

A mountain or a molehill: is the illicit trade in cigarettes undermining tobacco control policy in South Africa?

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I estimate the size of the market for illicit cigarettes in South Africa between 1997 and 2007 in order to consider the impact of the illicit trade in cigarettes on the effectiveness of tobacco control policies. Estimates of the illicit market are made using data on smoking prevalence and simulations of smoking intensity. I estimate that the size of the illicit market to have grown substantially from 1997 until peaking in 2000 between 7.2% and 9.4% of the total market. The most recent estimate for 2007 suggests that the illicit market occupied between 2.3% and 7.0% of the total market. Although the scale of the illicit market is significant it has not undermined tobacco control policy. Consumption in the total market, including both the illicit and legal market, has declined in size consistently. At the same time, tax revenue from higher excise taxes has offset the tax losses as a result of illicit trade.

The market for cigarettes in South African has changed remarkably over the last 15 years. Since the early 1990s South Africa has embarked upon a deliberate tobacco control program. Legislation in 1993 banned smoking on public transport and introduced warning labels on packaging and advertising (Republic of South Africa, 1993). Further legislation in 1999 banned smoking in most public places; banned advertising and sponsorship and the distribution of free product; and restricted the sale of tobacco products to persons older than 16 years (Republic of South Africa, 1999). Further regulation is currently in the legislative process and is expected to become law in 2009. Coupled with the legislation have been consistent and significant increases in excise taxes and the retail price of cigarettes. Van Walbeek (2005) ascribes these increases as the overwhelming reason why tobacco consumption and smoking prevalence has fallen so dramatically (see Table 1).

The tobacco industry has long argued that high taxes are responsible for the growth in illicitly traded cigarettes. They argue that higher prices, relative to those of neighbouring countries, encourage cross border smuggling while high taxes also encourage tax evasion on domestic production as well as brand piracy.¹ The Tobacco Institute of South Africa (TISA), a body which represent the majority of tobacco growers and cigarette manufacturers, claims the size of the illicit market to be 20% of the total (legal and illicit) market (TISA, 2008). They had previously claimed it to be between 5.5% and 11% of the total market in 2004 and 15% in 2006 (TISA, 2004

¹ The illicit trade in cigarettes can be broken down into two main categories: smuggling and illicit manufacturing. Smuggling refers to the trade in illegally imported cigarettes and is often referred to as contraband. Illicit manufacturing refers to illegal manufacture of tobacco products (the production contrary to law). Such laws may include taxation laws or laws relating to licensing or monopoly which restrict the manufacture of tobacco products. Illicit manufacturing includes counterfeit production where products bear a trademark without the consent of the owner of the trademark.

and 2006). However, Sahawi, a low price producer, claimed in 2007 that the illicit market was only between 5% and 10% of the total market (Sunday Times, 2007).

Yet no research has been published to substantiate these claims which are used to lobby against tax increases. Most estimates of illicit trade rely on surveys of the proportion of cigarettes that are illicit. These surveys suffer from the usual problems of sampling. Data on the confiscation of illicit cigarettes is also presented although there is no evidence of correlation between confiscations and illicit trade. Increases in confiscations might imply better enforcement rather than an increase in illicit trade.

The purpose of this paper is to estimate the size of the illicit market to allow a more constructive and accurate debate. I use these estimates to consider whether illicit trade is undermining tobacco control efforts in South Africa. The paper proposes an alternative model of estimating the scale of the illicit trade in cigarettes. It calculates the total consumption of cigarettes and then adjusts this data for the known 'legal' market to estimate the unknown 'illicit' market. It does so by using data on smoking prevalence and smoking intensity similar to that used to measure indirect tax losses in the United Kingdom (HM Revenue and Customs, 2007).

Section 1 describes a model which formalises the market for cigarettes and the relationship between the various smoking indicators (smoking prevalence, smoking intensity and consumption). Section 2 describes the data sources used and also some prior estimates of illicit trade and smoking intensity. Section 3 provides estimates of

illicit trade and analyses the results while Section 4 discusses these results. Section 5 concludes the paper.

