticity of demand reduce the share of the tax borne by consumers, and increases in the elasticity of supply reduce the share of the tax borne by producers. It is generally believed that cigarette supply is much more elastic than is the demand for cigarettes so that any tax on cigarettes will be shifted primarily to consumers irrespective of how the tax is labeled.

Taxes discourage people from buying products, leading to an efficiency loss. For illustrative purposes, suppose that cigarette supply is perfectly elastic so that firms are willing to supply an unlimited amount of the product at the current price. Imposition of a tax will impose an efficiency loss on consumers, some of whom will no longer buy the product. The measure of excess burden of the tax in this instance equals the loss in consumer surplus, i.e., the spread between the maximum amount people are willing to spend for cigarettes and the pre-tax market price, for all consumers who no longer buy cigarettes once the tax is imposed. The extent of the excess burden increases with the elasticity of demand for cigarettes because more people are altering their consumption decisions as the elasticity increases.⁹

To set taxes for products in a way that creates the least economic distortion, it should minimize the total excess burden. One methodology for achieving the ideal efficient tax stimulus is known as the Ramsey Rule, which also serves as the basis for efficient pricing for public utilities. Taxes across different products should be increased so that there are equiproportional changes in the quantity demanded as the taxes are increased. Put somewhat differently, the optimal taxes should be inversely related to the product's elasticity of demand. Products for which there is a very inelastic demand should have higher taxes because fewer consumer decisions will be altered by the tax. More specifically, the tax rate multiplied by the elasticity of demand for the product should be equal across products.

⁹ More specifically, the excess burden in this instance equals the following expression: $\frac{1}{2} \times (\text{pre-tax price of cigarettes}) \times (\text{pre-tax quantity of cigarettes}) \times (\text{tax rate})^2 \times (\text{compensated price elasticity of demand for cigarettes})$, where the "compensated" price elasticity adjusts for the fact that higher taxes in effect make the consumer poorer and focus solely on the pure substitution effect of taxes.

The broader implications of these results have interesting consequences for cigarette policy. From the standpoint of traditional tax theory, a low elasticity of demand is consistent with higher optimal taxes. However, if taxes are to be an effective policy instrument in discouraging smoking, a high elasticity is desirable. The difference in perspectives arises because traditional product tax theory is based on an assumption that products purchased are the result of fully rational decisions that do not pose external costs on others, and as a result, discouraging these decisions creates efficiency losses. In contrast, the advocates of higher cigarette taxes often question these assumptions and view taxes as a mechanism for aligning the incentives facing smokers so that they will make more efficient decisions.

IV. THE ELASTICITY OF CIGARETTE DEMAND

The key parameter for determining the effect of cigarette tax policies is the elasticity of demand. Are smokers in fact price responsive? The character of smokers' responsiveness has fundamental implications for the efficiency effects of tax policy, for assessments of the extent of smokers' addiction to cigarettes, and for the use of taxes as a policy tool to reduce smoking.

There have been several approaches to estimating the effect of cigarette prices on the demand for cigarettes. These have included cross section estimates, time series estimates, studies using pooled time series and cross section data, and analysis of individual data.

In Viscusi (1992) I provide a review of 41 of these studies.¹⁰ Thirty-one of these studies are for the U.S., for which the estimated elasticities of demand are clustered in the range from -0.4 to -1.0 . Nine of the studies are for the U.K., where the estimated elasticity range is from -0.1 to -0.8 , but most studies yield estimates around -0.5 or -0.6 . The one study from Switzerland found an elasticity of -1.0 , which is at the relatively high end of the range of estimates found elsewhere. Evidence for South Africa reported by van Walbeek (2002) indicates a price elasticity of -0.6 . Cigarettes are price responsive, but most studies indicate that there is less than a proportional reduction in the quantity purchased in response to an increase in price.

Many discussions of tobacco policy suggest that cigarettes have an aberrationally low responsiveness to prices. To see whether this comparative claim is in fact true, Table 2 summarizes price elasticity estimates for a wide range of products. The tobacco product demand elasticity shown in Table 2 is from a single study but is consistent with the range of estimates in the literature. The tobacco price elasticity is not unlike the similar estimate for stationery, legal services, automobile repair, newspapers and magazines, as well as a wide variety of food products, ranging from chicken to bananas.

