
Price elasticity and other forces shaping cigarette demand in South
Africa over 1996-2006

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ABSTRACT

The study seeks to re-investigate the price elasticity of South African cigarette demand over the period 1996 to 2006. At first glance, rising cigarette prices seem to have played an important role in reducing cigarette consumption over the sample period, especially during the late nineties. But how dependent is the impact of price increases on general economic conditions and overall health awareness among smokers? Health awareness, in particular, has not received sufficient attention in the South African context, due to a lack of data. Furthermore, previous estimates of price and income elasticity of cigarette demand are based on long annual time series data, which do not allow for changes in underlying tastes and preferences. The paper attempts to disentangle the forces of price, income, health awareness and policy intervention using a quarterly dataset. However, the study also cautions against the upward bias in estimates derived from formal cigarette sales data – in the light of increasing illicit cigarette volumes in South Africa.

Keywords: Price elasticity, Tobacco control, Cigarettes, Illicit cigarettes, Excise duties, Health awareness

JEL codes: D12, H21, I18, C40

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1. INTRODUCTION

The South African tobacco industry has seen extensive regulatory reforms in the nineties, including sharp increases in excise duties, limits on public smoking and strict control of tobacco advertising (Van Walbeek, 2004). These changes have encouraged research on the economics of tobacco control in South Africa – with particular emphasis on the price sensitivity of smokers (see Reekie (1994), Abedian and Dorrington (1994), Van Walbeek (1996), Van der Merwe and Annett (1998) and Van Walbeek (2000)).

Historically, only *annual* consumption and price data have been available. This frequency constraint has forced South African researchers to rely on longer sample periods commencing in the sixties or seventies. However, such a long-run perspective does not account for changes in consumer tastes and preferences – as data on health awareness or other preferences of South African smokers are not generally available. These data constraints may be particularly problematic for an analysis of cigarette demand over the past ten years, due to substantial tobacco policy intervention over this relatively short period of time. This study attempts to address these problems by using a new *quarterly* dataset for the period 1996 to 2006, including data on prices, disposable income and policy intervention (in particular, health awareness).

The paper commences with a brief overview of South African research on the price sensitivity of smokers, followed by an extensive discussion of the dataset. The empirical results then follow, divided into two components. The first part involves a descriptive analysis of the relationship between cigarette consumption and prices. The goal is to illustrate that this relationship is conditional on the general state of consumer income and on the health awareness of smokers (which is driven by, *inter alia*, changes in tobacco control policy). The second part is an attempt to disentangle the different forces shaping cigarette demand. To this end, a regression analysis is employed to obtain price, income and health awareness elasticity estimates. The paper concludes with a section on the impact of illegal cigarettes and a subsequent summary of the arguments.

2. PREVIOUS RESEARCH ON PRICE ELASTICITY

Reekie (1994) is the first formal attempt to estimate the price elasticity of tobacco demand in South Africa. Using data from 1970 to 1989, Reekie (1994) estimates a price elasticity of -0.87. This is derived from a fairly basic econometric specification including only two independent variables: price and disposable income per capita. Abedian and Dorrington (1994) offers a critique of Reekie (1994), arguing that this specification results in too high an estimate as it fails to account for all demand-shift factors.

Van Walbeek (1996) notes that, while Abedian and Dorrington (1994) highlight theoretical and technical issues deserving attention, it is quite difficult to measure the qualitative variables that these authors emphasize. Using different data sets, Van Walbeek finds evidence of long-run price elasticities ranging from -0.53 to -1.52, based on data from 1970 to 1990. He ascribes the wide range of different estimates to the relatively low correlation between the tobacco consumption data in the different data sets (Van Walbeek, 1996: 29). Similarly, Van der Merwe and Annett (1998) and Van Walbeek (2000) focus on price and income elasticity, reporting long-run elasticities of around -0.69 and -0.6 respectively over the period 1970 to the mid-nineties. Table 1 summarises the results in the South African literature:

Table 1. Comparison of tobacco price elasticity estimates for South Africa

<i>Author</i>	<i>Elasticity estimate</i>	<i>Sample period</i>
Reekie (1994)	-0.87	1970-1989
Van Walbeek (1996)	-0.53 to -1.52	1970-1990
Van der Merwe & Annett (1998)	-0.69	1970-1995
Van Walbeek (2000)	-0.60	1970-1998