THE MODEL

In order to estimate the size of the illicit market we need to formalise some relationships. We can define the total market for cigarettes as:

$$Q = Q_L + Q_I \tag{1}$$

Where Q represents quantity consumed and the subscript L denotes legal and I illicit. The number of people in the population who smoke, i.e. the smoking population, (P_S) can be calculated by multiplying the population (P) by smoking prevalence (R) which is the proportion of the population who smoke:

$$P_S = P \times R \tag{2}$$

The smoking population (P_S) multiplied by the average consumption per smoker or smoking intensity (A) gives us the size of the total market.

$$Q = P_S \times A \tag{3}$$

Substituting equation 4 into equation 1 and making the illicit market the subject of the formula gives us:

$$Q_I = (P_S \times A) - Q_L \quad (4)$$

Thus if one knows the quantity consumed in the legal market (Q_L), the smoking population (P_S) and the smoking intensity (A) one can calculate the size of the illicit market (Q_I). I will attempt to estimate consumption in the illicit market by using available data of the three right hand side variables. I will use the usual convention of considering only the adult population.²

DATA

Data on legal cigarette consumption is drawn from Van Walbeek (2005) from 1993 until 2003 and directly from the author for the subsequent periods up to 2007. Van Walbeek's method calculates consumption by taking the total excise tax revenue and dividing it by the specific excise tax. Data on smoking prevalence is sourced from the All Media and Product Survey (AMPS) conducted by the South African Advertising Research Foundation (SAARF) and represents adult smoking prevalence. Population data is sourced from the Statistics South Africa's mid-year estimates. The number of smokers is calculated by applying the smoking prevalence proportion to the adult population. The data is shown in Table 2 below.

The data exhibits some interesting trends. Consumption declines consistently until the early 2000s, which Van Walbeek (2005) attributed higher excise taxes on cigarettes, after which consumption stabilises at about 24 billion sticks. Smoking prevalence also declines consistently until 2002 after which it stabilises at about

² Thus smoking prevalence and smoking intensity will only refer to the adult population

24%. Declining smoking prevalence, combined with a growing population, has resulted in a relatively consistent smoking population throughout the period under consideration.

This is not the first research to consider the size of the illicit market in South Africa. Other research conducted by corporate research firms as well as by cigarette manufacturers exist.³ Boshoff (2008) gained access to some quarterly estimates by British American Tobacco South Africa (BATSA) between the third quarter of 2005 and fourth quarter of 2006. Presented graphically they suggest that the illicit market may account for more than 20% of the total market⁴. *Euromonitor* is a private sector research firm that conducts research on various markets of consumer goods. It has conducted research on the market for cigarettes in South Africa for a number of years and has estimated the size of the legal and total market. This data is of a proprietary nature and is thus not in the public domain. However, one set of estimates attributed to *Euromonitor* in 2002 was published in a trade publication (Table 3) (International Tobacco Growers Association, 2005). This provides annual estimates of the size of the legal and illicit market, and by implication, a ratio which measures the illicit cigarette penetration (the percentage of the total market which is illicit) from 1997 to 2001. More recent estimates were purchased directly from *Euromonitor* and cover the same indicators from 1997 to 2007 (Table 4).

The measure in Table 3 suggest that illicit trade is a significant problem in South Africa and grew aggressively from 1997 to 1999. The penetration and absolute size

³ TISA and BATSA claim that they have research on illicit trade although nothing has been published. Numerous requests for this data from the industry have been denied or ignored.

⁴ A request was made to the author for the underlying data but the request was denied on the grounds that the data was provided by BATSA who did not want to make the data available for this study.

of illicit cigarette market peaked in 1999 and declined slightly thereafter. These estimates suggest that, at its peak, the illicit market may have accounted for 30% of all cigarettes consumed. The size of the total market is estimated to have shrunk slightly during this period, by 4.9% from 1997 to 2001. Yet at this same time smoking prevalence declined from 28.4% to 24.5% and the smoking population from 7.6 to 7.4 million. The implication of this is that smoking intensity remained almost unchanged between 1997 and 2001. It is possible that the construction of the series could have been based on this assumption. Data I will present later indicates that smoking intensity was actually declining during this period and hence brings the reliability of these estimates into question. This would be consistent with Evans and Farrelly (1998), who suggest an increase in price leads to a reduction in smoking intensity.

The more recent *Euromonitor* estimates are in stark contrast to the earlier ones suggesting that the illicit market in 1997 was nearly non-existent and that it has grown consistently since. The illicit market penetration peaked at 13.7% of the total market in 2006, a far cry from the nearly one third in the prior estimate. The size of the total market in Table 4 indicates a slow decline in total consumption which is consistent with our expectations from the prevalence data and the relatively constant size of the smoking population. The implication is that smoking intensity declined steadily between 1997 and 2007. There is however an anomaly in the final year of the series where both the number of legal sales (and hence the size of the total market) grew substantially although this is likely the result of rapid income growth in 2007.

Smoking intensity refers to the amount that each smoker smokes in a specific period of time – usually a day, month or year. We can calculate smoking intensity from the various data sources already discussed. From the Van Walbeek (2005) data one can calculate a smoking intensity of the legal market. The *Euromonitor* estimates enable us to calculate an implied smoking intensity of the total market. By construction the *Euromonitor* measures are higher than those of Van Walbeek. However, if we assume that the illicit market was non-existent then the Van Walbeek data would also represent the total market.

