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Economic impact of counterfeiting in the clothing, cosmetics, and toy sectors in the EU

January 2024

ECONOMIC IMPACT OF COUNTERFEITING IN THE CLOTHING, COSMETICS, AND TOY SECTORS IN THE EU

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Acronyms and Abbreviations

ARIMA	AutoRegressive Integrated Moving Average
COVID	Coronavirus disease
DG TAXUD	Directorate-General Taxation and Customs Union
EC	European Commission
ESA	European System of Accounts
EU	European Union
EUIPO	European Union Intellectual Property Office
EUROPOL	European Union Agency for Law Enforcement Cooperation
EUROSTAT	Statistical Office of the European Union
GDP	Gross domestic product
ICCS	International Classification of Crime for Statistical purposes
IP	Intellectual property
IPR	Intellectual property right
MS	Member States
NACE	Nomenclature statistique des activités économiques dans la Communauté Européenne
OECD	Organisation for Economic Cooperation and Development
SBS	Structural business statistics
SEATS	Signal extraction in ARIMA time series
TRAMO	Time series regression with ARIMA noise, missing observations and outliers
UNODC	United National Office on Drugs and Crime

Country codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia

Executive Summary

The European Observatory on Infringements of Intellectual Property Rights (the Observatory) was created to improve the understanding of the role of intellectual property and of the negative consequences of intellectual property rights (IPRs) infringements.

The sectorial studies published during 2015-2018 analysed twelve sectors separately to quantify the economic impact of counterfeiting in several sectors in the European Union (EU) economy. Since then, new information has been made available allowing a consideration of additional aspects of counterfeiting, such as trends in detentions of counterfeit goods and crimes linked to counterfeiting. Based on the same methodology with improved data, this report asses the economic impact of counterfeiting in sales and employment in three sectors: clothing (including footwear), cosmetics and toys.

It is estimated that the legitimate clothing industry lost almost EUR 12 billion of revenue as an annual average in 2018-2021, representing 5.2 % of clothing sales in the EU. As a consequence of sales lost due to counterfeiting, the clothing industry employed 160 000 fewer people each year in the same period, with Germany and Italy the most affected markets.

The cosmetics market in the EU is much smaller than the market for clothing, amounting to about one third of the size in terms of sales. The estimated lost cosmetics sales due to counterfeiting amount to EUR 3 billion, corresponding to 4.8 % of total sales. The French cosmetics industry is the most affected in absolute terms, with EUR 800 million in annual lost sales. The lost employment in the EU is estimated at almost 32 000 people.

The toy sector is the smallest of the three sectors analysed in this study, but it suffers the highest ratio of sales lost due to counterfeiting: 8.7 %, corresponding to EUR 1 billion in lost sales and 3 600 fewer people employed in this industry. The German toy industry absorbed one third of sales lost due to the presence of fake toys in the EU.

Table 1. Annual lost sales and employment due to counterfeiting in three sectors, EU and 27 Member States, average 2018-2021

	Lost sales (%)			Lost sales (millions EUR)			Lost employment (people employed)		
	Clothing	**Cosmetics**	**Toys**	**Clothing**	**Cosmetics**	**Toys**	**Clothing**	**Cosmetics**	**Toys**
AT	7.7	5.9	9.8	580	133	71	4 292	970	191
BE	6.6	5.1	8.9	275	134	27	3 424	654	60
BG	8.1	8.7	9.2	88	37	19	7 336	576	218
CY	10.7	7.9	14.1	49	12	3	766	107	..
CZ	4.8	4.2	10.3	125	45	na	2 696	1 289	na
DE	6.2	4.6	7.4	2 913	724	334	31 339	6 946	1 251
DK	4.7	3.5	10.6	201	38	na	1 772	690	na
EE	8.7	7.2	5.6	33	9	1	657	76	..
EL	8.0	6.5	7.4	267	80	3	6 297	1 446	26
ES	3.7	5.5	11.1	1 000	398	113	11 208	3 601	235
FI	5.6	2.5	6.8	126	14	6	806	159	..
FR	4.5	4.7	8.8	1 719	801	175	11 860	2 385	182
HR	8.1	6.0	14.2	108	16	11	2 393	211	22
HU	6.2	7.6	13.7	126	51	12	3 247	870	349
IE	10.2	6.0	10.4	349	na	na	3 196	na	na
IT	3.7	3.1	10.3	1 700	260	122	19 081	4 938	222
LT	9.1	7.4	8.5	76	20	3	2 015	248	..
LU	9.2	6.9	5.2	50	7	1	320	39	..
LV	3.7	6.6	7.3	17	15	2	487	283	..
MT	5.8	4.8	16.2	na	4	na	na	69	na
NL	4.8	4.2	10.9	526	116	na	5 786	950	na
PL	7.6	5.7	6.6	549	140	39	15 378	2 499	367
PT	6.1	7.7	9.5	337	83	18	9 495	705	23
RO	8.2	7.9	12.2	256	76	27	11 442	1 085	267
SE	4.4	3.0	11.8	443	40	28	2 497	569	20
SI	7.9	6.8	13.1	49	9	7	631	150	42
SK	7.7	6.7	11.4	107	39	8	1 934	201	73
EU	**5.2**	**4.8**	**8.7**	**11 944**	**3 169**	**1 022**	**160 352**	**31 717**	**3 608**

Source: author's calculations

.. low values (< 20 people employed)

na not available

The ratios of sales lost due to counterfeiting as a share of total sales in the three sectors for all the EU MS are shown in Table 1. While estimated lost sales ratios for the clothing and cosmetics sectors are of similar magnitude, the toy sector's lost sales ratio for the EU is greater, and its range (the difference between the maximum and minimum values) among countries is also wider. Absolute losses cannot be estimated for some MS due to lack of data on legitimate sales or employment from official statistics.

Sales lost due to counterfeiting as a share of total sales in each sector are estimated based on econometric models detecting which of several counterfeiting indicators influence sales trends. It can be concluded that the higher the percentage of respondents who declare themselves to have bought fakes in a country (from the IP Perception survey), the higher the ratio of sales lost due to counterfeiting in the clothing and cosmetics sectors; the greater the border detentions of clothing and toys in an MS, the lower the sales lost due to counterfeiting; the higher the declared offences of unlawful drugs or corruption crimes, the higher the impact of counterfeiting in the three sectors; and finally, the greater the percentage of citizens that perceive corruption increasing in the past 3 years, the greater the impact of counterfeiting on the toy industry.

Another important result of the analysis of sales in 2018-2021 was the major impact of the COVID-19 pandemic on sales of both legitimate and counterfeit goods, especially in the clothing sector. A longer analysis period is needed to confirm a return to pre-crisis levels or a structural change in the impact of counterfeiting on different sectors.

1 Introduction

Counterfeiting affects consumers, brands, and the economy as a whole. Consumers are dissatisfied with low-quality products that can be a risk to health and safety. Firms whose intellectual property rights (IPRs) are infringed are also affected by unfair competition and the sale of cheaper low-quality goods making unlawful use of their brands, resulting in lower revenues and profit for the legitimate owners. Even in cases where buyers of fake goods would not buy the corresponding original goods, they would be likely to buy other affordable legitimate goods; the consequences of buying counterfeit goods therefore go beyond the attacked brands to cause economic impacts on sales by any legitimate seller. Moreover, the impact of counterfeiting goes beyond economic losses, as it fuels organised crime, undermines trust in the rule of law, and negatively affects the environment.

The scope of this report is the economic impact of counterfeit goods sold in the European Union (EU) territory: not only the impact on the producers and sellers of the infringed brands, but at the level of the respective sector. It follows the previous series of European Union Intellectual Property Office (EUIPO) studies known as 'sectorial studies' ([1]) published between 2015 and 2018 and updated three times to include the most recent and comparable figures based on the same methodology. The last update was published in 2020 and included results for 2013-2017. Now, more information is available (as detailed in Section 3), so the results presented in this report are not completely comparable with those published before.