Chaloupka *et al* (2000) provide a comprehensive summary of current international research on the demand for tobacco, distinguishing between estimates for developed and developing economies. The empirical literature indicates that the price elasticity of tobacco demand in developing countries is generally higher than for

developed nations (Chaloupka *et al*, 2000: 246). Warner (1990) argues that these higher estimates are feasible, given that lower absolute levels of income in poorer economies may induce higher consumer sensitivity to price. The South African estimates discussed above are generally at the lower end of the range of estimates for other developing countries (apart from Turkey, where elasticity is also low), as shown in Table 2:

Table 2. Comparison of tobacco price elasticity estimates for developing countries

Country	Elasticity estimate	Sample period
Papua New Guinea	-0.71 (cigarettes)	1973-1986
	-0.50 (non-cigarettes)	
Turkey	-0.37 (long-run)	1960-1988
	-0.21 (short-run)	
China	Range of -0.65 to -0.8	1981-1993
Taiwan	Range of -0.5 to -0.7	1966-1995
China	-0.987	1978-1992
Zimbabwe	-0.85	1970-1996
Brazil	-0.8	1983-1994

Source: Adapted from Chaloupka *et al* (2000: 246-250)

The South African studies outlined above highlight two issues important to this study. Firstly, estimates by Van der Merwe and Annett (1998) and Van Walbeek (2000) that include data from the nineties appear to fall in a range of -0.6 to -0.7. This paper reconsiders the first issue, showing that average price elasticity may be slightly lower than this range, although the estimate appears to have increased in recent years. This is not a novel idea in the South African context: Van Walbeek (2000) argues that one should not overemphasise the average elasticity estimate, as this value may hide underlying changes in price sensitivity. Secondly, all South African studies emphasise the problems with modelling cigarette demand in the absence of data on preferences. This data constraint receives attention in the expanded dataset, which is the subject of the following section.

3. THE DATASET

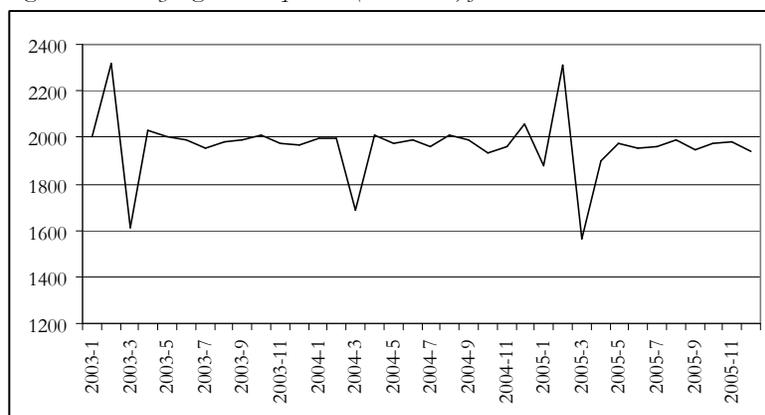
In general, the demand for any good depends, *inter alia*, on its own price and consumer income. The literature on cigarette demand acknowledges the importance of these demand-shift factors, but also points to the significant roles of advertising and legislation in the evolution of tobacco demand (see Abedian and Dorrington (1994: 66-67) for their discussion in a South African context). This paper attempts to control for the impact of regulation and increased health awareness, although the model remains fairly simplified. The following paragraphs briefly discuss the different variables considered in the subsequent analyses.

(a) Quantity of cigarettes demanded

The appropriate measurement of the quantity of cigarettes demanded is an important (and challenging) issue. As cigarette demand studies are concerned with the consumer's response to price and other demand-shift forces, retail cigarette sales are the preferred proxy for quantity demanded. However, retail figures are difficult to obtain, mostly due to the absence of national bodies with data collection capabilities. This is true of some developed countries such as Canada (Gospodinov and Irvine, 2005) and also for developing countries, including South Africa. Even where data is available, the frequency is usually annual, which forces the economist to use a fairly long sample period. While this overcomes the econometric problems associated with small samples, it does not account for changes in either consumer tastes or in the regulatory environment. Consequently, a shorter sample period of higher frequency (quarterly or monthly) may be more appropriate. However, this frequency requirement forces the current study to use wholesale cigarette shipments, instead of retail sales.