The AMPS survey used for the prevalence data also measures smoking intensity amongst smokers in South Africa. A quantitative measure has been measured since 2001 and a qualitative measure since 1998. The quantitative measure is comparable to those of Van Walbeek and *Euromonitor* and implies smoking intensity of the total market by asking respondents how many cigarettes they smoked in the previous day.⁵ The smoking intensity data for Van Walbeek and *Euromonitor* are shown together with those of AMPS in Figure 1 below. The qualitative measure asked respondents to classify their smoking behaviour as light, medium or heavy and is shown in Figure 2.

Figure 1 shows the distinct decline in smoking intensity of the legal and total market in South Africa between 1993 and 2007 using three of the four quantitative measures of smoking intensity. The Van Walbeek (2005) measure indicates that smoking intensity has declined steadily since 1993 but less aggressively since the early 2000s.

The *Euromonitor* (2007) estimate indicates that although smoking intensity fell

⁵ This figure was then annualized to make it comparable to the other sources. It is important to recognize that this is a self reported measure and is likely to underestimate actual smoking intensity (see Warner, 1978). We will consider the implications of this later in the paper.

aggressively in the late 1990s this decline has moderated in the 2000s. The AMPS estimate suggests that smoking intensity has declined steadily since it was first reported in 2001. However, we must consider that the series only starts in 2001 by which time the most significant declines in intensity had already been seen. These three measures all tell similar stories and follow similar trends. The anomaly here is the first estimate by *Eurononitor* (2002) which shows significantly higher estimates of smoking intensity than the other measures available during the same period and similar to those reported in the early 1990s.

We are able to conclude from Figure 1 that smoking intensity fell aggressively during the 1990s but began to slow considerably in the early 2000s, and may have ended altogether by 2007. The *Euromonitor* (2007) data corroborates the Van Walbeek data in the years they overlap until 2000 where they begin to diverge as the *Euromonitor* (2007) data shows higher rates of consumption than Van Walbeek. This would imply that the illicit market only became a significant entity in 2000 as seen by the *Euromonitor* (2007) estimates (see Table 4).

Figure 2 shows similar trends to that of Figure 1 with a general decline in smoking intensity. This is seen by a decline in those smokers who consider themselves heavy smokers while a commensurate increase in the number of smokers who consider themselves light smokers. At the same time the proportion who consider themselves medium smokers remained relatively constant. Therefore there is a clear indication that there has been a trend away from heavy smoking and towards light smoking. As a result we can anticipate that a quantitative measure of smoking intensity of the same sample would have shown consistent declines in intensity.

ESTIMATIONS

The estimation of the size of the illicit market in South Africa requires a multi-stage procedure. Firstly, one needs to simulate smoking intensity and then apply this to the number of smokers in the population to calculate the size of the total market.⁶ Once one has an estimate of the total market one is able to subtract the legal (and known) market from the total market to estimate the size of the illicit market. Essentially, we are solving equation 4. A and Q_L are known and P_S is being simulated.

The first assumption is that at the start of our analysis the illicit market was non-existent. As such we set the smoking intensity of the total market equal to that of the legal market. The question is when should we begin the analysis? We begin the analysis in 1997 since both the tobacco industry and public health advocates acknowledge that the illicit market was insignificantly small at such time as well as this being the start date for the *Euromonitor* (2007) estimate.⁷ The point estimate of the legal market smoking intensity in 1997 from Van Walbeek (2005) is 4053 cigarettes per smoker per year.

The second assumption we make is how smoking intensity changes over time. The previous section suggests that smoking intensity declined significantly since 1997. The question is by how much and at what rate does smoking intensity decline? It is unlikely that intensity declines in an organised and constant fashion. Figure 1 suggested that smoking intensity fell aggressively at first and then fell by smaller

⁶ Even though we have estimates of smoking intensity they refer either to the legal market (Van Walbeek, 2005) or are an implied calculation by *Euromonitor*. The only independent estimate of the total market smoking intensity is AMPS. However, the sample is very short and a simulated smoking intensity is used.

⁷ The *Euromonitor* (2007) estimate for 1997 is 0.8%.

increments. As a result it is prudent to simulate smoking intensity in such a fashion – with a function that decreases at a decreasing rate. We use a non-linear function $X_{t+1} = X_t \times Y^z$, where X represents smoking intensity, Y a decaying factor and z represents the number of years until the final year in the analysis.

