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Making Business Sense

# Quantification of the economic impact of plain packaging for tobacco products in the UK

**Report for Philip Morris Ltd.**

March 2013

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**Authorship and acknowledgements**

This report has been produced by Cebr, an independent economics and business research consultancy established in 1992.  The study was led by Oliver Hogan, Cebr Head of Microeconomics, with analytical and research support from Cebr Economist Chitraj Channa. The views expressed herein are those of the authors only and are based upon independent research by them.

This study has been commissioned by Philip Morris Ltd and has utilised a combination of industry data and data available in the public domain through ONS and related sources.

The report does not necessarily reflect the views of Philip Morris Ltd.

<div align="right">London, March 2013</div>

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## Executive Summary

**Headlines**

The findings of our study suggest that plain packaging for tobacco will have the following impacts on the UK economy:

- Lower prices for legal tobacco, increased illicit trade and a shift by customers from convenience retailers to larger retailers as a result of increased transaction times and longer queues are expected to have the following impacts:
  - Increased insolvency rates in convenience retailing with the loss of between 2,000 and 3,500 jobs in 'small independent retailers' (SIRs) - this is the effect solely of the reductions in the gross earnings of SIRs from tobacco of between £12 and £20 million.
  - Estimated job losses of 30,000 jobs in convenience retailing when the impact on non-tobacco sales is also taken into account – this is based on an estimated reduction in SIRs' overall gross earnings of £300 million.

- The loss of between 2,250 and 3,850 full-time equivalent (FTE) jobs through the direct impact on the tobacco manufacturing industry and the resulting multiplier impacts on the wider economy, despite a boost to tobacco manufacturing's supply chain as a result of increased tobacco consumption.

- A drop in consumer expenditure on legal tobacco products of between £0.9 and £1.6 billion despite increases of 3 and 7 per cent in legal and overall (legal and illicit) tobacco purchases, respectively.

- A reduction in the direct contribution of tobacco to UK GDP from 0.84 per cent to between 0.78 and 0.81 per cent.

- A reduction in tobacco's aggregate annual contribution to the Exchequer of between £219 and £348 million.

- A fall in the overall retail sector's gross earnings from tobacco of between £110 and £185 million, resulting in a 12 to 22 per cent reduction in tobacco's indirect contribution to UK GVA through the retail sector.

Neither the Government's consultation on plain packaging for tobacco – launched in April 2012 – nor the existing literature on the subject provides quantitative estimates of the effects on the economy that could result. Cebr was asked to fill this gap with a valuation of the micro and macroeconomic impacts of plain packaging in the UK.

Our scenario-based assessment begins with an analysis of the demand for, pricing and supply of both legal and illicit tobacco. We use the resulting 'micro' scenarios within Cebr's 'macro' impact modelling framework to produce estimated ranges for the potential effects of plain packaging on key indicators including GDP, jobs and Exchequer contributions.

Using the same framework, we examine tobacco's indirect contribution to the UK economy through the retail sector and how that could be affected by plain packaging. This is before analysing the potential impact of plain packaging specifically on 'small independent retailers' (SIRs).

The **key findings** of our study are summarised in the following paragraphs.

Using the results of Dr Jorge Padilla's economic modelling exercise, which provided figures for the impact of plain packaging on prices and purchases of legal tobacco, and the results of a UK behavioural study by SKIM, which assessed consumer demand for illegally sold (illicit) products in a plain packaging scenario, we estimate that the **value of legal cigarette sales in the UK could shrink by between 4 and 8 per cent as a result of plain packaging**. This is the result of lower prices reflecting stronger competition and the erosion of product differentiation, and is **despite increases in overall legal cigarette purchases as a result of lower prices**. The **value of legally sold hand-rolled tobacco (HRT) is also expected to fall by between 20 and 22 per cent** as a result of plain packaging but, unlike cigarettes, purchases of legally sold HRT are expected to decline.

This latter expectation is explained by a disproportionate 'feedback' effect (on legal HRT relative to cigarettes) from the illicit tobacco trade. Primary research by SKIM suggests that **consumption of illicit tobacco could**, under plausible assumptions, **increase by 30 per cent in response to plain packaging**. This drove Cebr's estimates of the increasing importance of illicit tobacco in a post-plain packaging world – from 9 per cent of all UK purchases of cigarettes to over 11 per cent and from 38 per cent of all UK purchases of HRT to 50 per cent. This **feedback effect - the consequent reduction in legal tobacco volumes as a result of substitution to illicit – is therefore disproportionately strong for HRT relative to cigarettes**. Nonetheless, overall volumes of cigarettes and HRT consumed, including legal and illicit, are expected to increase – by between 5 and 10 per cent for cigarettes and by between 9 and 12 per cent for HRT.

Despite the increase in overall tobacco purchases, the above estimates correspond with a **reduction in final demand expenditure on legal tobacco of between £0.9 and £1.6 billion**, which results in the following economic impacts of plain packaging on the UK economy:

- A **reduction in the direct contribution made by tobacco to GDP** from 0.84 per cent to between 0.78 and 0.81 per cent.

- The **loss of between 2,250 and 3,850 jobs** as a result of the impact of plain packaging on tobacco manufacturing through direct, indirect and induced impacts, **despite the boost to tobacco manufacturing's supply chain as a result of increased purchases**.

- A **reduction in tobacco's aggregate annual contribution to the Exchequer** of between £219 and £348 million.

Tobacco also benefits the economy through the retail sector that sells it on to tobacco consumers. We expect **the retail sector's gross earnings from tobacco to fall from our 2010 estimate of £850 million by between £110 and £185 million**. This reduces tobacco's indirect contribution to GDP through the retail sector by between 12 and 22 per cent of an absolute GVA contribution of £492 million.

**Small independent retailers (SIRs)** however **could be particularly hard hit by plain packaging**. This can be summarised as follows:

- **Profits from tobacco are of higher importance** to SIRs, which account for 11 per cent of all tobacco sales in the UK. The effects described above in terms of the retail sector as a whole yield estimated reductions of between £12 and £20 million in SIRs' earnings from tobacco.

- Given the current state of the retail sector and the fact that so many convenience stores are on the cusp of financial difficulties, we estimate that **this could result in some insolvencies and the loss of between 2,000 and 3,500 full-time equivalent (FTE) jobs in convenience retail**.

- There is an expectation however, based on survey evidence from Australia, that both tobacco and non-tobacco **customers will switch from smaller to larger stores as a result of increased tobacco transaction times and their effect on queue lengths**.

- On this evidence, **SIRs could be facing losses of earnings reaching as much as £300 million** once the lost non-tobacco sales are taken into account.

- This would lead to **greater numbers of insolvencies and up to 30,000 FTE employees losing their jobs in convenience retailing**. With so many local communities dependent on small independent retailers, such effects would have negative implications in terms of the wider social impact of SIRs.

# 1 Introduction and background

This Cebr report aims to provide a thorough estimation of the impact that compulsory plain packaging of tobacco products will have on the UK's economy. This includes effects on the legal and illicit tobacco markets, on small and independent retailers, and on key macroeconomic variables including GDP, employment, and government finances.

## 1.1 Purpose and objectives of the study

The Government launched a consultation on the issue of standardised (plain) packaging for tobacco products in April 2012 and, the consultation period having closed, is now deliberating on the matter. The Department of Health impact assessment (IA) that accompanied the consultation document recognised the risks of unintended consequences of legislating for plain packaged tobacco products, including:

- Downtrading to cheaper tobacco products and declines in the price of legal products;

- Increased overall consumption of tobacco products; and

- A possible increase in the supply of illicit tobacco products.[1]

However, there are no quantitative estimates in the IA of the economic effects that these, and other relevant factors, would have in the UK. Neither did any of the literature reviewed as part of our study provide a quantitative estimate of the macroeconomic impact of plain packaging. Cebr has been asked to fill this gap.

## 1.2 Methodological overview

Our scenario-based assessment begins with an analysis of how tobacco consumers and the tobacco industry are likely to react to and be impacted by, plain packaging at the 'micro' level. This involves analysing the demand for, pricing and supply of both legal and illicit tobacco. We use the resulting 'micro' scenarios within Cebr's 'macro' impact modelling framework to produce estimated ranges for the potential effects of plain packaging on key indicators including GDP, jobs and Exchequer contributions.

Using the same framework, we examine tobacco's indirect contribution to the UK economy through the retail sector and how that could be affected by plain packaging. This is before analysing the potential impact of plain packaging specifically on 'small independent retailers' (SIRs).

The sequence of the modelling and analytical processes adopted for the study is set out as follows:

1. **Analysis of legal tobacco**: in a 2010 study using economic simulation modelling, Dr. Jorge Padilla calculated the impact of plain packaging on the price and consumption of legally traded cigarettes due to a reduction in the role of branding.[2] Padilla presents a series of calculations, each based on a different set of assumptions, which provided the starting point for our analysis. We also developed a number of scenarios covering the relationship between the demand for

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[1] Department of Health (March 2012), "Impact Assessment – Standardised packaging of tobacco products" Final Version.

[2] Jorge Padilla (2010), "The impact of plain packaging of cigarettes in UK: a simulation exercise", study commissioned by Philip Morris International.

cigarettes and for hand-rolled tobacco (HRT) in order to produce estimates for the tobacco market as a whole.

2. **Analysis of illicit tobacco market:** we used the results from a recent behavioural study by SKIM[3] that examined how the preference shares for legal vs. illicit cigarettes in a sample of smokers would change with plain packaging. These were used to estimate the likely changes in the volumes of illicit cigarettes and HRT purchased in a post-plain packaging world.

3. **Feedback from the illicit into the legal tobacco market**: any increase in the size of the illicit market will mean a decrease in the size of the legal market for given levels of total consumption.

4. **GDP, employment and the public finances**: we then used our estimates of the above effects to model (i) the direct economic impact, and (ii) the indirect and induced multiplier impacts, on GDP and employment as a consequence of plain packaging. We also modelled the impacts on Exchequer revenues in the context of current UK fiscal policy.

5. **Tobacco's economic contribution through the retail sector**: we analyse how tobacco contributes indirectly to the economy through the retail sector and how plain packaging can be expected to affect that indirect contribution. Following this, we narrow our focus to the deleterious effects of plain packaging on SIRs, which can be expected to be particularly hard hit due to the likelihood of customers switching from smaller to larger stores in anticipation of longer tobacco transaction times and longer queues in convenience stores.

## 1.3  Limitations of the study

The expected impacts of plain packaging for tobacco are broader in scope than this study was capable of considering. There are other impacts which should be flagged therefore as limitations of this report. These other impacts include, but may not be limited to:

1. The impact of plain packaging on tobacco consumers' disposable incomes; and

2. The risk that government could be forced to pay compensation to tobacco companies.

The following two subsections outline these principal limitations of the study. The third subsection considers further potential limitations.

### *Disposable incomes*

The reduction in tobacco prices as a result of plain packaging can be expected to provide a boost to smokers' real disposable incomes. The results of Padilla's economic modelling and of SKIM's behavioural study inform us that a certain proportion of this will be spent on further legal and illicit tobacco purchases. However, some proportion of this increase can also be expected to find its way back into retail through non-tobacco purchases. These generally yield higher gross margins for retailers than tobacco.

While this could be expected to mitigate to some extent the lost tobacco earnings due to plain packaging, any mitigation could only really be expected to occur at the aggregate retail sector level. In other words, this does not change the evidence that customers are likely to switch from smaller to

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[3] Coehlo, M., et al. (2012), "The impact of standardized packaging on the illicit trade in the UK", study commissioned by Philip Morris International.

larger stores in anticipation of longer tobacco transaction times and longer queues in convenience stores when plain packaging is introduced.

