



# The New Tobacco Products Directive – Potential Economic Impact

Study



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## Foreword

In late 2012, the European Commission adopted its proposal for a revised Tobacco Products Directive (TPD), in our study referred to as the "new TPD". The Commission proposes changes in five areas of tobacco regulation: (1) packaging and labeling, (2) ingredients/additives, (3) extension of the product scope, (4) cross-border distance sales, and (5) traceability and security features.

Roland Berger Strategy Consultants has been commissioned by Philip Morris International (PMI) to assess the potential economic impact of the new TPD. In our study, we analyze the impact of the new TPD on the entire tobacco sector and EU Member States' economies in terms of two key parameters:

1. Employment
2. Tax revenue

In doing so, we focus on the impact of (1) the new packaging and labeling requirements leading to high levels of standardization, (2) the ban on slim cigarettes, i.e. cigarettes with a diameter of less than 7.5 mm, and (3) the ban on menthol cigarettes resulting from restrictions on additives. We view these three measures as likely to have the most significant, quantifiable impact. There are potential additional effects on employment and tax revenue which have not been quantified as part of this study.

Our study attempts to be consistent with standard practice in economic modeling. We adopt a comprehensive, quantitative economic model that allows us to simulate future developments in the tobacco sector.

Chapter 1 introduces the current situation in the tobacco sector and the important role it plays in the EU economy. Chapter 2 follows with an explanation of the new TPD's proposed regulations, in particular those at the center of our study. In chapter 3, we describe the economic model we used to simulate the potential effects of the new TPD in terms of employment and tax revenue, on a country-by-country basis.

The results of our analysis are presented in chapter 4. Details about certain product segments and various EU countries are given to illustrate the likely consequences for specific Member States. Chapter 5 describes limitations within our model-based quantitative analysis, and briefly discusses how addressing these limitations could change our results. Chapter 6 explores additional aspects of the new TPD that have not been modeled, but which are relevant to employment and/or tax revenue. Chapter 7 highlights the links between our analysis of the new TPD and the European Commission's "more economic approach" to policymaking. Finally, chapter 8 summarizes our key conclusions.

## Executive summary

We estimate the cigarette and fine-cut tobacco sector in EU Member States – including suppliers and retailers – to account for more than 600,000 jobs (i.e. employees on full-time and part-time schedules – excluding seasonal workers). This is a conservative estimate. Others, including the European Commission, have calculated much higher figures, some of them exceeding one million jobs. Moreover, the sector generated tax revenues (i.e. tobacco taxes and VAT) of more than EUR 100 bn in 2012.

In late December 2012, the European Commission adopted its proposal for a new Tobacco Products Directive (TPD) – a proposal that has the potential to significantly impact the tobacco sector and the EU economy.

The new TPD's standardization of packaging and labeling of tobacco products will likely reduce consumers' value perception, which is influenced by strong brands and high degrees of product differentiation. This will increase pressure on prices, shifting demand towards lower-priced products sourced from either the legal or the illicit (black) market.<sup>1)</sup> Price competition will reduce prices across all tobacco market segments. As a result, demand for cigarettes and fine-cut is expected to increase by up to 2% – an unintended consequence of standardizing the appearance of cigarette packs. Following the prohibition of slim and menthol cigarettes, those consumers with a strong preference for these products will potentially turn to the illicit market. In total, the black market is expected to grow by 25-55%, from 68 bn cigarettes to 84-106 bn cigarettes.<sup>2)</sup>

As a result, between 70,000 and 175,000 jobs could be lost in the EU, not counting seasonal workers. These numbers include direct employment effects in the tobacco sector – mainly due to the shrinking legal cigarette and fine-cut market – as well as indirect employment effects brought on by the tax losses. The drop in tax revenue from excise taxes and VAT on tobacco products ranges from a conservative estimate of EUR 2.2 bn to an elevated estimate of EUR 5.0 bn across the EU. Of the EUR 5.0 bn loss in tax revenue, approximately EUR 3.6 bn result from an increase in illicit trade.

All EU Member States will be affected by the new TPD. However, some countries will be particularly hard-hit. Strong effects will, for instance, occur in countries such as Germany, Greece, France, Poland and Romania. Countries with high demand for slim or menthol cigarettes, such as Bulgaria or Poland, will experience disproportionate losses.

## 1. The EU tobacco sector is a major driver of jobs and tax revenue

The tobacco sector constitutes an important source of employment and tax revenue in the EU. This chapter gives an overview of the associated figures with respect to employment and tax revenue. These figures are based on Roland Berger calculations using industry data, and are put into perspective with figures from other available sources.

Employment in the tobacco sector (i.e. the number of jobs) is calculated for each country based on the value added<sup>3)</sup> in each step of the value chain. "Jobs" in this context refers to employees working on full-time and part-time schedules – excluding seasonal workers predominantly present at tobacco farms during harvest seasons.<sup>4)</sup> As we use rather conservative estimates regarding the translation of value added into jobs, the numbers presented here can be seen as a lower bound calculation. Based on our calculations, more than 600,000 jobs are directly associated with the tobacco sector in the EU. Others, including the European Commission, have calculated much higher figures, some of them exceeding one million jobs. Small and medium enterprises (SMEs) make up a large percentage of these jobs, especially in retail.

Tobacco taxes play a major role in overall taxation in EU Member States. Taxes generated from cigarettes and fine-cut totaled more than EUR 100 bn in 2012.<sup>5)</sup>

### 1.1 Cigarettes and fine-cut are the leading tobacco products

The Commission distinguishes between five main product segments in the tobacco market:<sup>6)</sup>

1. Factory-manufactured cigarettes (referred to as "cigarettes" in our study) comprise all industrially produced cigarettes
2. Fine-cut tobacco is used to make self-made cigarettes. Consumers either roll tobacco into rolling paper by hand (roll-your-own cigarettes, RYO) or fill filter tubes (make-your-own cigarettes, MYO)
3. Pipe tobacco is produced for smoking pipes
4. Cigars and cigarillos are rolls of tobacco wrapped in tobacco leaves. Cigars are divided into large and standard cigars, while cigarillos represent the smallest version
5. Smokeless tobacco products include those products that are not combusted, such as chewing tobacco, nasal snuff and snus

**Our study focuses on the two most important tobacco product segments, cigarettes and fine-cut, which account for more than 95% of total tobacco market value<sup>7)</sup>**

In 2011, 574 bn duty-paid cigarettes were legally sold in the EU. The six largest markets, Germany, Italy, Spain, France, Poland and the United Kingdom, accounted for around 70% of total sales volume.<sup>8)9)</sup>

In 2011, 83 thousand tons of fine-cut tobacco, corresponding to around 112 bn cigarette stick equivalents (CSE)<sup>10)</sup>, were sold in the EU. In Germany, fine-cut tobacco sales accounted for about 29% of the German legal cigarette and fine-cut market; shares were even higher in Belgium (48%) and the Netherlands (47%).<sup>11)</sup> Demand for fine-cut tobacco has steadily grown in recent years. Throughout the EU, fine-cut tobacco is taxed significantly less than cigarettes, which could explain the growth in demand as consumers turn to cheaper products. (See figure 1).

### The cigarette market is highly differentiated

The cigarette market is highly differentiated and can be broken down into several categories. One categorization, for example, is based on price positioning in the market. Another categorization is based on product design and taste, for example king size cigarettes, slim cigarettes and menthol cigarettes. Pack size (e.g. packs of 20 cigarettes or so-called big packs containing 25 to 30 cigarettes) and pack type (e.g. soft pack or flip top box pack) can also serve as categories. Such categorization is important when analyzing the market, market-specific consumer preferences and the potential impact of regulation.

Slim and menthol cigarettes, for example, together account for about 10% of total EU cigarette sales roughly equivalent to the entire French market. However, their shares differ greatly from country to country, and are very small in some Member States, substantial in others. The largest market share for slim cigarettes in the EU is found in Bulgaria, where they account for over 30% of cigarette sales. Menthol cigarettes are most preferred in Finland and Poland, where they constituted about 25% and 18%, respectively, of all cigarette sales in 2011.<sup>12)</sup>

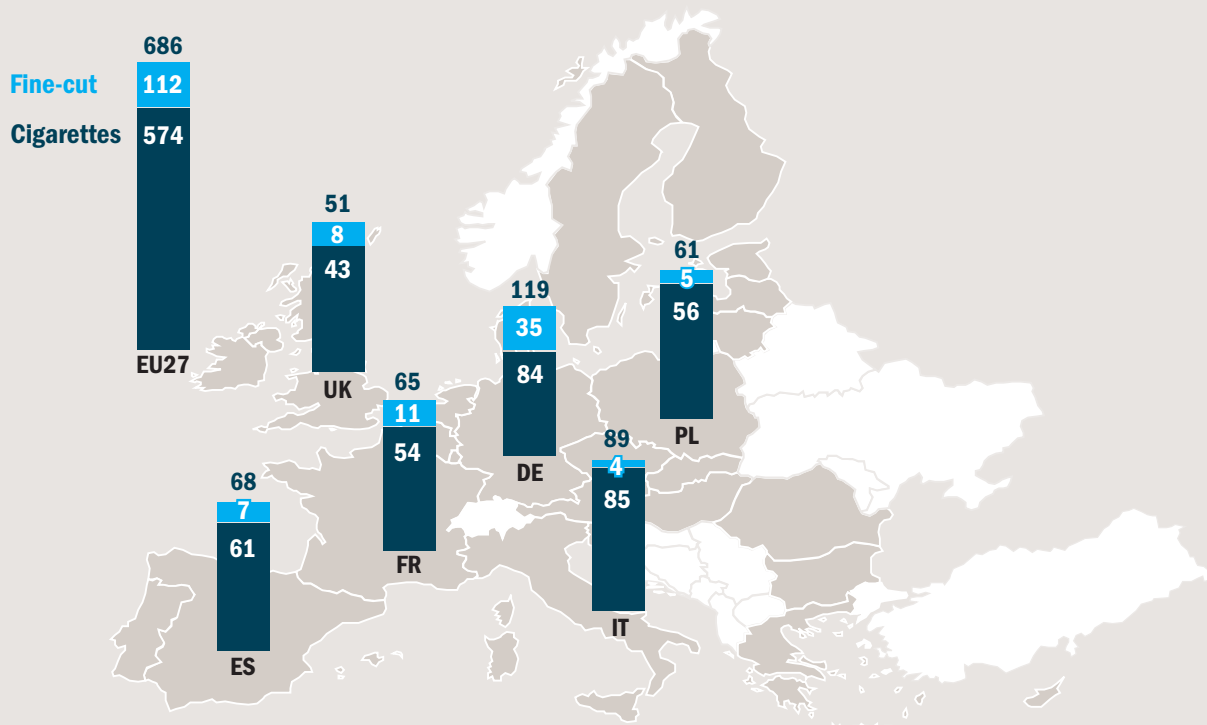
## 1.2 The tobacco sector provides more than 600,000 jobs

The cultivation of tobacco, as well as the production, distribution and sale of tobacco products compose a value chain that spans all EU Member States and many countries beyond the EU's borders. This value chain relies on a labor

market that ranges from rural farmers to factory workers, wholesalers to retailers. Throughout this study, we refer to the tobacco sector as the sum of the following steps of the value chain: agriculture and first processing, manufacturing, suppliers (to manufacturing), wholesale/distribution and retail (see figure 2).

The various steps in the tobacco value chain are diversely represented across EU Member States. In some countries (e.g. Italy and Poland), tobacco is harvested and processed, and tobacco products are manufactured to source to domestic and other European markets or for export outside Europe. In other countries (e.g. Sweden, Estonia and Latvia), the value chain only consists of wholesale/distribution and retail. Therefore, the economic footprint of this sector varies from country to country.

FIGURE 1: LARGEST CIGARETTE MARKETS IN THE EU IN TERMS OF CIGARETTE AND FINE-CUT SALES, 2011  
[BN STICKS]



Source: PMI market sales data

FIGURE 2: TOBACCO VALUE CHAIN



**Agriculture and first processing:** In 2011 approximately 214,000 tons of tobacco were produced in the EU,<sup>13)</sup> accounting for about 4% of worldwide tobacco production.<sup>14)</sup> Cultivation and harvesting occur in eleven EU countries, five of which make up about 87% of all EU cultivation and harvesting:<sup>15)</sup> Italy (about 72,000 tons), Poland, Spain, Bulgaria (each about 30,000 tons) and Greece (about 24,000 tons). After curing, tobacco leaves are supplied to first processing plants where they are prepared for manufacturing. In general, first processors are located in those countries where raw tobacco is grown and harvested. Based on value added calculations, approximately 35,000 jobs can be attributed to this step of the value chain – not including seasonal workers. According to the EU Advisory Committee for Tobacco, 70,000 farmers cultivate and harvest tobacco in the EU.

**Manufacturing:** Tobacco manufacturing in Europe is concentrated, with four major producers of tobacco products. British American Tobacco (BAT), Imperial Tobacco (IT), Japan Tobacco International (JT) and Philip Morris International (PMI) accounted for more than 90% of European cigarette production in 2011. In addition, there are many small, local tobacco companies.<sup>16)</sup> Major production facilities are located in Germany, Poland and the Netherlands, which contribute to about 60% of total cigarette production.<sup>17)</sup> The total number of cigarettes produced in 2011 amounted to 762 bn,<sup>18)</sup> more than 75% of which was destined for sale in countries within the EU. In 2011, approximately 186 bn cigarettes were exported to countries outside the EU.<sup>19)</sup> The most important destination markets were Japan (48 bn cigarettes), countries in the Middle East (44 bn cigarettes) and Turkey (19 bn cigarettes).<sup>20)</sup>

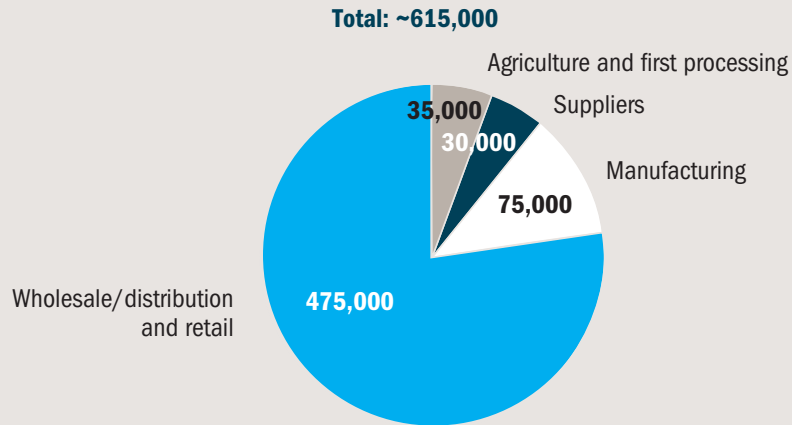
We estimate the number of jobs at the manufacturing stage of the value chain to total approximately 75,000. This estimate includes EU-based employment directly tied to the manufacturing facilities of tobacco companies as well as jobs generated by suppliers of machinery and equipment for the manufacturing of tobacco products. The European Commission estimates that about 50,000 jobs are directly related to tobacco products manufacturing, without including machinery and equipment suppliers.<sup>21) 22)</sup>

**Suppliers:** The main suppliers for the manufacturers of tobacco products include the wood and paper industry, which provides packaging material, fine papers and filter materials. Furthermore, adhesives, solvents and other processing aids for industrial cigarette manufacturing are sourced from the chemicals industry. The flavor industry supplies additives such as menthol. Based on the value added created at this step of the value chain, suppliers make up approximately 30,000 jobs attributed to the tobacco sector.<sup>23)</sup>

**Wholesale/distribution and retail:** Manufacturers in the tobacco sector generally do not sell their products directly to retailers. Rather, they utilize wholesale distribution networks that function as the link between manufacturers and retailers. These wholesalers store the products in warehouses and deliver smaller batches to retailers. In a number of Member States, tobacco manufacturers have set up their own entities to distribute their products, while in other countries, specific wholesale companies support manufacturers in delivering the tobacco products to retailers. We estimate around 475,000 jobs are directly related to this step of the value chain. Around 70% of these jobs can be allocated to the retail sector. We apply



FIGURE 3: TOTAL NUMBER OF JOBS ACROSS THE EU TOBACCO VALUE CHAIN



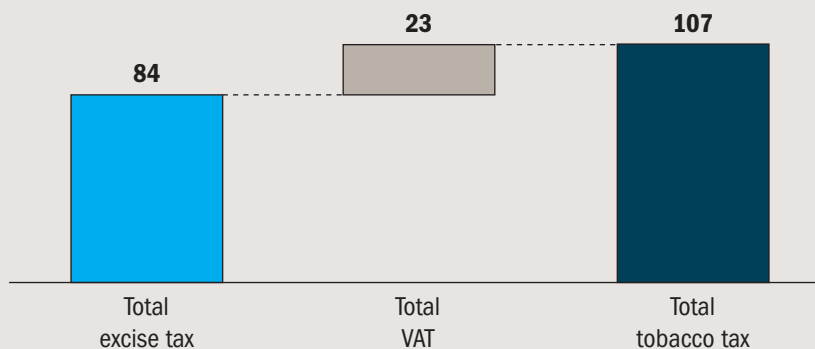
Source: Roland Berger analysis

the same approach for the retail sector as for all other steps of the value chain for transforming value added into the number of jobs. However, as part-time jobs in retail (mainly at SMEs) are more common than in other sectors, our estimate of the number of jobs is very conservative.<sup>24)</sup> A more detailed discussion on retail jobs can be found in chapter 6. Figure 3 illustrates the aggregate number of jobs, representing the sum of the jobs for each step of the value chain in each country based on a bottom-up calculation.