This function may seem arbitrary and is. Decaying factors are specified in order to achieve a specific outcome in the final year of the analysis. Three outcomes are assumed. We first assume smoking intensity to be that implied by the quantitative AMPS measure of 3176 cigarettes per smoker per year in 2007 (a total fall of 21.6%). The second and third are based on this AMPS estimate and represent a level 2.5% and 5% higher of 3255 and 3334 cigarettes per smoker per year in 2007 (total falls of 19.7% and 17.7% respectively) and provides slack for the potential understatement of smoking intensity.⁸

Results for all for all three outcomes are shown graphically below in Figure 3 together with the un-simulated AMPS data for the available years between 2001 and 2007. Figure 4 compares the outcomes with both the *Euromonitor* estimates. The percentages displayed indicate the size of the total market occupied by the illicit market.

From Figure 3 we can make some observations about the results from our simulations. Firstly, the simulations indicate that the illicit trade market penetration grew rapidly from 1997 until peaking in 2000 at between 7.2% and 9.4% of the total market. The illicit market has declined slowly since peaking although it has remained

⁸ The decaying factors used in order to achieve these outcomes are 0.995573, 0.99602 and 0.996455 respectively.

volatile. More important than the point estimates are the underlying trends. Figure 4 compares the three measures estimated here with those estimated by *Euromonitor*.

The first *Euromonitor* (2002) estimate should not be considered reliable since it is not consistent with any of the other estimates. Furthermore, the shortness of the sample reduces our ability to make judgements regarding the trend. The *Euromonitor* (2007) estimate is more smoothed than our estimates and peaks in 2006, long after our estimated peak of 2000, after which it declines slightly (its only year of decline). The estimates of this paper use the *Euromonitor* (2007) estimates as a calibration tool at the start of the analysis by assuming illicit trade to be non-existent in 1996. However, they diverge after 1996 and tell two differing stories. We will focus our analysis on the estimates of this paper although not discarding the *Euromonitor* (2007) estimates.

DISCUSSION

This research allows us to quantify, within some degree of certainty, the scale of the illicit trade problem in South Africa. The research shows that illicit trade is a significant problem in South Africa, the question is, how much of a problem? Estimates show that illicit trade has grown significantly, especially in the late 1990s. It shows that the illicit trade in cigarettes has most probably peaked in 2000 and that the size of the illicit market has stabilised in the 2000s. I estimate that the size of the illicit market peaked at between 7.2% and 9.4% of the total market in 2000. The most recent estimate suggests an illicit market penetration of between 2.3% and 7.0% in 2007.

TISA's anecdotal estimates of the size of the illicit market have at times been shown to be exaggerated although some seem to be corroborated by this data. Claims of 20% of the total market are far fetched. The claim of 15% market penetration in 2006 is also difficult to accept considering how the illicit trade market penetration was most probably falling at that time (from its peak of significantly less than 15% in 2000). Other estimates of between 5.5% and 11% in 2004 seem fair and Sahawi's estimate of between 5% and 10% in 2007 is corroborated by this data.

When considering whether illicit trade undermines tobacco control efforts we need to consider two specific things. Firstly, we need to consider the loss of tax revenue by the state and secondly the size of the total market.

Consumption taxes on cigarettes in South Africa comprise two separate taxes, a specific excise tax levied per packet of cigarettes as well as Value Added Tax (VAT), levied at a flat rate of 14% of value added⁹. Figure 5 below shows the estimates of real excise tax revenue (in constant 2000 prices) lost to illicit trade.

Even when the growth in illicit trade slowed the lost taxation remained high since the specific excise tax rose as well¹⁰. Yet this picture is misleading since if these cigarettes were not sold on the illicit market but on the legal market the paying of the tax would raise the retail price of these cigarettes thereby reducing their consumption. Using the argument that higher retail prices have lead to the growth in

⁹ VAT is levied on all new goods and services in South Africa with only a few exceptions and is not specific to cigarettes. Almost all substitutes in consumption to cigarettes include VAT and as a result we do not consider it. Even illicit cigarettes (those which have been manufactured in South Africa on which tax is not paid) includes some component of VAT since inputs in the production process include VAT and they are not claimed as an input since no VAT is claimed as an output.

¹⁰ Essentially, the higher taxes were offsetting the declining levels of illicit trade.

the illicit market allows us to assume that the return of the illicit market to a legal market would return those consumers to higher prices and hence lower consumption.