What this cigarette price responsiveness suggests is that if the object of tax policy is to tax the products with the lowest elasticities of demand in order to minimize the excess burden of taxes, cigarettes would not be at the top of the list to be taxed. If cigarettes are taxed, people will in fact reduce their cigarette purchases. Whether one views such a reduction as beneficial or not will depend on the level of the tax as well as a wide range of issues discussed below.

¹⁰ See pp. 102-104 of Viscusi (1992). In Viscusi (2002) I update these studies to include several more recent articles, which yield similar findings. Hersch (2002) provides similar estimates using individual data by gender.

Cigarette demand elasticities also play a critical role in determining the revenue-maximizing tax. As the tax rate is increased, tax revenues rise from people who continue to purchase cigarettes, but if demand is elastic the quantity purchased will decline as taxes rise, reducing tax revenues. Based on a cigarette demand elasticity estimated for South Africa to be -0.6 , van Walbeek (2002) estimates that the revenue-maximizing cigarette tax in South Africa is 55 percent of the retail price, about one-third higher than current tax rates. The revenue-maximizing tax would raise revenues from cigarettes by 10-15 percent, excluding possible offsets such as smuggling. Thus, a tax increase would further an objective of revenue maximization.

Raising revenue is surely a major objective of cigarette taxes as well as other taxes. But there are other factors that enter as well. The costs of raising taxes include the deadweight loss to consumers who are making informed decisions, costs associated with smuggling and contraband activities, and possible adverse trade effects. Additional possible benefits of taxes include deterring smoking behavior and the associated harms to the individual and society—issues that are examined in detail below.

V. FINANCIAL EXTERNALITIES OF CIGARETTES

A standard justification for taxing commodities is present when these goods impose external costs on other members of society. Pigouvian taxes in which the tax on a commodity is set equal to the marginal harm inflicted by the good will lead to efficient levels of consumption of the product. Such taxes discourage consumption to the level that would occur if consumers took full account of the harm their consumption caused, but the taxes will not compensate those who are harmed unless specific provision is made for compensation.

For roughly a decade there has been considerable debate about the financial costs smokers impose on others. Before addressing the cost calculations, first let us define the set of effects to be considered. The matter of concern here is the financial externalities smokers impose. If smokers are worse off either in terms of their health or their own financial well being, then that effect is not included. Similarly, if smokers die prematurely and do not contribute their income taxes after they are dead, that effect is excluded as well. We do not, for example, penalize people for not fulfilling their full earnings potential by, for example, choosing a lower paying public interest job. However, the calculations below will include contributions smokers do not make to pension and social insurance efforts due to their premature mortality.

Let me emphasize that these calculations do not place a value on smokers' lives. The mortality risks of smoking are surely grave, but these constitute a private cost borne by smokers. The focus here is on the financial external costs to society. This framing of the calculations in no way implies that the risks to smokers are unimportant. Rather, it simply defines the character of the study.

That smokers die sooner than nonsmokers is not a good thing. However, the driving force behind calculations purporting to show that smokers impose external costs on society is that smoking harms smokers' health, consequently imposing medical costs. If this relationship is recognized, then one should consider the effect of this risk on all cost calculations, whether doing so raises or lowers the cost tally. Properly formulated, the economic task is to calculate the net financial costs of smoking. It is not appropriate to include cost increases without recognizing cost decreases. On balance, what would the smokers' costs have been on a lifetime basis but for the smoking behavior? As with all

such calculations that go over a long period, the appropriate approach converts the cost stream into its present value, which I will do using a 3 percent real rate of interest.

Considering costs at a point in time will provide a misleading estimate of the costs of smoking. While smokers are alive, they do incur health costs sooner and at a higher rate than do nonsmokers. However, their trajectory of costs is shorter because of the life expectancy effects of smoking. Some non-economists have labeled taking into account the life expectancy effects a “death credit.” That characterization is certainly incorrect. The approach I advocate here simply recognizes the costs that actually occur, not the costs that would have occurred if smokers lived longer. Failure to recognize the life expectancy effect of smoking will lead the calculations to attribute to smokers costs that have never been incurred because smokers are deceased. Thus, smokers are being charged for costs that never in fact occurred if there is no appropriate life expectancy adjustment.

In assessing the costs associated with smoking, one will obtain a misleading estimate of these costs by comparing a typical smoker to a typical nonsmoker. The average nonsmoker is usually better educated and has fewer other risky health habits and risk exposures. As a result, the accepted approach in the literature is to construct the profile of a “nonsmoking smoker,” i.e., a person who is identical to a smoker other than smoking behavior. The cost associated with smoking is consequently the additional cost generated when a “nonsmoking smoker” takes on the additional health characteristic of smoking.