There are two particular problems with using cigarette shipments from manufacturers to wholesalers as a proxy for quantity demanded. Firstly, cigarette shipments are influenced by marketing activities. Wilkins, Yurekli and Hu (2007: 28) note that manufacturers tend to increase sales towards the end of a financial year to meet predetermined targets. In the South African context, a more plausible explanation may be that retailers and wholesalers will increase their cigarette purchases prior to the annual increase in excise duties. This behaviour is clearly evident if one considers Figure 1, illustrating such a pattern for monthly cigarette sales for the period 2003-2005.

Figure 1. Monthly cigarette shipments (in millions) for 2003-2005



Clearly, March sales tend to be uncharacteristically lower than other months, with February sales usually higher. This study uses average quarterly figures, calculated as the simple average of the three months in any quarter, which partially addresses the above-mentioned problems. Of course, monthly data based on a three-month moving average could also be used, but the frequency of the income variable (this paper uses personal disposable income) constrains the study to a quarterly frequency.

The second problem that could plague both retail sales and manufacturer shipments is their aggregate nature. National cigarette sales or shipments are aggregate figures that include various cigarette flavours¹. A regression of these figures on an average price series may lead to biased results, as an absolute increase in cigarette prices may have a different effect on higher-priced flavours compared to lower-priced ones. On the other hand, disaggregate figures are not without their own problems. Price elasticity estimates for different flavours may be biased upward, as they do not account for the fact that, following a price increase, consumers may not stop smoking, but rather switch to another brand. Therefore, if the goal is to assess the overall sensitivity of consumers to price and other demand-shifting factors, aggregate figures may yet be useful.

(b) *Price of cigarettes*

As far as the price variable is concerned, this study uses a weighted average price for a pack of twenty. Wilkins, Yurekli and Hu (2007: 17) note that a weighted price is to be preferred as this accounts for different types of cigarettes bought under different circumstances (e.g. a single pack, a vending machine, etc.), thereby providing a better representation of the average price facing different consumers. In particular, this study is based primarily on a recommended retail selling price series provided by a South African tobacco manufacturer.

(c) *Income of smokers*

This study employs real national disposable income as the proxy for income of smokers. Of course, one might argue that, given the skewed income distribution of South Africa, it may be prudent to account for different income groups – or even estimate separate demand functions for each income group (see for example Ground and Koch (2007)). However, apart from the problem of obtaining such information in the correct frequency and form, the aim of this study is to provide an assessment of overall sensitivity to price and other factors among South African smokers.

(d) *Other demand-shift variables*

Apart from the three central variables (quantity, price and income), changes in cigarette volumes may also be due to changes in advertising, regulatory changes and changes in consumer tastes. Nonetheless, accounting for changes in the institutional environment and for changes in the underlying tastes and preferences of tobacco consumers is a difficult task, as noted by previous researchers. This paper faces a similar difficulty with tobacco advertising expenditure, as this is not available at a quarterly frequency, although the picture is more promising for regulatory and consumer taste variables.

¹ The shipment data excludes non-cigarette tobacco products.

Government regulation may be aimed at reducing the demand for cigarettes. Two types of legislation are important: health warning and smoking restrictions (Keeler *et al*, 1993). This paper does not formally study the impact of the 1995 tobacco legislation requiring health warning labels on South African cigarette packs – given that our sample period only starts in 1996. However, this study does account for changes in government-imposed smoking restrictions via a dummy variable. The dummy variable is constructed from the chronology of tobacco legislation in Van Walbeek (2004). In particular, the series takes the value of 0 up to the last quarter of 2000, as smoking restrictions were virtually absent, except for a smoking restriction on public flights (Van Walbeek, 2004: 111). Amendments to the Tobacco Products Control Bill came into effect in January 2001 and contained substantial smoking restrictions in public places, including restaurants. Consequently, the dummy variable takes the value of 1 from the first quarter of 2001 onwards.