**1.3 At more than EUR 100 bn a year, taxes from cigarettes and fine-cut are a significant source of revenue for Member States**

Tobacco taxation is a significant source of revenue. All EU Member States are required to apply a mixed excise tax system consisting of an ad valorem and a specific tax component for the sales of tobacco products.

FIGURE 4: TAX REVENUE GENERATED FROM CIGARETTES AND FINE-CUT IN THE 27 EU MEMBER STATES, 2012 [EUR BN]



Source: Roland Berger analysis, based on PMI industry data and EU Excise Duty Tables 2012<sup>25)</sup>

In addition, 24 Member States have implemented a minimum excise tax. The sum of these taxes is called excise tax. Together with VAT, this equals the total tobacco tax.<sup>26)</sup>

EU tax rates for tobacco products are among the highest in the world.<sup>27)</sup> The total tax on cigarettes constitutes about 80% of the retail selling price on average; for fine-cut, this is slightly lower (about 65% on average).<sup>28)</sup> EU-wide annual total tax revenues from both cigarette as well as fine-cut taxation amount to more than EUR 100 bn. Besides mineral oil taxation (including environmental taxation and energy taxes), taxes on tobacco products generate the highest revenues of any specific consumption tax in the EU.<sup>29)</sup>

#### 1.4 A sizeable and steadily growing illicit market equates to 10% of legal cigarette sales in the EU

EU Member States' revenues are threatened by the growth of the illicit cigarette market. This issue has become more severe in recent years. The high levels of tobacco taxation in most Member States, both in absolute terms as well as in relation to local purchasing power, the large differences in excise tax levels among EU Member States and with neighboring countries outside the EU as well as different levels of law enforcement and corruption,<sup>30)</sup> have culminated into fertile ground for counterfeiting, bootlegging and smuggling.<sup>31)</sup> Large-scale and organized smuggling of tobacco products is a major problem for most Member States.

The illicit cigarette market consists of three different illegal forms.<sup>32)</sup> Each form circumvents payment of excise taxes applicable in the market where the product is consumed, as well as compliance with regulatory requirements:

1. *Contraband cigarettes* are genuine cigarettes that are bought in a low-tax country and then illegally sold in a higher-priced market to make a profit
2. *Counterfeit cigarettes* are cigarettes that are manufactured illegally under an official brand name and sold by a party other than the original trademark owner
3. *Illicit white cigarettes* are specific illegal brands that are produced primarily for the purpose of smuggling. Examples include the brands Jin Ling, American Legend and Fest

Prices for illicit cigarettes are significantly lower than those for legal cigarettes, making them attractive to consumers.<sup>33)</sup> The Project Star study conducted annually by KPMG states that about 65 bn illicit cigarettes were consumed in the EU in 2011. This is equivalent to about 10% of overall annual legal cigarette and fine-cut sales in EU Member States, and to the total number of legal cigarettes and fine-cut sold in France in 2011. The majority of illicit products sold in EU Member States originate from outside the EU.<sup>34)</sup>

It is expected that the illicit market will grow by 1% per year over the next five years.<sup>35)</sup> The illicit markets in Germany, France, Poland, Spain and the United Kingdom total more than 60% of the illicit market in the EU.<sup>36)</sup> According to the Commission's Anti-Fraud Office (OLAF) the loss in tax revenue due to illicit trade amounts roughly to EUR 10 bn every year.<sup>37)</sup>

## 2. Future EU tobacco regulation under the new TPD

**On December 19, 2012, the European Commission adopted its proposal for a new, significantly revised Tobacco Products Directive<sup>38)</sup>**

The current Tobacco Products Directive (Directive 2001/37EC) has been in place since 2001. In 2007, the Commission announced its intention to assess the need for a revision. With its proposal for a new TPD, the Commission states that it wants to reflect "market, scientific and international developments" within the past decade in the area of tobacco regulation. According to the Commission, "while the overall objective of the revision is to improve the functioning of the internal market, it is expected that citizens in all Member States will benefit from improved public health."<sup>39)</sup>

The Commission's proposal focuses on five policy areas:<sup>40)</sup>

1. Packaging and labeling
2. Ingredients/additives
3. Extension of the product scope
4. Cross-border distance sales
5. Traceability and security features

For the purpose of this report, policy areas 1 and 2 are particularly relevant from an economic perspective.<sup>41)</sup>

### Packaging and labeling standardization is one of the new TPD's major changes

The Commission's proposal more than doubles the total size of the current health warnings by introducing 75%/75% combined health warnings (pictorial and textual) on the front and back, and 50% textual warnings on both side panels. By comparison, under the current labeling rules, health warning labels must occupy 30% of the front and 40%<sup>42)</sup> of the back of the package, leaving most of the remaining space available for brand differentiation. In the thus reduced space left for manufacturers, the new TPD will further restrict the scope for branding by, e.g. prohibiting product descriptions that refer to flavor and taste and banning "misleading colors". In addition, the new packaging requirements also mandate the shape, format, layout, fabric and design of the pack, and, de facto, its dimensions (through the introduction of specific minimum sizes for health warnings).

All in all, the proposed packaging and labeling requirements represent a substantial degree of pack standardization. Figure 5 illustrates the planned future package design.

FIGURE 5: ILLUSTRATION OF THE PROPOSED CHANGE IN PACKAGE DESIGN



Source: European Commission<sup>43)</sup>

### The new TPD bans slim cigarettes and menthol cigarettes

As part of the packaging and labeling provisions, the new TPD also introduces a ban on the entire category of slim cigarettes, i.e. cigarettes with a diameter of less than 7.5 mm. In 2011, slim cigarettes represented around 5% of all legal cigarettes sold in the EU.<sup>44)</sup>

In the area of ingredients and additives, the Commission's proposal introduces a range of new measures. Most notably, the new TPD bans (1) the sale of tobacco products with a characterizing flavor, such as fruit, candy, vanilla and menthol, (2) the use of flavors in the components of tobacco products such as filters, papers, packages or capsules, and (3) the use of additives which are found to increase the toxicity or addictiveness of tobacco products.

While all of these represent significant new restrictions, for purposes of our economic impact assessment we focus on the ban on menthol cigarettes because it is expected to have the strongest impact. Menthol cigarettes represented about 4.5% of all legal cigarettes sold in the EU in 2011.<sup>45)</sup>

TABLE 1: MAJOR LEGISLATIVE FRAMEWORKS THAT SHAPE TOBACCO CONTROL POLICY IN THE EU TODAY

<b>Tobacco Products Directive</b> (2001/37/EC) – June 5, 2001	Health warnings, ban on misleading descriptions, ingredients reporting and maximum TNCO limits. Currently under revision
<b>Tobacco Advertising Directive</b> (2003/33/EC) – May 26, 2003	Ban on cross-border tobacco advertising and sponsorship in all media except television
<b>Audiovisual Media Services Directive</b> (2007/65/EC) – December 11, 2007	Ban on tobacco advertising and sponsorship in all audiovisual communications, including product placement
<b>Council Directive</b> (2008/118/EC) – December 16, 2008 <b>Council Directive</b> (2011/64/EU) – June 21, 2011	Regulation of the structure and rates of excise duty applied to manufactured tobacco and the general arrangements of excise duty

### 3. Our approach to analyzing the impact of the new TPD

#### 3.1 The economic rationale behind our modeling approach

While the new TPD encompasses measures across several policy areas (see chapters 2 and 6), this report focuses on three areas of the new TPD, namely (1) the new packaging and labeling requirements leading to high levels of standardization, (2) the ban on slim cigarettes, and (3) the ban on menthol cigarettes.

#### **Pack standardization is likely to influence consumer behavior**

With regard to packaging and labeling, we analyze the likely impact of the substantial degree of standardization imposed by the new TPD. As explained above, it is driven by the combination of more than doubling the size of the health warnings, further restricting the scope for branding, e.g., by prohibiting certain product descriptions and "misleading colors", and introducing new requirements defining the shape, dimensions, format, layout, fabric and design of the pack.

The pack standardization under the new TPD would therefore significantly reduce and restrict packaging space and elements available for brand differentiation and product description. It is thus likely to affect consumer perception of the attributes and qualities of cigarettes and fine-cut.<sup>46)</sup> Indeed, given the Commission's stated objective to diminish the attractiveness of tobacco products, this is an intended consequence of the new packaging and labeling measures.

To analyze the economic impact of such a fundamental regulatory change, it is crucial to consider that packages and thus brands will not only be perceived as less valuable but also that they will become less distinguishable for consumers. Therefore, consumer brand selection is likely to be affected across price segments by the new TPD.<sup>47)</sup>

From an industrial economics and product marketing perspective, the new TPD has the potential to transform the cigarette and fine-cut market from a highly differentiated product market into a market for rather homogeneous products.<sup>48)</sup> With considerable brand power and strong consumer attachment to their favorite brands – essentially the current situation – tobacco companies are able to charge a price premium for brands with a high brand value.<sup>49)</sup> Under the new TPD, however, this is likely to change fundamentally, drawing consumers' attention to cheaper or even illicit tobacco products.

For example, there is empirical evidence that the willingness of consumers to pay a higher price for a specific brand perceived as more attractive than other brands is likely to fall as cigarette packaging becomes plainer.<sup>50)</sup>

**Downtrading:**<sup>51)</sup> With a lower willingness to pay for premium brands, consumers will tend to move to cheaper cigarettes. This will put particular pressure on the premium segment. Also, due to the more homogeneous tobacco product market under the new TPD, fine-cut is likely to become a closer substitute for cigarettes than it is today.<sup>52)</sup>

**Illicit market growth:** Moreover, due to increasing perceived product homogeneity, the illicit market – currently equating to about 10% of the overall EU legal cigarette market<sup>53)</sup> – will also become a closer substitute for legal cigarettes and fine-cut. This will put particular pressure on the fine-cut segment, as it is the closest substitute for illicit cigarettes in terms of affordability.

Both downtrading and the growth of the illicit market will squeeze value added in the EU and therefore potentially lead to job and tax losses. The threat stemming from the illicit market is particularly harmful, since illicit cigarettes generate no tax revenue at all, and the value chain of, and employment in, the illicit market is primarily located outside of Europe. Additionally, employment in the illicit market is closely tied to criminal behavior – an undesirable situation.

### DOWNTRADING IN COMBINATION WITH ILLICIT MARKET GROWTH HAS BEEN SEEN IN SEVERAL COUNTRIES IN THE PAST – THE EXAMPLES OF SPAIN AND GREECE<sup>54)</sup>

The tobacco sectors of Spain and Greece have both experienced downtrading in recent years. Between 2004 and 2008, the sales of premium cigarettes dropped in Spain from 19.4 bn to 16.7 bn and in Greece from 16.4 bn to 15.1 bn sticks, an annual decrease of 4% and 2%, respectively. Afterwards, between 2008 and 2011, the Spanish and Greek premium segments fell from 16.7 bn to 9.1 bn and from 15.1 bn to 9.2 bn sticks, respectively. This translates into an average fall of 18% and 15% per year.

Two major reasons are expected to be driving these declines. First, prices sharply rose between 2008 and 2011. Second, the economic crisis in Europe has decreased consumer income. Looking at the price developments in the premium and the below-premium segments reveals that the economic crisis is likely to have played a major role.

FIGURE 6: PRICE AND SALES DEVELOPMENT SPAIN AND GREECE 2009-2011

Annual development 2009-2011	PRICES		SALES	
	Premium	Below-premium	Premium	Below-premium
Spain	+12%	+14%	-18%	-11%
Greece	+9%	+10%	-15%	-4%

Source: Roland Berger analysis based on PMI industry data

Although prices in the below-premium segment have increased more strongly than in the premium segment, the sales drop has been much more significant for the premium segment. It is likely that consumers sought out cheaper cigarettes as their available income decreased due to the economic crisis.

Interestingly, between the years 2008 and 2011 the illicit market in Spain and Greece grew significantly. In Spain, the illicit market has increased annually by around 30% (increase from 2.1 bn in 2008 to 4.6 bn sticks in 2011); Greece has even seen a 55% increase per year (increase from 0.7 bn to 2.7 bn sticks). As consumers turned to cheaper cigarettes, a significant portion of their demand was supplied by the illicit market.

The examples of Spain and Greece demonstrate that consumers are sensitive to relative price changes – whether caused by higher prices or by lower incomes. These examples also reveal that consumers searching for more affordable products may also make use of the illicit market, where cigarettes are generally much cheaper.

### How the ban on slim and menthol cigarettes will fuel the illicit market

Slim and menthol cigarettes have a significant market share in several European countries. If these cigarettes are banned, consumers are left with three options. They can reduce spending on cigarettes, move to other legally available types of cigarettes, or move to the illicit market to continue getting their preferred products.<sup>55)</sup> We analyze the potential impact of the product bans via a number of scenarios. These scenarios, which are broadly based on, and validated by, the few studies available on this issue,<sup>56)</sup> are described in chapter 3.3.

In general, our approach assumes the following. Substitution with illicit cigarettes in response to a slim and/or menthol ban is likely to be closely related to the current state of the illicit market in a respective country. The share of the current illicit market can also be interpreted as the general willingness of smokers to consume illicit cigarettes (even without a product ban). If a ban on slim and menthol cigarettes is introduced, the fraction of people moving to the illicit market should therefore be at least as high as the general willingness to buy illicit cigarettes, or in other words, the current market share of the illicit market. We thus use the current illicit market size in a country for a lower bound estimation of the substitution pattern with illicit cigarettes in response to a slim and/or menthol ban.

To substantiate a still realistic, higher estimate for substitution behavior, we analyze current brand loyalty data. This leads us to the conclusion that smokers strongly stick to their preferred cigarette type. The data reveal that when slim and menthol smokers switch brands, around

70% of them switch to the same cigarette type, i.e. slim smokers will select another slim cigarette brand and menthol smokers will select another menthol cigarette brand. Only a small share of them occasionally buys another type of cigarette.<sup>57)</sup> Presumably, the loyalty to the preferred cigarette type will decrease when slim and menthol cigarettes are banned because some consumers may not be willing to buy from the illicit market.

Thus, in order to derive a country-specific, higher value for substitution behavior under a ban on slim and menthol cigarettes, we scale down the 70% value according to the current share of the illicit market in comparison to the share of the illicit market in all other EU countries. A more detailed explanation can be found in appendix 2. Finally, as explained in chapter 5, we do not fully factor in the potential of additional dynamic effects that may occur in subsequent phases as more widespread illicit trade further increases the social acceptability of purchasing from illegal sources with the result that even more consumers may move to illicit trade.

### 3.2 Description of the quantitative model underlying our analysis

As described above, the cigarettes and fine-cut market is currently a complex, differentiated product market that offers a variety of choices to consumers, at considerably varying prices. In order to capture the relevant aspects of the tobacco market, a modeling approach has to be chosen that incorporates the nuanced, multifaceted decisions of consumers who can choose between different qualities, types and sources of products. In our analysis, we do this by considering four market segments:<sup>58)</sup>

FIGURE 7: OUR MARKET SEGMENTS<sup>59),60)</sup>

1.

**Premium  
cigarettes**

2.

**Below-premium  
cigarettes**

3.

**Fine-cut**

4.

**Illicit  
cigarettes**

We look at these market segments in each country individually, as prices and market sizes of these segments differ quite substantially across the EU Member States. Our analysis allows us to derive the status quo as well as the potential changes from the new TPD on a country-by-country basis. For the purpose of this study, these country-specific results are then aggregated to report the results for the EU as a whole.

The main goal of our modeling approach is to estimate the implications of the new TPD on overall cigarette consumption and expenditures on cigarettes, including the indirect effects of induced price changes on both overall tobacco consumption and the allocation of expenditures between the different tobacco market segments. This allows us to analyze employment and tax revenue effects (excise taxes and VAT on tobacco products) of the new TPD in detail.

We therefore specify a fairly standard quantitative economic model that incorporates key elements of the cigarette market. This section provides a brief, non-technical overview of the model. A more detailed description can be found in appendix 2. The model specifies (1) a demand side describing consumer expenditure choices in a differentiated product market, (2) company price-setting behavior, and price-setting in the illicit market, (3) interdependencies between consumer expenditure choices and company price-setting behavior (4) the value chains in cigarette segments of the tobacco sector. With the results from the quantitative model, employment and tax revenue effects can be calculated.