Furthermore, one must consider that even while lost excise taxation grew significantly as illicit trade grew, so did total excise tax collections. As Abedian and Dorrington (1994), Van Walbeek (1996) and Van Walbeek (2005) all indicate, due to the price inelastic nature of cigarettes in South Africa, the increase in the specific excise tax was greater, in percentage terms than the decline in (legal) sales. As a result, even though legal sales were falling excise tax collections rose significantly. Between 1997 and 2007 total excise tax collections rose by over 123% in real terms, thereby dwarfing any potential loss through illicit trade. Figure 6 considers the tax lost to illicit trade relative to the increases in excise tax collections by netting the loss off against the increase in tax collections. The series labelled “base” is the increase in real excise tax collections without netting off illicit trade while the other two series represent the netting off of illicit trade against the legal market using the estimates of this paper and *Euromonitor* (2007) estimates. One can clearly see that the net impact of the tax increases is overwhelmingly positive.

A second consideration is the size of the total market. Previous studies have only considered the size and dynamics of the legal market while our analysis in this paper covers the size of the illicit market. Figure 7 combines the legal market of Van Walbeek (2005) with the illicit market estimates of this paper and indicates consumption in the total market. The solid, black line indicates Van Walbeek’s legal estimates while the dashed lines indicate the total market estimates. The clearest conclusion from this is that the total market declined rapidly in the 1990s and early

2000s. Essentially, as taxes and prices have risen total consumption has fallen. A very small number of consumers have substituted their legal consumption with illicit consumption. Predictions that higher taxes would simply drive the industry underground have not come true.¹¹ The total market has declined in size by between 16.3% and 20.3% between 1997 and 2007, in spite of increases in illicit trade. All measures indicate a small increase in total consumption in the most recent years. This is a likely result of rapid income growth and a less aggressive tax policy.

One should also consider what drives illicit trade. The argument that higher taxes create greater incentives for criminal elements to enter into illicit trade carries some strategic importance since the suggested “remedy” is to reduce taxes. Yet it must be considered that the industry has chosen to pass on the entire tax and raise its profit margins in response to higher taxes (Van Walbeek, 2005) and thus should bear some, if not equal, responsibility for the rise in illicit trade. Furthermore, there is no correlation between our measure of illicit trade and real excise taxes which have been rising consistently throughout the period under consideration.

It is likely that there are other reasons, in addition to higher excise taxes, which have encouraged the growth in illicit trade in South Africa. Steinberg (2005: 4) argues that traders in South Africa specialise in trade routes rather than commodities and that a “trade route can host an infinite array of commodities over time, and several commodities at the same time”. For instance, routes between South Africa and China include illicit trade in abalone, clothes, electronics, drugs, guns, human beings and diamonds in addition to cigarettes. The illicit trade in a number of commodities has

¹¹ The tobacco industry has used this argument to lobby against tax increases globally (see Van Walbeek, 2005).

been able to grow in South Africa as a result of large and highly effective organised crime syndicates. This has been compounded by weak border controls and corruption. The rise in the illicit trade in cigarettes mirrors increases in the illicit trade of many other commodities since the 1990s.

Yet the illicit trade in cigarettes has declined substantially since peaking in 2000. One may speculate that this may be a function of the spectacular decline in tobacco production in Zimbabwe where production levels have fallen by over 70% since 2000 (Kwidini, 2008).¹²

We should however consider the limitations of this research in light of the experimental methodology and the data used. Data on legal consumption and excise taxes in South Africa, sourced from Van Walbeek (2005), are from official sources and represent actual data. However, the data on smoking prevalence sourced from AMPS represent a survey. The survey suffers from some problems, exposed by the volatility in the series which may arise from sampling issues. However, the limitations of the survey are compensated by using a consistent series throughout the analysis. Furthermore, the lack of reliable and consistent smoking intensity data has forced us to rely on a simulation approach, simulating smoking intensity based on anecdotal evidence of declining smoking intensity during the period of analysis. One must also keep in mind the potential understatement of smoking intensity in the AMPS data which may result in an understatement of illicit trade in the final years of

¹² Zimbabwe might have been the source of many cigarettes smuggled into South Africa given the large price differentials between the two neighbors. In 2006 the most affordable cigarettes in Zimbabwe cost \$1.44 per pack of 20 while they cost \$2.56 in South Africa (Blecher and Van Walbeek, 2009).

the study. We have provided for this in the model by assuming a higher smoking intensity than that suggested by the AMPS data.

CONCLUSION

It is clear that increased taxes and retail prices have resulted in very large declines in total cigarette consumption in South Africa which are even more pronounced in per capita terms. Thus, the strategy of increased excise taxes, to reduce cigarette consumption and increase government revenue, has worked with dramatic effect, even in the face of the growth in illicit trade. Even though South Africa has experienced a significant increase in illicit trade it has not undermined tobacco control efforts since total consumption has fallen and the net impact on tax revenue was positive. Furthermore, the illicit trade in cigarettes cannot be looked at outside the broader context of the growth in organised crime and cannot be solely attributed to high excise taxes.