Over ten years, the EUIPO, through the Observatory, has published several studies that aim to better understand the phenomenon of counterfeiting. The perceptions and behaviours of European citizens regarding intellectual property (IP) and counterfeiting (IP Perception studies) were assessed with EU-wide surveys. These surveys revealed that, although citizens recognise the value of IP in principle, they also tend to justify infringements at the individual level in certain cases.

Collaboration with relevant agencies and organisations helps the EUIPO to cover various aspects of counterfeiting: several reports on the trade in counterfeit goods examine the magnitude of the global trade in counterfeiting in collaboration with the Organisation for Economic Cooperation and Development (OECD). A joint EUIPO/EUROPOL report focused on poly-criminality to demonstrate

([1]) https://euipo.europa.eu/ohimportal/en/web/observatory/quantification-of-ipr-infringement

that IP crime has links to other serious crimes. Collaboration with the European Commission's DG TAXUD allows the EUIPO to access data on border and internal detentions of counterfeit goods.

Changes in the consumption of goods in recent years, increased online sales, and the availability of new information on counterfeiting have made it necessary to develop a new series of models to measure the economic impact of counterfeiting in three of the sectors most affected by this illegal activity. Counterfeiting in two of these sectors, namely cosmetics and toys, also have significant health and safety risks for consumers.

This report presents the methods and results of an estimation of sales lost due to counterfeiting by businesses in three sectors: the clothing (including footwear), cosmetics and toy industries. Sales lost due to counterfeiting are estimated based on independent econometric models that first analyse differences between the expected and actual sales of each type of goods at the national level (explained in Section 2) and subsequently attribute a share of these differences to sales of counterfeit goods in each EU MS. As the actual sales of counterfeit goods cannot be accurately known, the estimation of sales lost due to counterfeiting is based on indicators of various types of illegal activities and other variables. Section 3 details the counterfeiting indicators used in the models that are presented in Section 4. Section 5 summarises the economic impact of counterfeiting on sales and employment in each EU MS and, finally, Section 6 concludes with some recommendations for future research.

2 Expected and actual sales of goods in the EU

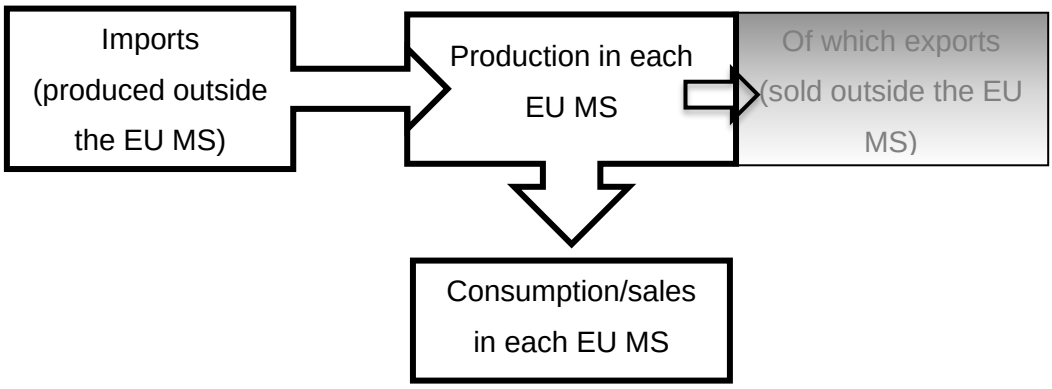
The first step to understanding the economic impact of clothing, cosmetics and toy counterfeiting in the EU is to analyse trends in sales of legitimate goods. The starting point is estimating the value of the production of legitimate goods in the EU MS based on data from the Structural Business Statistics (SBS) ([2]), which describes the structure, conduct and performance of economic activities, down to the most detailed activity level (NACE ([3]) classes). The SBS provide data on the value of production (and employment) each year in specific sectors (clothing, cosmetics and toys ([4])).

([2]) https://ec.europa.eu/eurostat/cache/metadata/en/sbs_h_esms.htm.
([3]) NACE is the Statistical Classification of Economic Activities in the European Community. Its most detailed level consists of 615 classes identified by four-digit numerical codes.
([4]) The NACE classes included in each sector are: 1413 'Manufacture of other outerwear', 1414 'Manufacture of underwear', 1419 'Manufacture of other wearing apparel and accessories, 1520 'Manufacture of footwear', 4642 'Wholesale of clothing and footwear' 4771 'Retail sale of clothing in specialized stores and 4772 'Retail sale of footwear

Based on the information available in the SBS, the value of clothing and cosmetics production approximates purchase prices by including wholesale and retail margins, although only for specialised stores, while specific classes for the wholesale and retail toy trade are not available, so the value of toy production is based on producer prices.

However, production in a territory is not equal to sales (or consumption) in that territory because a share of the goods produced in the EU countries are not consumed in the internal market (i.e. exports); likewise, some goods consumed in the MS are produced elsewhere (i.e. imports). To take into account the flows of goods among countries, the value of production in a country is modified in the following way to obtain the value of sales in each MS for each year and product ([5]).

Figure 1. Diagram for the calculation of sales from production and international trade statistics.



Therefore, for each product, the value of consumption in each EU MS consists of the value of the production in that MS, excluding the value of exports and adding the value of imports. The value of imports and exports includes both intra-EU and extra-EU flows and is downloaded from the Eurostat International Trade database ([6]) by MS and product.

Based on the previous formulae applied to statistics on production, imports and exports published by Eurostat, the value of clothing, cosmetics, and toy sales is considered throughout this report to be the value of legitimate sales. Although it is possible that some illegal goods were produced or

and leather goods in specialized stores' in the clothing sector; 2042 'Manufacture of perfumes and toilet preparations', 4645 'Wholesale of perfume and cosmetics' and 4775 'Retail sale of cosmetics and toilet articles' in the cosmetics sector; and 3240 'Manufacture of games and toys' in the toy sector. Sales of clothing and cosmetics include wholesale and retail margins, but toys do not, due to the absence of specific NACE classes for the trade in toys.

([5]) In this report, sales and consumption values are used interchangeably.

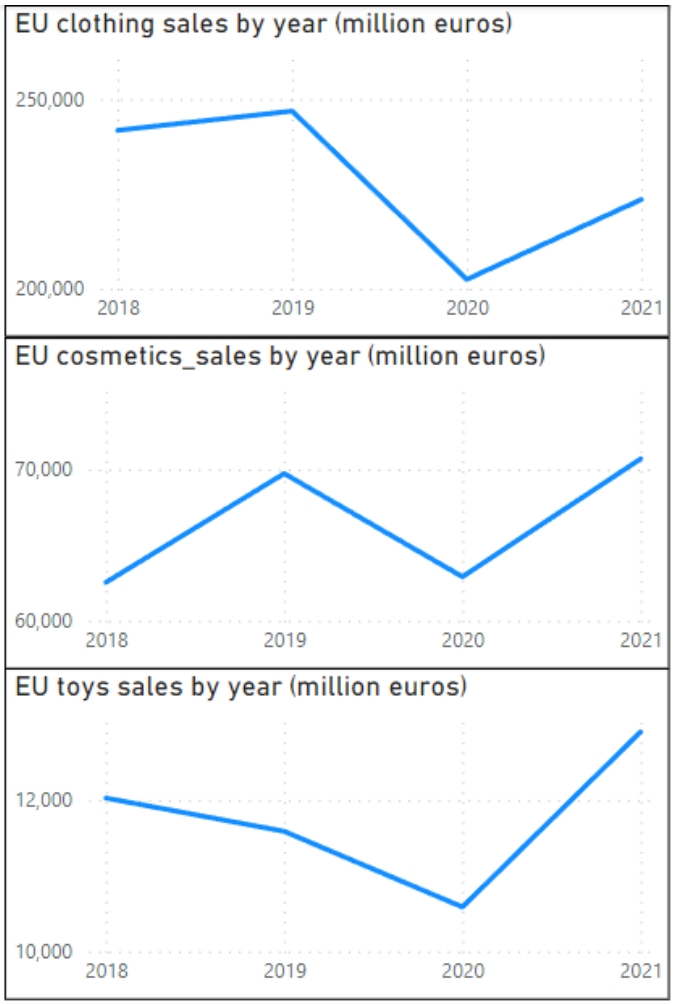
([6]) https://ec.europa.eu/eurostat/comext/newxtweb/.

imported by legal firms and declared to the statistical authorities, there is no reliable method to separate out sales of infringing goods that are legally produced and declared. Therefore, the economic impact of counterfeiting in the EU market estimated in this report is a minimum and does not include infringing goods that evade legal controls and are sold together with legal goods.