The boost in tobacco consumers' disposable incomes is unlikely, therefore, to mitigate the potentially stark impacts - under reasonable assumptions - of plain packaging on SIRs presented in this report.

Furthermore, the extent to which it mitigates the effects of plain packaging on the retail sector as a whole can only be expected to be limited given the prevailing economic conditions – specifically, continued widespread household 'de-leveraging' meaning any spare disposable income is used to pay off debts or saved, rising food and energy prices and the real decline in average levels of pay.

### *Government compensation of tobacco companies*

The tobacco industry has filed lawsuits against governments challenging restrictions on the marketing of tobacco products introduced over the last few decades. Logic suggests, therefore, a not insignificant risk of legal challenges to plain packaging, possibly under Article 17 of the EU Charter of Fundamental Rights or Article 1 Protocol 1 of the European Convention on Human Rights.

According to legal experts, if plain packaging legislation was passed and the tobacco industry challenged that legislation, it would likely be struck down as illegal absent fair compensation to the tobacco industry for the deprivation of its trademark rights.  That compensation could run into the billions of pounds.

The tobacco analyst at Citigroup Investment Research, using simplified discounted cash flow modelling of tobacco industry profits calculated a fair value for tobacco industry brand designs (which are lost with plain packaging) of £5 billion. An alternative estimate, based on the implicit value of the intangible assets of Gallaher when it was bought by Japan Tobacco, suggests a figure of a bit under £4 billion.[4]

This would of course, at the macroeconomic level, dwarf any of the effects of plain packaging outlined in this report as well as any mitigating impact on the aggregate retail sector of the potential increase in disposable incomes of tobacco consumers described above.

### *Other limitations of the study*

The unregulated nature of the illicit market means that there is considerable uncertainty over estimates of its size. It is possible that the actual size of the illicit market is larger than the HMRC mid-point estimates used in this study. Furthermore, the HMRC estimates used reflect the market situation in 2010-2011 and would not, therefore, have taken into account more recent increases suggested by the MS Intelligence UK Q4-2012 Market Survey Report, which concluded that 26.4 per cent of all cigarettes consumed in the UK were non-UK duty paid. To the extent that this is the case the negative economic impacts of plain packaging, including exchequer losses, presented in this report would constitute underestimates.

The Department of Health in the Impact Assessment supporting its consultation on plain packaging attributes a monetary value to each non-smoker that does not take up smoking and to each current smoker that quits. Plain packaging is predicted to cause an increase in tobacco consumption and it seems logical to conclude that at least some of this increase will be explained by non-smokers taking up smoking and existing smokers failing to quit. To the extent that this is the case, our modelling and analysis understates the costs associated with plain packaging because, pursuant to the Department's logic, there would be a cost associated with each person who, as a result of plain

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[4] Adam Spielman (2008), "Submission on the future of tobacco control".

packaging, takes up smoking when they otherwise would not have or does not quit when they otherwise would.

The additional minor limitation is our use of 2010 levels for each of the ad valorem and specific elements of tobacco duties in order to maintain consistency with our economic models, which are based on the 2010 national accounts. The up-to-date rates for 2013 are noted in the relevant section of the report.

## 1.4   Structure of this report

The remainder of the report is structured as follows:

- Section 2 provides an overview of the UK tobacco market, covering both the legal and illicit trades.

- Section 3 provides details of Cebr's estimates of the impact of plain packaging on the legal tobacco market, culminating in estimates of price reductions and the consequent falls in tobacco sales revenues despite increased purchases.

- Section 4 presents Cebr's estimates of the current 'macro' contributions of tobacco to the UK economy.

- Section 5 assesses the likely impact on the levels and structure of these contributions depending on reactions in the market to plain packaging.

- Section 6 provides our assessment of the potential impacts of plain packaging on retailers with a focus on SIRs.

## 2 Overview of the UK tobacco market

> **Key findings**
>
> - Consumption of legal cigarettes has been decreasing. In 2001-02, 51.3 billion legal cigarettes were consumed, which had fallen to 45.7 billion cigarettes by 2010-11. This is a fall of 11 per cent.
> - The value of legal sales of cigarettes has increased from £11.3 billion in 2001-02 to £15.1 billion in 2010-11, an increase of 34 per cent.
> - Legal hand-rolled tobacco (HRT) consumption has been on the rise, growing from 2,746 tonnes in 2001-02 to 5,431 tonnes in 2010-11, an increase of 98 per cent.
> - The value of legal sales of HRT increased from £406 million in 2000-01 to £1.58 billion in 2010-11, an increase of 290 per cent.
> - Illicit market shares have been falling. For cigarettes, the illicit market share decreased from 21 per cent in 2000-01, to 9 per cent in 2010-11. For HRT, the illicit market share fell from 61 per cent to 38 per cent during the same period.
> - The estimated volume of illicit cigarettes fell by 47 per cent from 2000-01 to 2010-11, whilst the estimated volume of illicit HRT fell by a much smaller 9 per cent.
> - Whilst the tobacco duties lost due to illicit tobacco have fallen by 46 per cent from 2000-01 to 2010-11, this was largely driven by a fall in the trade of illicit cigarettes, where the tobacco duty revenues lost have decreased by 56 per cent. On the other hand, the loss of tobacco duties due to illicit HRT fell by only 1.5 per cent during the same period.

This section provides an overview of the UK tobacco market, covering both the legal and illicit trades.

### 2.1 The legal tobacco market

To facilitate the analysis of the impact of plain packaging within our economic modelling frameworks, it was necessary to produce a 'bottom-up' estimate of aggregate expenditure on tobacco in the UK. The baseline estimate for financial year 2010 was about £17 billion,[5] based on Cebr's analysis of pricing data from HMRC and the Tobacco Manufacturers Association (TMA), HMRC volume data and Keynote's estimate that cigarettes and hand-rolled tobacco (HRT) account for over 98 per cent of the entire tobacco market, with the remainder representing sales of cigars and pipe tobacco.[6]

#### *Cigarettes*

The UK saw 45.7 billion cigarettes released for legal consumption in 2010-11. As shown by Figure 1 below, the cigarette market has been in structural decline for most of the previous two decades. In 1997-98, the volume of cigarettes released for consumption was 91.7 billion sticks, more than twice

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[5] This 'bottom-up' estimate is broadly consistent with ONS national accounting data, which reports total final expenditure on tobacco products of £17 billion. While the latter number would constitute the corresponding 'top-down' estimate, the 'bottom up' estimate was necessary to be able to analyse the impacts on the prices and consumption that make up total final expenditure.

[6] Keynote (2011), Cigarettes & Tobacco Market Report 2011 – Keynote's own estimate of the market size of tobacco in 2010 was £17.7 billion. We have not sought to reconcile the difference between this and our 'bottom-up' estimate, nor do we think it necessary given the proximity of our own estimate to official statistics.

as much as in 2010-11. During the period 2001-02 to 2010-11, cigarettes released had fallen by about 11 per cent overall.[7]

**Figure 1: Volumes of cigarettes released for legal sale and consumption**
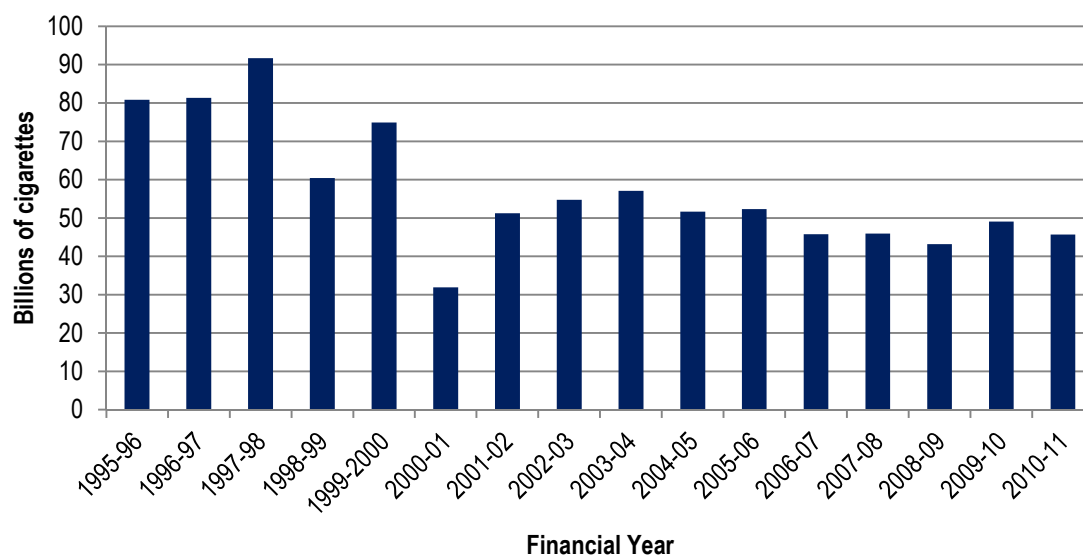


*Source: HMRC*

Successive increases in the tax rate applied to tobacco products have most likely been a major driving force in reducing legal cigarette consumption. The 1990s saw the then Conservative Government follow a duty "escalator" policy on tobacco, whereby the tax on tobacco products was increased by more than the annual rate of inflation. But, reading only from this data would naturally lead one to exaggerate the decline in overall tobacco consumption because, in response to increases in the price of cigarettes, many smokers will have down-traded to HRT or to illicit tobacco products.[8] The data, as will be seen, would seem to support this proposition.

The prevalence of smoking in the UK fell from 27 per cent of the population in 2000 to 20 per cent in 2010.[9] But viewing the impact of this on tobacco consumption through the lens of cigarettes only would likewise lead one to exaggerate it.

Despite decreases in the volume of legal cigarettes sold, the total value of sales of legal cigarettes has been climbing over the past decade, as shown in Figure 2 below. The value of sales in 2010-11 stood at £15.1bn, having grown by 34 per cent from £11.3 billion in 2001-02.

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[7] We note the swings between years in cigarettes released for consumption. These are mainly driven by what is known in the industry as 'forestalling' and not by massive ups and downs in actual consumption. NAO (2010) in its Audit of Assumptions for Budget noted that "forestalling occurs when manufacturers stockpile cleared, duty paid cigarettes, in advance of an anticipated increase in excise duty or a manufacturers price increase".

[8] Significant down-trading to lower priced legally sold cigarettes has also occurred. The detail of this was beyond the scope of this report, but it is accounted for in our modelling through the use of Padilla's estimates of the cigarette price and consumption impacts of plain packaging.

[9] ONS General Lifestyle Survey (2010).