This research supports the strategy of increased cigarette taxation in South Africa. Although it identifies a significant illicit trade problem it also finds that this problem has most likely peaked and has probably declined substantially since. At its current levels illicit trade counts for less than 10% of the total market. It is likely that if the government pursues a more aggressive taxation strategy again in the future that total consumption (not only legal consumption) will fall and government revenue will rise even if there is some growth in illicit trade.

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Table 1: Percentage changes in smoking indicators (1993 to 2007)

Indicator	Change
Real price per pack	148.2%
Aggregate consumption	-31.9%
Per capita consumption	-37.7%
Smoking prevalence	-25.5%
Number of smokers	-2.1%
Average consumption per smoker	-30.4%

Source: Van Walbeek (2005)

Table 2: Summary of consumption, prevalence and population data

	Legal consumption Sticks (billions)	Prevalence Percent	Population (millions)	Smokers (thousands)
1993	36.04	32.6	24.83	8.09
1994	35.38	28.8	25.42	7.32
1995	34.16	30.2	26.03	7.86
1996	33.80	30.3	26.66	8.08
1997	31.54	28.4	27.40	7.78
1998	29.90	28.5	28.15	8.02
1999	28.44	27.9	28.93	8.07
2000	26.68	27.1	29.52	8.00
2001	25.52	24.5	30.12	7.38
2002	24.68	24.8	30.56	7.58
2003	24.06	23.8	30.89	7.35
2004	24.04	24.1	31.24	7.53
2005	23.70	23.2	31.69	7.35
2006	24.02	23.3	32.12	7.48
2007	24.56	24.3	32.59	7.92

Source: Van Walbeek (2005), AMPS, StatsSA.

Table 3: Euromonitor estimates of illicit market (2002)

	1997	1998	1999	2000	2001	Average
Legal sales*	32.6	30.4	25.3	25.7	25.7	27.9
Contraband*	4.5	6.2	10.8	10.2	9.6	8.3
Total	37.1	36.6	35.5	35.9	35.3	36.1
Penetration	12.1%	16.9%	29.9%	28.4%	27.1%	22.9%

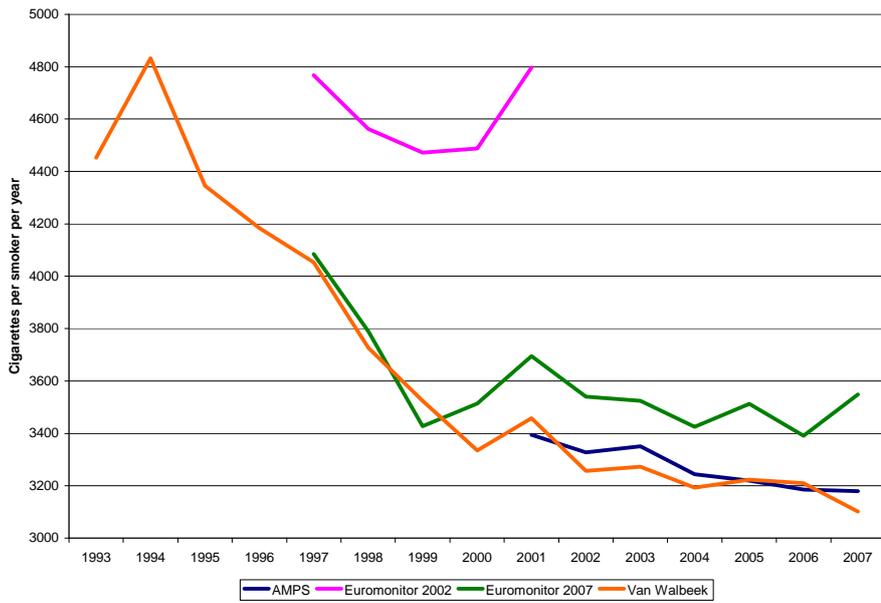
Notes: * billions of sticks

Table 4: Euromonitor estimates of illicit market (2007)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Ave
Legal sales*	31.54	29.90	26.68	26.68	25.52	24.68	23.51	23.01	22.53	21.90	24.41	25.52
Contraband*	0.25	0.50	0.99	1.43	1.75	2.15	2.40	2.78	3.30	3.47	3.69	2.15
Total	31.79	30.40	27.67	28.11	27.27	26.83	25.91	25.79	25.83	25.38	28.10	27.67
Penetration	0.8%	1.6%	3.6%	5.1%	6.4%	8.0%	9.3%	10.8%	12.8%	13.7%	13.1%	7.7%