Changing preferences among smokers can also influence the demand for cigarettes. International research (e.g. Hsieh *et al* (1999)) point to the importance of the health awareness variable in the demand function. Keeler *et al* (1993) note that the market share of light cigarettes – cigarettes delivering lower levels of nicotine and tar – could be used to gauge the health awareness among smokers. This study defines light cigarettes as cigarettes with a tar content of lower than 9 mg, based on the classification of a South African tobacco manufacturer.

Given the above discussion of the variables of interest, the analysis in the following sections is divided into two main components: a descriptive and a statistical analysis. The descriptive analysis attempts to uncover the relationship between prices and quantity under various conditions. The statistical analysis then helps to untangle the impact of different factors, presenting formal estimates of price, income and health elasticity of South African cigarette demand.

4. DESCRIPTIVE ANALYSIS

Figure 3 shows the trend in the quantity of cigarettes sold in South Africa since 1990. The early nineties experienced a moderate decline in cigarette consumption, which accelerates from 1995 through 2000. This is followed by a period of relative stability in cigarette sales.

This behaviour can be compared to that of cigarette prices to establish whether a relationship exists. Figure 4 shows the evolution of the real average retail sale price for a pack of twenty cigarettes. Cigarette prices rise substantially from 1994 onwards, driven mostly by excise tax increases (Van Walbeek, 2004).

Figure 3. Seasonally adjusted cigarette shipments in South Africa, in millions

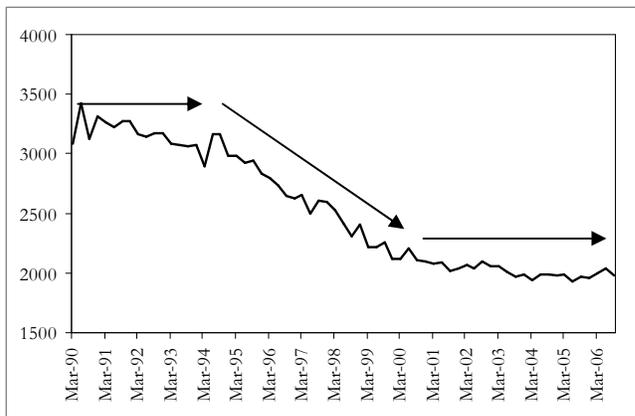
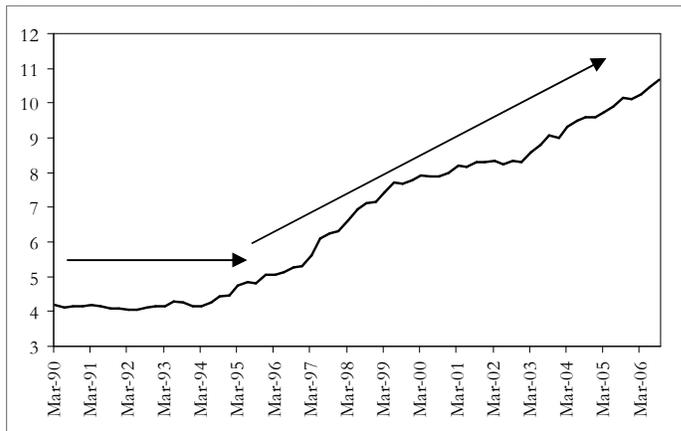
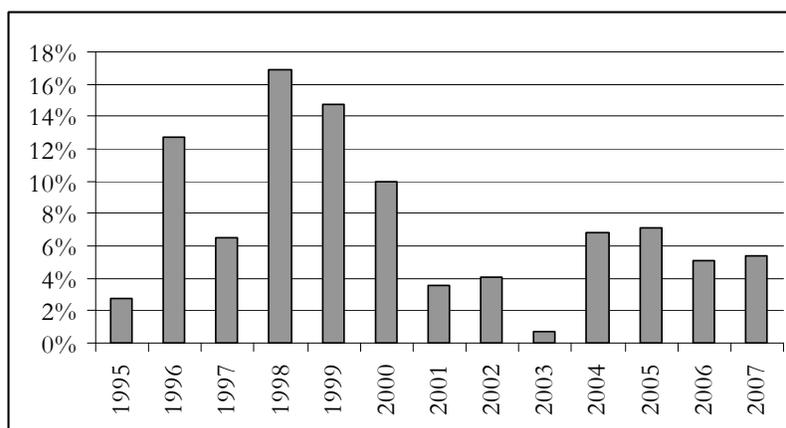


Figure 4. Recommended retail selling price, adjusted for inflation



A comparison of the price and quantity graphs suggests a generally negative relationship between prices and quantity until around 2001. But why do changes in cigarette consumption appear to become less correlated with changes in the real price since then? Arguably, part of the answer is found by considering the behaviour of the year-on-year *growth rate* in the real cigarette price, as shown in Figure 5.