### **Consumer choices are defined by their preferences and by product prices and availability**

In our framework, consumers make optimal choices (subjectively), taking the prices of products as a given. Consumers make two fundamental decisions. On the one hand, they decide which fraction of their overall budget to allocate to tobacco products. On the other hand, they decide on which specific tobacco segments (premium, below-premium, fine-cut or illicit trade) to spend their money.

We assume that the demand for a product depends on its own price as well as on the price of all other products available. The higher the price of a product, the lower the demand for this product will be – and the demand for other, cheaper, products will grow. To give an example, the demand for premium cigarettes may increase if prices in the below-premium segment increase, as the price advantage of the below-premium segment diminishes. We also take into consideration that the relative attractiveness of products (i.e. the value perceived by consumers resulting from the price they pay) differs across the four cigarette segments analyzed in this study – due to brand power, for example, or due to a negative image of the illicit trade – and that the new TPD will potentially affect this attractiveness. For instance, in a country where a large share of smokers prefer legally sourced menthol cigarettes, the relative attractiveness of illegal cigarettes may increase if black market channels become the only place where menthol cigarettes are available.

### **Companies optimize their prices according to the economic environment**

Following basic economic logic, we assume that companies in each market segment set prices to maximize profits. Companies take into account that consumer demand depends on the price of their products and on other variables beyond their control, such as competitor pricing. As a result, companies will reconsider their price-setting behavior in response to changes in the economic environment.

### **The interaction of consumers and companies determines consumption and prices**

Consumers and companies interact on the tobacco market. Consumers respond to price changes through their demand. Companies take this response into account when setting their prices. The market outcome predicted by our model consists of prices in the four tobacco segments as well as market shares of the four segments and total cigarette sales. Based on these prices and quantities, employment and tax revenue per country can be calculated (see below).



### **Changes in demand are reflected in changes in value added at each step of the value chain**

Changes in the demand for cigarettes in the four segments will reverberate in the supply chain and thus impact employment. We consider four important production steps in the supply chain in detail, namely (1) agriculture and first processing, (2) manufacturing, (3) suppliers, and (4) wholesale/distribution and retail. Country-specific information on employment and gross value added per employee is taken from Eurostat to determine employment at each step of the value chain.

### **3.3 Assessing employment and tax revenue effects through scenario-based forecasting**

Our economic model is based on the assumption that the new TPD will come into effect as of 2015. The estimated economic impact of the new TPD on employment and tax revenue in each country are calculated as follows.

#### **Employment effects are calculated based on changes in value added and tax revenue**

To calculate the direct employment effects of the policy changes, we first calculate the value added per cigarette for every type of cigarette for each step of the value chain. We then translate changes in demand into changes in supply for each of these steps – taking exports into account, as well. This allows us to calculate the total change in value added for each step of the value chain. We then combine this with information on how much value added is generated per employee at every step to calculate employment effects.

Indirect employment effects are based on changes in tax revenues (see below). They stem from reductions in tax revenues, which decrease government spending. As a result, governments fund fewer public goods and services, and in turn, aggregate demand in the economy declines. Less demand in the economy leads to further reductions in employment. For our calculation we use country-specific numbers for value added per employee to translate lost taxes into the number of lost jobs.<sup>61)</sup>

### **Tax revenue is calculated based on sales volume and current tax rates**

The tobacco tax system in every Member State includes the following components:

1. A specific tax per cigarette
2. An ad valorem tax calculated on the price per cigarette
3. A minimum excise tax per cigarette
4. A value added tax (VAT)

Country-specific tax rates are taken from the European Commission's Excise Duty Tables 2012.<sup>62)</sup>

Estimated changes in tax revenue for a Member State brought about by the new TPD are calculated based on the predicted changes of the market segment composition as derived from the demand side and from the pricing behavior of tobacco companies.

#### **Three main scenarios reflect the potential range of the new TPD's impact**

The key output of our model is its predictions of potential changes in employment and tax revenue as a result of the new TPD. Since no empirical evidence on consumer reaction to the slim and menthol cigarette ban as well as to tobacco product standardization was available at the time of this analysis, we captured these uncertainties by building three different scenarios.<sup>63)</sup> These scenarios span potential outcomes of the new TPD with regard to employment and tax revenue.

In defining the scenarios for our model, we have considered the following key dimensions:

1. Higher price sensitivity and shifts in demand towards lower-priced products due to product standardization
2. Substitution with illicit cigarettes due to the ban on slim and menthol cigarettes
3. Potential direct policy effects on consumption (i.e. decrease in consumption) resulting from the new TPD<sup>64)</sup>

Adaptation of consumer behavior due to product standardization mainly describes potential changes in price elasticity that will result from the new TPD. Since no comparable policy in the tobacco sector has been evaluated so far,<sup>65)</sup> we use different ranges for the expected changes in our scenarios.

Similarly, we use ranges to model substitution via the illicit market. Substitution behavior gauges how consumers will substitute slim or menthol cigarettes with other available products, e.g. legally available cigarettes,<sup>66)</sup> or with cigarettes from the illicit market.

Direct effects refer to the new TPD's-potential impact on tobacco consumption. In one of our scenarios we have assumed consumption effects similar to those indicated (but not substantiated with empirical evidence) in the Commission's impact assessment. The extent to which these factors change in light of the new TPD vary across our three scenarios.

Since no empirical evidence exists that the new TPD will decrease tobacco consumption, two of our three scenarios (Conservative Scenario A and the Elevated Scenario) do not simulate any direct effects on consumption from the new TPD. Taking into account the indirect consumption effects from lower prices and illicit trade substitution, this means that overall consumption is expected to rise. These scenarios use conservative and moderate estimates, respectively, of the extent to which consumers will change their behavior and turn to cheaper products and the black market. Of course, the actual consumer behavior changes in response to the new TPD may turn out to be less pronounced, or much more pronounced, than these estimates.

In a third scenario, which is a variation of Conservative Scenario A, we assumed that overall consumption will not increase but stay flat. In this scenario (Conservative Scenario B), there is some direct effect on consumption from the measures under discussion. The scenario assumes that these direct effects offset the increase in consumption resulting from a fall in cigarette and fine-cut prices. Conservative Scenario B can be seen as the most cautious approach as it is built on low elasticity, low substitution, and some direct policy effects.

### 3.4 The data behind our quantitative model

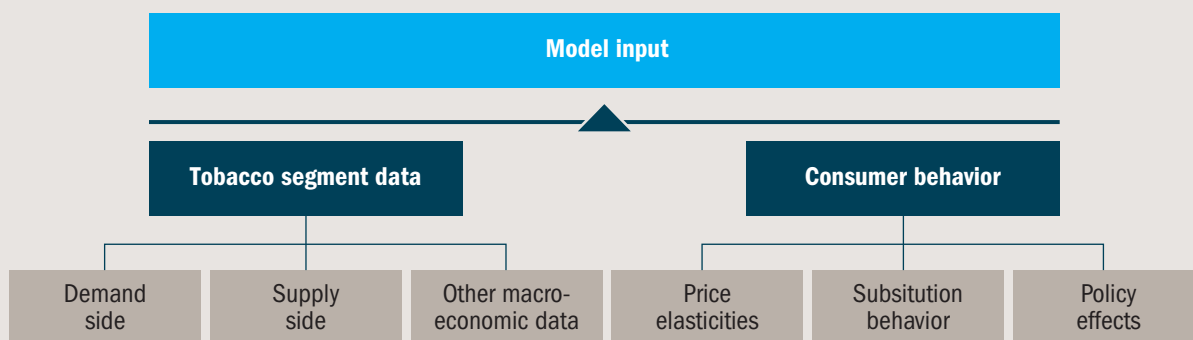
We used data and parameters from various sources as input for the quantitative model. As illustrated in Figure 8, they can be classified in two broad areas. On the one hand, there are actual market data that describe the tobacco sector.<sup>67)</sup> Data were collected for all 27 EU Member States, and can be grouped into three areas: demand side, supply side and other macroeconomic data.

On the other hand, there are data that describe the market behavior of consumers of tobacco products.

These data are estimated based on statistical models and are taken from research papers on consumer demand for tobacco products and from industry market data.

Figure 8 provides a general overview of the data that have been used. More information is provided in appendix 1.

FIGURE 8: MODEL INPUTS



Source: Roland Berger

## 4. How the new TPD will impact the economy

The following conclusions are not forecasts in a statistical sense, but the result of a calibration exercise based on standard economic modeling and the input data described in chapter 3. To ensure a realistic outcome, all conclusions are based on intermediate values of parameters found in relevant, academic research papers. Scenarios have been used where empirical evidence was not available. Confidential and proprietary industry data were only used when publicly accessible data were not available. Industry data were challenged and, where necessary, benchmarked and validated for every step of the value chain. The analysis is done country-by-country. Results were then aggregated to report EU-wide effects.

### 4.1 The new TPD will have a major impact on the EU tobacco sector

Today's tobacco sector has a significant economic footprint in terms of jobs and tax revenue. As outlined in chapter 1, it generates more than EUR 100 bn in annual tax revenues

and contributes more than 600,000 jobs to the economy. The latter is a conservative estimate. Others, including the European Commission, have calculated much higher figures, some of them exceeding one million jobs. The main facts on the current state of the EU tobacco sector are summarized in figure 9.

In this chapter, we present the results from our analysis of the effects of the new TPD on the entire EU economy. Where appropriate, we present the results also for individual countries. Our model focuses on changes of major economic indicators: market demand, prices, tax revenue and employment. As outlined in chapter 3, we project the effects of the new TPD by modeling three scenarios.

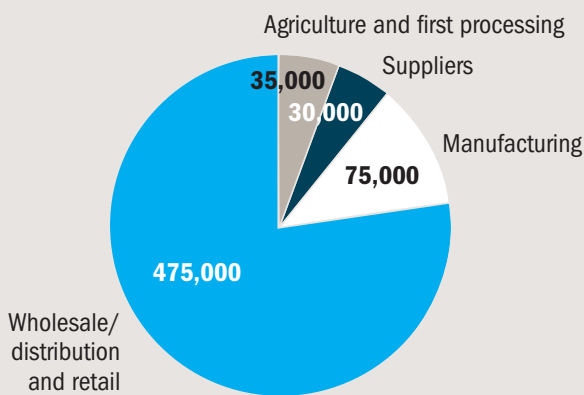
The mechanics of the changes brought on by the new TPD are summarized in figure 10.

#### Standardization will put pressure on prices

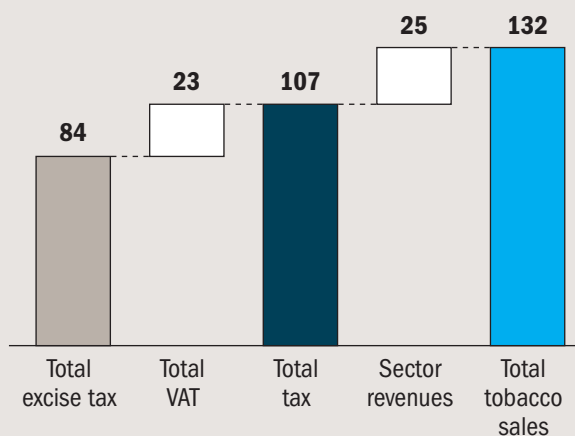
Our model suggests that average prices will decline in all segments. The reasons for the drop in prices can be directly related to the proposed measures of the new TPD. Since the new TPD shifts the tobacco market from

FIGURE 9: EU27 TOBACCO SECTOR TODAY

**More than 600,000 jobs - most in wholesale/distribution and retail**

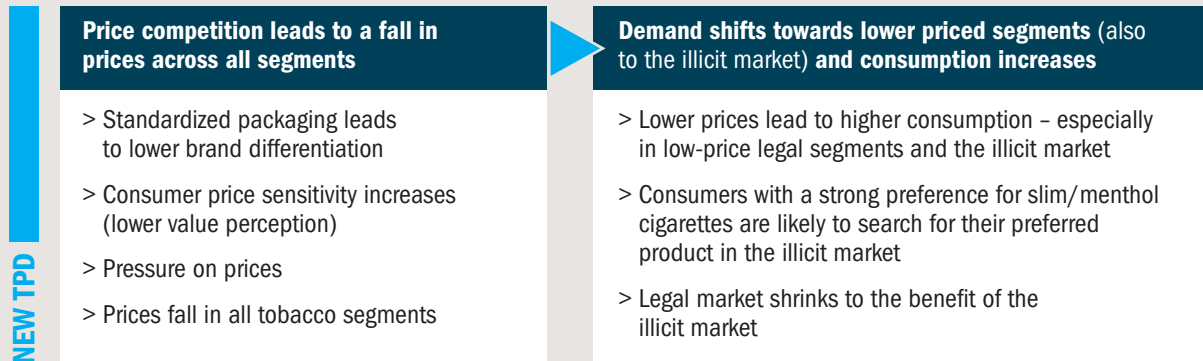


**Tax revenues of more than EUR 100 bn per year**



Source: Roland Berger analysis

FIGURE 10: SERIES OF EFFECTS DUE TO NEW TPD



Source: Roland Berger analysis

a highly differentiated product market towards a market for rather homogeneous products (see chapter 3), price competition will increase, leading to falling margins and increased consumer switching across segments. A new pricing strategy is likely to evolve particularly in the illicit market. The more homogenous cigarettes become, the easier it is to trigger segment switching with price changes. Therefore, it will become substantially easier for cheap brands to gain market share through price cuts.

As a result, illicit traders will sacrifice margins in order to maximize profits by increasing market share. Since illicit traders do not pay taxes, they have by far the greatest scope for cutting margins. This aggressive pricing strategy becomes most visible in our Elevated Scenario. Prices will also fall in all other market segments as the legal industry tries to defend its current market shares.

The strongest price pressure in the legal cigarette and fine-cut market will be on fine-cut, being the closest substitute for illicit cigarettes in terms of affordability. Therefore, the price drop in this segment will be more pronounced than in the premium and below-premium segments.

Note that these effects would be even stronger in the case of plain packaging, a measure not discussed here, in particular for the premium segment.<sup>68)</sup> Figure 11 provides an overview of the expected falls in prices across market segments (see figure 11 next page).

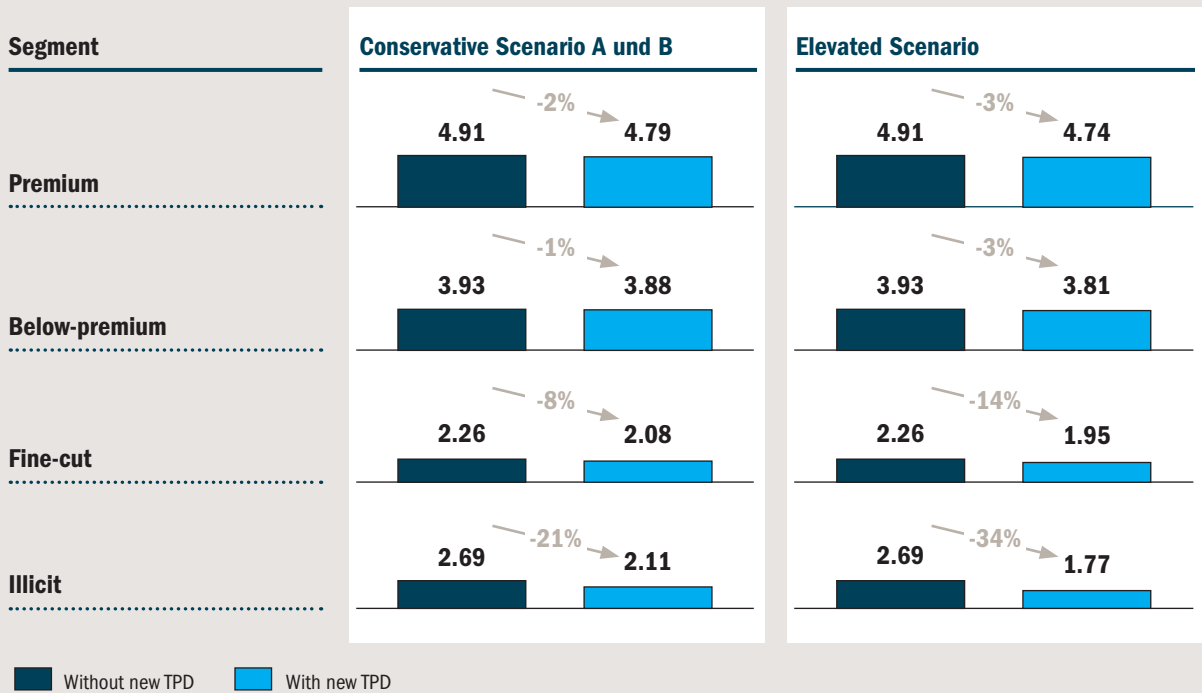
#### **With the shift towards lower-priced segments, the illicit market will grow**

Our model takes into consideration that standardization will increase consumer price sensitivity and reduce willingness to pay. As a result, consumers will shift demand to lower-priced legal segments as well as to the illicit market.<sup>69)</sup>

The illicit market is expected to grow by 25-55%, an increase from 68 bn cigarettes to 84-106 bn cigarettes.<sup>70)</sup> This is a result of consumer shifts towards lower-priced tobacco products as well as of consumer substitution with illicit cigarettes caused by the ban on slim and menthol cigarettes, products which the illicit market will make available. In countries with high shares of slim and menthol cigarettes, the increase of illicit trade will be particularly strong. For instance, our analysis projects that illicit trade in Poland will grow by about 50-130% and in Bulgaria by about 45-100%.