Table 3 reports the estimated financial costs of smoking in the U.S. on a per pack basis.¹¹ The first column of total costs includes costs to the Federal government, costs to the state government, and cross subsidies from nonsmokers to smokers under private insurance. The second column summarizes the costs to the Federal government, while the third column presents the costs to state government entities. For concreteness, let us focus on the column of total costs. Overall, smokers generate a cost savings of \$0.32 per pack excluding as taxes paid on cigarettes.

There are five categories of expenses that represent cost increases due to smoking: medical care, sick leave, group life insurance, fires, and taxes on earnings. The most important of these is medical care, which involves a cost increase of \$0.58 per pack. Next in importance is the \$0.43 per pack that smokers do not contribute to social insurance programs due to their premature mortality.

On the positive side of the ledger are the savings in nursing home care costs of \$0.24 per pack and the savings in retirement and pension costs of \$1.30 per pack. That smokers die sooner and spend less time in nursing homes and reap fewer retirement benefits is not desirable. However, given the reality that smoking is very dangerous, any proper calculation of costs must recognize that these risks have fundamental cost ramifications.

Given estimates such as this that indicate cost savings associated with cigarettes, how is it that cigarette litigation in the U.S. generated a substantial settlement? The reason is that the focus of these lawsuits was on a particular medical care cost

¹¹ My estimates, which were prepared for the National Bureau of Economic Research, are similar to other studies prepared for U.S. government entities. See Manning et al. (1989) and Gravelle and Zimmermam (1994).

component, Medicaid, which did in fact have positive smoking-related costs. As is indicated in Table 3, smokers do have higher medical expenses on a present value basis.

Do the cost estimates in Table 3 generalize to other countries? Whether they do or not depends on the structure of the private and social insurance efforts. Barendregt, Bonneux, and Vandermaas (1997) found a surprising result for the Netherlands, which is that even if the calculations are restricted to the health insurance component alone, cigarettes are self financing. A more comprehensive cost study in Czechoslovakia focusing on programs in addition to medical care was prepared for Phillip Morris and found that on balance cigarettes are self financing.¹² An important caveat is that, as with my calculations, it should be emphasized that these results in no way imply that the risks of cigarettes are socially desirable. The estimates only reflect the financial costs imposed by smokers, which has become a frequent concern in the smoking policy debate.

The main message of these and similar calculations is twofold. First, it is important to conceptualize the cost effects correctly, focusing on the present value of net lifetime costs. Costs observed at a point in time will give an incorrect cost perspective. Second, whether the costs on balance are positive or negative cannot be answered without examining the particular situation within that country and the insurance programs involved. If such costs are a matter of concern for African nations, the estimates must be redone taking into account the country-specific insurance and pension structures. If the U.S. had only medical insurance, the overall tally in Table 3 would, for example, be quite different. However, to the extent that smoking imposes costs, the brunt of this cost is

¹² See Arthur D. Little, International, Inc., “Public Finance Balance of Smoking in the Czech Republic,” Report to Phillip Morris CR a.s., November 28, 2000. I had no involvement with this study.

borne by smokers themselves. Moreover, the methodology used for the U.S. analysis establishes the sound principles on which other analyses can be formulated.

VI. SMOKING AS A RISKY DECISION

Smoking is a very hazardous consumer activity. If people are cognizant of the risks, they can balance the perceived benefits and expected costs of the activity and choose to smoke if doing so enhances their welfare. Such consumer decisions are potentially efficient, as are choices to buy other dangerous products, whether they are automobiles or prescription drugs. However, a principal requirement for those decisions to be sound is that consumers be cognizant of the associated risks.

Suppose the state of the world was one in which consumers had no knowledge of the hazards of smoking. What policy instruments could be used to deter consumers from smoking to the same extent as would accurate risk beliefs? Two approaches are the use of focused risk communication efforts and taxes to discourage smoking.

Consider first the role of hazard communication policies to lead consumers to have accurate risk beliefs. In the U.S., there have been a series of government reports on the dangers of smoking since 1964. Beginning in 1966 there have been on product warnings. The current series of rotating warnings that began in 1984 alerts consumers to a series of health risks (lung cancer, heart disease, emphysema, and the risks to pregnancy), risks of birth defects, the benefits of quitting, and the presence of carbon monoxide in cigarette smoke. The risks of smoking have received widespread media coverage for at least a half century, and other policies such as advertising restrictions have been in place.