**Figure 2: Value of cigarettes released for legal sale and consumption**
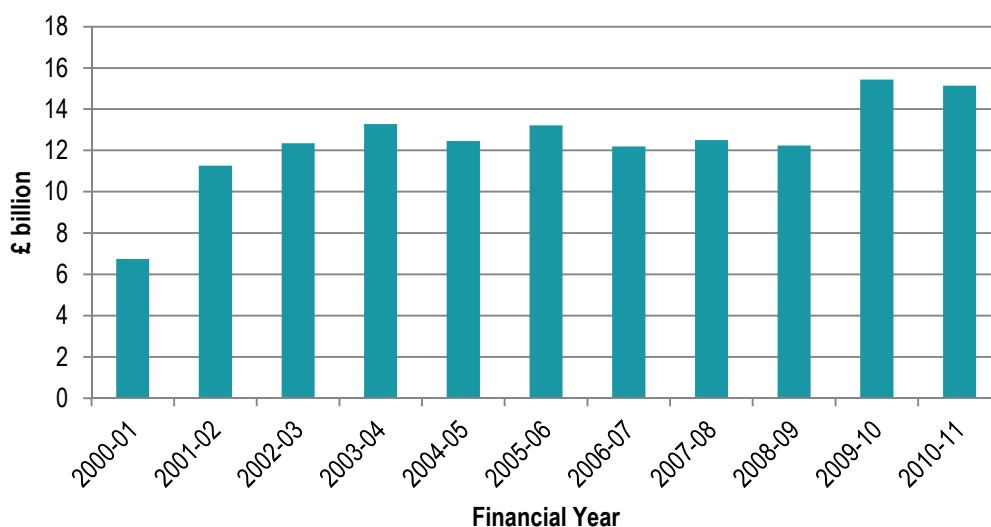


*Source: HMRC, TMA, Cebr estimates*

The effect of the price increases on the value of sales has, therefore, outweighed any revenue-reducing effects of the corresponding reductions in consumption.

### Hand-rolled tobacco

Given the down-trading phenomenon, it is not surprising that, in contrast to the clear decline in cigarette volumes, legal HRT released for consumption has been on the rise. Figure 3 shows that in 2010-11, 5,431 tonnes of HRT were released for consumption in the UK, representing a staggering 132 per cent growth over a 10-year period.

**Figure 3: Volumes of HRT released for legal sale and consumption**
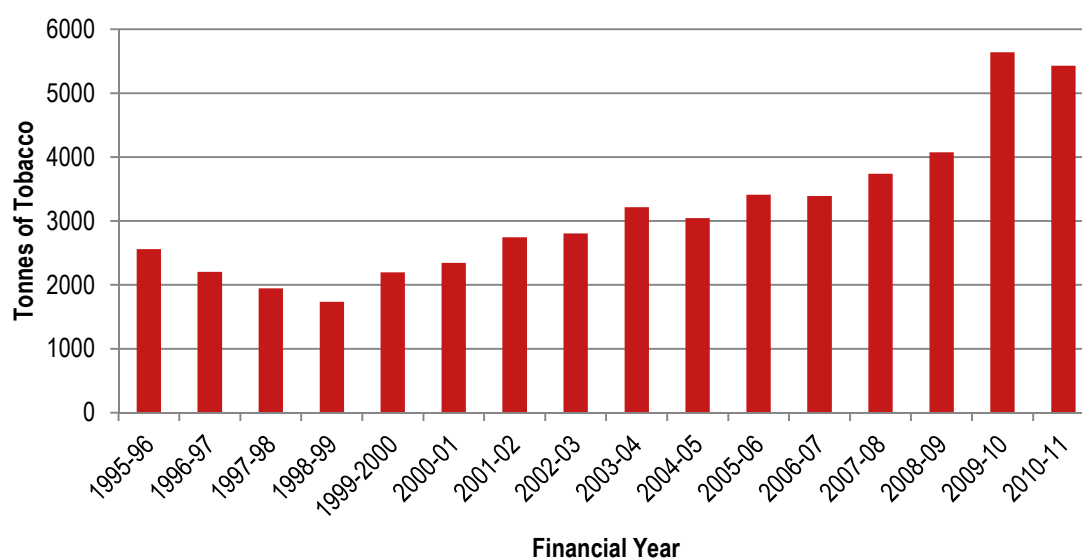


*Source: HMRC*

The value of HRT sales has also increased dramatically. This is a function of the same (or similar) tax policies as those applied to cigarettes, as well as the upward trend in consumption. We estimated that HRT sales had a value of about £1.58 billion in 2010-11, an increase of 290 per cent since 2000-01, as shown in Figure 4 below.

**Figure 4: Value of sales of legally purchased HRT**
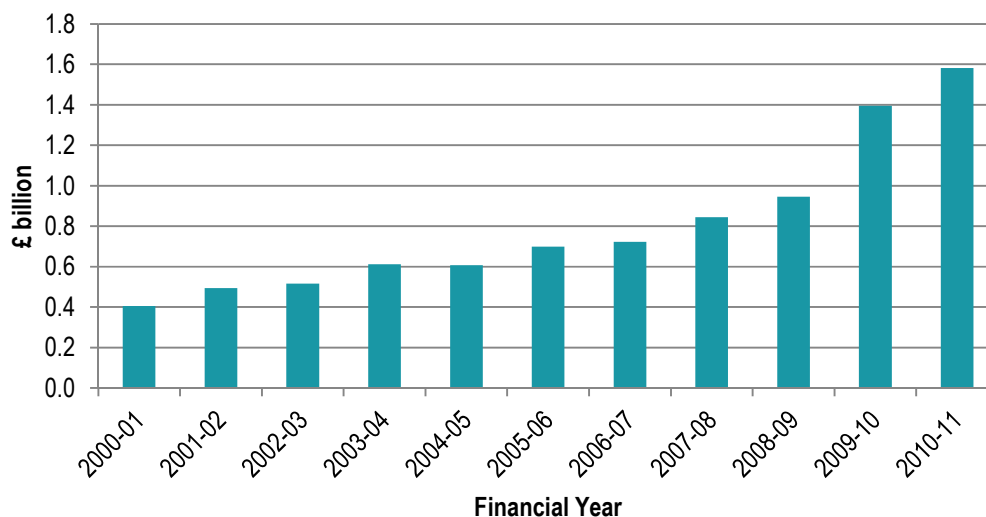


Source: HMRC, TMA, Cebr estimates

## 2.2 The illicit tobacco trade

### Size and volume

The illicit tobacco market is defined in terms of the unlawful production, distribution and sale of tobacco products, and is made up of a diverse range of products. Illicit cigarettes fall into three broad categories:

- *Bootlegged*: genuine branded cigarettes where the required tax has not been paid.

- *Counterfeit*: illicit cigarettes attempting to imitate a brand.

- *Illicit whites*: non-counterfeit cigarettes produced legally in one market or country, but smuggled into and sold in another market or country where they have no legal distribution.

HMRC data suggest that the market share of illicit cigarettes had declined (Figure 5) from 21 per cent in 2000-01 to 9 per cent in 2010-11 (based on central estimates).

**Figure 5: Estimated market share of illicit cigarettes**
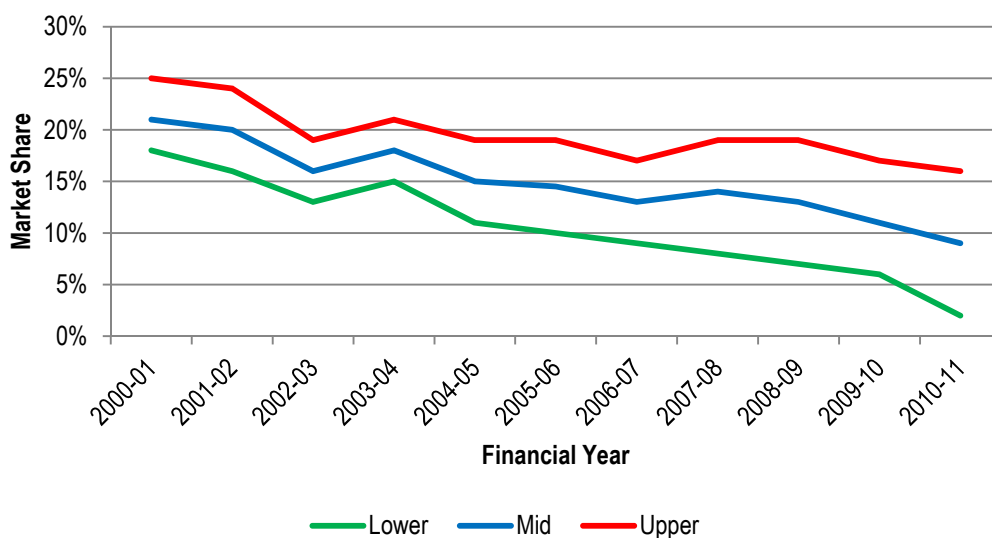


*Source: HMRC*

Across the same period, the volume of illicit cigarettes had declined from 8.5 billion sticks to 4.5 billion sticks, a fall of 47 per cent (Figure 6 below).

**Figure 6: Central estimate of volume of illicit cigarettes**
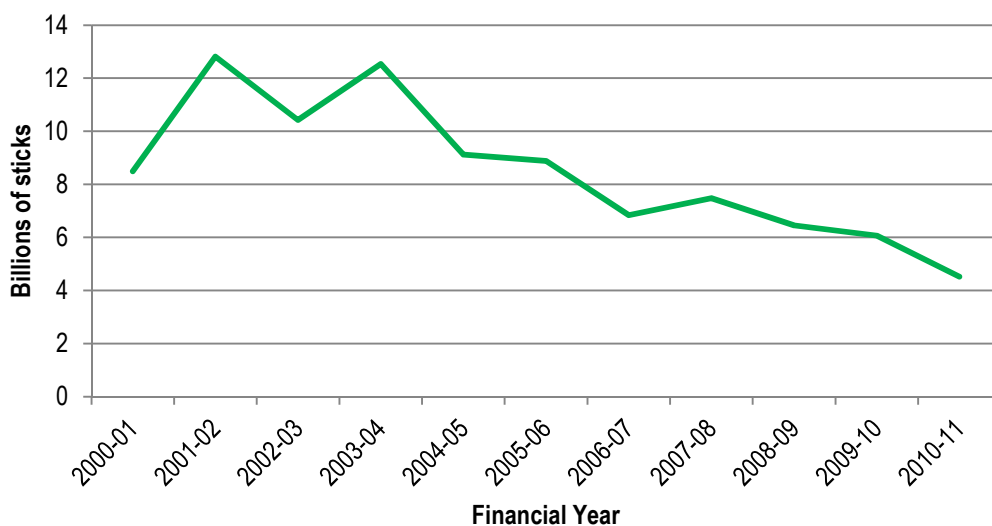


*Source: HMRC, Cebr estimates*

The unregulated nature of the illicit market means that there is, however, considerable uncertainty over these estimates. For example, a recent survey of empty discarded cigarette packs suggests that illicit cigarette consumption in the UK is increasing. The MS Intelligence UK Q4-2012 Market Survey Report concluded, as noted in section 1.3 above that 26.4 per cent of all cigarettes consumed in the UK were non-UK duty paid in Q4 2012.

Estimates of the market share of illicit HRT also suggest a decline over the last decade, as shown in Figure 7. HMRC's central estimate for 2010-11 was 38 per cent, significantly less than its 2000-01 central estimate of 61 per cent. The penetration of the market by illicit products has, however, been consistently higher in HRT than in cigarettes.