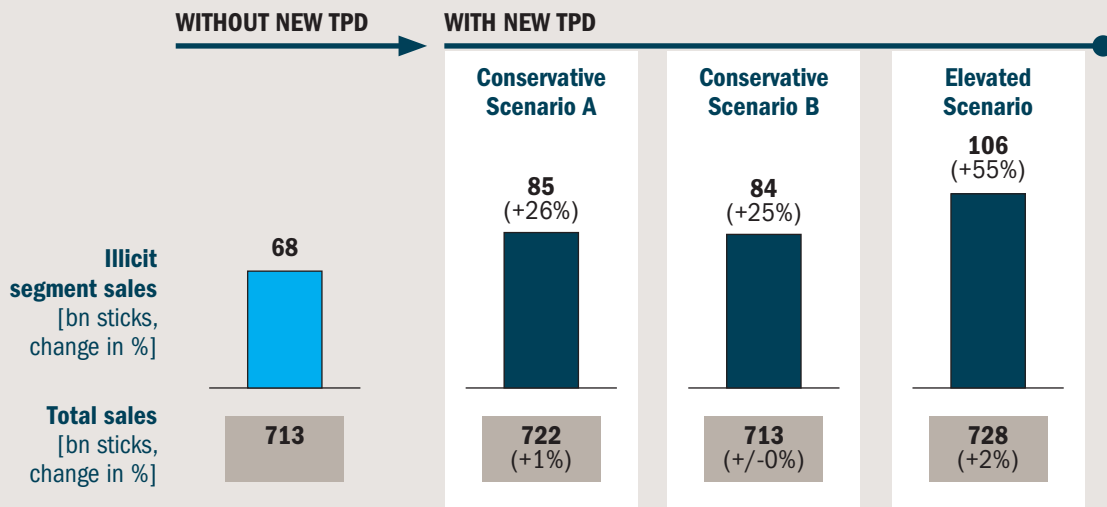
As a side effect of the decrease in prices, consumption will actually increase by up to 2% in our Elevated Scenario – an unintended consequence of standardizing the appearance of cigarette packs. Figure 12 illustrates three projections – in line with the three scenarios – of how total sales and the share of the illicit market would evolve as a result of the new TPD.

FIGURE 11: PRICE DECREASE BY SEGMENT AND SCENARIO; AVERAGE PRICE FOR 20 CIGARETTES/CIGARETTE STICK EQUIVALENTS IN THE EU27 MEMBER STATES [EUR]



Source: Roland Berger analysis

FIGURE 12: ILLICIT MARKET AND TOTAL SALES (INCL. ILLICIT) WITH AND WITHOUT THE NEW TPD, 2015



Source: Roland Berger analysis

### 4.2 Significant losses in jobs and tax revenues are expected

Depending on the scenario, the total number of jobs lost ranges from 70,000 (Conservative Scenario A) to 175,000 (Elevated Scenario). The drop in tax revenue ranges from

a conservative estimate of EUR 2.2 bn to an elevated estimate of EUR 5.0 bn for the whole EU (see figure 13).

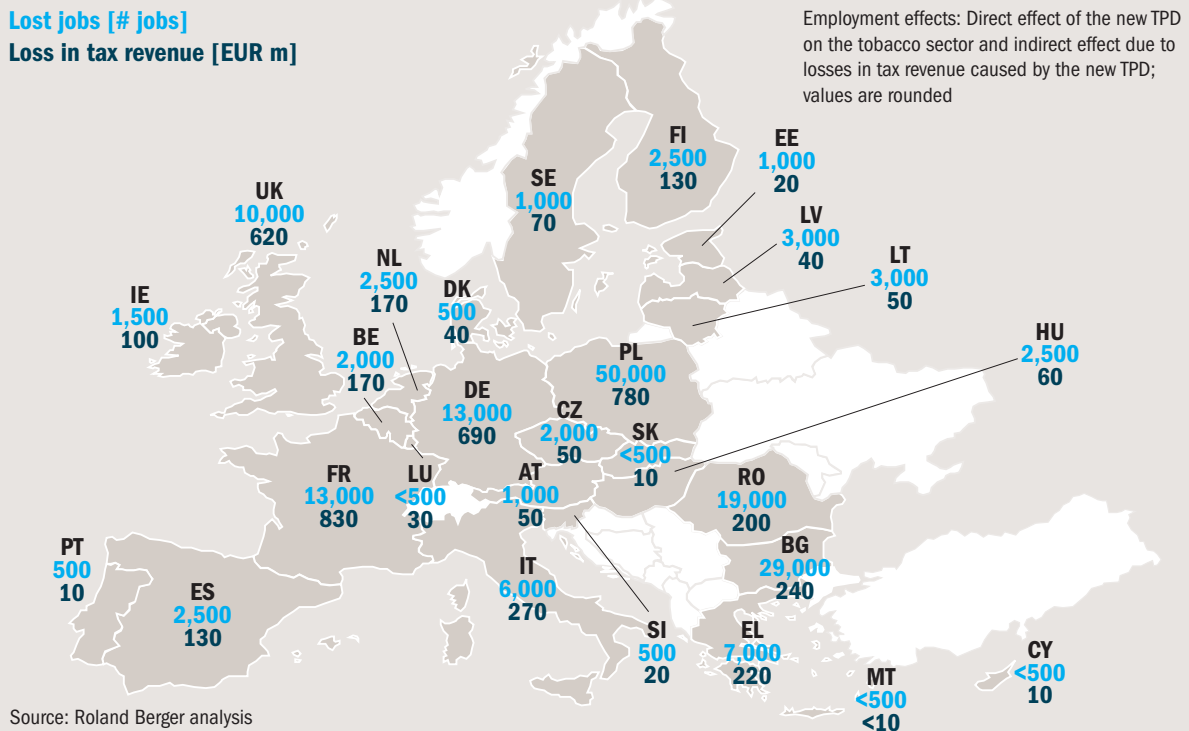
Figure 14 illustrates job losses and losses in tax revenue estimated in our Elevated Scenario for each country in the EU.

FIGURE 13: MODEL RESULTS FOR THREE DIFFERENT SCENARIOS

EU tobacco sector today	More than ... ... 600,000 jobs ... EUR 100 bn tax revenue		
POTENTIAL IMPACT	Conservative Scenario A	Conservative Scenario B	Elevated Scenario
Lost jobs [# jobs]	● ~70,000	● ~105,000	● ~175,000
Loss in tax revenue [EUR bn]	● ~2.2	● ~3.4	● ~5.0

Source: Roland Berger analysis

FIGURE 14: IMPACT FOR EACH EU COUNTRY – ELEVATED SCENARIO



Source: Roland Berger analysis

### Significant job losses are expected throughout the EU – some countries will be particularly hard-hit

Employment is likely to suffer significant losses in all EU countries due to the new TPD. Our approach predicts country-specific employment losses on the basis of value added, where "jobs" refers to part-time and full-time employment, but does not include seasonal workers (see chapters 1 and 3 for a more detailed description).

Our model makes a distinction between direct and indirect employment effects. Direct employment effects denote the immediate impact on jobs resulting from changes in legal sales in the tobacco sector (as outlined in chapter 3.1). That is, as overall revenues decline, firms along the value chain will be forced to lay off workers. Indirect employment effects will result from reductions in tax revenues, as described in chapter 3.

Since these job losses will stem from the new TPD, but are actually channeled through taxation, they are deemed "indirect". Both direct and indirect employment effects are addressed by our economic modeling approach. However, note that our model leaves out a variety of other effects on employment resulting from the new TPD. Potential additional impact is discussed in chapter 6.

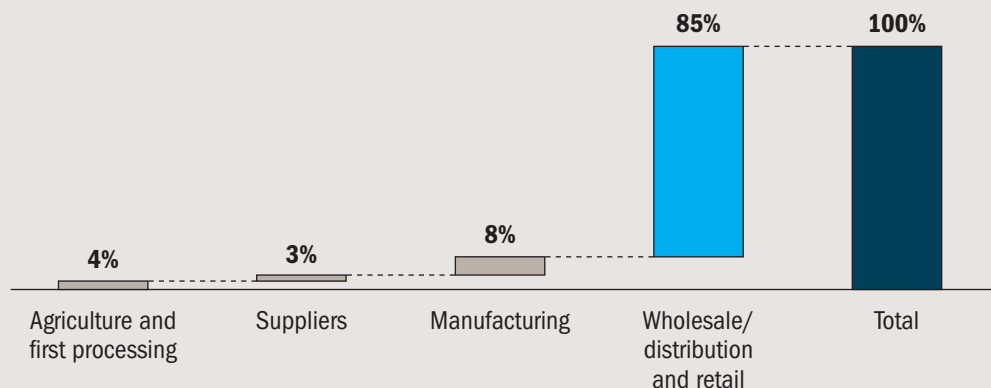
Our model suggests that total job losses – including direct and indirect job losses – in the EU will amount to between 70,000 and 175,000 jobs under the new TPD, depending on the scenario. The degree to which jobs are lost depends on market demand for legal tobacco products and the degree to which prices fall.

Figure 15 illustrates the magnitude of direct job losses of about 25,000 along the tobacco value chain in the Elevated Scenario. The wholesale/distribution and retail part of the value chain is expected to be hit hardest, bearing a share of around 85% of total direct job losses.

Total job losses are derived from our country-specific analyses. With respect to individual countries, total job losses correspond, by and large, to the overall size of the tobacco sector and the current market share of slim and menthol cigarettes. All countries will be affected but the impact is expected to be particularly negative in countries like Poland (19,500-50,000 jobs lost), Bulgaria (12,500-29,000 jobs lost), Romania (7,500-19,000 jobs lost) and Hungary (1,000-2,500 jobs lost).

FIGURE 15: LOST JOBS (DIRECT EFFECT) BY STEP IN THE VALUE CHAIN – ELEVATED SCENARIO

**Total lost jobs (direct effect of the new TPD): ~25,000**



Source: Roland Berger analysis



**Significant drops in tax revenue are expected, particularly pronounced in some countries**

The new TPD will significantly affect tax revenues in the EU. Our model predicts losses between EUR 2.2 bn and EUR 5.0 bn in tobacco excise taxes and VAT on tobacco products, depending on the scenario.

Conservative Scenario A and Conservative Scenario B predict losses in tax revenue of EUR 2.2 bn and 3.4 bn, respectively. These losses are mainly driven by the changes in consumption patterns outlined above, and, in particular, by increased consumption via the illicit market which implies lost tax revenue.

The two conservative scenarios differ in the expected effect on tax losses because in Conservative Scenario B there is no change in overall sales. Whereas in Conservative Scenario A no direct effects of the new TPD on consumption are taken into account, in Conservative Scenario B it is assumed that direct effects of the new TPD offset the potential 1% increase in sales.

In the Elevated Scenario, the loss in tax revenues is more severe, amounting to EUR 5.0 bn. One reason for this is the projected increase in the share of the illicit market by 55%, which exceeds the growth rates predicted by the first two scenarios (at 26% and 25%, respectively). Approximately EUR 3.6 bn result from an increase in illicit trade. This scenario also factors in stronger changes in consumer behavior (shift to lower priced segments and substitution with illicit products), which nevertheless remain moderate.

In terms of segment specific developments, the Elevated Scenario predicts a strong decrease of EUR 2.6 bn in tax revenues stemming from consumers abandoning the premium segment. Consequently, losses associated with changes in the remaining product segments are less pronounced: EUR 1.6 bn in the below-premium segment and EUR 0.8 bn in the fine-cut segment.

Tax revenues in all countries will be affected by the new TPD. However, the strongest effects will, for instance, occur in countries with large tobacco sectors (in terms of sales volume). Examples include Poland and Germany. Poland will lose up to EUR 780 m in tax revenues; Germany will incur a tax loss of up to EUR 690 m.

In Greece, where per-capita consumption is one of the highest in the EU (exceeding 2,500 cigarettes annually)<sup>71</sup>, annual tax revenue could decline by up to EUR 220 m. In light of the tough austerity programs and deficit limits in Greece – programs that will most likely continue after the new TPD is enacted – this tax loss translates into a disproportionate contraction of the Greek economy, much higher than would be expected in "normal" times, i.e. without the current crisis.<sup>72</sup>

## COUNTRY EXAMPLE: BULGARIA

Bulgaria is one of the biggest European producers of tobacco. In 2010, only Italy and Spain produced more tobacco in terms of crop value. Bulgaria also has a strong first processing industry. In 2009 about one fifth of all EU processing factories were located there.<sup>73)</sup> According to our calculations about 17,000 jobs can be attributed to agriculture and first processing in Bulgaria which is by far the highest number across the EU. Cigarette manufacturing has a long tradition in Bulgaria, providing more than 1,500 jobs in 2011.<sup>74)</sup> In terms of cigarette sales, with about 11 bn legally sold cigarettes in 2011, Bulgaria represents a fairly small market in the EU (less than 2% of the total EU legal cigarette sales).

Slims cigarettes are traditionally popular in Bulgaria: in 2011, every third legally sold cigarette was a slim cigarette.<sup>75)</sup> Given the high share of illicit cigarettes in total domestic consumption (currently about 20%),<sup>76)</sup> we estimate that between 20% to 50% of today's slim cigarette smokers would move to the illicit market when their preferred product is banned. Factoring in how the pack standardization measures will prompt downtrading to cheaper segments, especially to illicit trade, our model estimates that in total the new TPD will increase the illicit trade in Bulgaria by between 45% to 100%.

It is possible that the actual shift to the illicit trade could exceed this upper bound estimate. On the one hand, slim cigarettes are already available on the black market in proportions mirroring legal market demand.<sup>77)</sup> On the other hand, the main inflow of illicit products in Bulgaria originates from the Ukraine and Serbia, both countries where slims are also quite common (with market shares higher than 15%) and cheaper than in Bulgaria.<sup>78)</sup> Moreover, as the social acceptance and market penetration of illicit trade in Bulgaria further increases, this can have an additional accelerating effect such that even more consumers may purchase tobacco products from black market sources.

The new TPD would have a major economic impact on Bulgaria: Between 12,500 (Conservative Scenario A) and 29,000 (Elevated Scenario) jobs are at stake – almost 20% of the job losses expected for the entire EU in our Elevated Scenario. The main reason for this disproportionate job loss is that expenditures on tobacco products represent a high fraction of income. Whereas cigarettes prices are about two thirds of the EU27 average, income in Bulgaria is only about one-fifth of the average EU27 income. In terms of tax revenue, a loss of EUR 110-240 m can be expected. This equates to up to 2% of total tax revenues in Bulgaria in 2011, the highest relative impact in the EU.<sup>79)</sup>

FIGURE 16: MODEL RESULTS FOR THREE DIFFERENT SCENARIOS IN BULGARIA

POTENTIAL IMPACT	Conservative Scenario A	Conservative Scenario B	Elevated Scenario
<b>Lost jobs</b> [# jobs]	~12,500	~14,000	~29,000
<b>Loss in tax revenue</b> [EUR m]	~110	~120	~240

Source: Roland Berger analysis

## 5. Limitations of the quantitative analysis

In this chapter, we describe various limitations within our model-based quantitative analysis, and briefly discuss how addressing these limitations could change our results.

### **Gradual employment changes resulting from the new TPD are not considered**

Labor market dynamics – the gradual adjustments of employment over time resulting from demand shifts triggered by the new TPD – could be modeled more explicitly.<sup>80)</sup> Our static input/output analysis does not permit dynamic adjustments.<sup>81)</sup> Despite this, our main conclusions are unlikely to change. The ban on slim and menthol cigarettes will presumably lead to immediate changes in consumer behavior and thus to job losses and unemployment. Potential effects from consumer spending directed towards other expenditure categories may occur given that lower prices leave consumers with more money, despite increased consumption.

However, such effects are likely to take place more gradually. The same is true for job "creation" outside the legal tobacco sector resulting from the increased illicit trade. Therefore, the longer-term development of unemployment is difficult to predict.<sup>82)</sup> Yet, even in the long run, demand shifts to the illicit cigarette market – in any event, an undesirable outcome – are unlikely to generate substantial employment in EU Member States. The reason for this is that value added in the legal tobacco sector is mainly created within the EU. In contrast to this, value added and employment in the illicit market is created mostly outside the EU.<sup>83)</sup>

### **Employment in the tobacco retail sector is estimated very conservatively**

Our estimate of employment in the retail sector can be seen as a very conservative estimate. We apply the same approach to the retail sector as to all other steps of the value chain for transforming value added into the number of jobs.