The period analysed comprises the years 2018-2021 ([7]) including 2020, which saw a remarkable fall in the value of consumption of many goods during lockdowns and other restrictions due to the COVID-19 pandemic, as shown in Figure 2. The greatest relative decrease in sales in 2020 was registered by the clothing sector (-20 % annual rate), with a recovery in 2021 but remaining far from pre-pandemic level. Cosmetics and toy sales registered a decrease of about 10 % in the same year. With regard to cosmetics sales, there was also a remarkable increase of more than 10 % in 2019, so that sales in 2020 were at the same level as sales in 2018, and the pre-pandemic level had already been reached in 2021.

([7]) Results from the SBS have been cleaned and imputed in some cases due to a break in the series, explained by the implementation of the European Business Statistics (EBS) regulation (reference year 2021) and of the statistical unit enterprise (reference year 2018).

Figure 2. Value of clothing, cosmetics, and toy sales in the EU, 2018-2021.



Source: author's calculations based on Eurostat databases.

3 Analysis of counterfeiting-related variables

The selection of statistical indicators considered drivers of the purchase of counterfeit goods is based on previous EUIPO research and other reliable data sources. The counterfeiting indicators may be related to the consumer (individual characteristics) or to the market (institutional environment), making it easier (or more difficult) to find and purchase fakes or discouraging the production or import of fake goods.

As explained in the EUIPO/OECD report on 'Misuse of e-commerce for trade in counterfeiting', the increasing trend in the use of online commerce accelerated in 2020 as a result of the COVID-19 pandemic. The report also demonstrated that the level of a country's e-commerce development is related to the level of counterfeit goods imports into that country. Nevertheless, online sales of legitimate goods have also showed an upward trend, so it is difficult to attribute online sales to increased counterfeiting. E-commerce indicators are included in the econometric model explaining sales trends, but they are not assigned as a counterfeiting indicator, as will be explained in Section 4.

Indicators of the level of counterfeiting in a country include, among others: the percentage of citizens that purchase counterfeit goods, based on the IP Perception report ([8]); indicators of good governance (Worldwide Governance indicators ([9])); indicators of the effectiveness of anti-counterfeiting enforcement measures (e.g. internal and border detentions of counterfeit goods ([10])); and indicators of crimes that may accompany counterfeiters' activities (i.e. declared offences ([11])). Among the selected explanatory variables, only detentions are specific to each type of product; the rest are general for any type of counterfeit product.

This section analyses the variables included in the models as drivers for counterfeiting, although more variables were initially tested. The values of all counterfeiting indicators in each MS are combined, based on estimated models in Section 4, to obtain the volume of sales lost due to counterfeiting separately for each sector and MS.

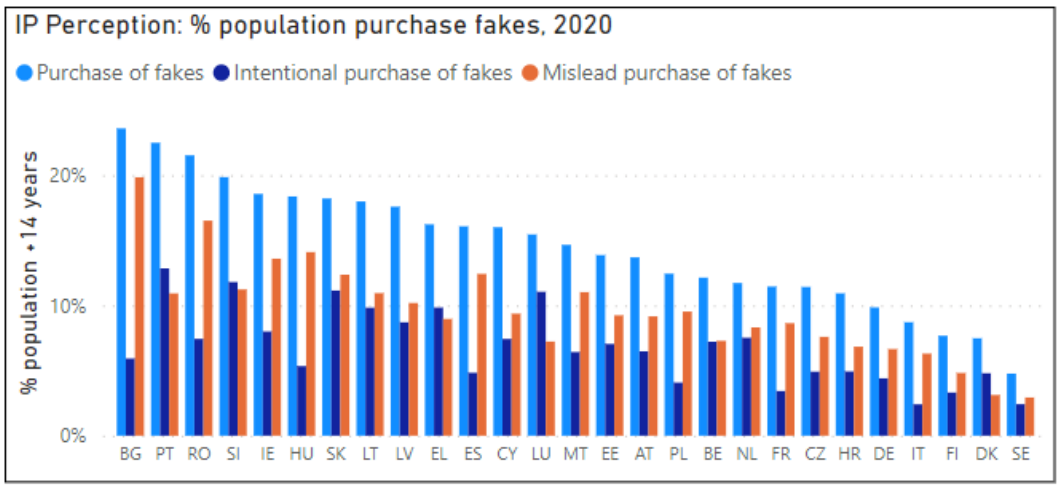
3.1 EU citizens purchasing fake goods

The EUIPO has so far published four studies on EU citizens' perception of IP and IPR infringements: in 2013, 2017, 2020 and 2023. These reports are based on interviews with residents aged 15 years or over in all EU Member States, in order to determine their understanding of IP and behaviour with regard to IP infringement. The variable of interest with regard to counterfeiting is the share of people that acknowledge buying counterfeit goods, whether misled or intentionally. The answers to these questions in each MS are useful because the more people that admit purchasing fake goods, the higher the expected incidence of counterfeiting, and consequently the higher the losses to legitimate industries explained by counterfeit goods being sold in their markets.

([8]) EUIPO (2020).
([9]) https://databank.worldbank.org/reports.aspx?Report_Name=WGI-Table&Id=ceea4d8b.
([10]) EUIPO / European Commission (2023).
([11]) https://ec.europa.eu/eurostat/databrowser/view/crim_off_cat$dv_1401/default/table?lang=en.

Depending on the type of product, the purchase of a counterfeit product may be deceptive or not, but both indicators (i.e. intentional and misled purchases) are tested for all sectors, as they are all purchases of counterfeit goods, regardless of whether the buyer is deceived. The chosen reference year is 2020, as this was the year that fell within the reference period (2018-2021). These indicators have already been used in many of the previous EUIPO sectorial studies.

Figure 3. Percentage of people that purchased counterfeit goods in EU MS, 2020.



Source: author's calculations based on EUIPO (2020)

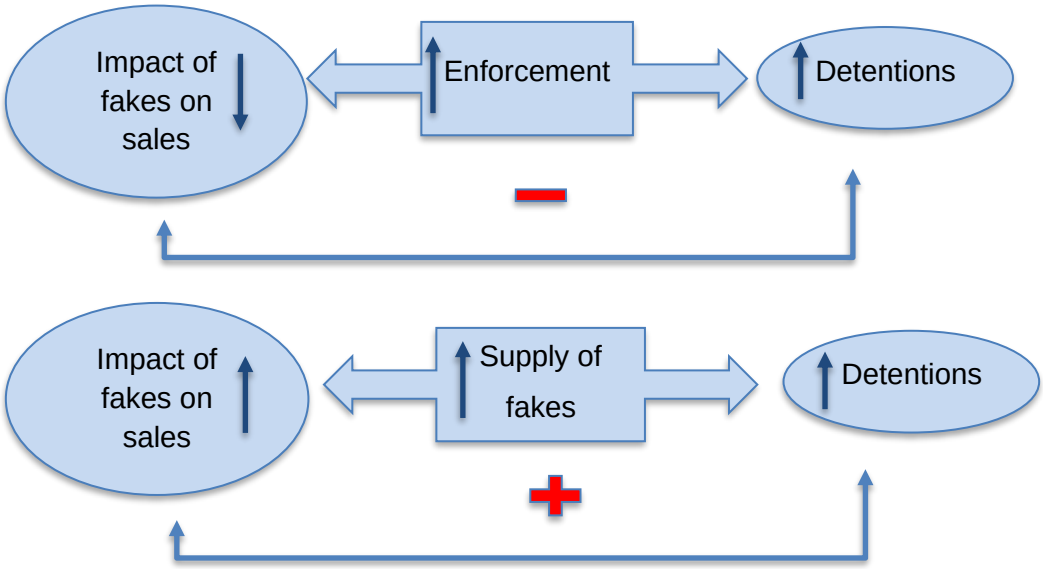
3.2 Detentions of counterfeit goods

The annual joint reports of DG TAXUD and the EUIPO on 'EU enforcement of IPRs: results at the EU border and in the EU internal market' provide figures on detentions of counterfeit goods at the EU border and in the EU internal market, broken down by category of goods. Goods detained at the borders are compared with total imports of equivalent goods from third countries (or extra-EU imports), and total detentions (i.e. border detentions plus internal market detentions) are compared with the total sales of equivalent goods in each MS.