Figure 5. Average growth rate of quarterly recommended retail selling price, adjusted for inflation



The average growth rate of the real price is about 11% for the period 1995 to 2000 –significantly higher than the

average of about 5% price growth achieved from 2001 onwards. Hence, it may be more accurate to consider a generally negative relationship between quantity and the *intensity* of price increases: larger price increases appear to result in significant reductions in quantity, while smaller price rises do not necessarily affect consumption negatively.

These visual impressions can be given formal content by calculating “elasticity” estimates between cigarette consumption and price. Such values are not elasticity estimates in the econometric sense of the word, as the calculation does not control for the impact of other factors. Consequently, these values will be termed conditional elasticity estimates.

(a) *Conditional price elasticity estimates*

One attempt to measure the responsiveness of cigarette sales to prices is based on a comparison of the percentage change in annual cigarette sales and that of cigarette prices over each year in the sample period. Table 3 presents these percentage changes, together with the “elasticity” estimates calculated using the mid-point formula.

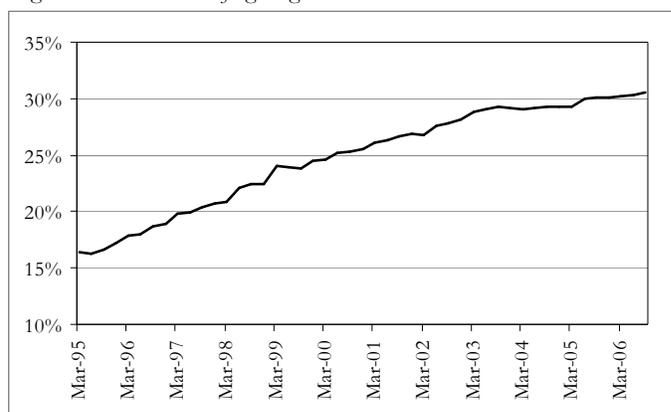
Table 3. *Conditional price elasticity estimates, 1996-2006*

Year	Price change (%)	Quantity change (%)	Elasticity estimate
1996	8.9	-7.8	-0.88
1997	17.3	-4.1	-0.24
1998	13.0	-7.0	-0.54
1999	13.4	-9.3	-0.69
2000	3.9	-3.3	-0.85
2001	5.7	-3.8	-0.66
2002	-1.0	0.6	-0.57
2003	9.2	-3.0	-0.33
2004	6.0	-1.6	-0.26
2005	4.1	-0.6	-0.14
2006	3.0	2.2	0.72

The estimates presented in Table 3 varies from -0.09 to -0.88. Also, the estimate for 2006 indicates a positive conditional correlation. Arguably, this wide range of estimates can be ascribed to the over-powering impact of other benign forces on cigarette demand. Nonetheless, a closer scrutiny of the table could provide some important (if preliminary) insights. Consider the behaviour of the estimates from 1999 onwards. The year 1999 marks the start of the South African economy’s longest (and continuing) post-War expansion. The first years of the upswing were quite mild and conditional price elasticity estimates range between -0.57 and -0.85. However, from 2003 onwards economic growth accelerates substantially, resulting in 5%+ annual growth in real disposable income. For this period (excluding 2006), conditional price elasticity estimates appear to be much lower: in the range of -0.14 to -0.33. Hence, Table 3 suggests that changes in disposable income (as driven by the economic growth cycle) could offer an important additional explanation for changes in cigarette sales.

Conditional estimates also appear to be influenced by the evolution of health awareness among smokers. Figure 6 presents light cigarettes as a proportion of total cigarette sales in South Africa.