However, in retail, the number of hours spent on tobacco sales per employee is typically only a fraction of total time worked. Therefore, for a given value added, many salespersons are involved in tobacco sales. Since we do not have exact numbers available on how many people work how many hours in different kinds of tobacco retail businesses across Europe (supermarkets, convenience stores, tobacco specialists, vending machines, etc.), we did not incorporate this into our model and instead worked from a conservative estimate. See the box at the end of this chapter for additional information.

### **More detailed data on consumer choices would be beneficial**

More detailed consumer choice data could be considered in the analysis. However, the input data available for our analysis is not suited for such analyses. We therefore restricted ourselves to the macroeconomic outcome related to the tobacco sector, namely the cigarettes and fine-cut sales, as well as employment and tax revenue. However, consumer data, including consumer-specific characteristics (such as age, gender, income, educational background) and consumer choices for a variety of tobacco products on a country level, would more accurately describe substitution behavior within the tobacco product portfolio. Interesting first steps in this direction have been made.<sup>84)</sup> Such progress – including the evaluation of natural experiments such as the recent introduction of plain packaging in Australia – would also permit simultaneous estimation of key model parameters instead of calibrating them based on different studies.

### **Cross-border trade with non-EU countries was not considered**

Consumers living in countries at the EU's external borders and those who travel frequently may take advantage of legal cross-border shopping to buy those products that the new TPD will ban. This increase in cross-border shopping is distinct from illicit trade and was not included in our model for data availability reasons.<sup>85)</sup> Moreover, for the same reason, cross-border internet sales of tobacco products were not included in our model, although the internet sale of tobacco products is expected to rise in

the coming years.<sup>86)</sup> In particular, it would be interesting to include the likely increase in illegal cross-border distance sales of tobacco products due to the slims and menthol ban in the new TPD. While the new TPD attempts to tackle some of these problems, it is difficult to assess what the combined effect of the product ban and the measures to restrict cross-border trade in the new TPD will be.<sup>87)</sup>

### **Second-round effects like income tax effects are not included in the study**

In terms of tax revenue, the key focus of our analysis is on the very substantial revenues that Member States generate from excise taxes and VAT on tobacco products. However, if employment and revenues in the legal tobacco sector shrink, income tax paid by individuals and companies is also affected. Furthermore, if disposable income of households employed in the tobacco sector falls, consumption expenditures of these households are also likely to fall. In addition, the interaction between legal and illegal market income would need to be taken into account. While these complex and uncertain second-round (feedback) effects are beyond the scope of this study, they are, on balance, likely to strengthen the conclusions drawn from our analysis.

### **Additional, compounding illicit market effects are not considered**

Illicit market growth tends to follow a dynamic pattern starting with low market penetration rates and then – after a threshold market share has been reached – accelerating market penetration.<sup>88)</sup> Indeed, a determining factor for the growth of illicit trade is its social acceptability and the availability of illicit tobacco products. The more common illicit products become, the more socially acceptable they are, which reduces the "psychological cost" of buying illegally. Also, a higher density of black market channels reduces consumers' search costs. These elements have an accelerating effect on the development of illicit trade.<sup>89)</sup>

In our country-by-country analysis of consumers' substitution behavior, we have factored in these elements by assuming that the propensity of consumers moving to illicit trade as a result of the new TPD will be stronger in countries where illicit trade levels are already high. We also take into account that the illicit trade is likely to develop dynamically in countries with currently very small illicit markets when the demand for illegally sourced products increases. We did not, however, attempt to model how in a subsequent phase much increased illicit trade levels – which simultaneously translate into higher social acceptability of, and easier access to, illegal tobacco products – may lead to even more consumers switching to black market channels. Therefore, our quantitative results may underestimate the longer term impact of the new TPD on illicit trade.

However, given that no actual market data exist regarding how consumer behavior changes, whether short term or long term, in reaction to a ban on menthol or slim cigarettes (because no country has implemented such measures) and given the uncertainty related to potentially mitigating factors, e.g. efforts by manufacturers and governments to slow down or revert the growth of illicit trade, we have not included such additional long term effects in our quantitative model.

## 6. Additional potential effects of the new TPD

In this chapter, we discuss additional aspects outside the reach of our modeling approach, and how taking these into account could deepen our insights into the economic effects of the new TPD. Where possible, the quantitative significance of these aspects has been estimated.

### **Specialized technology suppliers will suffer disproportionate losses**

The broad range of companies supplying goods and services to the tobacco sector include many specialized technology suppliers across the EU. These companies, often small or medium size enterprises (SME), supply, innovate and invest in technologies for packaging resealing mechanisms, slim cigarette filters, flavor capsules, capsule insertion machinery and flavor applications for paper and packaging. They stand to suffer disproportionate losses as their highly capital-intensive investments are likely to become redundant as a result of the new TPD.

### **Some EU-based factories that produce slim and menthol cigarettes may downsize or close**

The new TPD has the potential to affect closure and off-shoring decisions of companies. Since the ban on slim and menthol cigarettes prohibits selling these products in the EU, current facilities producing these items would only contribute to exports. This, however, may be inefficient for some companies; shifting these facilities to markets in which there are no such sales restrictions may become a more attractive option. Thus, production currently located in the EU would likely be abandoned, leading to employment losses.

### **The e-cigarette sector may face significant job losses**

Nicotine-containing products (NCP) below a certain nicotine threshold will be subject to the TPD, while those above the threshold will require authorization under the

Medicinal Products Directive (Directive 2001/83/EC). This is likely to have a particular impact on electronic cigarettes (e-cigarettes) currently available in the EU. By imposing a potential de facto ban on e-cigarettes, the new TPD may eliminate a market with a total value of EUR 400-500 m. Depending on the exact distribution of e-cigarette consumption and production across EU Member States, and based on an estimate of the average gross value added per full-time employee in the EU tobacco sector, this could result in job losses of up to 10,000 jobs under the assumption that the entire e-cigarette market is eliminated.

### **Tracking and tracing requirements**

The new TPD seeks to introduce measures to reduce or prevent the growth of illicit trade in the EU. To achieve this objective the Commission has proposed the introduction of an EU-wide traceability system and security features for all tobacco products. These product tracking and tracing measures will require players across the value chain, especially the small and medium sized ones, to undertake significant investments in the installation of electronic tracking equipment, data storage systems and additional resources required to operate and maintain the new systems. For example, if each of the more than 3,900 distribution points at the wholesale level in the EU, has to spend an estimated EUR 5,000 on tracking systems,<sup>90)91)</sup> the total cost amount to approximately EUR 20 million for the initial hardware installation alone.

Additionally, manufacturers need to spend an estimated annual EUR 150 million in mandatory security features for tobacco products' packaging, and this figure does not include costs for additional resources to operate and maintain the systems.<sup>92)</sup>

Whereas the tracking requirement for distribution channels in EU countries will generate substantial data sets on product volumes sold through legitimate channels, the effectiveness of the proposed tracking and tracing policies is unclear.

Illicit products available in the EU are mainly sourced from outside the EU,<sup>93)</sup> i.e. from countries in which the proposed measures will not be applicable anyway.

Furthermore, it is unclear if measures introduced in the legal distribution chain can in fact reduce illicit trade. The Commission's impact assessment does not indicate that illicit trade is driven by the diversion of products from the legal EU-based distribution chain into illegal channels.

### **Expanded reporting requirements**

The new TPD will significantly broaden the scope of manufacturers' reporting obligations. In addition to the existing information on additives, all companies, regardless of their size, will have to report tobacco leaf composition, packaging materials, smoke emissions, market research, consumer preferences and sales data. These requirements will make operating in the EU more costly and burdensome, in particular for small and medium-size companies.

## **THE SPECIAL CASE OF RETAILERS**

### **The actual number of retail jobs that are involved in tobacco sales is presumably substantially higher than our estimates**

In retail, employees typically spend only a fraction of their time on the sales of cigarettes, depending on the type of retail store. Rough estimates of the proportion of tobacco sales in total sales in the retail sector indicate that the number of employees generating non-negligible value added with tobacco products could easily be twice the number of jobs we have reported, exceeding 600,000 in the EU.<sup>94)</sup> Therefore, the number of jobs in the retail sector affected to some extent by the new TPD is likely to be higher than our estimates provided in chapter 1.

### **With the new TPD, retailers' profitability would come under additional pressure**

The persistent fall in profitability of retail stores has been a major problem in recent years. The new TPD would reduce margins from cigarette sales due to a potential decrease in prices and downtrading. Therefore, many retailers will struggle under increasing financial pressure.

### **Traffic from smokers benefits the sales of other goods in many retail stores**

Since smokers stopping by at retail stores typically also purchase other goods, reduced sales from cigarettes has a multiplier effect on the sales of other goods. A decrease in tobacco sales, therefore, disproportionately reduces retailer profitability.

### **Many small retailers will face financial distress**

Under the assumption of a 5% decrease in revenue from tobacco sales – a value within the range of our scenario estimates – a sizeable number of small retailers such as tobacco specialists and newsagent tobacconists/kiosks are likely to experience financial distress. Based on an estimate of current profitability of small retail stores in the EU, we find that under the new TPD the fraction of small retailers under financial pressure would increase substantially, bringing up to 7,000 additional small retailers in the EU close to bankruptcy – or even forcing them to close.

## 7. Towards a "more economic approach" in tobacco regulation

### The European Commission has imposed very high standards for its approach to policymaking

Over the last decade, the EU has developed a regulatory standard referred to as the "more economic approach".<sup>95)</sup> This standard, which originated in the Commission's merger control practice, requires model-based reasoning and quantitative methods of analysis in policymaking. It is reflected in the European Commission's Impact Assessment Guidelines.<sup>96)</sup>

Under this approach, the EU's standard is that policy proposals should achieve decision makers' objectives at the lowest cost. The standard set by the EU under its "more economic approach" to policymaking requires that decision makers minimize both direct and indirect costs when making new policy. These costs include not only direct economic costs, but also indirect costs that incorporate the opportunity cost of pursuing one policy over another.

### The new TPD should be carefully evaluated with respect to its societal costs and benefits

In keeping to the standards required by the EU Commission under its Impact Assessment Guidelines, the following questions should be asked regarding the new TPD:

1. How effective are the measures of the new TPD? In light of the available empirical evidence, how certain (or uncertain) is it that the proposed measures will reduce smoking prevalence? To what extent are statistical and economic significance considered in regulatory decision making?
2. Are there other measures that have been shown to be effective and which have no or less severe economic side effects?
3. Are the measures proposed by the new TPD economically efficient?

Empirical research is integral to answering these questions. Such research can come in the form of cross-national studies in which countries with different policies are compared to understand which measure is likely to perform best. For example, to evaluate the effectiveness of pictorial health warnings, one can compare, by applying econometric techniques, Member States that have adopted such warnings with Member States that have not. Similarly, research outside the EU has increasingly become available for evaluating the effectiveness of already implemented tobacco laws similar to those proposed by the Commission.

For instance, a study by Gospodinov and Irvine<sup>97)</sup> analyzed textual and pictorial health warnings as well as changes in warning label sizes in Canada – key provisions of the new TPD. The study found that no evidence existed that enlarging pictorial health warnings on tobacco packaging decreased smoking prevalence.

### The uncertain effectiveness of the new TPD

In addition to the already existing body of research on which the EU could rely in fully assessing the new TPD, the economic modeling conducted in connection with this study provides additional information that should be considered under the EU's standards for policymaking.

For example, the objectives of the new TPD depend on a presumed causal effect of its measures on smoking; the Commission assumes that standardizing packaging will cause a decrease in overall smoking rates. However, our analysis suggests that this causal assumption might not hold and that there is a scenario in which tobacco product consumption could increase as a result of the new TPD. This is because our model projects that the new TPD is likely to lead to an overall decrease in prices as a result of the combined effect of downtrading and shifts to the illicit market. This decrease in prices would, in turn, stimulate demand for tobacco products. Such adverse public health effects of the new TPD, combined with the economic costs, are worrying, and these should also be a concern for the Commission.<sup>98)</sup>

### The proven potential of alternative measures

The premise of the "more economic approach" is simply that in deciding how to achieve a given policy goal, decision makers should choose the option with the lowest economic cost. Empirical evidence suggests that there are a number of tobacco control policies that coincide with a decrease in smoking prevalence outside of those proposed under the new TPD. As an example, a study by Wilson<sup>99)</sup> indicates that awareness programs for the younger population appear to be effective in reducing tobacco consumption. Strong and effective enforcement of minimum age laws at retail as well as school-based interventions to prevent youth access to tobacco from social sources also have this effect.<sup>100)</sup>

From a public policy perspective, such programs and measures are preferred options to those in the new TPD because their effectiveness is backed up by empirical evidence. Moreover, awareness programs for youth can be seen as particularly desirable given their more sustainable, preventative character. Such programs would be useful to consider in connection with the new TPD, since, according to the Commission's own data, peer pressure and parental smoking are by far the most important factors in youth smoking. This finding is of course not surprising, as it is in line with decades of research.<sup>101)</sup>

### The promise of efficient policies

So far, we have discussed effective policies, which are measures with a demonstrably clear effect on smoking prevalence. But effective policies are not necessarily efficient policies and this is another factor that should be considered under the EU's policymaking standards. Efficiency in the context of the new TPD means that the Commission must conduct a cost-benefit analysis of the range of policy options and base its proposals on what will maximize that equation.

One important way to measure this in the new TPD is to assess its impact on tax revenue. For example, if tax revenue is lower under the new TPD,<sup>102)</sup> then other taxes

(e.g. income taxes or VAT) have to be increased to avoid cuts in government spending.<sup>103)</sup> But increasing other taxes will have an adverse effect on the economy and, consequently, a negative effect on employment in the EU.<sup>104)</sup> Additionally, a decrease in tax revenue would mean that there is less money available for other effective tobacco control programs. If tax revenue is not affected, this money could be used to fund youth smoking programs, which have proven very effective in reducing smoking prevalence.<sup>105)</sup>

Therefore, potential effective policies have to be compared according to the same target tax revenue.<sup>106)</sup> Policymakers therefore should determine which policy comes with the lowest economic cost when the public health goals of the EU are considered under the premise that tax revenue levels will remain fixed. If as a result of the new TPD governments have to increase taxes in other sectors of the economy to keep tax revenue at that fixed level, the policy would have to be considered inefficient.

\* \* \*

Attempting to achieve predefined policy goals at minimal economic cost is generally the European Commission's guiding intention. This approach can and should be applied to designing all EU policy, including tobacco control policies. To do so, the Commission should use the model-based quantitative methodology put forward in the "more economic approach" to assess the impact of tobacco regulation and any proposed measures. Applying this standard to tobacco regulation would help the EU achieve the predefined health goals without harming tax revenue and the economy, at all or at least not more than necessary.



## 8. Conclusion

The new TPD will have a major impact on the EU economy. While the whole EU will be affected, some countries will be particularly hard-hit.

Price competition will reduce prices across all tobacco market segments. As a result, demand for cigarettes and fine-cut is expected to increase by up to 2% – an unintended consequence of standardizing the appearance of cigarette packs.

Following the prohibition of slim and menthol cigarettes, those consumers with a strong preference for these products will potentially turn to the illicit market. In total, the black market is expected to grow by 25-55%.

Between 70,000 and 175,000 jobs could be lost in the EU, not counting seasonal workers. These numbers include direct employment effects in the tobacco sector – mainly due to the shrinking legal cigarette and fine-cut market – as well as indirect employment effects brought on by the tax losses. The drop in tax revenue ranges from a conservative estimate of EUR 2.2 bn to an elevated estimate of EUR 5.0 bn.

Particularly strong effects will occur in countries with large tobacco sectors, such as Germany, France and Poland. Countries with high demand for slim or menthol cigarettes, such as Bulgaria or Poland, will experience disproportionate losses.

## Appendix 1 – Input data for the quantitative model

In addition to chapter 3.4, the following passages provide a more detailed overview on the data that have been used as input for our quantitative model. In general, the data shown below have been collected at a country-by-country level in order to account for relevant differences between the EU Member States. Only where country specific data were not available and reasonable estimates across the EU were possible, aggregate EU27 data were used for our model. Using country-specific data, our model was run for each country individually. Results at an EU-level represent the aggregate results derived from these country-specific data.