As explained in the DG TAXUD and EUIPO 2023 report on 2022 detentions, '[the] ratio of detentions of counterfeits versus total trade may increase due to higher priority for law enforcement authorities, or because counterfeiters are more interested in IP crime as a crime with lower penalties or because of a higher consumer demand for cheaper counterfeits or for all of these reasons'. Therefore, a higher

ratio of detentions as a share of imports (or sales) may be the result of the increasing effectiveness of enforcement activities or of a higher volume of counterfeit goods entering the EU market. In the first case, the relationship between detentions and sales lost due to counterfeiting would be negative, but in the second case, this coefficient would be positive, as explained in Figure 4. Section 4 presents the results of the econometric model explaining sales lost due to counterfeiting. These do not predetermine which is the dominant relation with detentions of counterfeit goods; this will be determined by the data.

Figure 4. Two possible schemas of relationship between detentions and the impact of counterfeiting in legitimate sales.



Detention ratios ([12]) are analysed for 2018-2021 to check whether they show a relationship (or not) with sales lost due to counterfeiting in each MS for the three sectors analysed in this report. Internal market detentions are missing for several countries: Germany, Luxembourg, Austria, Slovenia, Finland, and Sweden; this is a limitation on using total detentions as a share of sales in the econometric models. Finally, detentions of consumer goods ([13]) are also compared with total value

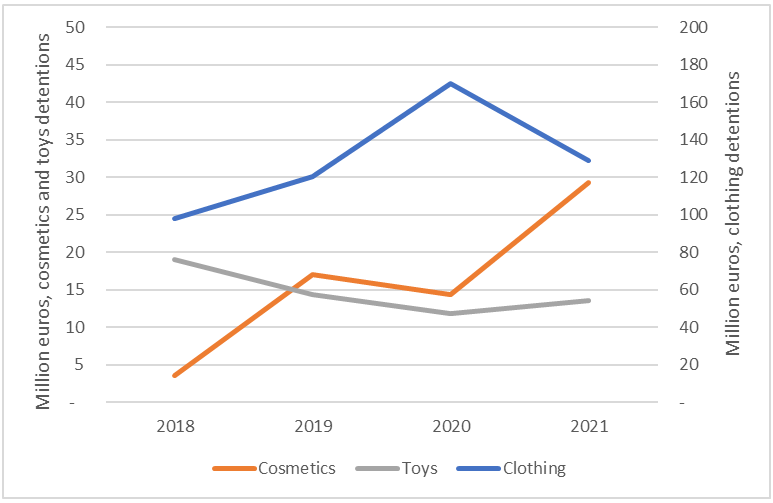
([12]) Detentions used in this report exclude detentions of goods exported or in transit to non-EU countries, released goods, and goods not destined for one of the 27 EU MS, following Appendix G of the DG TAXUD / EUIPO report. All caveats and limitations expressed in Appendices B and G of the 2022 enforcement report apply in this report to the use of detentions as an explanatory variable for sales lost due to counterfeiting. Ratios used in this report are calculated based on sales and imports for goods used in the econometric models; they are not the ratios published in the DG TAXUD / EUIPO reports, but differences are minimal.

([13]) Consumer goods exclude: 12a 'machines and tools', 12b 'vehicles including accessories and parts', 6b 'parts and technical accessories of mobile phones', 7a 'video/audio apparatus', and 7d 'computer equipment'.

of final consumption expenditure in each MS, and this ratio is also included as a potential explanatory variable of sales lost due to counterfeiting.

At an aggregated level, the value of border detentions of consumer goods destined for countries in the EU has increased from EUR 300 million in 2018 to more than EUR 400 million in 2021, although the maximum was registered in 2020 with a value of EUR 470 million. Clothing ([14]) represents more than one third of the value of detentions during this period, while cosmetics and toys represent 4 % of the value of detentions of consumer goods on average in 2018-2021. The trend in border detentions varies by product: clothing detentions showed an upward trend between 2018 and 2020, follow by a decrease in 2021. Detentions of cosmetics are more volatile, with a remarkable 2021 in which the value of border detentions doubled over the previous year (reaching 7 % of the value of all detentions of consumer goods). Border detentions of toys registered a decreasing trend until 2020 and a slight recovery in 2021.

Figure 5. Border detentions in the EU in millions EUR, 2018-2021.



Source: author's calculations based on EUIPO / DG TAXUD

Although the value of detentions in the internal market could be an important signal of efforts to fight counterfeiting in EU MS, the lack of data in some countries prevents us from using this information as an explanatory variable for the economic impact of counterfeiting.

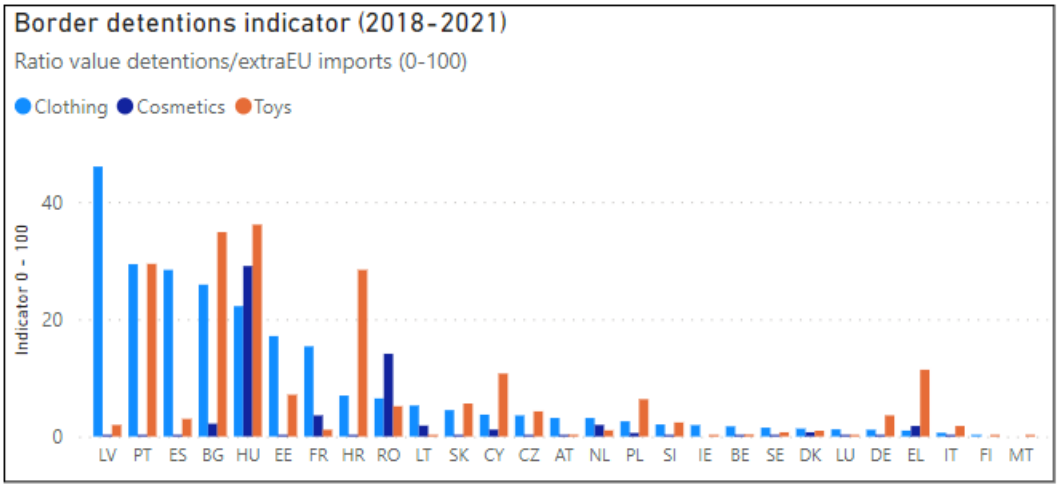
The indicators used to explain counterfeiting are not the absolute values of border detentions in euro, but rather their relative value as a share of extra-EU imports of similar products in each MS. The

([14]) Categories of clothing detentions in this report include accessories and shoes (including sport shoes).

total value of border detentions by product and destination country is divided by the value of extra-EU imports of equivalent goods as published by Eurostat at NACE class level, with the NACE classes included in the three sectors as indicated in Section 2, footnote 4.

Detentions as a share of imports of the three types of goods analysed varies considerably among MS and by year and are used as a signal of the presence of fake goods in the market. The ratios are scaled to reach value 100 in the year and country with the highest value and 0 at the year and country with the minimum value of the same ratio. Countries with greater ratios of border detentions are Bulgaria, Spain, Croatia, Latvia, Hungary, and Portugal.