Figure 6. *Market share of light cigarettes*



Light cigarettes have grown substantially since 1994 – in a period during which aggregate cigarette sales have been falling. In particular, light cigarettes gained increased their market share from about 16.4% in 1995 to 29% in 2003. Since 2003, the trend tapers off and stabilises around 30%. Arguably, the increase in this proxy of health awareness offers an additional explanation for the behaviour of the conditional price elasticity estimates. Price-quantity correlation appears to lower from around 2003 – the same period during which light cigarette sales are stabilising. Hence, light cigarettes also appear to offer a partial explanation for changes in cigarette consumption. In fact, while previous South African research controls for the impact of income changes, changes in health preferences have not received attention. Therefore, the price and income elasticity estimates in previous studies could suffer from omitted variable bias.

Health awareness can be considered a proxy for policy intervention, given that the elaborate tobacco policy interventions of the nineties were aimed at increasing awareness of the health consequences of smoking. An alternative (albeit, more elementary) measure of considering the impact of tobacco policy on cigarette consumption, is to compare cigarette sales before and after 2001, when extensive smoking restrictions were enacted. It is difficult to isolate the effect of this intervention using the somewhat informal analysis in this section – as it is likely that other forces discussed previously may be overshadowing the negative effect of smoking restrictions. The statistical analysis pursued in the following section will assist in disentangling the different effects.

(b) *Conclusions*

The conditional estimates of price elasticity presented above, suggest that price changes are strongly correlated with changes in cigarette consumption. Nevertheless, the discussion suggests that awareness of the health consequences of smoking and the general state of the economy appear to either complement or counteract the impact of increased cigarette prices over the sample period. However, it is difficult to distinguish the relative strengths of these effects using descriptive analysis. The regression analysis attempted in the following section helps to separate the different influences, so as to obtain a clear idea of the impact of any one demand-shift factor *ceteris paribus*.

5. REGRESSION ANALYSIS

The goal of the regression analysis is to explore the sensitivity of cigarette sales to different demand-shift factors, including price, income and health awareness. The precarious nature of cigarette consumption data (as discussed later) implies that estimates merely indicate orders of magnitude and are not necessarily useful for calculating optimal excise tax levels. Nevertheless, these approximate orders of magnitude offer at least preliminary support for alternative explanations of the evolution of South African cigarette consumption.

(a) *Methodology*

The statistical analysis follows a data-driven approach and is based on an unrestricted vector autoregression (VAR), which allows the economist to treat all variables as endogenous. Specifically, the VAR consists of four equations, with cigarette consumption, price, disposable income and health awareness as dependent variables, where each dependent variable is modelled as a function of past values of itself and of the other variables. The VAR is based on the natural logarithms of the variables. This implies that we are assuming that the price elasticity is a constant value. Such an assumption may be problematic for purposes of tobacco policy modelling and it has been heavily criticised by Abedian and Dorrington (1994) in the South African context. However, Wilkins, Yurekli and Hu (2007) note that it is acceptable where the goal is constrained to an analysis of relationships, as is the case for the current study. The VAR is estimated for a lag order of three quarters. This study is particularly interested in the equation for cigarette consumption, which can be interpreted as the cigarette demand equation as it shows the impact of different factors on cigarette sales. Algebraically, this particular equation can be represented as:

$$Q_t = \mu + \sum_{k=1}^3 \beta_k Q_{t-k} + \sum_{k=1}^3 \gamma_k P_{t-k} + \sum_{k=1}^3 \theta_k Y_{t-k} + \sum_{k=1}^3 \varphi_k H_{t-k} + \varepsilon_t \quad (1)$$

where Q_t log of cigarette consumption

P_t log of real cigarette price
 Y_t log of real disposable income
 H_t log of market share for light cigarettes

The output from this equation can be used to estimate long-run elasticities. For example, the price elasticity of cigarette demand (E_d) can be estimated, from an estimated equation of (1), as follows:

$$\hat{E}_d = \frac{\sum_{k=1}^3 \hat{\gamma}_k}{1 - \sum_{k=1}^3 \hat{\beta}_k} \quad (2)$$

Similar formulae can be used to estimate the income elasticity of cigarette demand as well as the impact of increased health awareness among smokers.