**Demand side:** Retail selling prices (RSP) as a weighted average price, including excise taxes, were taken from industry data provided by PMI. For the fine-cut price, an additional amount for the purchase of paper and filters was added.<sup>107)</sup> Sales figures were derived from PMI in-market sales data. These data were validated by Roland Berger using publicly available sources such as analyst reports and additional studies.<sup>108)</sup> In addition to sales data for the segments premium, below-premium and fine-cut, sales figures also include sales data for slim and menthol cigarettes. To quantify the consumption of illicit products, a study published by KPMG in 2011<sup>109)</sup> was taken as the primary data source.<sup>110)</sup> The street price for illicit products was based on various market studies.<sup>111)</sup>

**Supply side:** Industry production figures for cigarettes and fine-cut were estimated based on PMI data. Again, we validated these data using external sources such as Eurostat. Production data in agriculture and first processing was sourced from PMI industry data and Nomisma (2012) validated with data from the EU Advisory Committee for Tobacco.<sup>112)</sup> For the production of raw and processed tobacco, the model assumes that both harvesting and first processing are conducted in the same country. Eurostat trade database<sup>113)</sup> served as the source for export figures for cigarettes. Value added was calculated for each step of the value chain (agriculture and first processing, manufacturing, suppliers, and wholesale/distribution and retail) based on the data stated above and additional PMI industry data.

**Other macroeconomic data:** In order to determine employment effects, data on wages, gross value added per employee at every stage of the value chain, and hours worked per year per country were taken from publicly available datasets, namely Eurostat, EU KLEMS<sup>114)</sup> and OECD.<sup>115)</sup> Other macroeconomic data also include information required to calculate the tax revenue effects. The European Commission's TAXUD Excise Duty Tables from July 2012<sup>116)</sup> served as the source for tax rates for cigarettes and fine-cut.

**Price elasticities:** The key parameter for assessing reactions in consumer behavior to price changes was the price elasticity of demand (own-price elasticity within the four segments as well as cross-price elasticity). We drew on studies that meet a high academic standard and at the same time yield results that can be applied to the EU27 countries.<sup>117)</sup>

**Substitution behavior:** The substitution behavior of consumers, i.e. to what extent smokers move to the illicit market when slim cigarettes and menthol cigarettes are banned, was estimated by applying two different sets of assumptions that yield a lower and a higher value. For the lower value, we used the current share of the illicit market in the various countries as the share of consumers moving to the illicit market, as this represents the current willingness of the smoking population to buy illicit cigarettes, even in the absence of a ban on slim and menthol cigarettes. For the higher value, we based our calculation on brand loyalty data adjusted with the illicit market share in the various countries.<sup>118)</sup> This provided, for each country, a plausible range from a specific lower to higher value. Whereas the lower value can be seen as a very conservative lower boundary, the higher value helps us to describe a potentially stronger effect.

**Policy effects:** Direct policy effects on consumption are considered as described in chapter 3.3.

The following table provides an overview of the data sources that have been used to collect the input data for our model.

TABLE 2: OVERVIEW OF KEY INPUT DATA AND SOURCES

<b>Data subcategory</b>	<b>Data description</b>	<b>Data source</b>
<b>Demand side</b>	RSP premium, below-premium and fine-cut	PMI industry data validated with Euromonitor
	Illicit cigarettes street price	EU Full Pack Survey 2011 PMI and PMI industry data
	Cigarettes and fine-cut sales	PMI industry data (in-market sales) validated with Euromonitor
	Illicit cigarettes sales	KPMG Project Star 2011
	Sales menthol and slim cigarettes	PMI industry data (in-market sales)
<b>Supply side</b>	Cigarettes and fine-cut production	PMI industry data
	First processing production	EU Advisory Committee for Tobacco 2012, PMI industry data, Nomisma 2012
	Cigarette exports	Eurostat EU27 Database "Trade Since 1988 By CN8 [DS-016890]". Product code 24022090
	Value added	PMI industry data
<b>Other macroeconomic data</b>	Tax rates	EC TAXUD Excise Duty Tables 2012 validated with industry data PMI
	Value added per employee and per full-time employee (specific for each step of the value chain)	Eurostat, EU KLEMS
	Annual hours worked per employee	OECD
<b>Consumer behavior</b>	Price elasticities	Various published papers including Cullum and Pissarides (2004), Mindell and Whynes (2000) and Nguyen, Pekurinen and Rosenqvist (2012)

## Appendix 2 – Concise model description and calibration strategy

This appendix provides important technical aspects of our modeling approach. The explanation is kept as non-technical as possible.

### Modeling overview

As already sketched in section 3.2, we consider a quantitative model of the economy with a special focus on four segments of the tobacco sector (cigarettes and fine-cut) that is summarized below as the "cigarette sector". The following figure provides an overview of our model (see figure 17).

We adopted a fairly standard quantitative economic model describing key interdependencies as well as reasonable ("optimal") behavioral reactions to changes in the economic environment of consumers as well as companies. The economic impact of these changes is assessed in a standard input/output analysis that allows us to make predictions about the likely economic impact of the new TPD policy interventions on key variables (employment, tax revenue). Dynamic developments have not been considered in our model. It focuses on the allocation (economic outcome) before and after the new TPD.

The general model is specified through demand functions that describe consumers' choices and the decisions of companies which operate in a differentiated product market with price-setting power. The supply side of the cigarette sector is modeled across the entire value chain as described in chapter 3.

### Modeling the demand side

On the demand side, our model describes how consumers demand cigarettes (including fine-cut tobacco) in our four segments. We restrict ourselves to  $N=4$  goods (premium, below-premium, fine-cut, illicit), denoted by  $x_1, x_2, x_3, x_4$ . The price for each good is denoted  $p_i$  ( $i = 1, 2, 3, 4$ ) and corresponds to the WAP<sup>119</sup> (weighted average price) in a segment and includes all taxes (tobacco taxes and VAT). This price represents the consumer retail price.

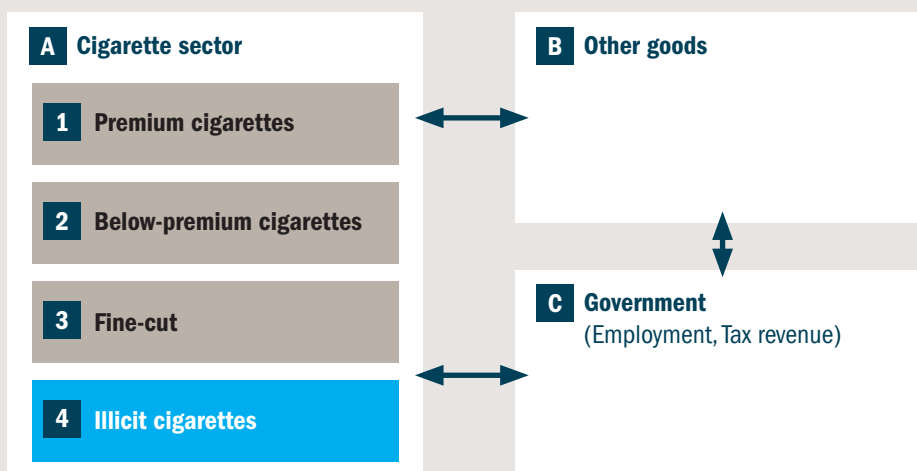
Key inputs of the demand side are:

- > Prices per segment (premium, below-premium, fine-cut, illicit)
- > Today's market shares per segment

### Consumer choices

Specifying consumers' preferences through demand functions imposes some restrictions on the demand functions. We require that consumers' demand can

FIGURE 17: SCHEMATIC ILLUSTRATION OF OUR MODEL



Source: Roland Berger

be derived from preferences that are represented by a utility function  $U(x_1, x_2, x_3, x_4)$ . It is assumed that consumers make optimal choices (subjectively), taking prices as given.

The aggregate demand system is specified in logarithms (to obtain elasticities in the following equations directly) with constants  $x_1^0, \dots, x_4^0$ .

$$\log(x_1) = \log(x_1^0) + \alpha_{11} \log(p_1) + \alpha_{12} \log(p_2) + \dots + \alpha_{14} \log(p_4)$$

$$\log(x_2) = \log(x_2^0) + \alpha_{21} \log(p_1) + \alpha_{22} \log(p_2) + \dots + \alpha_{24} \log(p_4)$$

$$\log(x_3) = \log(x_3^0) + \alpha_{31} \log(p_1) + \alpha_{32} \log(p_2) + \dots + \alpha_{34} \log(p_4)$$

$$\log(x_4) = \log(x_4^0) + \alpha_{41} \log(p_1) + \alpha_{42} \log(p_2) + \dots + \alpha_{44} \log(p_4)$$

The demand for good  $i$  potentially depends on all prices. The higher the price of a good, the lower the demand for this good and the higher the demand for other goods. The intercept terms  $x_i^0$  reflect the relative attractiveness of good  $i$ . It varies from country to country. The parameter matrix  $\alpha = (\alpha_{ij})$  for  $i = 1, 2, 3, 4, j = 1, 2, 3, 4$  describes own-price and cross-price elasticities of demand. For this quite general and flexible demand system to be locally consistent with a utility maximizing consumers requires the following (symmetry) conditions for all price elasticities – relative demand between two segments depends on relative prices of these two segments:

$$\frac{\alpha_{ij}}{\alpha_{ji}} = \frac{p_j x_j}{p_i x_i}$$

where prices and quantities are evaluated at the market outcome. This puts restrictions on the parameters in the matrix  $\alpha$ , which have to be respected in the calibration of these parameters. At the same time it reduces the number of parameters to be specified.

#### Supply side I: market structure and company price-setting behavior

Companies operate on a standard differentiated product market with price-setting power. We assume that they set their prices to maximize profits. Producer of good  $i$  therefore sets the price  $p_i$  to maximize:

$$(p_i - c_i) x_i,$$

where  $c_i$  denotes production costs. Companies take into account that their demand  $x_i$  depends negatively on the price  $p_i$  (which they control) and on other variables beyond their control (such as the prices of competitors). Optimal price-setting depends on consumer preferences as reflected by their demand behavior, which can be summarized by own-price and cross-price elasticities of demand as well as country-specific preferences. The latter can be recovered from market shares of the four segments given the initial prices in a country, and essentially reflect purchasing power differences across countries. We assume that policy changes affect price elasticities but leave the country-specific preference for certain segments unaffected. For companies it is profit-maximizing to reset price in response to changes in consumer behavior triggered by changes in policy.

#### Market outcome

Consumers and companies interact on the cigarette and fine-cut market. Consumers adjust their choices to price changes by companies and changes in their willingness to pay triggered by the new TPD, e.g. due to product standardization. Companies take this response into account when setting their prices. The market outcome, which is governed by the basic relationship that supply equals demand, is defined by prices and market shares in the four segments considered and by the total market volume.

#### Supply side II: value chain and employment

Given prices and volumes before and after the new TPD, employment effects can be considered. To compute the employment effects of policy changes we proceed as follows:

- > Step 1: We compute the value added per cigarette for every type of cigarette for each step of the value chain in every country
- > Step 2: We then use our demand/supply system to compute the change in demand for every type of cigarette in every country. This, together with the previous step, yields the total change in value added per step of the value chain in every country

- > Step 3: We then use information on how much value added is generated per employee (full-time equivalent) at every step of the value chain in every country
- > Step 4: Since we know the change in value added for every step of the value chain in every country, we also know the change in employment per step of the value chain in every country
- > Step 5: Adding up these numbers yields the total change in employment in every country and can then be aggregated to yield EU-wide employment effects

Jobs are estimated from full-time employment by adjusting the numbers up by 20% at every step of the value chain and in every country. Reliable country-specific information was only available for a very limited number of countries.

### Taxation and tax revenue

The tax system is captured in the following way:

- > A specific tax  $\tau^s$  per cigarette
- > An ad valorem tax  $\tau^{vt}$
- > A minimum excise tax  $\tau^m$  per cigarette
- > A value added tax  $\tau^{va}$

The total tax per cigarette of price  $P$  then equals:

$$\max(\tau^s + \tau^{vt} P, \tau^m) + \tau^{va} P$$

The total change in tax revenue is computed by calculating new quantities and prices from the demand/supply system and then applying the tax system previously described.

### Calibration of model parameters: strategy

The parameters of the demand system can be summarized by the 4 by 4 matrix  $\alpha = (\alpha_{ij})$  previously introduced. We subsequently sketch how they are calibrated.

We first start with the four diagonal elements. These are the responses of demand  $x_i$  to a change in the price of this good  $p_i$  (own-price elasticity). We obtain  $\alpha_{11} = -1.89$

and  $\alpha_{22} = -3.03$  based on Cullum and Pissarides (2004). The choice of  $\alpha_{33} = -1.2$  is based on Mindell and Whynes (2000). Finally  $\alpha_{44}$  can be chosen between -1.2 and -1 and we set it equal to -1.05. Variations in this range do not affect our conclusions.

The next step is to determine the off-diagonal elements. Here, due to the previously discussed model restrictions, the upper triangular elements are determined once the lower triangular elements are known. This puts some discipline on our parameter choices. We set  $\alpha_{31} = \alpha_{32} = 0.38$  and  $\alpha_{41} = \alpha_{42} = \alpha_{43} = 1.0$  based on Cullum and Pissarides (2004).

Finally  $\alpha_{21}$  is set such that the aggregate demand for legal cigarettes has a price elasticity of -0.5 which is a consensus estimate in the literature, see e.g. Cullum and Pissarides (2004) and Nguyen, Rosenqvist and Pekurinen (2012). This means that a price increase by 10% leads to an aggregate decrease of 5% in terms of demand.

In the two Conservative Scenarios, product standardization is assumed to slightly increase elasticities due to commoditization, i.e. the goods in the four segments become closer substitutes. Own-price elasticities are increased very conservatively between 1% for illicit cigarettes and 3.5% for below-premium cigarettes. The most important change in cross-price elasticities is an increase in the cross-price elasticities between legal cigarettes and illicit cigarettes by 30%. The values after the new TPD are still quite conservative. The least conservative estimate assumes that under the new TPD, a decrease in the price of premium cigarettes decreases the demand for illicit cigarettes by 13% (instead of 10% in the status quo).

The Elevated Scenario is assumed to be identical to the Conservative Scenarios with regard to all cross-price elasticities. Own-price elasticities are, however, further increased. The values are now between 1% (illicit) and 5% (below-premium) higher than in the Conservative Scenario. All values are still broadly consistent with the values that can be found in the literature. We therefore consider our predicted outcomes very realistic, even in the Elevated Scenario.

### Substitution with illicit cigarettes due to the ban on slim and menthol cigarettes

Substitution with illicit cigarettes caused by the ban on slim and menthol cigarettes lies crosswise to the effects from standardized packaging described above. The shift of consumers to the illicit cigarette market will be simultaneous to the change in consumer behavior caused by pack standardization.

We estimate a lower value and a higher value for substitution behavior in order to span potential outcomes of the new TPD. The following equations are used to calculate country-specific lower values and higher values for substitution behavior with illicit cigarettes:

$$l_i = \text{share of illicit market in country } i$$

$$h_i = \max(20\%, 70\% \times w_i + l_i \times (1 - w_i))$$

$l_i$  stands for the lower value in country  $i$ , whereas  $h_i$  stands for the higher value in country  $i$ . As can be seen in the equation above, the lower value simply represents the current share of the illicit market in the respective country. This share can also be interpreted as the general willingness of the public to consume illicit cigarettes (even without a product ban). If a ban on slim and menthol cigarettes is introduced, the share of people moving to the illicit market should be at least as high as this value.

70% represents an upper bound for substitution behavior. This figure is based on PMI consumer loyalty analyses, which indicate that about 70% of current slim and menthol smokers would stick to their preferred product (no occasional brands, and if these smokers switch to other brands, they switch to the same type of cigarette).<sup>120)</sup> This value represents an upper bound, as it reflects a situation in which these product types are still legally available.