The result of this strong informational environment is that the public's risk beliefs with respect to smoking exceed the actual risks as estimated by the U.S. Surgeon General and the scientific literature. Table 4 provides a comparison of the risk beliefs and actual risk levels for several major categories of risk. Overall, about 10 smokers out of 100 are estimated to die from lung cancer because they smoke. The public, however, estimates this risk to kill 48 out of 100 smokers. The scientific estimate of the total smoking mortality risk from smoking is likewise below people's assessed risk of 54 deaths per 100 smokers, but to a lesser extent than the lung cancer overestimation. Finally, both men and women overestimate the life expectancy loss from smoking, which is 6-8 years.

My coauthors and I have found similar results for Spain.¹³ The informational environment in Spain also parallels that in the U.S. Spain adopted a four rotating warnings policy that was approved in 1988, and which it later modified in 1993. These warnings address the risks of cancer and heart disease, health risks generally, risks of birth defects, and environmental tobacco smoke. Our survey in Spain was similar in character but in some respects more comprehensive in that it also included risk perceptions with respect to heart disease, lung disease, and other risk outcomes. The risk beliefs in Spain were not unlike those in the U.S., as people perceived a lung cancer risk of 0.50, a heart disease risk of 0.45, and a loss of life expectancy due to smoking of 10.9 years.

Warnings and other informational policies may not be present in all countries and may not be effective in every country even if they are adopted. Countries differ, for example, in media coverage of health risk information, education levels, and other determinants of the efficacy of risk communication efforts. Tax policies can potentially

¹³ See Antonanzas et al. (2001), Rovira et al. (2000), and Viscusi et al. (2000).

substitute for risk information in such circumstances. From an economic standpoint, higher risk beliefs have an important consequence in that they deter product purchases. The higher the risk belief, the less attractive cigarettes will be. In the same vein, it is possible to impose cigarette taxes that will deter smoking behavior just as would perception of smoking risks.

I have developed such estimates of the risk belief equivalent of cigarette taxes for lung cancer risk beliefs.¹⁴ The excise tax on cigarettes was 30.8 percent of the retail price in the U.S. time period that I examined. Assessing the effect of such taxes depends on the elasticity of product demand. If demand is relatively inelastic with a demand elasticity of -0.4 , such excise taxes will reduce smoking to the same degree as would lung cancer risk beliefs of 0.17 . If the demand elasticity is -0.7 , the lung cancer risk equivalent of excise taxes is 0.27 . Finally, for a unitary demand elasticity of -1.0 , the excise tax is tantamount to having a lung cancer risk belief of 0.38 . Using excise taxes to discourage cigarette consumption to achieve the same deterrent effect as would higher risk beliefs consequently is most effective when the elasticity of demand for cigarettes is large.

Medical experts beginning with the 1988 report of the U.S. Surgeon General now label cigarette smoking as an addiction rather than an habituation. An addiction to a product is not simply of medical interest, as it has economic consequences as well. I prefer to view cigarette addiction as not a risk of cigarettes but a property of cigarettes. Quitting smoking for many people is difficult. Moreover, smoking now may increase the desire to smoke more in the future.

¹⁴ See Viscusi (1992), p. 109.

Because I have examined these issues in detail elsewhere,¹⁵ here I will summarize the two principal points of view in the economics literature with respect to cigarette addiction. The rational addiction model hypothesizes that people could freely choose to buy an addictive product.¹⁶ The fact that cigarettes are addictive does not necessarily imply that there is a market failure. For example, we make many decisions that are hard to alter, whether it be a choice of an occupation or where one lives. The existence of transactions costs does not imply that the decisions are flawed. The main concern is whether there is anticipation of the future consequences of one's addictive choices, and advocates of this point of view provide empirical evidence that there is such anticipation with respect to prices, risks, and the difficulty of quitting.

Smokers also display consistent risk taking behavior across a wide variety of risky behaviors, which is in accordance with the rational addiction model.¹⁷ Smokers choose to work on more hazardous jobs and are willing to do so for less compensation per unit risk than are nonsmokers. The rate of job injury is also greater for smokers, controlling for the objective risk level. Smokers are also less likely to floss their teeth, are less likely to check their blood pressure, and are more likely to be injured at home. Overall, there is a consistent pattern of risk taking behavior correlated with smoking status.