**Figure 7: Estimated market share of illicit HRT**
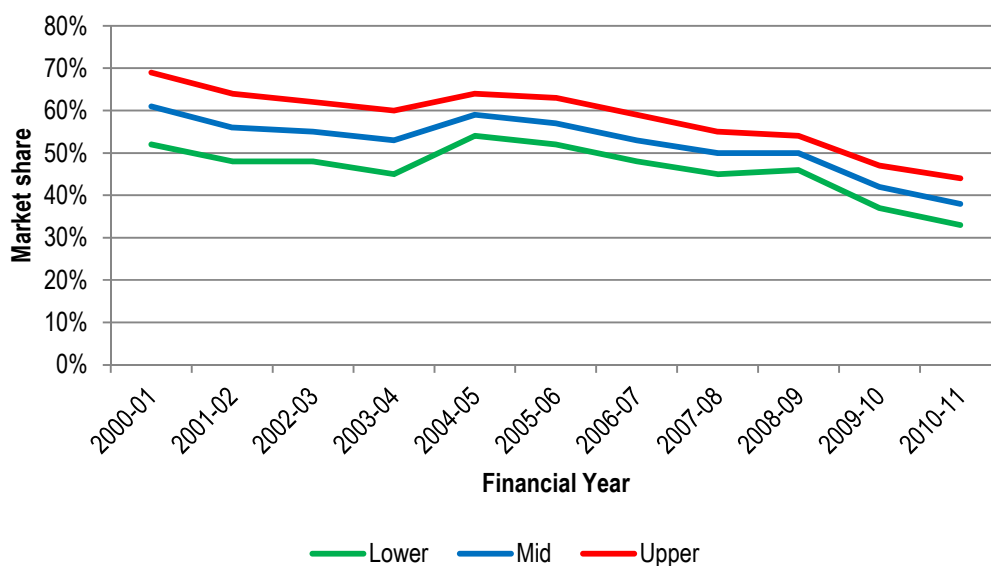


*Source: HMRC, Cebr estimates*

Despite a trending decline in the illicit share of the HRT market, estimates of the volume of illicit HRT show little change over the ten year period ending in 2010-11. Then, the volumes were estimated to be 3,329 tonnes in 2010-11, only 9 per cent less than the 3,665 tonnes estimated for 2000-01. As Figure 8 shows, volumes actually increased in the period 2002-06, a notable difference from the illicit cigarette market where volumes declined in this period.

**Figure 8: Estimated volume of illicit HRT**
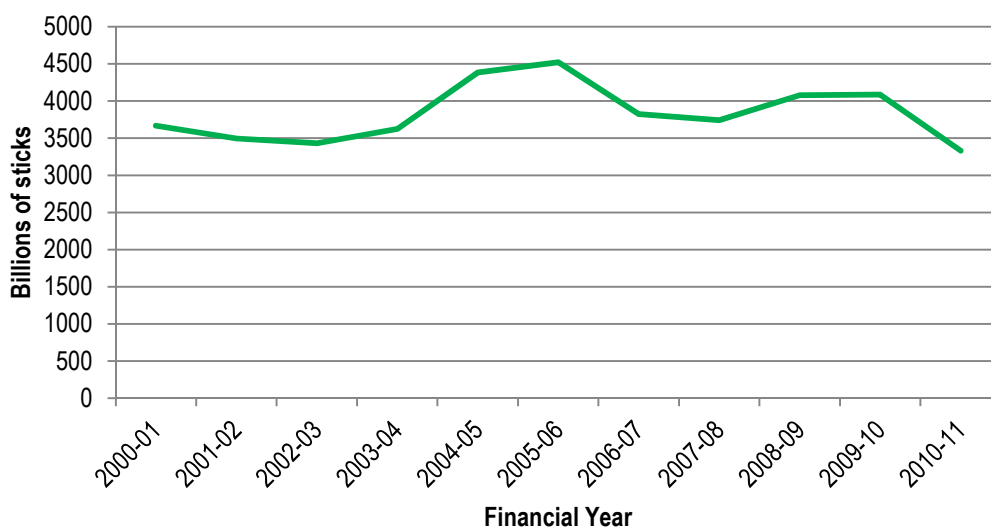


*Source: HMRC*

*Lost tax revenues from illicit trade*

Since every tobacco purchase in the illicit market is a loss of sales in the legal market, each purchase of illicit tobacco represents a financial loss of tax revenue to the government.

HMRC's central estimate of Exchequer losses as a result of the trade in illicit tobacco, as depicted in Figure 9, shows an estimate of £1.9 billion in 2010-11. This is 46 per cent lower than the £3.4 billion estimated to have been lost in 2000-01. Nonetheless, nearly £2 billion is not an insubstantial amount in the current fiscal context.

**Figure 9: Estimated tax revenue lost from illicit cigarettes and HRT**
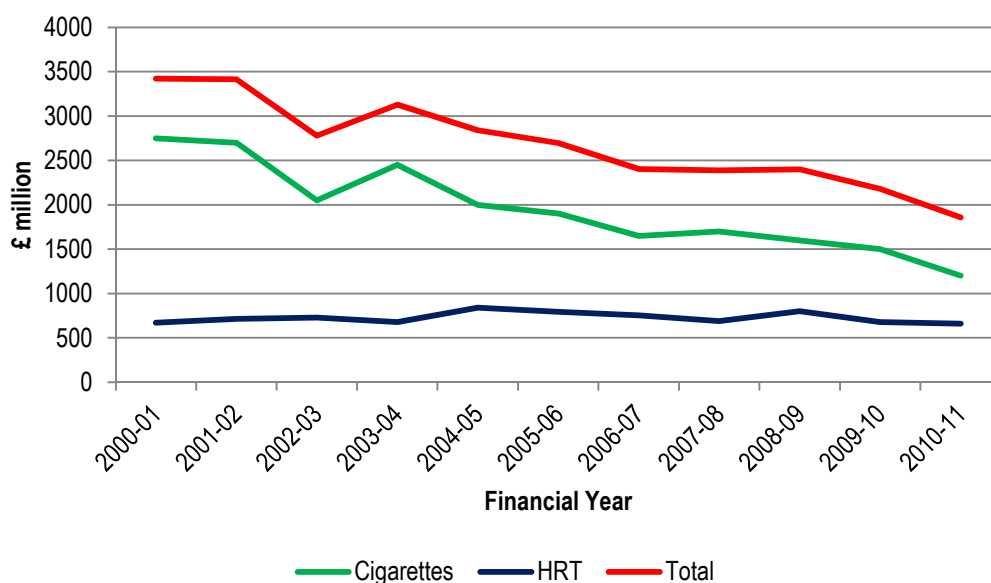


*Source: HMRC*

The driving force behind this fall is the decline in illicit cigarettes. Here, the tax revenues lost as a result of the illicit trade fell from £2.8 billion in 2000-01 to £1.2 billion in 2010-11, a decrease of 56 per cent.[10]

Figure 9 also reveals that the estimated tax revenues lost from illicit HRT have remained relatively constant, falling only from £670 million to £660 million over the last 10 years, a decrease of 1.5 per cent. Illicit HRT was responsible for 35 per cent of the total tax loss resulting from the illicit tobacco trade in 2010-11. This is up from 20 per cent in 2000-01.

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[10] Based on central estimates from HMRC

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# 3   Estimated impact of plain packaging on the legal tobacco market

**Key findings**

We estimate that the following will occur as a result of plain packaging:

- The value of legal sales of cigarettes will fall by between £0.6 and £1.2 billion and legal sales of hand-rolled tobacco (HRT) will fall by between £0.31 and £0.35 billion.
- The volume of legal cigarettes consumed will increase by between 1.0 billion and 3.5 billion sticks, and the volume of legal HRT consumed will decrease by between 488 tonnes and 1,007 tonnes.
- The market share of illicit cigarettes will increase to between 10.8 per cent and 11.4 per cent from its 2010-11 baseline of 9.0 per cent, whilst the market share of illicit HRT will increase to between 47 per cent and 50 per cent from its 2010-11 baseline of 38 per cent.
- Therefore, we estimate that the total consumption of all (legal and illicit) cigarettes will increase by between 4.8 per cent and 9.9 per cent, and that the total consumption of HRT will increase by between 1.6 and 6.8 per cent.

We have used the results of Padilla's 2010 study estimating the impact of plain packaging on the price and consumption of legal cigarettes and begin by briefly reviewing this study. We then consider the direct effects of plain packaging on each of the legal cigarette and HRT markets, before analysing indirect effects through 'feedback' from the illicit market.

## 3.1   Brief review of Padilla (2010)

Padilla's analysis of plain packaging is based on the intended objective of the policy - to greatly reduce or eliminate the role of branding in the legal cigarette market.  Cigarette manufacturers will not be able to use their packaging to differentiate their products, turning cigarettes into an increasingly homogenous product.  Consumers can be expected to be more willing to substitute one brand for another which can, in turn, be expected to increase the level of price competition between manufacturers, driving down the average price.

Padilla stipulates that a second effect will occur through reduced barriers to entry as a result of the erosion of brand loyalty brought upon by plain packaging.  This will allow new, so-called "no-name" entrants, with lower marginal cost than incumbents, into the market, further increasing competition and downward pressure on prices.

Finally, Padilla demonstrates that, consistent with the law of demand, a lower average price will result in higher consumption, and supports this with the results of econometric studies that estimate the price elasticity of demand for cigarettes.  That is, the percentage change in cigarettes consumed for a 1 per cent change in price.  A good with price elasticity between 0 and -1 is said to be relatively *inelastic*, whilst a good with price elasticity lower than -1 is said to be relatively *elastic*.

Padilla developed a demand-supply simulation model using the principles of industrial organisation theory. This model is supported by econometric estimates of the parameters required to simulate the effects of plain packaging on the price and quantity of cigarettes consumed through the model.

Padilla's results are presented in two stages.  The first stage models the effect of reduced product differentiation in two scenarios – an "average" increase in substitutability, and a "large" increase in substitutability. The second stage adds to this the effect of the entry of three kinds of 'no-name' producers, each with different levels of marginal cost (MC) relative to the incumbent firms.  At each

stage, the results are presented for two different assumptions for the price elasticity of demand for cigarettes: -0.5 and -1. The estimates on which we focused for use as inputs in our modelling are presented in Table 1 below.

**Table 1: Padilla results used in this study, price elasticity = -1**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on consumption |
|---|---|---|---|---|
| Average | No entry | - | -6.0% | 5.3% |
| | Super-low brands | -25% | -8.5% | 7.2% |
| | | -50% | -9.1% | 7.7% |
| | | -75% | -9.7% | 8.3% |
| Large | No entry | - | -11.8% | 9.0% |
| | Super-low brands | -25% | -13.3% | 9.9% |
| | | -50% | -13.9% | 10.3% |
| | | -75% | -14.5% | 10.9% |

## 3.2 Direct impact on legal cigarette market

We used Padilla's results to determine the absolute levels of price, purchases and revenues from cigarettes in the UK after accounting for the direct effect of plain packaging.

Having reviewed other important research (notably HMRC, 2010 and Pissarides and Callum, 2004), we encountered relative consensus on a price elasticity of demand in excess of 1 (in absolute terms) for cigarettes. It made sense, therefore, to focus on the Padilla results for the -1 assumption on price elasticity of demand. Finally, we have also narrowed our focus to Padilla's "mean" scenario as opposed to his "minimum" or "maximum" scenarios.

Table 2 shows the 2010-11 figures used as our baseline, and Table 3 shows the estimated changes in price, purchases and revenues when we apply Padilla's results to data from 2010-11.

**Table 2: 2010-11 baseline data**

| | |
|---|---|
| Price per pack of 20 cigarettes (£) | 6.63 |
| Purchases of cigarettes (billion sticks) | 45.7 |
| Cigarette sales (£bn) | 15.14 |
| Price per 25g of HRT (£) | 7.28 |
| Purchases of HRT (tonnes) | 5,431.0 |
| HRT sales (£bn) | 1.58 |

Table 3 shows a projected decrease in revenues from legal cigarette sales of between £0.15 billion and £0.78 billion. The decline in sales revenue occurs because the estimated increase in the volume of tobacco sold is not enough to counteract the fall in price resulting from plain packaging.