(b) *Results*

The VAR model will be estimated for different sample periods. The first sample period is 2001-2006 and subsequent sample periods are expanded by including earlier years: 2000-2006, 1999-2006, etc. Prior to considering the results, the VAR models' congruency with the relevant dataset can be assessed by a set of misspecification tests on the residuals. Both the individual equations and the system pass the heteroscedasticity, normality and autocorrelation tests.

Table 4 reports the long-run elasticity estimates for price, income and health awareness. The first column reports the results based on the sample period 2001-2006, which provides a general idea of the size of elasticity coefficients after the introduction of the smoking regulations in 2001. However, care should be taken when interpreting the coefficients, given the very short sample period (only 21 observations). Consequently, the subsequent columns report the results if the VAR is estimated over ever-longer sample periods that include the years preceding 2001.

Table 4. Long-run estimates for price, income and health elasticity of cigarette demand

	2001- 2006	2000- 2006	1999- 2006	1998- 2006	1997- 2006	1996- 2006
Price	-0.53	-0.57	-0.62	-0.38	-0.22	-0.16
Income	0.64	0.71	0.70	0.53	0.44	0.37
Health awareness	-0.34	-0.53	-0.53	-0.54	-0.59	-0.61

It is important to note that the estimates based on sample periods that include the first two to three years (1996-1998) seem to diverge from the results obtained for sample periods excluding these earlier years. Generally, based on the eight years (from 1999 to 2006), the price elasticity suggested by this simple model is in the range -0.5 to -0.6, while they are in the range -0.2 to -0.4 if earlier years are included. Arguably, this indicates that consumers were much less responsive to price in the earlier years and that elasticity increased as prices rose: elasticity tends to increase along the demand curve. The suggested income elasticity is in the range 0.5 to 0.7 for sample periods excluding 1996 and 1997; estimates are lower (around 0.4) if these years are included. Estimates for health awareness elasticity are in the range -0.5 to -0.6 for all but the shortest sample period. In general, these estimates suggest that other factors, apart from price, may have played important roles in decreasing the consumption of cigarettes. In particular, the size of these elasticity estimates coupled with the substantial increase in health awareness and the generally lacklustre economic growth of the late nineties may explain a significant part of the reduction in consumption over that period. In addition, this interpretation is consistent with the fairly stable cigarette sales after 2002. In this time, favourable economic conditions and a slowdown in the growth of health awareness counteracted the mild adverse effect of slow increases in the real price of cigarettes.

The above findings are based on a VAR that does not include a dummy variable to control for the impact of increased smoking regulations. Such a dummy variable can be added to equation as an exogenous variable. Table 5 presents the results for this case. The general features are unaltered, with price elasticity estimates in the range -0.5 to -0.7, income elasticity estimates in the range 0.5 to 0.7 and health awareness in a slightly lower range of -

0.35 to -0.5. The general conclusion is maintained: income changes and increased health awareness, by virtue of their fairly high elasticity estimates, may have complemented price increases in reducing cigarette consumption.

Table 5. Long-run estimates for price, income and health elasticity of cigarette demand (controlling for impact of smoking regulations in 2001)

	2001-2006	2000-2006	1999-2006	1998-2006	1997-2006	1996-2006
Price	-0.53	-0.64	-0.66	-0.50	-0.25	-0.18
Income	0.64	0.73	0.70	0.59	0.46	0.38
Health awareness	-0.34	-0.35	-0.40	-0.40	-0.55	-0.59