An alternative point of view, reflected in the work of Schelling (1984) and more recently by Gruber (2003), hypothesizes that people are subject to intertemporal irrationality. Experimental evidence often indicates time inconsistency in choices.

¹⁵ See Viscusi (2002, 2003). The latter publication provides a commentary on Gruber (2003).

¹⁶ See Becker and Murphy (1988) and Becker, Grossman, and Murphy (1996) for this approach.

¹⁷ See Hersch and Viscusi (1990), Viscusi and Hersch (1998, 2001), and Viscusi (2002).

Similarly, surveys of smokers often indicate a desire to quit smoking.¹⁸ In the view of these proponents of intertemporal irrationality, cigarette taxes potentially could serve a constructive role by discouraging smoking behavior. For much the same reason that taxes can substitute for lung cancer risk beliefs, taxes can also deter people from making mistaken addictive choices.

Unfortunately, data do not currently exist to make it possible to determine the level of such taxes. As a result, there have been attempts to extrapolate from rates of time preference in behavioral experiments. Available evidence specifically for smokers is not, however, clearcut. Evidence on people's rates of time preference in Viscusi and Chesson (2000) indicates that smokers may have lower rates of discount with respect to the future than do nonsmokers, which is the opposite of what the intertemporal irrationality analysts hypothesize. The empirical evidence on these issues is still emerging. In the interim, if policymakers believe that there is merit to these concerns with addiction, cigarette taxes could serve a beneficial role and may already be fulfilling that function in countries where taxes already exist.

VII. YOUTH SMOKING

A frequent policy concern is the prevention of youth smoking. Although youths age 16-21 have higher risk beliefs than do adults,¹⁹ and consequently are not making mistaken choices based on inadequate risk beliefs, I have long supported restricting smoking to those age 18 or older in the U.S. In some African countries there is an age limit of 16 on cigarette purchase. Legal requirements for the purchase of cigarettes are

¹⁸ However, as I discuss in Viscusi (1992, 2002, 2003) interpreting what people mean by such statements is not straightforward.

¹⁹ See Viscusi (1992, 2002).

the most refined policy mechanism for addressing youth smoking because they are targeted at the youth segment of the market.

Taxes could also play a role in discouraging youth smoking, but the efficacy of taxes depends on two critical parameters. First, what is the cigarette price elasticity of demand for youths? Some studies suggest that youths are more responsive to prices than are adults, whereas other studies suggest that they are just as responsive to prices as are adults.²⁰ These empirical magnitudes will vary across countries. The greater the price responsiveness of youths compared to adults, the stronger will be the rationale for the use of taxes to deter youth smoking. If there is greater relative responsiveness by youths, then discouraging their smoking will not have the same welfare-reducing effects on adults for whom policymakers do not want to discourage smoking to the same extent.

The second critical empirical parameter for determining the appropriateness of taxes in deterring youth smoking is the share of youth smoking purchases in the retail market. If this share is small, as it is in the U.S. where empirical estimates place this share to be on the order of about 3 percent, then cigarette taxes are a very blunt instrument for decreasing youth smoking.²¹ The overwhelming proportion of the anti-youth smoking tax will be borne by adults. In summary, unless youth smoking is highly price sensitive and constitutes a large segment of the market, stringently enforced age restrictions on cigarette purchases would be a more highly focused remedy that would cause fewer costs on the adult smoking population.

²⁰ Lewit, Coate, and Grossman (1981) suggest that teens are more price responsive, but other studies, such as Wasserman et al. (1991), find no evidence of greater price responsiveness.

²¹ Estimates for the youth smoking share of cigarette purchases appear in Cummings et al. (1994).

Teen smoking may also be responsive to other factors that are more instrumental. Whether the parents smoke in the home and permit teens to smoke in the home, for example, is an important factor.²²

VIII. ENVIRONMENTAL TOBACCO SMOKE

Environmental tobacco smoke (ETS) also will decline if cigarette taxes rise because people will smoke less. In recent years, there has been considerable publicity regarding the potential health risks of ETS, which my review in Viscusi (2002) indicates is not as compelling as the evidence on risks of primary tobacco smoke, which are among the most well established health risks. Scientific studies have had difficulty in identifying ETS risks that pass the usual tests of statistical significance. Similarly, the study by Moore and Zhu (2000) found that ETS exposures did not significantly boost the health care costs of those exposed. Even if one were to adopt the high end estimates of ETS risks, the extent of the public fears of ETS is out of line with any published scientific studies. For example, Spanish respondents believe that 25 of 100 people in the population will get lung cancer from ETS exposures and that an equivalent number will get heart disease.²³ Such fears dwarf any estimates of ETS risks that have ever appeared in the scientific literature.