**Table 3: Estimated absolute effects of plain packaging on cigarette prices and purchases**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on purchases (bn sticks) | Change in sales (£bn) |
|---|---|---|---|---|---|
| Average | No entry | - | -£0.40 | 2.4 | **-0.15** |
| | Super-low brands | -25% | -£0.56 | 3.3 | **-0.29** |
| | | -50% | -£0.60 | 3.5 | **-0.32** |
| | | -75% | -£0.64 | 3.8 | **-0.33** |
| Large | No entry | - | -£0.78 | 4.1 | **-0.56** |
| | Super-low brands | -25% | -£0.88 | 4.5 | **-0.71** |
| | | -50% | -£0.92 | 4.7 | **-0.76** |
| | | -75% | -£0.96 | 5.0 | **-0.78** |

## 3.3 Direct impact on the legal HRT market

Padilla's simulation model only examined the effects of plain packaging on the legal cigarette market, thus excluding HRT. We did not uncover any numerical estimates of the effect of plain packaging on HRT price and purchases in the literature we reviewed. To overcome this shortfall, we examined a number of different scenarios in which we assumed that the effects on HRT price and purchases would be some proportion – 25, 50, 75 or 100 per cent - of the effects of plain packaging on cigarette price and purchases.

The idea that the HRT market would react to plain packaging along similar lines to the cigarette market is logical. HRT product packaging is branded in the same way as cigarettes. Below, Table 4 presents the results for the 50 per cent scenario and Table 5 for the 100 per cent scenario.

**Table 4: Direct effects of plain packaging on HRT price & purchases (Scenario A, 50%)**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on purchases (mn tonnes) | Change in sales (£bn) |
|---|---|---|---|---|---|
| Average | No entry | - | -£0.22 | 143.9 | **-0.01** |
| | Super-low brands | -25% | -£0.31 | 195.5 | **-0.01** |
| | | -50% | -£0.33 | 209.1 | **-0.01** |
| | | -75% | -£0.35 | 225.4 | **-0.01** |
| Large | No entry | - | -£0.43 | 244.4 | **-0.03** |
| | Super-low brands | -25% | -£0.48 | 268.8 | **-0.03** |
| | | -50% | -£0.51 | 279.7 | **-0.03** |
| | | -75% | -£0.53 | 296.0 | **-0.03** |

**Table 5: Direct effects of plain packaging on HRT price & purchases (Scenario B, 100%)**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on purchases (mn tonnes) | Change in sales (£bn) |
|---|---|---|---|---|---|
| Average | No entry | - | -£0.44 | 287.8 | **-0.02** |
| | Super-low brands | -25% | -£0.62 | 391.0 | **-0.03** |
| | | -50% | -£0.66 | 418.2 | **-0.03** |
| | | -75% | -£0.71 | 450.8 | **-0.03** |
| Large | No entry | - | -£0.86 | 488.8 | **-0.06** |
| | Super-low brands | -25% | -£0.97 | 537.7 | **-0.07** |
| | | -50% | -£1.01 | 559.4 | **-0.08** |
| | | -75% | -£1.06 | 592.0 | **-0.08** |

These tables show projected decreases in revenues from legal HRT sales of between £0.01 and £0.08 billion. Like in the case of cigarettes, the decline in sales revenue occurs because the estimated increase in the volume of HRT sold is insufficient to counteract the fall in price estimated to occur as a result of plain packaging.

## 3.4 Indirect effects through feedback from the illicit market

We use the results of a 2012 study by SKIM[11] and HMRC's mid-point estimates of the absolute size of the illicit cigarette and HRT markets, to estimate the effects of plain packaging through the illicit trade.

The SKIM study was a virtual behavioural experiment that presented each individual in a representative sample of UK smokers with an on-screen display, designed to mimic the cigarette display in a shop. Various scenarios were presented to the individual, and he or she was asked to select the product that they would purchase in a real life situation. Each display includes a clearly labelled selection of products available from a "street vendor" which represents illicit tobacco purchases. The report states that "*subjects were not directly informed that this is an illicit channel, but sufficient information was provided for them to reach this conclusion.*"

The use of HMRC's mid-point estimate of the size is, of course, purely illustrative. HMRC's estimates of the size of the illicit market vary significantly, and it is possible that the actual size of the illicit market is closer to the upper end of the range (16 per cent for cigarettes and 44 per cent for HRT). Furthermore, the HMRC estimates used reflect the market situation in 2010-2011 and would not, therefore, have taken into account the more recent increases suggested by the MS Intelligence UK Q4-2012 Market Survey Report, noted in sections 1.3 and 2.2 above.

The study compares a baseline scenario representing the current market situation, with three other scenarios representing possible outcomes due to plain packaging:

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[11] SKIM is a global markets research company.

1. **Baseline Scenario:** as in the current market situation, branded packaged cigarettes are available in regular shops and from street vendors.

2. **Scenario 1**: only plain packaged cigarettes are available in regular shops whilst a mixture of plain packs and branded packs are available from street vendors.

3. **Scenario 2:** only plain packaged cigarettes are available in regular shops, and only branded packs are available from street vendors.

4. **Scenario 3:** only plain packaged cigarettes are available from regular shops and from street vendors.

The results for each scenario, tabulated in Table 6, show the proportion of the sample that opted to purchase a product from the legal market versus the illicit market – these representing the aforementioned preference shares.

**Table 6: SKIM study results**

| Scenario | Products Available | | Preference Share | |
|---|---|---|---|---|
| | **Regular Shops** | **Street Vendors** | **Regular Shops** | **Street Vendors** |
| Baseline | Current market situation | Current market situation | 63% | 37% |
| 1 | Plain Packaging | Mix of Branded and Plain Packs | 53% | 47% |
| 2 | Plain Packaging | Branded only | 51% | 49% |
| 3 | Plain Packaging | Plain Packaging only | 56% | 44% |

The results suggest that the illicit market would have the greatest market share under Scenario 2, in which street vendors sell only branded packs whilst regular shops are restricted to selling only plain packs. If plain packaging is legislated, we would expect street vendors to recognise that demand for their products is likely to be highest when they sell branded packs only. Therefore, when modelling the effects of plain packaging on the illicit market, we used the results from Scenario 2 in Table 6 above.

The proportionate increase in the preference share for illicit tobacco from the Baseline Scenario to Scenario 2 is 32.4 per cent. This was applied to the HMRC central estimate of the volume of illicit tobacco consumed in 2010-11 providing us with an estimate of the volume of illicit tobacco that will be purchased under plain packaging. The results of this analysis are tabulated in Table 7 below.

**Table 7: Change in the size of the illicit market**

| Market | Illicit purchases (billions of sticks/tonnes) | | Absolute change (bn sticks / tonnes) |
|---|---|---|---|
| | 2010-11 | Post-plain packaging (estimate) | |
| Cigarettes | 4.52 | 5.98 | +1.46 |
| HRT | 3,329 | 4,408 | +1,079 |

Every additional unit of tobacco purchased illicitly will mean one less unit purchased from the legal market, with the loss of revenue for legal traders translating into a loss to the exchequer. We accounted for this by subtracting the estimated increases in the absolute size of the illicit market from our estimates of the direct absolute effect of plain packaging on purchases of legally sold tobacco to generate our estimate of the total effect of plain packaging. Our results are presented in Table 8 to Table 10 below.

Whereas the increase in cigarette purchases was estimated to fall in the range of 2.4 - 5.0 billion sticks as a result of **the 'direct' impact of plain packaging** (Table 3 above), this **is eroded by the feedback effect from the illicit market**. The results suggest that the 'net' effect of plain packaging is an increase in purchases of legal cigarettes of between 1.0 and 3.5 billion sticks, as shown in Table 8 below.

But note that, if the recent increases in the size of the illicit trade suggested by the aforementioned survey evidence are, in fact, widespread, then the projected size of the feedback effects from the illicit market in Table 7 (and the size of the resulting losses to the legitimate economy and to the exchequer) could be considered underestimates.

The corresponding fall in overall sales revenues ranges from £0.6 to £1.2 billion.

**Table 8: Overall changes in legal cigarette market after feedback effects from illicit market**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on legal purchases (bn sticks) | Change in sales (£bn) |
|---|---|---|---|---|---|
| Average | No entry | - | -£0.40 | 1.0 | **-0.61** |
| | Super-low brands | -25% | -£0.56 | 1.8 | **-0.73** |
| | | -50% | -£0.60 | 2.1 | **-0.76** |
| | | -75% | -£0.64 | 2.3 | **-0.77** |
| Large | No entry | - | -£0.78 | 2.6 | **-1.01** |
| | Super-low brands | -25% | -£0.88 | 3.0 | **-1.14** |
| | | -50% | -£0.92 | 3.2 | **-1.18** |
| | | -75% | -£0.96 | 3.5 | **-1.20** |

Our estimates for legal HRT suggest that plain packaging will cause purchases of legal HRT to decrease by between 488 and 1,007 tonnes. This overall predicted fall in legal HRT purchases is in contrast to the predicted increase in legal cigarette purchases. This is explained in terms of our

finding that the increase in the size of the illicit HRT market due to plain packaging was greater in absolute size than the increase in purchases of legal HRT as a result of the price reductions (in legal HRT) expected to follow the introduction of plain packaging.[12]

The alternative scenarios (50 and 100 per cent) represented by each of Tables 9 and 10 respectively reflect the extent to which the predicted effects of plain packaging on cigarette prices and purchases will be mirrored in the HRT market.

**Table 9: Overall changes in legal HRT market after feedback effects from the illicit market (Scenario A, 50%)**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on legal purchases (mn tonnes) | Change in sales (£bn) |
|---|---|---|---|---|---|
| Average | No entry | - | -£0.22 | -935.6 | **-0.31** |
| | Super-low brands | -25% | -£0.31 | -884.1 | **-0.31** |
| | | -50% | -£0.33 | -870.5 | **-0.31** |
| | | -75% | -£0.35 | -854.2 | **-0.31** |
| Large | No entry | - | -£0.43 | -835.2 | **-0.32** |
| | Super-low brands | -25% | -£0.48 | -810.8 | **-0.33** |
| | | -50% | -£0.51 | -799.9 | **-0.33** |
| | | -75% | -£0.53 | -783.6 | **-0.33** |

**Table 10: Overall changes in legal HRT market after feedback effects from the illicit market (Scenario B, 100%)**

| Substitutability increase | Entry | Entrant MC ratio | Effect on average price | Effect on legal purchases (mn tonnes) | Change in sales (£bn) |
|---|---|---|---|---|---|
| Average | No entry | - | -£0.44 | -791.7 | **-0.31** |
| | Super-low brands | -25% | -£0.62 | -688.5 | **-0.32** |
| | | -50% | -£0.66 | -661.4 | **-0.32** |
| | | -75% | -£0.71 | -628.8 | **-0.32** |
| Large | No entry | - | -£0.86 | -590.8 | **-0.34** |
| | Super-low brands | -25% | -£0.97 | -541.9 | **-0.35** |
| | | -50% | -£1.01 | -520.2 | **-0.35** |
| | | -75% | -£1.06 | -487.6 | **-0.35** |

When compared with the 'direct' impacts of plain packaging on legal HRT purchases (Tables 4 and 5), the 'net' impacts in Tables 9 and 10 reveal that the indirect or 'feedback' effect from the illicit

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[12] To further clarify this point, for cigarettes, the predicted increase in consumption in the legal market is greater than the predicted increase in the size of the illicit market. Therefore, legal cigarette consumption rose even after accounting for the increase in the illicit market.

market has a significantly greater proportionate impact on revenues from legal HRT than on revenues from legal cigarettes.

These results are summarised below.