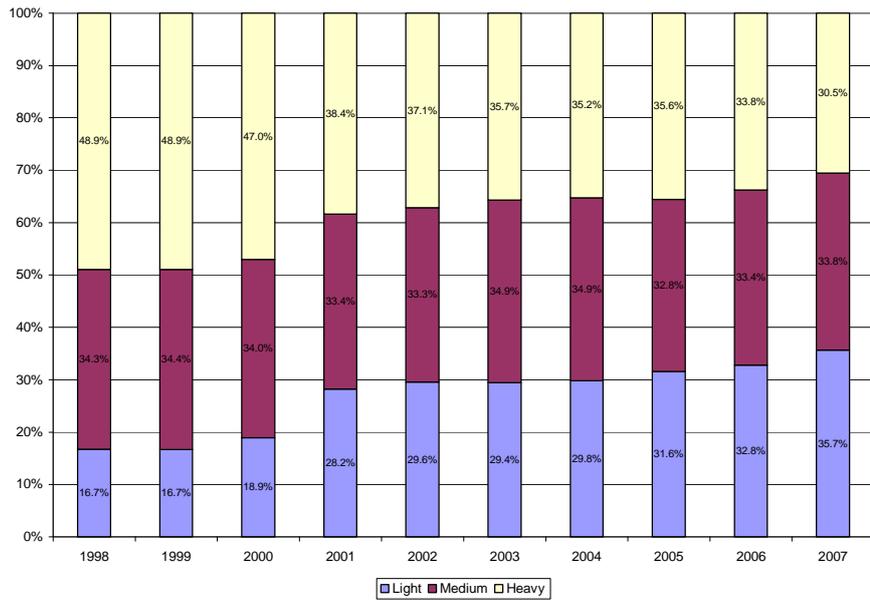
Notes: * billions of sticks

Figure 1: Quantitative measures of smoking intensity



Source: Van Walbeek (2005), Euromonitor, AMPS

Figure 2: Qualitative measure of smoking intensity



Source: AMPS

Figure 3: Simulations of the illicit market penetration

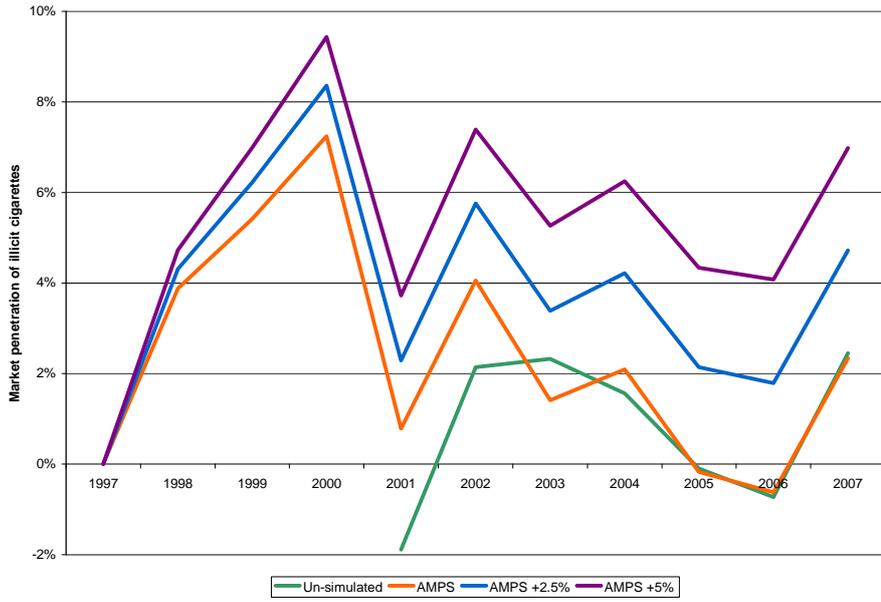