Wholly apart from real and imagined health risks, people quite legitimately may wish to avoid potential health risks that have not been firmly established as well as the smelly annoyance aspects of smoking, for which they may be incurring significant nonpecuniary losses. These effects represent real economic costs even though they may not be strictly financial in nature. There also may be particularly sensitive and vulnerable

²² See Hersch (1998) and Viscusi (2002).

²³ See Viscusi et al. (2000), p. 216.

population groups, such as asthmatics, who will incur greater health risks from ETS exposures.

Once again taxes are not a well suited policy instrument for dealing with such a focused problem. Cigarette taxes decrease all smoking, not just smoking that generates ETS. A superior policy alternative is to impose smoking restrictions, whether it be establishing nonsmoking areas in restaurants or outright bans of smoking in public buildings.

To reduce ETS exposures in the home, other policy measures may prove effective. Spain has included warnings about the risks posed by ETS as part of the on pack warnings. Evidence in the U.S. indicates that in California where there has been extensive publicity regarding the dangers of ETS that there has been a dramatic decrease in the extent to which smokers expose other members of the household to ETS.

IX. CIGARETTE TAX REGRESSIVITY

Cigarette taxes fall principally on the poor to the extent that it is the lower income groups in the country who smoke. For such countries, it will not be the legislators of the tax who will bear the brunt of the tax, but rather it will be the janitors and the maintenance crew at these government offices who will be paying it.

The extent of U.S. cigarette tax regressivity is quite remarkable.²⁴ People making \$50,000 or more per year pay 0.08 percent of their income in cigarette taxes, while those with income below \$10,000 pay 1.62 percent of their income in cigarette taxes. Poor smokers do not simply pay a higher share of the tax relative to their income, which is the standard measure of regressivity. Instead, the absolute level of the tax borne by the poor is greater as well.

²⁴ See Viscusi (1990, 1992, 2002) for empirical support.

Data from 2000 provided by the South African treasury department indicate that the incidence of tobacco taxes in South Africa is regressive, with the poor paying a higher percentage of their income on tobacco and on tobacco taxes. The overall average expenditure on tobacco was R 1,114 out of an average income of R 39,082, or 2.8 percent. People with incomes R 0 - R 6,480 spent up to 17.2 percent of their income on tobacco products, as compared to 10 – 17.2 percent for incomes R 6,481 - R 11,090, 5.7 – 10 percent for incomes R 11,091 – R19,440, 2.7 to 5.7 percent for incomes R 19,441 – R 41,484, and less than 2.6 percent for incomes R 41,485 and above. Cigarette taxes in South Africa tend to fall disproportionately on the poor, which is an unattractive characteristic of these excise taxes to the extent that income distribution is a matter of concern.

Evidence on smoking trends in South Africa developed by van Walbeek (2003) also indicates that cigarette taxes in South Africa are quite regressive. As cigarette taxes have risen, smoking prevalence among those 15 and older has declined in South Africa from 32.6 percent in 1993 to 27.1 percent in 2000.²⁵ The poor have cut back their smoking in response to higher prices, but cigarette taxes remain regressive. The percentage of household income spent on cigarette taxes declines steadily as one moves from the bottom income quartile (1.39 percent), to the second quartile (0.84 percent), the third quartile (0.56 percent), and the upper quartile (0.33 percent).²⁶ Extreme tax regressivity such as this may create reluctance among policymakers to rely too heavily on cigarette taxes as a tax revenue source.

²⁵ See van Walbeek (2003), p. 20.

²⁶ Ibid, p. 46.

A potential counterargument is that taxes will be welfare-enhancing because, according to this view, smoking decisions are flawed. Before overriding consumer sovereignty, there should in fact be a demonstration of a market failure that will be eliminated. Such shortcomings presumably should be based on a careful analysis of the nature and extent of inadequacies of private choices.

Whether cigarette tax regressivity will be a concern will vary across countries. Smoking once was more prevalent among the better educated and upper income groups in the U.S. In Spain it is still the case that smokers have higher levels of education than do nonsmokers. The nature of cigarette tax regressivity may vary substantially across countries, as may the extent to which the poor are bearing a disproportionate share of the tax. However, to the extent that equity is a concern, consideration of the distributional consequences of cigarette taxes may be more critical than in other areas of tax policy.