**Table 11: Summary table of results of this section**

| Variable | Effect of plain packaging |
| --- | --- |
| Cigarette volumes (legal) | An increase in the range of 1 and 3.5 billion sticks purchased |
| Cigarette volumes (overall, legal+illicit) | An increase in the range of 2.5 and 5 billion sticks purchased |
| Cigarette prices (legal) | A fall in average price of between 40p and 96p |
| Cigarette sales revenues | A fall in the range of £0.6 and £1.2 billion |
| | |
| HRT volumes (legal) | A decrease in the range of 488 and 1,007 tonnes purchased |
| HRT volumes (overall, legal+illicit) | An increase in the range of 145 and 590 tonnes purchased |
| HRT prices (legal) | A fall in average price of between 22p and £1.06 |
| HRT sales revenues | A fall in the range of £0.31 and £0.35 billion |

# 4    The macroeconomic impact of tobacco in the UK

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**Key findings**

- Tobacco directly contributes 0.84 per cent of UK GDP, equivalent to about £12.3 billion in 2010 prices.
- The direct GVA contribution from the tobacco manufacturing industry is £1.4 billion or 0.1 per cent of aggregate UK-wide GVA.
- For every £1 of GVA generated directly by the tobacco manufacturing industry, an additional £0.82 of GVA is generated in the wider UK economy through indirect (supply chain) and induced (employee spending) multiplier impacts.
- As a consequence of this 1.82 GVA multiplier, tobacco manufacturing generated an aggregate GVA contribution of £2.5 billion in 2010 terms.
- Tobacco manufacturing accounts for 0.01 per cent of total UK employment, equal to about 3,360 full-time equivalent (FTE) jobs.
- For every 1 FTE job supported by tobacco manufacturing, an additional 3.58 FTE jobs are supported in the wider economy through indirect and induced multiplier impacts.
- This employment multiplier of 4.58 produces an estimated aggregate jobs impact of 15,391 FTEs – or 0.1 per cent of total UK employment.
- The tobacco manufacturing industry contributed £11 billion to the UK Exchequer in 2010, equal to about 3.5 per cent of HMRC's aggregate tax take in that year.

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Before we could understand the 'macro' impacts of plain packaging, it was necessary to first understand the macro impact of tobacco itself. This section presents Cebr's independent assessment of the contribution made by tobacco to the UK economy.

We begin with a methodological overview. This is followed by subsections 4.2 to 4.5, in which we focus on the economic output and jobs generated in the manufacture of tobacco products (direct impacts) and on what flows (through indirect and induced impacts) from these activities. Subsection 4.6 examines the Exchequer contributions from the sale and manufacture of tobacco products in the UK.

## 4.1    Methodological overview

The macro impact modelling underlying this report is based on the framework provided by the ONS' supply-and-use tables, the most detailed official record of how the industries of the economy interact with other industries, with consumers and with international markets in producing the nation's GDP and national income. Making use of the supply-and-use framework to analyse the contribution of tobacco is the best means of ensuring consistency with the national accounting framework.

### *Establishing an explicit role for tobacco in Cebr's modelling framework*

Cebr's baseline economic impact models are based on 20 aggregate sectors, reflecting the 20 1-digit Sections under the Standard Industrial Classification (SIC) system. Manufacturing of tobacco products is a distinct 2-digit industry that forms a subset of the broad manufacturing sector (or Section). The task, therefore, was one of extraction, involving the separation of tobacco

manufacturing from the broader manufacturing sector and, thus, assigning tobacco manufacturing an explicit role within the modelling framework.

Having completed this assignment, we had the foundation for establishing:

- *The economic size (or direct impact) of tobacco manufacturing*, using standard measures of GVA[13] – and, from this, the percentage contribution to GDP – and employment; and

- *The wider economic impact of tobacco manufacturing on the UK economy*, using Leontief input-output modelling to estimate a full set of (matrix) multipliers capturing direct, indirect and induced impacts on output, GVA, employment and income from employment.

We use the multipliers in association with the direct impacts data to produce estimates of the aggregate impacts of the industry through its supply chain (indirect impacts) and through household consumption by the employees of the tobacco industry and its suppliers who spend their earnings in the wider economy (induced impacts).

### *Multiplier impacts based on Leontief input-output framework*

The multiplier effect denotes the phenomenon whereby some initial increase (or decrease) in the rate of spending will bring about a more than proportionate increase (or decrease) in national income. The Keynesian approach barely requires a mention but is very much grounded in macroeconomic analysis, offering little capability to analyse impacts of entities that are smaller than the whole economy.

Input-output analysis, due largely to the work of Wassily Leontief,[14] while macroeconomic in the sense that it involves analysing the economy as a whole, owes its foundations and techniques to the microeconomic analysis of production and consumption.[15] According to ten Raa (2005), some argue that input-output analysis is at the interface of both, defining it as the study of industries or sectors of the economy.

The well-known Leontief inverse matrix, which shows the inter-industry dependencies of an economy, is the basis for producing input-output multipliers. These are some of the most important tools for measuring the total impact on output, employment and income of an industry.

The Leontief inverse matrix can also be described as the output requirements matrix for final demand, that is, it shows the input requirements from the other sectors of the economy per unit of output produced in the industry under examination in response to a final demand stimulus. The matrix can be used to produce two types of multiplier – the Type I multiplier incorporating direct and indirect (supply chain) impacts and the Type II multiplier incorporating induced (employee spending) impacts as well.

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[13] GVA or gross value added is a measure of the net value of goods and services which, in the national accounts, is the value of industrial output less intermediate consumption. That is, the value of what is produced *less* the value of the intermediate goods and services used as inputs to produce it. GVA is also commonly known as income from production and is distributed in three directions – to employees, to shareholders and to government. GVA is linked as a measurement to GDP – both being a measure of economic output. That relationship is GVA + Taxes on products - Subsidies on products = GDP. Because taxes and subsidies on individual product categories are only available at the whole economy level, GVA tends to be used for measuring things like gross regional domestic product and other measures of economic output of entities that are smaller than the whole economy, such as the tobacco industry.

[14] See, for example, Leontief, Wassily W. (1986), *Input-Output Economics.* 2nd ed., New York: Oxford University Press.

[15] See ten Raa, Thijs (2005), *The Economics of Input-Output Analysis*, Cambridge University Press.

## 4.2    Contribution of tobacco manufacturing to GDP

Cebr estimates that **tobacco accounts for approximately 0.84 per cent of UK GDP**. While the absolute GVA contribution of the tobacco manufacturing industry is £1.4 billion, which is only 0.1 per cent of aggregate UK-wide GVA once tobacco's indirect tax contributions (the difference between GVA and GDP) are taken into account, tobacco's contribution is significantly greater than the isolated examination of what the industry contributes in GVA terms might suggest.[16]

The manufacture of tobacco products, whilst generating a £1.4 billion contribution to UK GDP, also supports firms in its supply chain as well as in industries in the wider economy through spending by employees of the tobacco manufacturing industry and its suppliers. Cebr has used its in-house input-output models to produce estimates of these indirect and induced multiplier impacts of the industry.

Based on this we estimate that, **for every £1 of GVA generated directly by the tobacco manufacturing industry, an additional £0.82 of GVA is generated in the wider UK economy through indirect and induced multiplier impacts.** This GVA (or total production income) multiplier of 1.82 is decomposed and explained further in Figure 10 below.

Based on this Type II multiplier (capturing direct, indirect and induced impacts), **we estimate that tobacco manufacturing generated an aggregate GVA contribution of £2.5 billion in 2010**.

**Figure 10: GVA multiplier for the tobacco manufacturing industry**

| Tobacco manufacturing GVA multiplier = £1.82 | | |
|---|---|---|
| **Direct impact £1** | **Indirect impact £0.46** | **Induced impact £0.36** |
| Expenditure on tobacco generates the industry's supply response. In 'producing' its products, the tobacco industry generates additional value added. Assume sufficient initial expenditure to enable the industry to generate £1 of GVA. This £1 of GVA is the direct GVA impact of the relevant increment in tobacco expenditure | To increase its supply, the tobacco industry must increase its demands on its suppliers, who increase demands on their suppliers and so on through the supply chain. This generates the indirect impact, an increase in GVA throughout the supply chain of £0.46 for every additional £1 of tobacco manufacturing GVA | The combined direct and indirect impacts have an impact on household income throughout the economy, through increased employment, profits etc. A proportion of this income will be re-spent on final goods and services, producing a supply response by the producers of these goods/services and further impacts through their supply chains etc. This produces the induced impact of £0.36 for every additional £1 of GVA generated in tobacco manufacturing |

*Source: Cebr analysis*

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[16] The industry's aggregate tax contributions are discussed later in this section.

## 4.3 The industrial output multiplier for tobacco manufacturing

The tobacco manufacturing industry produced £2.3 billion of industrial output in 2010, valued at basic prices.[17] The 'industrial' output multiplier associated with tobacco manufacturing is estimated at 1.99. This means that **for every £1 of industrial output of tobacco products, an additional £0.99 of output is generated in the wider economy, again through indirect and induced multiplier impacts.** This aggregate 'industry' output multiplier is illustrated in deconstructed form in Figure 11 below.

**Figure 11: Tobacco manufacturing's industrial output multiplier**

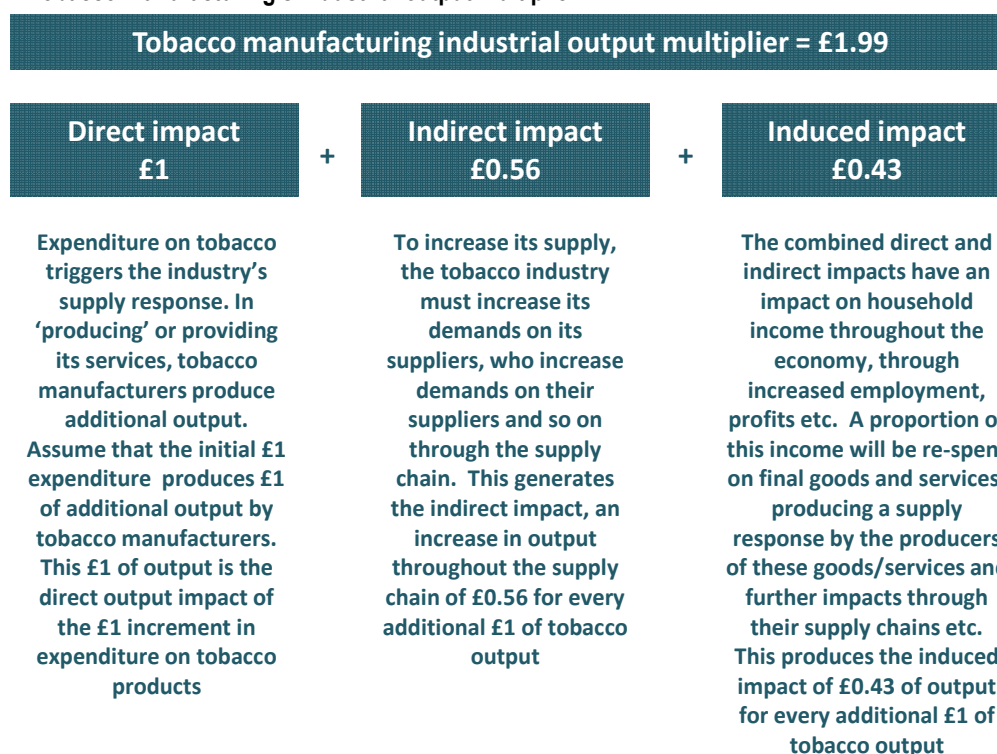| Tobacco manufacturing industrial output multiplier = £1.99 | | | | |
|---|---|---|---|---|
| **Direct impact £1** | + | **Indirect impact £0.56** | + | **Induced impact £0.43** |
| Expenditure on tobacco triggers the industry's supply response. In 'producing' or providing its services, tobacco manufacturers produce additional output. Assume that the initial £1 expenditure produces £1 of additional output by tobacco manufacturers. This £1 of output is the direct output impact of the £1 increment in expenditure on tobacco products | | To increase its supply, the tobacco industry must increase its demands on its suppliers, who increase demands on their suppliers and so on through the supply chain. This generates the indirect impact, an increase in output throughout the supply chain of £0.56 for every additional £1 of tobacco output | | The combined direct and indirect impacts have an impact on household income throughout the economy, through increased employment, profits etc. A proportion of this income will be re-spent on final goods and services, producing a supply response by the producers of these goods/services and further impacts through their supply chains etc. This produces the induced impact of £0.43 of output for every additional £1 of tobacco output |

*Source: Cebr analysis*

## 4.4 Contribution of tobacco manufacturing to employment

Our estimates suggest that **tobacco manufacturing accounts for 0.01 per cent of total UK employment**. This equates with an estimated 3,358 full-time equivalent (FTE) jobs.