Figure 6. Border detentions as a share of extra-EU imports, indicator 0-100, average 2018-2021.



Source: author's calculations based on EUIPO / DG TAXUD and Eurostat

DG TAXUD collects the estimated value of detentions at domestic retail value (DRV), which is the retail price at which the goods would have been sold had they been genuine. The statistical value of imports of goods that are used for the ratios of border detentions are estimated at the border of the reporting country, known as CIF value (cost, insurance, freight); this does not include retail margins or distribution cost in the destination country. This difference in the definition of values can influence the level of the indicators, but econometric models use only the relative differences among MS.

The ratio of detentions as a share of imports is an indicator of the relative success of border detentions of counterfeit goods by country and product. Nevertheless, as explained in Figure 4, the relationship between detentions of counterfeit goods and the prevalence of counterfeiting of a specific product in a country is not clear. A higher value of the ratio could be explained by a high

degree of attention from customs, or a high degree of attractiveness to counterfeiters. In the first case, a greater value of the ratio as a consequence of more (or more successful) attention from customs will be reflected as a negative relationship to sales lost by legitimate firms due to counterfeiting: the customs authorities are more focused on that product, and this explains the lower impact of counterfeiting in the economy.

On the other hand, a high value of detentions of a specific product could be interpreted as a higher degree of attractiveness to counterfeiters; then there will be a positive relationship between the ratio of detentions and the impact of counterfeiting in a specific country. It is not clear which of the impacts dominates, nor whether it depends on the product in question.

One immediate consequence of this is that the resulting ratio in no way depends on the performance of the custom authorities of the Member State in question. At most, it could indicate attempts by IPR infringers to import counterfeit goods into a certain Member State through any of the borders of the EU.

3.3 Poly-criminality

The EUIPO/EUROPOL (2020) report presents some case studies to demonstrate how IP crime is linked to other forms of criminality, including money laundering, document fraud, cybercrime, fraud, drug production and trafficking, and terrorism.

Based on the empirical evidence of counterfeiting and other criminal activities supporting each other as well as parallel activities, the econometric model that looks for statistics related to counterfeiting includes criminal offences as a sign of counterfeiting in EU countries. It is expected that illegal firms engaged in the production and distribution of counterfeit goods are neither registered nor pay taxes, and therefore a large proportion of their illegal activities should involve organised crime groups engaging in money laundering, tax evasion, etc.

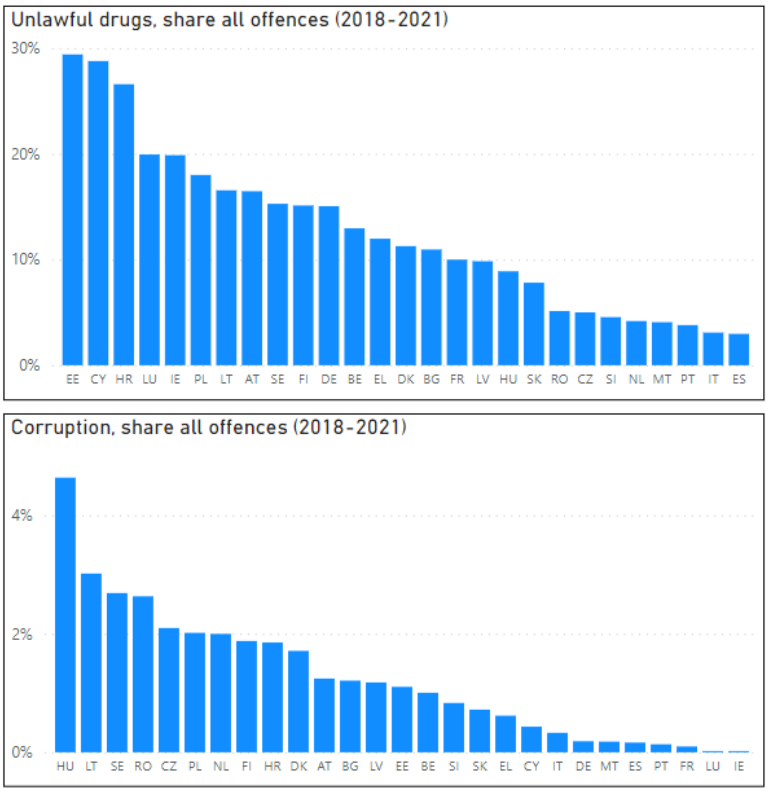
Eurostat-UNODC (United Nations Office on Drugs and Crime) data on police-recorded offences by category ([15]) are included in the econometric models to test whether a higher incidence of various crimes accompanies a higher impact of counterfeiting in EU MS. The following offences are tested:

([15]) Recorded offences are published by Eurostat based on the International Classification of Crime for Statistical purposes (ICCS). More details of the classification here: https://www.unodc.org/documents/data-and-analysis/statistics/crime/ICCS/ICCS_English_2016_web.pdf.

fraud, corruption, bribery (included in corruption offences), money laundering, unlawful acts involving controlled drugs or precursors, and participation in an organised criminal group. The indicators used in the econometric models are offences per hundred thousand inhabitants and share of each category among all recorded offences.

The share of unlawful drugs and corruption crimes over all reported offences are the most explanatory variables in the econometric models for counterfeiting. The results in Figure 7 show large differences among MS.

Figure 7. Share of unlawful drugs and corruption offences in EU MS, average 2018-2021.



Source: author's calculations based on Eurostat.

3.4 Perceived corruption

The relationship between IP crime and corruption can be analysed based on criminal offence statistics, as explained in Subsection 3.3, and through information on citizens' perception of corruption.

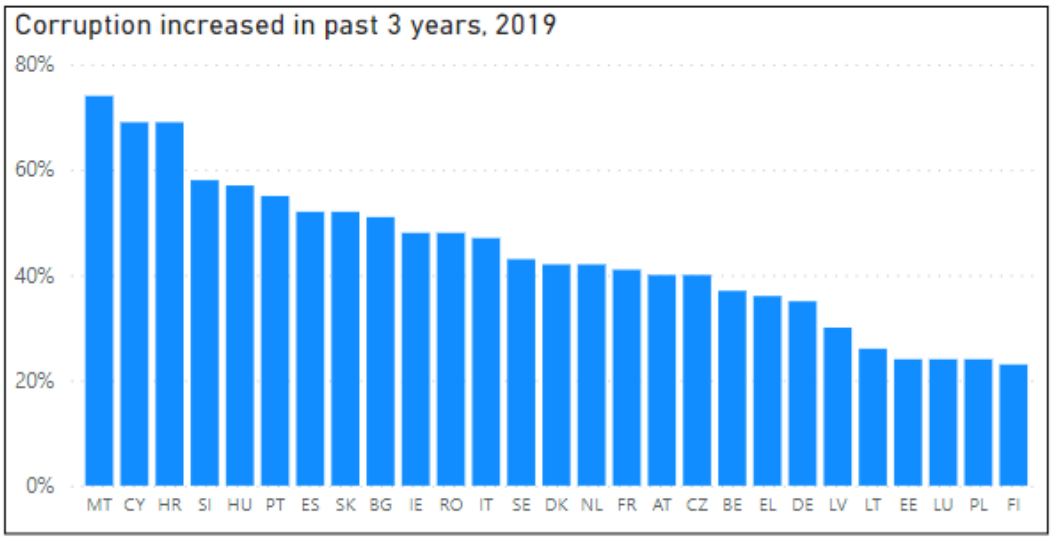
Citizens' perception of corruption has been analysed by eight Eurobarometer ([16]) surveys published by the European Commission since 2005, designed to explore the level of corruption perceived and experienced by European citizens through opinion surveys. The corruption indicators tested as drivers of counterfeiting from the 2020 Special Eurobarometer on corruption ([17]) (fieldwork carried out in December 2019) are based on the following questions: acceptability of corruption as summarised by the Tolerance index to corruption; answers to the question 'how widespread do you think the problem of corruption is in your country?'; and the level of corruption increase in the past three years.