X. CONCLUSION

There are in fact general principles for cigarette taxation, but the application of these principles will vary by country. Cigarette taxes can serve as a simple revenue raising device, but the resulting excess burden imposed by the tax will depend on the elasticity of demand. Whether there are in fact financial externalities from smoking will depend on the insurance structure in the country, but if there are such net financial externalities, cigarette taxes are well suited as a policy remedy. If there is evidence that people are making irrational cigarette choices, then higher taxes could discourage smoking and eliminate the market failures that might exist. Informational regulations also might address these shortcomings in individual decisions.

It is noteworthy that if one finds merit in the potential economic rationales for taxing smoking—financial externalities and irrational smoker decisions—then there are implications for the structure of optimal taxes as well. The harms to society and to the individual smoker are closely related to the quantity of cigarettes smoked and not the amount spent on cigarettes. Thus, a unit tax per pack is a more appropriate remedy than an ad valorem tax in such circumstances. A more finely tuned tax might link the tax to cigarette riskiness if a consensus measure of product risk levels emerged. To the extent that cheaper cigarettes pose greater risks, an ad valorem tax will have disproportionate effects on the comparatively safe cigarettes on the market.²⁷

For other policy concerns such as youth smoking and ETS, cigarette taxes appear to be an excessively blunt policy instrument. Regulatory mechanisms, such as age restrictions on cigarette purchase and public smoking restrictions of various kinds, represent more targeted policy approaches that can be effective without causing broadly based penalties on smoking behavior generally.

Although these nuances of using taxes as a policy lever are prominent in the academic literature, a more salient practical policy concern in Africa is the role of smuggling and contraband cigarettes. High taxes and tax differences across countries create incentives for a variety of forms of illegal activities to evade taxes. The social costs include both foregone profits and foregone tax revenue, which can be considerable, but also creation of crime-related externalities associated with these illegal efforts.

Two final caveats are worth noting. First, cigarette taxes may fall disproportionately on the poor so that consideration of tax regressivity should be an important part of the policy assessment process. If the poor tend to buy less expensive

²⁷ Evans et al. (1999) examine the higher risks posed by cheaper cigarettes sold in the U.S.

cigarettes, reliance on an ad valorem tax rather than a unit tax may promote this objective. However, it is more likely that protectionist concerns may be the driving force leading to the adoption of ad valorem taxes rather than a concern with tax regressivity. Second, smoking decisions represent consumer choices that should be respected in the same way as are other product decisions to the extent that they are based on a rational assessment of the consequences of the product for their welfare.

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TABLE 1
Cigarette Excise Incidence*

VALUE IN RANDES / %	Botswana	Kenya	Lesotho	Malawi	Mauritius	Mozambique	Namibia	South Africa	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
Recommended Retail Price (3/03)	10.47	6.32	10.80	6.23	15.46	4.43	10.80	10.80	4.59	5.53	3.95	5.47	3.41
VAT and Share of Retail Price	0.95 9.1%	0.87 13.8%	0.98 9.1%	1.04 16.7%	2.02 13.0%	0.64 14.5%	1.41 13.0%	1.33 12.3%	—	0.92 16.7%	0.57 14.5%	0.81 14.9%	—
Price Net of VAT	9.52	5.45	9.82	5.19	13.44	3.78	9.39	9.47	4.59	4.61	3.37	4.65	3.41
Excise per Pack	2.45 23.4%	0.18 2.8%	3.89 36.0%	0.83 13.4%	20.11 130.1%	1.85 41.8%	3.89 36.0%	3.89 36.0%	1.94 42.2%	0.18 3.3%	1.85 46.8%	3.28 60.1%	1.41 41.4%
Price Net of Taxes	7.07	5.27	5.93	4.36	(6.67)	1.93	5.51	5.59	2.65	4.43	1.53	1.37	2.00
Total Excise Tax and VAT	3.41 32.5%	1.05 16.6%	4.87 45.1%	1.87 30.0%	22.12 143.1%	2.49 56.3%	5.29 49.0%	5.21 48.3%	1.94 42.2%	1.10 19.9%	2.42 61.3%	4.10 75.0%	1.41 41.4%
Other Taxes	—	—	—	—	0.02 0.1%	—	—	—	1.32 28.8%	—	—	—	—
Total Taxes	3.41 32.5%	1.05 16.6%	4.87 45.1%	1.87 30.0%	22.14 143.2%	2.49 56.3%	5.29 49.0%	5.21 48.3%	3.26 71.0%	1.10 19.9%	2.42 61.3%	4.10 75.0%	1.41 41.4%
Most Popular Price Class	Peter Stuyvesant	Sportsman	Peter Stuyvesant	Embassy Menthol	Matinee	Palmer KS	Peter Stuyvesant	Peter Stuyvesant	Peter Stuyvesant	Sweet Menthol	Safari	Consulate	Madison
Notes	a	j	b	g	g, k	g	c	a	d, e	h	g	g	f, g