Figure 4: Comparison of estimates of illicit trade

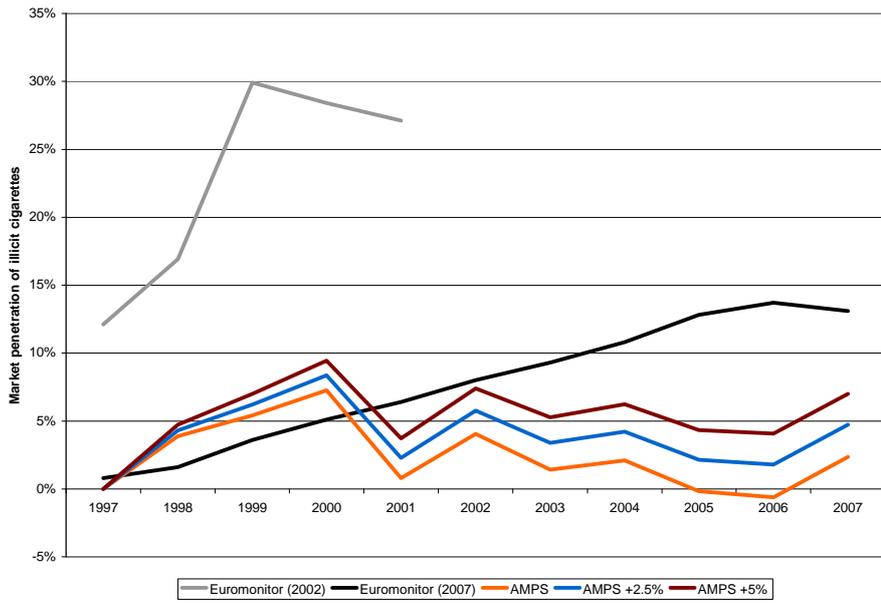


Figure 5: Real excise taxation lost as a result of illicit trade (constant 2000 prices)

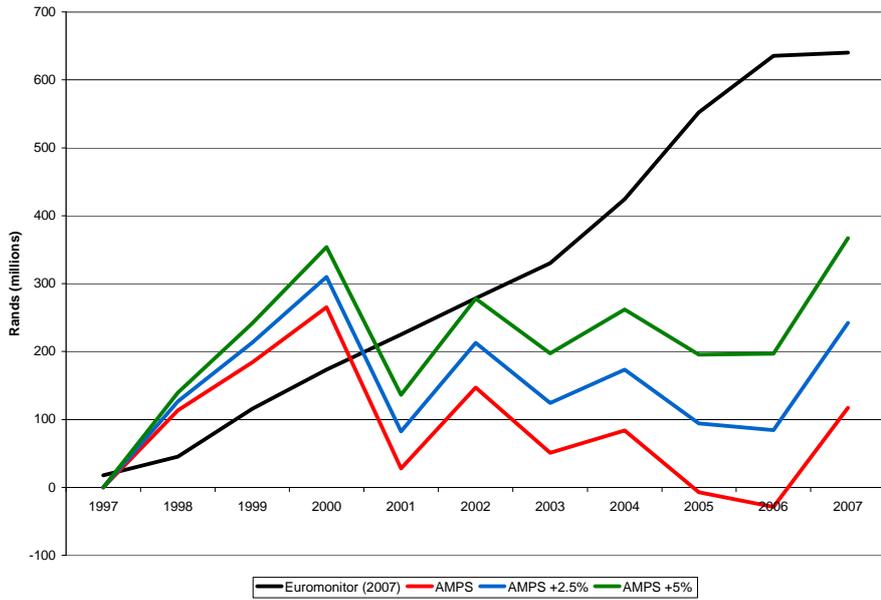


Figure 6: Net gain in real excise taxation collections (constant 2000 prices)

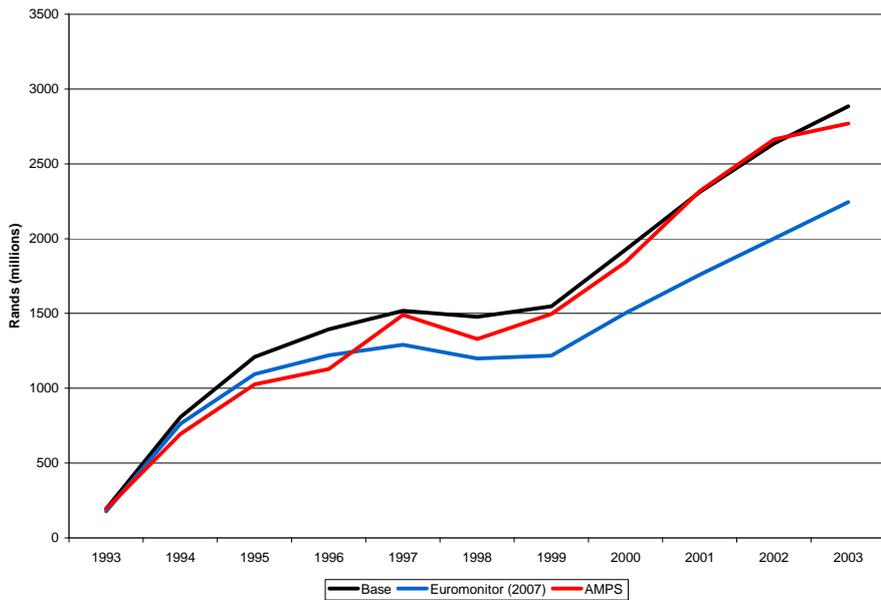


Figure 7: Total consumption