The three corruption perception indicators are tested in the econometric models explaining sales lost due to counterfeiting, as it is expected that the higher the perception of the corruption level in a country, or the higher the increase in that level, the higher the presence of counterfeit goods in the market and, consequently, the higher the losses to legitimate industry due to counterfeiting.

There is a high degree of variability among MS in the percentage of citizens that consider corruption acceptable, as there is in the belief that it is widespread in their countries, and the perception of increased corruption in the past three years. These differences among MS could result in different incidences of counterfeiting. The perception of an increased level of corruption is significant in explaining lost sales in the toy sector, helping to measure the impact of counterfeiting on the legitimate industry.

([16]) https://europa.eu/eurobarometer/about/eurobarometer.
([17]) https://europa.eu/eurobarometer/surveys/detail/2247.

Figure 8. Percentage of citizens declaring that the level of corruption increased in past three years, 2019.



Source: Eurobarometer on corruption, 2020

4 Panel data models

As was the case with the earlier sectorial studies ([18]), the economic impact of counterfeiting on legitimate industry is estimated based on econometric panel data models ([19]) that relate counterfeiting indicators to sales forecasting errors, defined in this report as unexpected changes in sales in three sectors in the EU market.

The three sectors (clothing, cosmetics, and toys) are analysed separately, as it was demonstrated in previous studies that drivers of counterfeiting differ by sector.

The first step consists of analysing yearly sales in each sector in each EU MS during 2008-2021. Based on sales trends since 2008, a forecast model ([20]) generates the expected sales in each country for the years 2018 to 2021 for each of the three sectors.

([18]) EUIPO (2015-2018).
([19]) Panel data models combine observations over time and cross-sectional units (individuals, firms, households, countries, or any unit that can be observed over time). This report analyses data of EU MS over 4 years, from 2018 to 2021.
([20]) Forecasts are automatically generated by univariate Autoregressive Integrated Moving Average (ARIMA) models with the software TRAMO/SEATS from Banco de España.

The second step is to analyse the difference between expected and actual sales, or forecasting errors, in a panel data model ([21]). These models explain sales forecasting errors through counterfeiting-related and other socioeconomic variables. Counterfeiting, like any illegal activity, cannot be accurately measured, but there are many variables that are signals or indicators of the level of counterfeiting in a country. Section 3 presents some variables that are considered indicators of counterfeiting, and all of them are tested in each of the three sectors. Only some of them are significant (the econometric model detects a significant relationship between each counterfeiting indicator and the corresponding forecasting errors), and these are used to estimate the impact of counterfeiting on legitimate sales.

The coefficients estimated for these counterfeiting-related variables are then used to calculate the extent to which the legitimate sector's sales are lower than expected due to the presence of fake goods in the market. These counterfeiting-related variables reflect different consumer behaviour with regard to purchases of fake goods, different characteristics of a country's legal and regulatory environments, or the frequency of other illegal activities that are usually linked to counterfeiting activities.

Although the econometric models include additional variables not related to counterfeiting, these are not used to estimate the economic impact of counterfeiting on legitimate sales, as they represent unexpected changes in sales due to reduced consumption (as was the case in all countries in 2020 due to the COVID-19 pandemic) or to the increased value of online sales. In Table 1, only counterfeiting-related variables are summarised with a '+' symbol, indicating a positive impact on losses due to counterfeiting, and a '–' symbol indicating the opposite; a higher value of this indicator signifies reduced losses due to counterfeiting. The number of symbols in each cell indicates the confidence level of significance with a 90 % confidence level signified by one symbol, 95 % by two symbols, and 99 % by three symbols.

According to the summary in Table 2, the higher the percentage of respondents who acknowledge having bought fakes in a country, the higher the sales lost due to counterfeiting in the clothing and cosmetics sectors; the higher the border detentions of clothing and toys in an MS, the lower the sales lost due to counterfeiting (with limited and positive impact in the cosmetics sector); the higher the declared unlawful drug or corruption offences, the higher the impact of counterfeiting in the three sectors; and, finally, the higher the perception of increased corruption by citizens, the higher the impact of counterfeiting in the toy industry.

([21]) More details on the panel data models are included in the appendix.

Table 2. Explanatory variables in econometric panel data models.

	Clothing	**Cosmetics**	**Toys**
Purchase of fakes (Figure 3)	+++	+++	
Border detentions (Figure 6)	---	+	---
Offences (Figure 7)	+++ (Unlawful drugs)	+++ (Unlawful drugs)	++ (Corruption)
Perceived increased corruption (Figure 8)			+++
Number of observations	100	76	74

The maximum number of observations in the panel models is 108 (27 MS and 4 years) and the effective number of observations available in each sector is the consequence of missing data in each sector, reducing the accuracy of the models.

To better understand the estimated economic impact of counterfeiting on legitimate sales, Figures 3, 6, 7 and 8 in Section 3 show the value in each MS of the four explanatory variables. For example, the first cell in Table 2 indicates that the purchase of fakes is very significant (99 % confidence level) and positively related to sales lost due to counterfeiting in the clothing sector. Following the IP Perception results (see Figure 3), Bulgaria showed the highest percentage of people acknowledging that they had purchased fake goods, and this results in a major impact by counterfeiting on reducing sales in the legitimate clothing sector in this country. The opposite occurs in Sweden, with the lowest share of people buying fakes. To continue with the same sector, in the same column, the negative symbols in the border detentions row means that a higher value of detentions (as a share of total imports from non-EU countries) in Latvia (as shown in Figure 6) implies a lower impact of counterfeiting in this country (which is also the case for Bulgaria, reducing the impact of counterfeiting in this country). Finally, the large share of recorded unlawful drug offences in Estonia, Croatia, and Cyprus increases the estimated impact of counterfeiting on the clothing industry, while the opposite happens in Spain and Italy. The final result, of sales lost due to counterfeiting in the clothing industry, is the joint effect of the three variables and is presented in Section 5.

The results concerning sales lost due to counterfeiting in each country are presented in Section 5 expressed as a percentage of total sales and in euro, as well as the corresponding lost employment estimated in line with lower sales in the legitimate industries.

5 Sales and employment lost due to counterfeiting

The presence of counterfeit goods in the EU market reduces sales of legitimate goods in the clothing, cosmetics, and toy sectors. The lost sales in the three sectors are estimated as explained in Section 4, based on counterfeiting indicators and expressed as a share of total sales in each sector. In addition to lost sales, employment lost due to counterfeiting can be estimated based on the SBS data on people employed in the three sectors and in line with sales in the producer country and exports to other EU MS, as explained in the appendix ([22]). The scope of this report is limited to EU MS, which prevents us from estimating exports and employment in EU industries reduced by counterfeiting in non-EU countries. This is indeed a limitation for countries selling their products outside the EU, as is the case, for example, of the Italian clothing industry (constituting a value of extra-EU exports of EUR 16 billion, or 40 % of all EU clothing exports to third countries), the French cosmetics sector (40 % of extra-EU exports, valued at EUR 9 billion) or the German and Czech toy industries (more than 20 % of extra-EU exports from each country).

The reference period for all the results presented in this section is the annual average in 2018-2021. For the correct interpretation of these results, it is important to bear in mind that 2020 registered a dramatic drop in the value of sales in the three sectors; clothing sales were particularly affected, and in 2021 were still 10 % below their pre-crisis level.