* -- The Rand rate is simply converted based on the Rand:US\$ interbank exchange rate (June 19, 2003).

a -- Specific rate of R194.25 per thousand. Excise is calculated at 50% of RRP prior to the excise increase. Calculated per SACU agreement

b -- Specific rate of M194.25 per thousand. Excise is calculated at 50% of RRP prior to the excise increase. Calculated per SACU agreement.

c -- Specific rate of N\$194.25 per thousand. Excise is calculated at 50% of RRP prior to the excise increase. Calculated per SACU agreement.

d -- Specific rate of E194.25 per thousand. Excise is calculated at 50% of RRP prior to the excise increase. Calculated per SACU agreement.

e -- Sales tax computed on import value plus excise.

f -- Sales tax of 15% not applied to cigarettes.

g -- Ad valorem rate on ex factory price.

h -- Specific excise rate with 3 tiers of US\$9 and 3.8 per thousand. Third tier is on imports and is US\$16.

j -- Specific excise rate with 4 tiers at US\$18, 12, 9, and 6 per thousand.

k -- Import levy computed on MPPC (leaf tobacco)

TABLE 2*

Representative Product Elasticities of Demand

<u>PRODUCT</u>	<u>ELASTICITY OF DEMAND</u>	
Tobacco Products	-0.46 (short-run)	-1.89 (long-run)
Toilet articles and preparations	-0.20 (short-run)	-3.04 (long-run)
Kitchen/other household appliances	-0.63	
Stationery	-0.47 (short-run)	-0.56 (long-run)
Water	-0.20 (short-run)	-0.14 (long-run)
Legal services	-0.37	
Automobile repair	-0.40 (short-run)	-0.38 (long-run)
Taxicabs	-0.63	
Newspapers and magazines	-0.42	
Theater and opera	-0.18 (short-run)	-0.31 (long-run)
Beef	-0.62	
Chicken	-0.37	
Fish	-0.12	
Turkey	-0.54	
Pork	-0.73	
Butter	-0.24	
Cheese	-0.25	
Eggs	-0.11	
Milk	-0.04	
Apples	-0.19	
Bananas	-0.50	
Carrots	-0.53	
Grapefruit	-0.46	
Peanuts	-0.17	
Tomatoes	-0.62	

* Source: The non-food items from tobacco through theater and opera are from H. S. Houthakker and L. D. Taylor, 1970. *Consumer Demand in the United States: Analysis and Projections*. 2nd ed. Cambridge, MA: Harvard University Press. The food items from beef through the end of the table are from Kuo S. Huang, "Nutrient Elasticities in a Complete Food Demand System," *American Journal of Agricultural Economics*, Vol. 78 (1996), pp. 21-29

TABLE 3

Financial Externalities of Cigarettes

	<u>Total</u>	<u>COST PER PACK (DOLLARS)</u>	
		<u>Federal Government</u>	<u>State Governments</u>
Total medical care	0.580	0.236	0.033
Sick leave	0.013	0.001	0.001
Group life insurance	0.144	0.004	0.005
Nursing home care	-0.239	-0.145	-0.078
Retirement and pension	-1.259	-0.847	-0.078
Fires	0.017	0.000	0.000
Taxes on earnings	0.425	0.221	0.027
Total net costs	-0.319	-0.530	-0.090

Notes: All figures are discounted using a 3 percent rate of interest. Data are from Viscusi (2002), pp. 73, 94.

TABLE 4

Summary of U.S. Smoking Risk Perceptions, 1997

	<u>Scientific Estimates</u>	<u>Public Perception</u>
Lung Cancer Fatality Risk	0.06 - 0.13	0.48
Overall Mortality Risk	0.18 - 0.36	0.54
Life expectancy loss	6 - 8 years	10.1 years (males) 15.9 years (females)