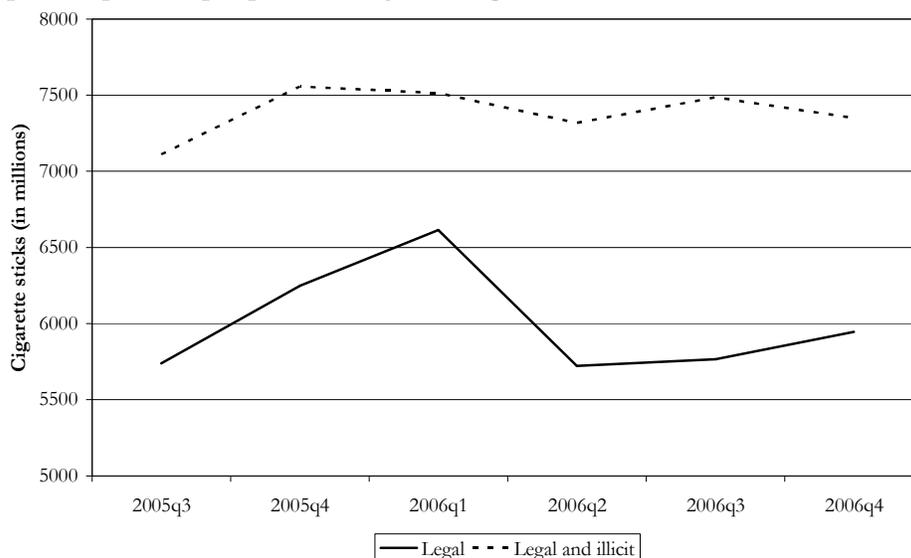
(b) Comparison with previous findings

The long-run price elasticity estimates, especially those based on sample periods including 1996-1998, are lower than previous studies suggest. Nonetheless, they do support the general notion that price sensitivity has increased in recent years. Income elasticity estimates are generally in line with the lower estimates provided in Van Walbeek (2000). In general, this study has attempted to address the criticism by Abedian and Dorrington (1994) concerning the absence of preferences in econometric models of cigarette demand. The results show that a smoker's decision function is not satisfactorily described by the price and income sensitivity of the smoker alone. Preferences are quite important and it may be that changes in preferences during the nineties have been more important in reducing consumption than price intervention strategies have been.

6. ILLEGAL CIGARETTES

A factor that may bias the elasticity estimates upward is the apparently growing consumption of illegal cigarettes in South Africa. Mohamed (2002) is the only South African paper so far to consider the potential impact of illicit trade, but does not provide empirical evidence. Very little data exist on this phenomenon, but the tobacco industry has argued that sales of illegal cigarettes has increased from about 8 million in 2005 to about 10 million in 2006 (IISA, 2006). A large South African cigarette manufacturer has recently started to estimate illicit cigarette volumes. Figure 7 reports the legal and total (that is, including illicit) cigarettes sold from the second quarter of 2005 to the last quarter of 2006.

Figure 7: Legal and illegal cigarette volumes from third quarter 2005 to end 2006



While these figures are for a short period and have not been verified independently, it is clear that illicit cigarette volumes may represent approximately 20% of total cigarette consumption in South Africa. Also, the impact of their inclusion may not be limited to a parallel shift in cigarette volumes – the preliminary figures suggest that their inclusion may also alter the *behaviour* of the time series (see how the stronger upward movement in legal volumes for the first three quarters on the graph is reduced in the case of total volumes). Consumption may be much more stable in the face of increasing prices and other demand-shift factors than previously thought.

Therefore, the price elasticity estimates presented earlier may be too large: data on legal cigarette volumes is probably *overestimating* the reduction in the number of smokers – as some smokers have substituted legal for illicit cigarettes. This upward bias may be particularly large for the later years of the sample, if we assume that illegal cigarettes have become more pervasive.

7. CONCLUSIONS

This paper reconsiders the impact of cigarette price increases on the quantity of cigarettes demanded in South Africa. The evidence presented show that the reaction of smokers to price increases is dependent on the business cycle as well as their overall health awareness. The nineties saw a substantial decline in cigarette consumption due to higher prices. However, these were supported by slow economic growth and rising awareness about the health risks of smoking. In recent years, the booming economy has boosted disposable income, while health awareness appears to have hit a plateau – offsetting the negative effect of real price increases. Therefore, a narrow policy aimed at repeatedly exploiting the price elasticity of smokers may be misguided if it ignores other factors that also contribute to the evolution of cigarette consumption. It is mistaken to argue that a 10% increase in cigarette prices today will reduce consumption by the same amount it would have in the 1990s, as preferences and economic conditions are quite different. Furthermore, there is not convincing evidence that the price elasticity of cigarette demand exceeds the range -0.5 to -0.7. Although the regression results suggest an increase in price elasticity over recent years, the lack of data on illicit trade in cigarettes is likely to generate an upward bias in these estimates.

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