5.1 Losses due to counterfeiting in the clothing and footwear sector ([23])

Sales lost due to counterfeiting in the clothing and footwear sector are estimated based on the percentage of people who acknowledge purchasing fake goods, the value of border detentions of

([22]) For instance, lost employment in the Italian clothing industry is linked to lost domestic sales in Italy and lost exports to other MS due to the presence of fakes in the destination MS. There are additional economic losses for the Italian clothing industry due to the presence of fakes in non-EU countries, reducing their extra-EU exports, but these losses cannot be estimated in this report due to the absence of information on the impact of clothing counterfeiting in non-EU countries.
([23]) The clothing (and footwear) sector is defined along this report by the addition of the following NACE classes: 1413 ‘Manufacture of other outerwear’, 1414 ‘Manufacture of underwear’, 1419 ‘Manufacture of other wearing apparel and

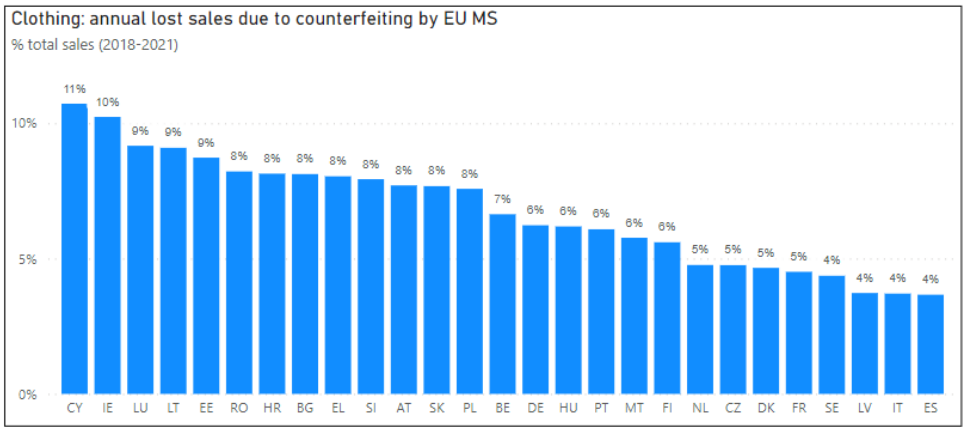
similar goods in relation to the value of extra-EU imports, and the share of declared offences related to unlawful drugs. These counterfeiting-related variables are explained in Section 3, and their level in each MS determines the relative impact of counterfeiting on the clothing sector of that MS.

The average sales lost in the clothing sector in 2018-2021 as a consequence of the presence of fake goods in the internal market is estimated at 5.2 % of total sales (at market prices), or almost EUR 12 billion. The impact in the 27 EU MS ranges from 10.8 % in Cyprus to 3.8 % in Spain. All the results at the EU and MS levels are presented in Table 3 in Subsection 5.4.

Although the present estimates are not completely comparable with those of previous EUIPO reports due to the availability of new sources of data, there are signals that confirm the lower impact of counterfeiting in the clothing sector: namely a lower share of citizens acknowledging their purchase of fakes in the EUIPO IP Perception report 2020 compared with 2017, as well increasing border detentions of clothing items.

As shown in Figure 9, only eight MS have lost sales below the EU average of 5.2 %. This is because many large countries registered low ratios (with the exception of Germany and Poland), and the EU average is weighted by the value of clothing sales by country.

Figure 9. Annual sales lost due to counterfeiting in the clothing sector (% total sales) in EU MS, average 2018-2021.

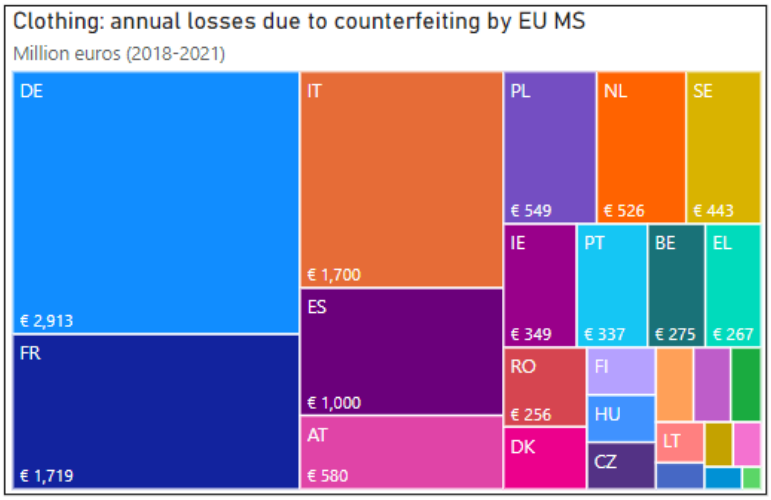


Source: author's calculations.

accessories, 1520 'Manufacture of footwear', 4642 'Wholesale of clothing and footwear' 4771 'Retail sale of clothing in specialized stores and 4772 'Retail sale of footwear and leather goods in specialized stores'.

The absolute sales losses due to counterfeiting in Figure 10 stress the different sizes of the markets, with Germany representing almost one fourth of total lost sales and the three larger MS constituting half of the total lost sales in all 27 EU MS.

Figure 10. Annual sales lost due to counterfeiting in the clothing sector (millions EUR) in EU MS, average 2018-2021.



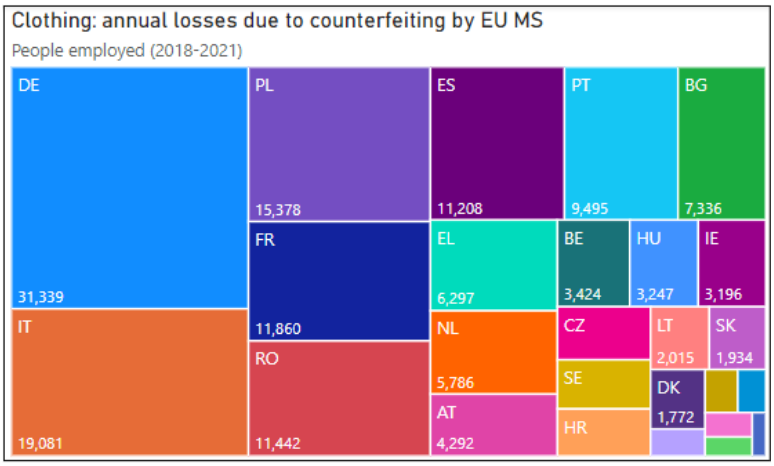
Source: author's calculations.

Sales lost due to counterfeiting in EU MS also have an impact on reduced employment in the clothing sector. Although the impact of counterfeiting on sales is calculated based on the ratio for each MS, the impact on employment is not only explained by the presence of fake goods in that MS. The flow of goods among EU MS (intra-EU trade) must be considered in estimating employment loses in the producer country, regardless of the destination of the goods but limited to EU MS.

The total employment lost in the EU due to counterfeiting in the clothing sector accounts for more than 160 000 people employed each year on average in 2018-2021. The lost employment in EU MS is shown in Figure 11 and Table 3.

Some producer countries, such as Poland, Portugal and Romania, rank higher in lost employment than lost sales. This is explained by their specialisation in the internal market, with more than 80 % of their exports to other EU MS, compared with Italy, from which only 40 % of exports are destined for the internal market.

Figure 11. Annual lost employment due to counterfeiting in the clothing sector (number of people employed) in EU MS, average 2018-2021.



Source: author's calculations.