However, as with GVA, the employment impact of tobacco manufacturing is not confined to this direct jobs contribution. We used the same input-output modelling to produce an employment multiplier for the industry, finding that, **for every 1 FTE job supported by tobacco manufacturing, an additional 3.58 FTE jobs are supported in the wider economy through indirect and induced multiplier impacts.**

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[17] Basic prices exclude taxes and subsidies on products. As such they reflect the amount received by the producer for a unit of goods or services and are the preferred method of valuing output within the supply-and-use framework.

This produces an estimated **total FTE employment impact of tobacco manufacturing of 15,391 FTE jobs** in 2010 – or 0.1 per cent of total UK employment.

This employment multiplier of 4.58 is illustrated and explained further in Figure 12 below.

**Figure 12: Tobacco manufacturing's employment multiplier**

| Tobacco manufacturing employment multiplier = 4.58 | | | | |
|---|---|---|---|---|
| **Direct impact 1 FTE** | + | **Indirect impact 1.98 FTE** | + | **Induced impact 1.60 FTE** |
| Expenditure on tobacco triggers the industry's supply response. In 'producing' its products, the tobacco industry hires additional staff. Assume sufficient expenditure on tobacco to generate 1 additional FTE job. This 1 FTE job is the direct employment impact of the relevant increment in expenditure on tobacco | | To increase its supply, the tobacco industry must increase its demands on its suppliers, who increase demands on their suppliers and so on down the supply chain. This generates the indirect impact, an increase in employment throughout the supply chain of 1.98 FTEs for every additional FTE in tobacco manufacturing | | The combined direct and indirect impacts have an impact on household income throughout the economy, through increased employment, profits etc. A proportion of this income will be re-spent on final goods and services, producing a supply response by the producers of these goods/services and further impacts through their supply chains etc. This produces the induced impact of 1.60 FTEs for every additional FTE in tobacco manufacturing |

*Source: Cebr analysis*

Cebr's estimates, as can be seen from above, suggest a very strong employment multiplier for tobacco manufacturing. This reflects the relatively high labour productivity of the industry as well as the relatively high labour intensities of the industries from which tobacco manufacturers source their intermediate inputs.

Specifically, the relatively high labour productivity of tobacco manufacturing means that increasing employment by 1 FTE in this industry is likely to produce much greater increases in output than could be achieved by increasing employment by 1 FTE in other sectors of the economy. Consequently, an expansion of output by tobacco manufacturing requires suppliers to hire more workers per unit of additional input supplied than tobacco needs to hire per unit of additional output produced.

## 4.5  Impact on income from employment of tobacco manufacturing

Based on official earnings data taken from the Annual Survey of Hours and Earnings (ASHE), the tobacco industry is estimated to incur a median cost per FTE employee of £43,302 in 2010 (£45,827 in 2012). This compares to the median across the UK as a whole of £25,879 in 2010 (£26,462 in 2012). On this measure, tobacco manufacturing makes a significant positive contribution to average household incomes in the UK.

Based on our input-output modelling we estimate that, **for every £1 of income from employment (IfE) generated in the tobacco manufacturing industry, an additional £1.28 of IfE is generated in the wider economy through indirect and induced multiplier impacts.**

In other words, for every median gross salary of £43,302 paid to tobacco manufacturing employees in 2010, a further £55,585 of gross salary was earned elsewhere in the economy. This income from employment multiplier of 2.28 is illustrated in deconstructed form in Figure 13 below.

**Figure 13: Tobacco manufacturing household incomes multiplier**

| Tobacco manufacturing household incomes multiplier = 2.28 | | |
|---|---|---|
| **Direct impact £1 IfE** | **Indirect impact £1.08 IfE** | **Induced impact £0.20 IfE** |
| Expenditure on tobacco triggers the industry's supply response. In 'producing' its products, the industry pays its staff. Assume sufficient expenditure tobacco to generate £1 of additional income from employment. This £1 of additional income from employment is the direct income impact of the relevant increment in expenditure on tobacco products. | To increase its supply, the industry must increase its demands on its suppliers, who increase demands on their suppliers and so on down the supply chain. This generates the indirect impact, an increase in income from employment throughout the supply chain of £1.08 of IfE for every additional £1 of IfE paid by the tobacco manufacturing industry | The combined direct and indirect impacts have an impact on household income throughout the economy, through increased employment, profits etc. A proportion of this income will be re-spent on final goods and services, producing a supply response by the producers of these goods/services and further impacts through their supply chains etc. This produces the induced impact of £0.20 of IfE for every additional £1 of IfE paid by tobacco manufacturers |

*Source: Cebr analysis*

## 4.6   Exchequer contributions

Cebr's estimates suggest that **tobacco contributed £11 billion to the UK Exchequer in 2010**. This is a significant **3.5 per cent share of HMRC's aggregate tax take** in that year. This aggregate contribution is broken down in Table 12 below.

**Table 12: Contributions of tobacco to the UK Exchequer, 2010 estimates[18]**

| Tax category | Tax type | Tax paid (£m) |
|---|---|---|
| Indirect taxes | Duties and VAT | 10,879 |
| Taxes on production | Business rates / Employer's NICs | 2 |
| Taxes on income | Employee income tax / NICs | 46 |
|  | Corporation tax | 74 |
| **TOTAL TAX PAID** |  | **11,001** |

*Source: ONS, HMRC, Cebr analysis*

The bulk of this contribution comes through indirect taxes on tobacco products, with an aggregate tobacco duty and VAT contribution of £10.9 billion. Taxes on production, which include business rates and employer's national insurance contributions (NICs) paid by the tobacco manufacturing industry are small at £2 million.

After indirect taxes, taxes on income from tobacco manufacturing provide the next largest share of tobacco's total tax contribution, including £74 million in corporation tax in 2010 and £46 million in employee NICs and income taxes.

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[18] The amounts in this table for taxes on income and production do not include the revenues that flow through businesses in the retail sector engaged in the sale of tobacco. Their estimation was beyond the scope of the study and would, once isolated for tobacco, be negligible relative to the contributions made by tobacco manufacturing. However, the retail sector is analysed in terms of tobacco and plain packaging in section 6 of this report.

# 5    The impact of plain packaging on these macroeconomic contributions

> **Key findings**
>
> Cebr analysis suggests that the value of tobacco sales in the UK could shrink by between 5.5 and 9.2 per cent as a result of plain packaging, despite increases of 3 and 7 per cent in legal and overall (legal and illicit) tobacco purchases respectively. This corresponds with a reduction in final expenditure on legal tobacco of between £0.9 and £1.6 billion.
>
> We estimate that this would have the following impact on the UK economy as a result of plain packaging:
>
> - A reduction in the percentage contribution made by tobacco to GDP, from 0.84 per cent to between 0.78 and 0.81 per cent.
> - An absolute reduction in the industry's GVA contribution of between £290 and £500 million.
> - Once indirect and induced multiplier impacts are taken into account, the industry's aggregate economy-wide contribution to GVA falls from £2.5 billion to between £1.86 and £2.14 billion.
> - The loss of between one and two thousand tobacco manufacturing jobs.
> - A total loss of between 2,250 and 3,850 full-time equivalent jobs once revised indirect and induced multiplier impacts are taken into account. Despite the boost to the industry's supply chain (and thus its indirect impact) as a result of increased tobacco consumption, this is outweighed by the loss of employee spending (induced) impacts.
> - A reduction in tobacco's aggregate annual contribution to the UK Exchequer of between £219 and £348 million.

We have used the predicted drops in the value of sales of legal tobacco as our starting point in estimating the likely impacts of plain packaging on tobacco's contribution to the UK economy. The estimates presented in section 3 suggest a fall in legal tobacco sales revenues of between £0.9 and £1.6 billion depending on the scenario being examined.

What this means for the UK in economic terms can be estimated using our understanding of the contribution made by tobacco to the UK economy, of which we presented our estimates in the last section. This section does just that.

## 5.1    Assumptions

The introduction of plain packaging is expected to result in brand dilution and greater price competition amongst tobacco producers. Reduced product differentiation can be expected to result in reduced brand loyalty and the need to compete more fiercely on price to keep customers loyal and maintain market share. The price of tobacco will be driven downwards, which could, if the law of demand holds, have the unintended effect of increasing overall tobacco purchases.[19]

Not all of the economic contributions outlined in the previous section will necessarily be affected nor indeed by the same amount. Where the negative economic effects of the projected loss in revenues from legal cigarette and hand-rolled tobacco (HRT) sales are felt depends on the actions of market participants. Depending on the scenario being examined, Cebr's projections of the economic impact

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[19] "Plain Packaging and its Unintended Consequences," Montreal Economics (August 2011)

of plain packaging start with a £0.9 to £1.6 billion loss in sales revenues, as presented in section 3 above.

But because legal cigarette purchases (which account for most of the tobacco market) are predicted to increase, the volume of intermediate inputs required to support expanded production would have to increase. We assumed, therefore, that tobacco manufacturers, by taking advantage of greater economies of scale in the supply chain, increase their expenditure on intermediate inputs by 2.5 per cent in response to a 10 per cent increase in output. This was, in the absence of hard data, assumed for illustrative purposes.

## 5.2  Reduced contribution to GDP

Cebr's estimates suggest that **the percentage contribution of tobacco to GDP will fall from 0.84 per cent of UK GDP to between 0.78 and 0.81 per cent following the introduction of plain packaging**. This is a function of the net loss of duties and VAT on tobacco (due to falling tobacco prices and the prominence of the ad valorem element of tobacco duty) as well as falling sales revenues and the squeeze on gross margins (due to increasing demands on suppliers) resulting in tobacco manufacturing adding less value (in monetary terms) to the economy.

Specifically, the **absolute GVA contribution of the tobacco manufacturing industry is expected to fall by between £290 and £502 million from the 2010 contribution of £1.4 billion**. This would amount to a 21 to 36 per cent fall in the value added by tobacco manufacturing. Such reductions are likely to have implications for jobs, employee incomes and on the working practices of employees themselves, particularly in the medium to long term.

Plain packaging would also have the effect of reducing the industry's indirect and induced multiplier impacts. The revised multiplier impacts from Cebr's input-output modelling suggest **a drop in the industry's aggregate GVA contribution from £2.5 billion to between £1.86 and £2.14 billion** (a reduction of between £394 and £674 million).