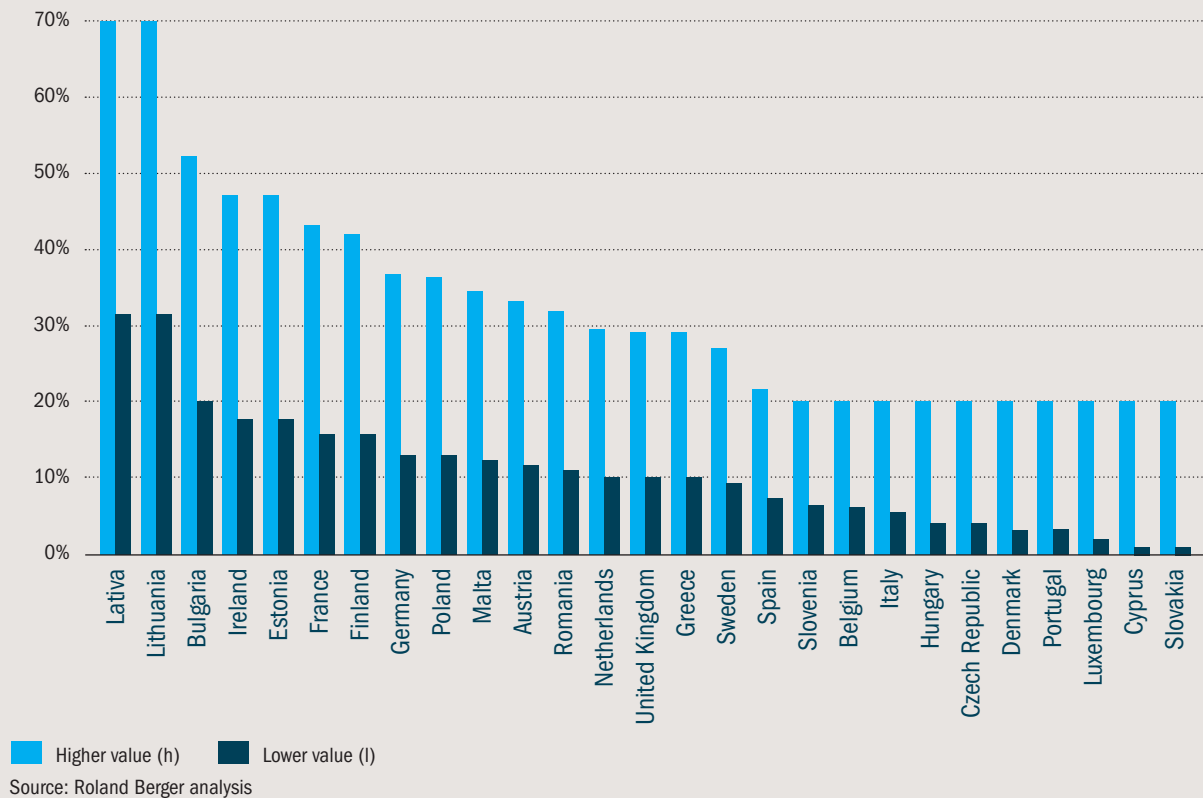
In case of a ban on slim and menthol cigarettes, some consumers may not stick to their preferred product as they are not willing to buy it on the illicit market. Therefore, we derive our higher value as an estimate between the lower value  $l_i$  and our upper bound of 70% depending on the presence of the illicit market in the respective country. To do this, we use a weight,  $w_i$ , that sets the illicit market of the respective country in relation to the highest present illicit market in the EU27:

$$w_i = \frac{\text{share of illicit market in country } i}{\text{max share of illicit market in any EU27-country}}$$

Additionally, we set a lower bound for the higher value of 20%. This value applies to those countries with currently very small illicit markets, since it is likely that the illicit market will evolve as demand for illicit slim and menthol cigarettes increases. 20% is lower than the estimates of other related studies into movement to the illicit market due to a menthol ban.<sup>121)</sup>

Recent data from consumer behavior experiments helped us validate our substitution modeling approach. Two studies using a Choice Based Conjoint (CBC) method evaluated the potential impact of the new TPD's product bans on illicit trade: the ban on slim cigarettes was assessed in Romania and the ban on menthol cigarettes in Poland, both countries where the market shares of the respective products are important.<sup>122)</sup> For Romania, the study found that about 33% of the slims smokers who today purchase their products legally would move to the illicit market in case of a ban on slim cigarettes.

FIGURE 18: ESTIMATED HIGHER VALUE AND LOWER VALUE FOR SUBSTITUTION WITH ILLICIT CIGARETTES PER COUNTRY (percentage value illustrates the fraction of slims/menthol smokers moving from the legal market to the illicit market in case of a product ban)



The study for Poland found that up to 42% of the menthol smokers who today buy their preferred product legally would move to the illicit market in case of a ban on menthol cigarettes. Self-mentholation could reduce this value to about 35% taking into account the share of study participants who have stated their intention to definitely buy self-mentholation equipment in case of a menthol cigarette ban.

These results are consistent with the estimates our model produces for these countries. Thus, while the experimental data from the studies are limited to Poland and Romania, they confirm that our substitution behavior modeling provides realistic and plausible estimates of what consumers will do when faced with a ban on slim and menthol cigarettes.



## Glossary<sup>123)</sup>

**Ad valorem tax** – Tax that is assessed as a percentage markup on a determined value, usually the retail selling price or a wholesale price that includes any value added tax<sup>124)</sup>

**Additive** – Substance contained in a tobacco product, its unit packet or its outside packaging, with the exception of tobacco leaves and other natural or unprocessed parts of tobacco plants

**Characterizing flavor** – A distinguishable aroma or taste other than tobacco, resulting from an additive or combination of additives, including but not limited to fruit, spice, herb, alcohol, candy, menthol or vanilla, observable before or upon intended use of the tobacco product

**Chewing tobacco** – A smokeless tobacco product exclusively designed for the purpose of chewing

**Cigar** – A roll of tobacco wrapped in tobacco leaves, consumed via a combustion process. Cigars are divided into large and standard cigars

**Cigarette** – A roll of tobacco consumed via a combustion process, either factory manufactured (FMC), roll-your-own (RYO) or make-your-own (MYO)

**Cigarette consumption** – The number of cigarettes that are consumed, often representing the cigarette consumption of consumers living in a particular country or region

**Cigarette stick equivalents (CSE)** – The amount of tobacco that equals one cigarette. For fine-cut, the conversion rate of 0.75 g of fine-cut tobacco per cigarette is applied

**Cigarillo** – A small type of cigar with a diameter of up to 8 mm

**Contraband** – Products which have been diverted into illicit trade and which do not respect the legal requirements in the jurisdiction of destination

**Counterfeit** – Brand-protected products which have been falsified without consent of the brand owner and which do not respect the legal requirements in the jurisdiction of destination

**Downtrading** – Downtrading is the switching of consumers from more expensive brands to cheaper alternatives

**E-cigarette** – An electronic device typically consisting of a mouthpiece (containing an electronic evaporator) and a cartridge (typically replaceable) and designed to deliver nicotine to the lungs through inhalation of a mixture of air and vapors

**Excise tax** – In all countries with a "mixed" tax system (all EU27 countries), it is an indirect tax levied on the sales of tobacco products, composed of a specific and an ad valorem component

**Factory-manufactured cigarette (FMC)** – A cigarette, produced by a tobacco manufacturer, capable of being smoked as such. In this study, simply referred to as "cigarette"

**Fine-cut tobacco** – Tobacco used to make self-made cigarettes. Consumers either roll cigarettes into rolling paper by hand (roll-your-own cigarettes, RYO) or fill filter tubes (make-your-own cigarettes, MYO)

**Flavoring** – An additive that imparts aroma and/or taste

**Ingredient** – An additive, tobacco (leaves and other natural, processed or unprocessed parts of tobacco plants, including expanded and reconstituted tobacco), as well as any substance present in a finished tobacco product, including paper, filter, inks, capsules and adhesives

**(In-market) cigarette sales** – The number of cigarettes sold within a country/region

**Illicit trade/black market** – Any practice or conduct prohibited by law and which relates to production, shipment, receipt, possession, distribution, sale or purchase, including any practice or conduct intended to facilitate such activity

**Illicit white cigarettes** – Cigarettes produced (often legitimately) in their country of origin at very low cost, destined to be illicitly sold in other jurisdictions and not respecting the legal requirements in the jurisdiction of destination

**King size cigarettes** – Most popular cigarette type with a length of 84 mm

**Make-your-own cigarette (MYO)** – A cigarette made by filling a filter tube with fine-cut tobacco

**Menthol cigarette** – A cigarette in which menthol flavor is added

**Minimum excise tax** – Tax that represents a minimum absolute excise level which is applied if it exceeds the excise tax as the sum of specific and ad valorem taxes. The minimum excise tax has been implemented by most EU27 countries

**Nasal snuff** – A smokeless tobacco product consumed via the nose

**Nicotine containing products (NCP)** – A product usable for consumption by consumers via inhalation, ingestion or in other forms and to which nicotine is either added during the manufacturing process or self-administered by the user before or during consumption

**Other macroeconomic data** – Macroeconomic data on a country level or for the EU27, e.g. tax rates, exchanges rates, value added, etc.

**Pipe tobacco** – Tobacco consumed via a combustion process and exclusively designed for the purpose of being used in a pipe

**Plain packaging** – Full standardization of packages, including brand and product names printed in a mandated size, font and color on a given place of the package; standardized package color; standardized size and appearance of the package; display of required (textual and pictorial) health warnings and other legally mandated product information, such as tax-paid stamps and marking for traceability and security purposes

**Retail Selling Price (RSP)** – Sales price of cigarettes at the retailer, including all duties

**Roll-your-own cigarette (RYO)** – A cigarette rolled into paper by hand using fine-cut tobacco

**Slim cigarette** – Cigarettes with a diameter of less than 7.5 mm

**Smokeless tobacco products (STP)** – A tobacco product not involving a combustion process, including tobacco for oral use

**Snus** – Moist, pasteurized, spit-free variant of American snuff, either sold in loose form or in a small pouch similar to a tea bag, which the consumer places under the upper lip. Product mainly used in Sweden and Norway; snus has been banned in the rest of the European Union since 1992<sup>125)</sup>

**Specific tax** – Tax that is assessed as a monetary amount per item (cigarette) or per weight (fine-cut)

**Tobacco for oral use/oral tobacco** – All products for oral use, except those intended to be inhaled or chewed, made wholly or partly of tobacco, in powder or in particulate form or in any combination of those forms, particularly those presented in sachet portions or porous sachets

**Value added** – Value added (at market price) is calculated as the output at market prices minus the intermediate consumption at purchaser prices. Value added generally represents the amount by which the value of a good is increased at each step of the production process.

## Endnotes

- 1) In this study, the terms illicit market and black market are used interchangeably
- 2) Comparison for the year 2015. Current trend of about +1% growth p.a. in the illicit market taken into account, as reported in Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012, p. 28 (based on Euromonitor)
- 3) We understand value added as defined by Eurostat: value added (at market price) is the output at market prices minus intermediate consumption at purchaser prices. Eurostat – [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Glossary:Value\\_added](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Value_added)
- 4) Estimates on seasonal workers employed in the tobacco farming sector amount to over 300,000 people (The European Tobacco Sector, Nomisma, 2012, page 12-13)
- 5) Tax amount is based on Roland Berger analysis and includes excise taxes and VAT for cigarettes and fine-cut. Matrix Insight estimates EUR 105 bn for 2011 (Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012, p. 166)
- 6) Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, Part 3, p. 1
- 7) Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, Part 3, p. 1 (based on Euromonitor and industry estimates for 2010)
- 8) Figures for total cigarette sales and country shares refer to sales in the total legal cigarette market in 2011, based on PMI market sales data
- 9) Euromonitor estimates sales of 578 bn cigarettes for 2011 (Tobacco – Industry overview, Euromonitor)
- 10) The conversion rate applied is 0.75 g of fine-cut tobacco per cigarette
- 11) Figures for total fine-cut sales and segment shares refer to sales in total legal cigarette and fine-cut market in 2011, based on PMI market sales data
- 12) Figures for slim and menthol shares refer to total legal cigarettes sales in 2011, based on PMI market sales data
- 13) Raw tobacco market situation, EU Advisory Committee for Tobacco, Nov 26, 2012, p. 4
- 14) Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, Part 3, p. 8 (based on Member States' statistics communicated to DG AGRI)
- 15) Raw tobacco market situation, EU Advisory Committee for Tobacco, Nov 26, 2012, pp. 2, 4. Additional information: harvest of raw tobacco has been decreasing by 15% per year since 2010, when the EU stopped subsidizing the tobacco sector
- 16) Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012, p. 60 (based on Euromonitor)
- 17) Tobacco – Industry Overview, Euromonitor
- 18) PMI industry data verified with Euromonitor (Tobacco – Industry Overview, Euromonitor)
- 19) Additional information: The EU imported only about 2.8 bn cigarettes in 2011. Eurostat EU27 Database "Trade Since 1988 By CN8 [DS-016890]". Product code 24022090
- 20) Eurostat International Trade Database, EU27 Trade Since 1988 By CN8 [DS-016890], Product Code 24022090, figures for Intra EU27 and Extra EU27. Countries in the Middle East include Iraq, Saudi Arabia and the United Arab Emirates
- 21) For reasons of data availability, employment of producers of machinery and equipment for the production of tobacco products is included under manufacturing. Non-manufacturing related employment (e.g. staff of tobacco companies at local sales entities) has been specifically excluded in our calculations

- 22) Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, page 11, based on Eurostat; Nomisma also estimates that about 50,000 jobs are directly related to tobacco products manufacturing: The European Tobacco Sector – An analysis of the socio-economic footprint, Nomisma, June 2012, pp. 19-20, based on EUROSTAT (SBS), ILO, OECD (STAN database)
- 23) As noted above, employment generated by suppliers of tobacco production machinery and equipment is captured by our estimate for manufacturing
- 24) For instance, the European Commission, in its impact assessment, states that "the total number of people involved in the sales of tobacco products should not exceed 600,000 FTE's [Full Time Equivalent]" (Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, Part 6, p. 38)
- 25) Figure 4 illustrates the aggregate tax revenue, representing the sum of tax revenues in each of the 27 Member States based on a bottom-up calculation
- 26) More information on tobacco taxation in the EU, including rates: European Commission – [http://ec.europa.eu/taxation\\_customs/taxation/excise\\_duties/tobacco\\_products/index\\_en.htm](http://ec.europa.eu/taxation_customs/taxation/excise_duties/tobacco_products/index_en.htm)
- 27) Cnossen, S.: Tobacco taxation in the European Union, CESifo working paper, No. 1718, 2006
- 28) Based on European Commission Duty Tables 2012 (EC TAXUD Excise Duty Tables, Part III – Manufactured Tobacco, Ref 1035 REV1, July 2012). National tax legislations applicable as of December 2012. Percentages are calculated as fraction of total taxes on total sales across the EU27 including filters and papers for fine-cut. This provides us with a "fair" comparison of factory manufactured cigarettes and cigarette stick equivalents (CSE) of fine-cut tobacco
- 29) Taxation trends in the European Union – Main results, Eurostat, 2012, p. 99 [http://epp.eurostat.ec.europa.eu/cache/ITY\\_OFFPUB/KS-EU-12-001/EN/KS-EU-12-001-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-EU-12-001/EN/KS-EU-12-001-EN.PDF)
- 30) Joossens, L.: Industry Market Response – Illicit tobacco trade in Europe: issues and solutions. A Pricing Policies and Control of Tobacco in Europe (PPACTE) output, 2011
- 31) Bootlegging is the purchase of duty-paid tobacco products in excess of cross-border shopping allowances in low-tax states for consumption in high-tax states. Smuggling is the purchase and consumption of tobacco products on which no duty has been paid
- 32) Definitions of the different forms of the illicit market are based on Project Star 2011 Results, KPMG, June 19, 2012, p. 3
- 33) Although prices for illicit products are relatively low, margins are still very high (Joossens, L.: Smuggling, the Tobacco Industry, and Plain Packs, A Report for Cancer Research UK, November 2012)
- 34) KPMG estimates that 60% of the illicit cigarettes sold in EU Member States originate from outside the EU (Project Star 2011 Results, KPMG, June 19, 2012, p. 34)
- 35) Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012, p. 28 (based on Euromonitor)
- 36) Project Star 2011 Results, KPMG, 2011. Figures verified with information from Matrix Insight (Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012, p. 27, based on Euromonitor)
- 37) FAQ: Commission's Anti-Fraud Strategy, European Union Press Releases – [http://europa.eu/rapid/press-release\\_MEMO-11-454\\_en.htm](http://europa.eu/rapid/press-release_MEMO-11-454_en.htm)
- 38) Proposal for a Directive of the European Parliament and of the Council on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and the sale of tobacco related products, COM(2012)/788 final, European Commission, Dec 19, 2012