This is despite an increase in the GVA multiplier from 1.82 (see Figure 10 above) to between 1.94 and 2.08 under the minimum and maximum sales revenue impact scenarios. These revised multipliers reflect the greater input requirements (in £ terms) per £1 of output of tobacco manufacturing following plain packaging.[20]

## 5.3  Loss of jobs

Our model predicts **the loss of between one and two thousand full-time equivalent (FTE) jobs in tobacco manufacturing as a result of lower tobacco sales revenues**.

The industry's aggregate employment contribution once indirect and induced multiplier impacts are included is projected to also fall from 15,391 FTE jobs to between 11,545 and 13,315 jobs. **This is an aggregate loss of between 2,250 and 3,850 jobs**, despite substantial increases in the employment

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[20] The increases in the individual input requirements per unit of output (otherwise known as 'technical coefficients') reflect, in arithmetic terms, (i) the fall in the value of tobacco industry output (caused by the fall in price of tobacco following plain packaging); (ii) the increase in output in volume terms (caused by increased consumption) and the fact that more intermediate inputs are required to produce these higher volumes of output. The first reduces the size of the denominator in each technical coefficient. The second increases the size of the numerator.

multiplier from 4.58 (as illustrated in Figure 12 above) to between 6.02 in the minimum scenario and 8.91 in the maximum scenario.

Therefore, the need for tobacco manufacturers to expand output and increase demands on their suppliers, thus enhancing the indirect impact of the industry following plain packaging is outweighed by the loss of induced employee spending impacts due to job losses and reductions in revenue from tobacco sales.

## 5.4    Impact on the Exchequer

The aggregate tax loss as a result of plain packaging is estimated to range between £219 and £348 million. The maximum losses arise from the scenario reflecting the smallest expected reduction in revenues from legal tobacco sales. This is due to the structure of tobacco duties.

Tobacco duties on cigarettes have two elements: (i) an *ad valorem* element levied at 24 per cent of the retail price;[21] and (ii) a fixed element of £119.03 per thousand cigarettes.[22] VAT is also levied at 20 per cent of the retail price including tobacco duties. The expected fall in price of cigarettes as a result of plain packaging would cause revenues under (i) to fall but the increase in purchases will result in increased Exchequer takings from (ii). Duties on HRT are levied at a fixed rate per kilogram, so the expected fall in the volume of legally sold HRT following plain packaging would also depress tax takings.

The scenario reflecting the largest expected reductions in tax revenues from legal tobacco sales predicts smaller price reductions and, hence, smaller increases in legal tobacco volumes. The gains through the fixed element are, therefore, outweighed by the loss through the ad valorem element. In the other scenario, the price reductions are larger but the volume increases are greater, resulting in lesser losses of product taxes to the Exchequer under this scenario.

Corporation tax contributions are also likely to be affected. The results in Table 12 reflect a hypothetical scenario in which tobacco manufacturers swallow a small proportion of the price reductions in the form of reduced net profits, which in turn reduces corporation tax contributions.

At least £16 to £28 million can be expected to be lost in income taxes and employees' NICs.

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[21] This is the 2010 level.  The level in 2013 is 16.5 per cent. See section 1.3 above.

[22] Again, this was the 2010 level, which has now been increased to £167.41. See section 1.3 above.

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**Table 13: Contributions of tobacco manufacturing to the UK Exchequer, hypothetical short term post-PP, 2010 estimates**

| Tax category | Tax type | Minimum scenario Tax revenue loss (£m) | Maximum scenario Tax revenue loss (£m) |
|---|---|---|---|
| Indirect taxes | Duties and VAT | -323 | -175 |
| Taxes on production | Business rates / Employer's NICs | 0 | 0 |
| Taxes on income | Employee income tax / NICs | -16 | -28 |
| | Corporation tax | -9 | -16 |
| **TOTAL TAX LOST** | | **-348** | **-219** |

*Source: ONS, HMRC, Cebr analysis*

These losses can be equated with:[23]

- The annual gross salaries of 5,656 to 8,987 police officers; or

- The annual gross salaries of 6,147 to 9,768 teaching professionals.

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[23] Salary data is based on median annual earnings for each profession sourced from ASHE 2010.

# 6   The impact of plain packaging on the retail sector

**Key findings**

Tobacco also benefits the economy through the retail sector that sells it on to consumers. We expect the retail sector's gross earnings from tobacco to fall from our 2010 estimate of £850 million by between £110 and £185 million. This reduces tobacco's indirect contribution to GDP through the retail sector by between 12 and 22 per cent of an absolute GVA contribution of £492 million.

Small independent retailers (SIRs) however could be particularly hard hit by plain packaging. This can be explained in summary as follows:

- Profits from tobacco are of higher importance to SIRs, which account for 11 per cent of all tobacco sales in the UK. The effects described above in terms of the retail sector as a whole yield estimated reductions of between £12 and £20 million in SIRs' earnings from tobacco.

- Given the current state of the retail sector and the fact that so many convenience stores are on the cusp of financial difficulties, we estimate that this could result in some insolvencies and the loss of between 2,000 and 3,500 full-time equivalent jobs in convenience retail.

- There is an expectation however, based on survey evidence from Australia, that both tobacco and non-tobacco customers will switch from smaller to larger stores as a result of increased tobacco transaction times and their effect on the length of queues.

- On this evidence, SIRs could be facing losses of earnings reaching as much as £300 million once the lost non-tobacco sales are taken into account.

- This would lead to greater numbers of insolvencies and up to 30,000 FTE employees losing their jobs in convenience retailing. With so many local communities dependent on SIRs, such effects would have negative implications in terms of the wider social impact of SIRs.

We analyse how tobacco contributes indirectly to the economy through the retail sector and how plain packaging can be expected to affect that indirect contribution. Following this, we narrow our focus to the deleterious effects of plain packaging on small independent retailers (SIRs), which can be expected to be particularly hard hit due to the likelihood of customers switching from smaller to larger stores in anticipation of longer tobacco transaction times and longer queues in convenience stores.

## 6.1   Impact of plain packaging on tobacco's indirect contribution to the UK economy through the retail sector

Using national accounting data, we estimate that tobacco sales account for about 15 per cent of the revenues earned by the entire retail sector.[24] However, data from the Association of Convenience Stores (ACS) suggest that, once government and tobacco manufacturers have taken their share,

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[24] What we mean by the 'entire retail sector' is the 2-digit industry 47: Retail trade services, except of motor vehicles and motorcycles under the SIC classification system.

retailer margins on tobacco average at about 5 per cent of the retail price. This equates to about £850 million in gross earnings by the retail sector through the sale of tobacco.[25]

The retail sector's GVA-to-output ratio is 58 per cent, and assuming this ratio applies to the gross earnings of retailers from the sale of tobacco, then **tobacco's indirect contribution to GDP through the retail sector would amount to about £492 million**.

The retail activity supported through the sale of tobacco comes with its own set of multiplier impacts. Cebr's input-output models suggest a combined indirect and induced GVA multiplier of 2.22 for the retail sector. That is, for every £1 of GVA generated by the sector, another £1.22 is supported in the wider economy through supply chain (indirect) and employee spending (induced) impacts. Given the multi-product setting in which most tobacco is sold means that tobacco, as much as any other product in the mix, can claim to contribute to these direct and multiplier impacts of the retail sector.

Our model predicts retailer earnings could be expected to fall by between £109 and £184 million from their baseline level of £850 million. This would translate into a **reduction in tobacco's indirect contribution to GDP through the retail sector of between £60 and £110 million.**[26]

These estimates are based on pro rata reductions in the share of the price received by retailers as tobacco prices fall following the introduction of plain packaging. In other words, the percentage margin is assumed to remain unchanged, with the estimated loss of earnings to retailers being driven by lower prices for tobacco, despite higher demand.

## 6.2 Focus on the impact on small independent retailers

There is an expectation that retail customers may shift away from SIRs in anticipation of longer tobacco transaction times and hence longer queues as a result of the introduction of plain packaging. An Australian study has examined the proportion of customers who were either "somewhat likely" or "very likely" to switch away from using small retailers if mandatory plain packaging was introduced.[27]

To examine this issue, we defined small retailers as those with a sales area of less than 3,000 square feet and that fall into one of two groups – "Non-affiliated Convenience Retailers" and "Independent Forecourt Convenience Retailers".[28] These two groups contributed 5.2 per cent of the total value of sales of the entire UK grocery retail industry in 2011.[29] But these groups (which we have labelled 'small independent retailers' or SIRs) made up 27 per cent of the stores in the industry in the same

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[25] Based on the fact that national accounting data suggest a total of £3 billion allocated to 'distributors trading margins' on tobacco, the corollary is that about £2.15 billion of transport costs are borne in the distribution of tobacco from manufacturers to retailers (via wholesalers where relevant).

[26] Clearly, a similar analysis can be applied to the industries that supply the logistical services required to distribute manufactured tobacco to the retail market. There may also be elements of the wholesale sector that would be affected. However, this analysis was beyond the scope of the current study.

[27] Deloitte (June 2011), "Plain packaging and channel shift".

[28] 'Non-affiliated convenience retailers' is a term used by the Institute of Grocery Distribution which excludes convenience multiples (convenience specialists and supermarket based chains e.g. Tesco Express and Sainsbury's Local), co-operatives (e.g. The Co-operative Group) and symbol groups (e.g. SPAR, Londis, Premier). 'Independent forecourt convenience retailers' are the dealer owned small convenience stores found at petrol stations.

[29] IGD, Catalist, Cebr estimates.

year. SIRs' presence, in other words, is stronger than their contribution to aggregate grocery retail turnover might suggest.

It should not be surprising then that the ACS data suggest that the SIRs group accounts for almost 11 per cent of aggregate tobacco sales in the UK, nearly twice as much as their contribution to aggregate sales in wider grocery retail. Using this percentage with the results of our analysis in 6.1 above suggests that plain packaging could result in:

- A loss of gross earnings by the SIRs of between £12 and £20 million from a baseline estimate of £92 million gross earnings from tobacco;

- A loss of between £7 and £12 million in GVA terms.

The ACS has produced data on the 2012 employment profiles of convenience stores, which includes our definition of SIRs. Based on these data, we estimate that 182,301 people in Great Britain are currently employed by convenience stores. Given the current state of the retail sector and the fact that so many convenience stores are on the cusp of financial difficulties, we estimate that **the loss of tobacco earnings described above could result in some insolvencies and the loss of between 2,000 and 3,500 full-time equivalent (FTE) jobs in convenience retail**.

But these estimates only include the expectations of the effects of plain packaging that we have for all retailers. Building in assumptions about the expected tendency to switch from SIRs following the introduction of plain packaging and the fact SIRs could suffer losses of revenues from both tobacco and non-tobacco customers, these estimates increase substantially to:[30]

- A loss of gross earnings by the SIRs of over £300 million from a baseline estimate of £1.6 billion gross earnings from tobacco and non-tobacco sales;

- A loss of £175 million in GVA terms from a baseline estimate of £926 million GVA generated through SIRs' tobacco and non-tobacco sales.

**This would lead to greater numbers of insolvencies and up to 30,000 FTE employees losing their jobs in convenience retailing**. With so many local communities dependent on SIRs, such effects would have negative implications in terms of the wider social impact of SIRs. Plain packaging would also increase the likelihood of business failures at a time and in circumstances in which retail space occupancy rates on the High Street are already noticeably depressed.

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[30] These estimates do not account for reductions in non-tobacco sales to tobacco customers that switch away from SIRs. The estimates presented can, therefore, be considered underestimates.