- 39) Revision of the Tobacco Products Directive, European Commission – [http://ec.europa.eu/health/tobacco/products/revision/index\\_en.htm](http://ec.europa.eu/health/tobacco/products/revision/index_en.htm)
- 40) Proposal for a Directive of the European Parliament and of the Council on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and the sale of tobacco related products, COM (2012)/788 final, European Commission, Dec 19, 2012; Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012
- 41) In chapter 6, we briefly discuss the policy areas which have the potential to result in an additional impact on the economy but have been excluded from our analysis
- 42) These proportions are 32%/45% for Member States with two official languages and 35%/50% for Member States with three official languages (Directive 2011/37/EC)
- 43) [http://ec.europa.eu/health/tobacco/products/revision/index\\_en.htm](http://ec.europa.eu/health/tobacco/products/revision/index_en.htm)
- 44) Mentholated slim cigarettes are not included here as they are counted as menthol cigarettes for the purpose of this analysis
- 45) Figures for menthol share refer to sales in the total legal cigarette market in 2011, based on PMI market sales data. By comparison, the use of other characterizing flavors listed, e.g. fruit, candy or vanilla, is negligible in the EU. Estimates put the EU-wide market share of these products, which we do not consider in our study, at less than 0.2% (based on PMI industry data)
- 46) For recent empirical evidence on the role of packaging for branding, see: Scheffels, J. and Sæbø, G.: Perceptions of Plain and Branded Cigarette Packaging Among Norwegian Youth and Adults: A Focus Group Study, *Nicotine & Tobacco Research* 15(2), 2013: pp. 450-456
- 47) For a recent analysis of the cigarette market (among others), see: Fischer, M., Völckner F. and Sattler H.: How Important are Brands? A Cross-category, Cross-country Study, *Journal of Marketing Research* 47, 2010, pp. 823-839
- 48) Sharp, Byron and Dawes, John: What is Differentiation and How Does it Work?, *Journal of Marketing Management* 17, 2001, pp. 739-59
- 49) For evidence that less pack space for branding affects the willingness to pay, see: Thrasher, J.F. et al.: Estimating the impact of pictorial health warnings and "plain" cigarette packaging: Evidence from experimental auctions among adult smokers in the United States. *Health Policy* 102, 2011, pp. 41-48
- 50) Wakefield, M. A., Germain, D., and Durkin, S.J.: How does increasingly plainer cigarette packaging influence adult smokers' perceptions about brand image? An experimental study, *Tobacco Control* 17:6, 2008, pp. 416-421. See also London Economics, The Role of Packaging Imagery on Consumer Preferences for Experience Goods – A consumer behavioural experiment, 2012, Working Paper. Online Access: <http://www.londecon.co.uk/publication/the-role-of-packaging-imagery-on-consumer-preferences-for-experience-goods-2>
- 51) Downtrading is the switching of consumers from more expensive brands to cheaper alternatives
- 52) For information on the development of fine-cut in the UK, see: Cullum, P. and Pissarides, C.: The demand for tobacco products in the UK, Government Economic Service Working Paper No. 150, 2004
- 53) Project Star 2011 Results, KPMG, June 19, 2012, p. 34
- 54) Roland Berger analyses based on PMI industry data (legal sales and retail selling prices) and Project Star 2011 Results, KPMG, June 19, 2012 (illicit market)

- 55) Already today, both slim and menthol cigarettes are available through black market channels. For instance, Jin Ling Super Slims, illicit white cigarettes sold by street vendors in Hungary, or Lifa menthol, found in Poland (PMI empty pack surveys study conducted in 2012)
- 56) Menthol Cigarettes and Public Health: Review of the Scientific Evidence and Recommendations, Tobacco Products Scientific Advisory Committee (TPSAC), 2011. See also: O'Connor, R.J., Bansal-Travers, M., Carter, L.P and Cummings, K.M.: What would menthol smokers do if menthol in cigarettes were banned? Behavioral intentions and simulated demand, *Addiction* 107, July 2012; Center for Regulatory Effectiveness: An Inquiry into the Nature, Causes and Impacts of Contraband Cigarettes. January 2011; Compass Lexecon: Estimating Consequences of a Ban on the Legal Sale of Menthol Cigarettes. January 2011; The impact of a ban on slim cigarettes on illicit trade in Romania. SKIM, February 2013 (commissioned by PMI); The impact of a ban on menthol cigarettes on illicit trade in Poland. SKIM, February 2013 (commissioned by PMI)
- 57) According to PMI brand loyalty analyses for Poland
- 58) For a more differentiated description of the cigarette market segments, see: Cullum, P and Pissarides, C.: The demand for tobacco products in the UK, Government Economic Service Working Paper No. 150., 2004. Our choice to distinguish four market segments reflects a compromise between model complexity and parsimony
- 59) For data availability reasons, we do not differentiate between the different categories of illicit products that are described in chapter 1
- 60) The differentiation between the premium and below-premium cigarette markets is made for every country based on the retail price of cigarettes. In other studies, the below-premium cigarette is sometimes called the value-for-money cigarette
- 61) The calculations for indirect employment effects are based on the methodology described in: Ramey, V.A.: Can Government Purchases Stimulate the Economy?, *Journal of Economic Literature*, 49, June 14, 2011, pp. 673-85. For a reasonable comparison between the status quo and the situation after the implementation of the new TPD, it is necessary to level the playing field with regard to tax revenue ("revenue neutrality"). Therefore, policy interventions have to be compared for a given tax revenue. If tax revenue is lower under the new TPD, then other taxes (e.g. labor taxes or VAT) have to be increased under this scenario. This will destroy employment in an empirically predictable way and is taken into account in our analysis. Thus, we take "shadow costs of public funds" into account
- 62) European Commission TAXUD Excise Duty Tables, Part III – Manufactured Tobacco, Ref 1035 REV1, July 2012. National tax legislations applicable as of December 2012
- 63) See appendix 2 for a description of recent empirical data subsequently used to validate our model
- 64) Note: consumption effects resulting from lower prices or substitution are indirect effects
- 65) Similar policy interventions (plain packaging) have been recently implemented in Australia. No country has banned slim or menthol cigarettes to date (Euromonitor – Tobacco – Industry overview)
- 66) For instance, one possible option to continue to consume menthol cigarettes would be self-mentholation using menthol sprays or oils
- 67) Market data generally refer to 2011. Where not available, reference was made to 2010
- 68) Wakefield, M. A., Germain, D., and Durkin, S.J.: How does increasingly plainer cigarette packaging influence adult smokers' perceptions about brand image? An experimental study, *Tobacco Control* 17:6, 2008, pp. 416-421.

- 69) Research analyzing the effects of plain or standardized packaging confirms that downtrading is a likely implication of packaging restrictions (see, e.g., Plain packaging and its unintended consequences, Montreal Economic Institute, Economic Note, Aug 2011, p. 3; Department of Health, Impact Assessment number 3080, Standardised packaging for tobacco products, 5 March 2012, paragraph 9: "The effect of standardised tobacco packaging could be further to erode the ability of tobacco companies to distinguish their brands from one another. We might expect therefore that it would reinforce the trend towards downtrading to lower priced cigarette brands, a process that has, for a variety of reasons, been a notable feature of the market over the past decade.")
- 70) Current trend of about +1% growth p.a. in the illicit market taken into account reported in Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012, p. 28 (based on Euromonitor)
- 71) World Health Organization (WHO) 2009 – [http://www.tobaccoatlas.org/products/cigarette\\_consumption/annual\\_cigarette\\_consumption/](http://www.tobaccoatlas.org/products/cigarette_consumption/annual_cigarette_consumption/)
- 72) There is overwhelming empirical evidence that the so-called "government spending multiplier" is currently extraordinarily high, much higher than in normal times, Christiano, L., Eichenbaum, M. and Rebelo, S.: When Is the Government Spending Multiplier Large? *Journal of Political Economy* 119, 2011, 78-121; see also Boussard, J, de Castro, F, and Salto, M.: *European Economy, Economic Papers* 460, July 2012, Brussels: European Commission, Directorate General Economic and Financial Affairs
- 73) The European Tobacco Sector – An analysis of the socio-economic footprint, Nomisma, June 2012
- 74) At least Bulgartabac had about 1,500 employees at its manufacturing sites in Blagoevgrad and Sofia in 2011 (Financial disclosure overview Bulgartabac, Q3 2012)
- 75) PMI industry data
- 76) Project Star 2011 Results, KPMG, June 19, 2012
- 77) PMI empty pack survey study conducted in 2012: slims cigarettes' packs represented 30% of the total collected sample of non-domestic products
- 78) Project Star 2011 Results, KPMG, June 19, 2012
- 79) Roland Berger analysis based on Eurostat
- 80) The same applies to potentially different timing effects in relation to consumer behavior. For instance, compared to the relatively immediate changes in consumer behavior resulting from the prohibition of menthol and slim cigarettes, effects from downtrading and brand equity erosion resulting from pack standardization will probably occur more gradually
- 81) The limitation of missing dynamic adjustments in the analysis also applies to the Matrix Insight report (Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012) and to the labor market considerations in the EU Impact Assessment based on the Matrix Insight report
- 82) Rogerson, R. and Shimer, R.: Search in macro-economic models of the labor market, in: Ashenfelter O. and Card, D., eds, *Handbook of Labor Economics*, Vol. 4A, chapter 7, 2010, pp. 619–700
- 83) Project Star 2011 Results, KPMG, June 19, 2012
- 84) Nguyen, L., Rosenqvist G. and Pekurinen, M.: Demand for Tobacco in Europe: An Econometric Analysis of 11 Countries for the PPACTE Project, June 2012
- 85) For an analysis of cross-border shopping in the UK, see: Cullum, P. and Pissarides, C.: The demand for tobacco products in the UK, Government Economic Service Working Paper No. 150, 2004
- 86) Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, Part 2.1.1

- 87) The example of sales bans and import restrictions for snus in Finland illustrates the threat of an increase in illegal cross-border distance sales. In 1995, Finland declared a sales ban for snus and, in 2010, restricted the import quota to a maximum of 30 cans (700 g). Despite the ban, there has been no decline in smokeless tobacco consumption, but a 10% increase was seen between 2010 and 2011. In this example, consumers acquired snus via cross-border trade (legal and possibly illegal)
- 88) Such a dynamic penetration pattern is quite common in other product markets. For the dynamic penetration pattern of cigarette smuggling through the internet, see Goolsbee, A., Lovenheim, M., and Slemrod, J.: *Playing With Fire: Cigarettes, Taxes and Competition From the Internet*, NBER Working Paper No. 15612, 2009
- 89) See, e.g. Cullum, P. and Pissarides, C.: *The demand for tobacco products in the UK*, Government Economic Service Working Paper No. 150, 2004
- 90) *The European Tobacco Sector – An analysis of the socio-economic footprint*, Nomisma, June 2012, page 27
- 91) This estimate assumes that on average two tracking systems would have to be installed per distribution point, each costing about EUR 2,500
- 92) Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012, page 111
- 93) KPMG estimates that 60% of the illicit cigarettes sold in EU Member States originate from outside the EU (Project Star 2011 Results, KPMG, June 19, 2012, p. 34)
- 94) Roland Berger analysis based on tobacco sales as a fraction of total sales across different channels of retail (e.g. tobacconists or convenience stores)
- 95) Röller, L.-H.: *Economic Analysis and Competition Policy Enforcement in Europe*, in *Modelling European Mergers: Theory, Competition Policy and Case Studies* (Edward Elgar, ed.), 2005, pp. 11-24
- 96) EU Impact Assessment Guidelines, 2009 – [http://ec.europa.eu/governance/impact/commission\\_guidelines/commission\\_guidelines\\_en.htm](http://ec.europa.eu/governance/impact/commission_guidelines/commission_guidelines_en.htm)
- 97) Gospodinov, N. and Irvine, J.: *Global health warnings on tobacco packaging: evidence from the Canadian experiment*, B.E. Journal of Economic Analysis & Policy, Vol. 4, Issue 1, 2004, pp. 1-21
- 98) Examples of adverse effects include the cases of Philip Morris vs. Papastratos (2003) and Imperial vs. Altadis (2007)
- 99) Wilson, L.M. et al.: *Impact of Tobacco Control Interventions on Smoking Initiation, Cessation, and Prevalence: A Systematic Review*, Journal of Environmental and Public Health, Vol. 2012, 2012
- 100) Sutcliffe, K., Brunton, G., Twamley, K., Hinds, K., O'Mara-Eves, A.J., Thomas, J.: *Young people's access to tobacco: a mixed-method systematic review*, EPPI-Centre report no. 1918, London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London, 2011
- 101) *Attitudes of Europeans towards tobacco*, Special Eurobarometer 385, May 2012; Salgueiro, V. et al: *The impact of social influence on adolescent intention to smoke: Combining types and referents of influence*, British Journal of Health Psychology, Vol. 14, 2009, pp. 681-699
- 102) Lower tax revenues under the new TPD would mainly stem from consumers shifting to the illicit market and the reduced prices of legal cigarettes. The economic effects of government spending cuts are quantified in: Ramey, V.A.: *Can Government Purchases Stimulate the Economy?*, Journal of Economic Literature, Vol. 49, Jun 14, 2011, pp. 673-85



- 103) Economic analysis of the EU market of tobacco, nicotine and related products, Matrix Insight, May 2, 2012
- 104) Taxing other goods or income can have greater impact, as it influences labor market decisions and thus employment
- 105) Jason, L.A., Ji, P.Y., Anes, M.D. and Birkhead, S.H.: Active Enforcement of Cigarette Control Laws in Prevention of Cigarette Sales to Minors, *Journal of the American Medical Association*, Vol. 266, 1991, pp. 3159-3161; Chaloupka, F.J. and Warner, K.E.: *Handbook of Health Economics*, 2002. For a national assessment of programs for the youth, see: Effective tobacco use prevention interventions for youth, Canadian Cancer Society Manitoba Division, Feb 2011
- 106) Chari, V.V. and Kehoe, P.J.: Optimal Fiscal and Monetary Policy, in Taylor, J.B. and Woodford M. (eds.), *Handbook of Macroeconomics*, Vol. 1, chapter 26, 1999
- 107) Additional amount for the purchase of paper and filters equals about 16% of the retail selling price for fine-cut. The figure is based on PMI industry data and equals an average for a sample consisting of Italy, Germany, Belgium, Spain and France
- 108) For example: Project Star 2011 Results, KPMG, June 19, 2012; *Global Tobacco – Investing in the Global Tobacco Industry 2011*, Bank of America Merrill Lynch, Aug 9, 2011
- 109) Project Star 2011 Results, KPMG, June 19, 2012
- 110) In accordance with legally binding agreements, KPMG annually calculates the level of illicit trade in the EU pursuant to a methodology accepted by the European Commission and all EU Member States
- 111) PMI EU Full Pack Survey 2011, survey in all EU27 countries assessing average price structures for illicit cigarettes
- 112) *The European Tobacco Sector – An analysis of the socio-economic footprint*, Nomisma, June 2012; *Raw tobacco market situation*, EU Advisory Committee for Tobacco, Nov 26, 2012
- 113) Eurostat International Trade Database, EU27 Trade Since 1988 By CN8 [DS-016890], Product Code 24022090 (cigarettes containing tobacco (excl. containing cloves))
- 114) For a description of the EU KLEMS database see <http://www.euklems.net/>
- 115) Missing country values for aggregate data were extrapolated based on available data
- 116) EC TAXUD Excise Duty Tables, Part III – Manufactured Tobacco, Ref 1035 REV1, July 2012. National tax legislations applicable as of December 2012
- 117) Nguyen, L., Rosenqvist G. and Pekurinen, M.: Demand for Tobacco in Europe: An Econometric Analysis of 11 Countries for the PPACTE Project, June 2012; Cullum, P. and Pissarides, C.: The demand for tobacco products in the UK, *Government Economic Service Working Paper No. 150*, 2004; Mindell, J.S. and Whynes, D.K.: Cigarette consumption in the Netherlands 1970-1995, *European Journal of Public Health*, Vol.10, No.3, 2000
- 118) PMI consumers' brand loyalty market research data
- 119) The weighted average price (WAP) is based on retail selling prices (RSP)
- 120) According to PMI brand loyalty analyses for Poland

- 121) O'Connor, R.J., Bansal-Travers, M., Carter, L.P., Cummings, K.M.: What would menthol smokers do if menthol in cigarettes were banned? Behavioral intentions and simulated demand, *Addiction* 107, 2012, pp. 1330-1338. In this paper 25% are estimated for the case of the US which has a rather low illicit market share of about 6% of cigarette consumption according to Bank of America Merrill Lynch, Aug 9, 2011; Center for Regulatory Effectiveness: An Inquiry into the Nature, Causes and Impacts of Contraband Cigarettes. January 2011. This study estimates that if a menthol ban were imposed in the US, the contraband market for menthol cigarettes would increase by about 45%.
- 122) The impact of a ban on slim cigarettes on illicit trade in Romania. SKIM, February 2013 (commissioned by PMI); The impact of a ban on menthol cigarettes on illicit trade in Poland. SKIM, February 2013 (commissioned by PMI)
- 123) This glossary draws to a large extent on the glossary of the Commission's impact assessment, as many definitions are introduced there. Commission Staff Working Document, Impact Assessment, SWD(2012) 452 final, European Commission, Dec 12, 2012
- 124) Project Star 2011 Results, KPMG, June 19, 2012
- 125) Global Tobacco – Investing in the Global Tobacco Industry 2011, Bank of America Merrill Lynch, Aug 9, 2011

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## **Attribution/Disclaimer**

Roland Berger Strategy Consultants prepared the study "The New Tobacco Products Directive – Potential Economic Impact" for, and at the request of, Philip Morris International Management S.A. All judgments and opinions expressed in the study are those of the authors.

Roland Berger Strategy Consultants have sought to ensure that factual statements included in the study are correct, based on specific assumptions and information available as of when it was prepared. Given the nature of this study, however, which deals with judging possible future developments based on a range of assumptions, estimates and projections, which in turn depend on many uncertain variables, Roland Berger Strategy Consultants cannot guarantee that the underlying assumptions and expectations are accurate, and in particular, we cannot provide any guarantees for the assumed future developments stated in the study. No protective effect shall arise for the benefit of third parties.

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