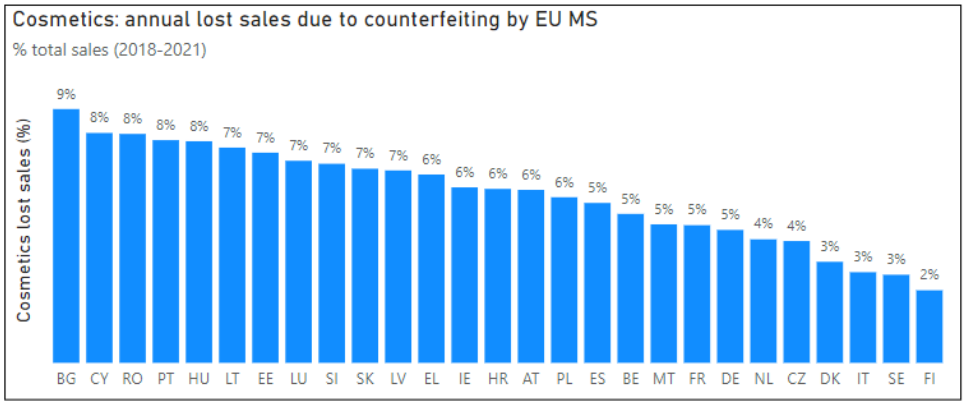
5.2 Losses due to counterfeiting in the cosmetics sector ([24])

Sales lost due to counterfeiting in the cosmetics sector are also estimated based on the percentage of people who acknowledge purchasing fake goods, the value of border detentions of similar goods in relation to the value of extra-EU imports, and the share of declared offences related to unlawful drugs. The only difference from the clothing sector model is the value of the coefficients applied to each variable (see appendix) and the fact that border detentions are hardly significant, with a 90 % confidence level, having a minimal and positive influence on the impact of counterfeiting on sales.

The average sales lost in the cosmetics sector due to the presence of fake goods in the internal market is estimated at 4.8 % of the value of total sales (at market prices) or EUR 3 billion. The impact on the 27 EU MS ranges from 8.7 % in Bulgaria to 2.5 % in Finland.

([24]) The cosmetics sector is defined throughout this report as the combination of the following NACE classes: 2042 'Manufacture of perfumes and toilet preparations', 4645 'Wholesale of perfume and cosmetics', and 4775 'Retail sale of cosmetics and toilet articles'.

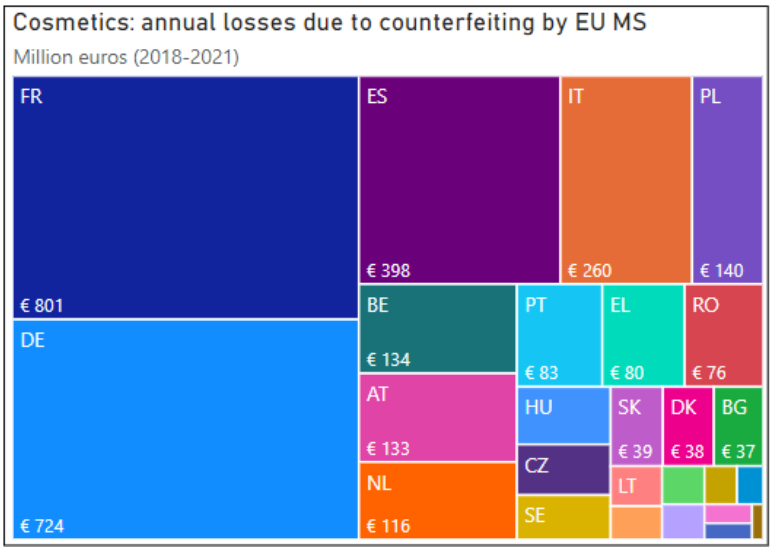
Figure 12. Annual sales lost due to counterfeiting in the cosmetics sector (% total sales) in EU MS, average 2018-2021.



Source: author's calculations.

Cosmetics sales in the EU in 2018-2021 averaged more than EUR 65 billion, with France the top-ranked market, representing one fourth of sales in the EU. The relative impact of counterfeiting in France is near the EU average (with the German ratio also very close to the EU average); consequently, France is the country most affected by lost sales in absolute value, with one fourth of total losses, as shown in Figure 13.

Figure 13. Annual sales lost due to counterfeiting in the cosmetics sector (millions EUR) in EU MS, average 2018-2021.

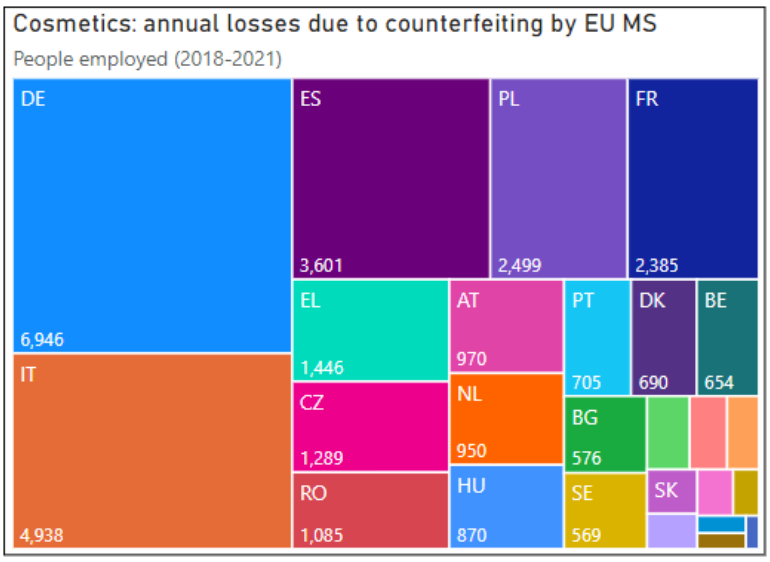


Source: author's calculations.

With regard to lost employment, the EU cosmetics industry lost a total of more than 31 000 people employed due to counterfeiting in the internal market.

The ranking of countries by lost employment is quite different, with the special case of France, the country with the highest lost sales in its territory and the fifth country by employment losses. As explained in Subsection 5.1 and in more detail in the appendix, the extra-EU exports are impacted by counterfeiting in non-EU countries, for which no data on the impact on sales is available. France is the top-ranked producer and exporter of cosmetics, with more than 60 % of its exports to non-EU countries (compared with 40 % in the rest of the EU MS). The impact of counterfeiting in non-EU countries on employment cannot be estimated in this report. The opposite is true for Germany and Italy, which total 31 % of lost sales and 38 % of lost employment including the impact of employment on intra-EU exports, which represent more than half of their total exports.

Figure 14. Annual employment lost due to counterfeiting in the cosmetics sector (number of people employed) in EU MS, average 2018-2021.



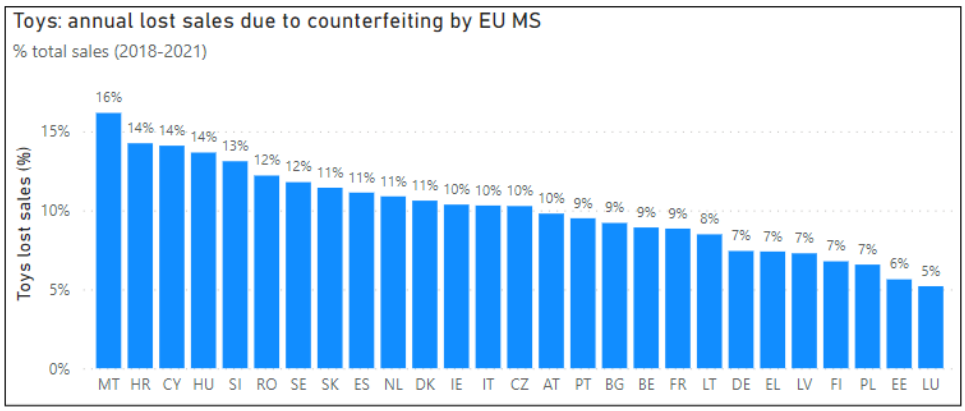
Source: author's calculations.

5.3 Losses due to counterfeiting in the toy sector ([25])

Sales lost due to counterfeiting in the toy sector are estimated based on the value of border detentions of similar goods in relation to the value of extra-EU imports, the share of declared corruption-related offences, and the perception of citizens that corruption has increased in the past three years.

The average sales lost in the toy sector due to the presence of fake goods in the internal market is estimated at 8.7 % of the value of total sales (at producer prices), or EUR 1 billion. The impact in the 27 EU MS ranges from 16.2 % in Malta to 5.2 % in Luxembourg, as shown in Figure 15.

Figure 15. Annual sales lost due to counterfeiting in the toy sector (% total sales) in EU MS, average 2018-2021.



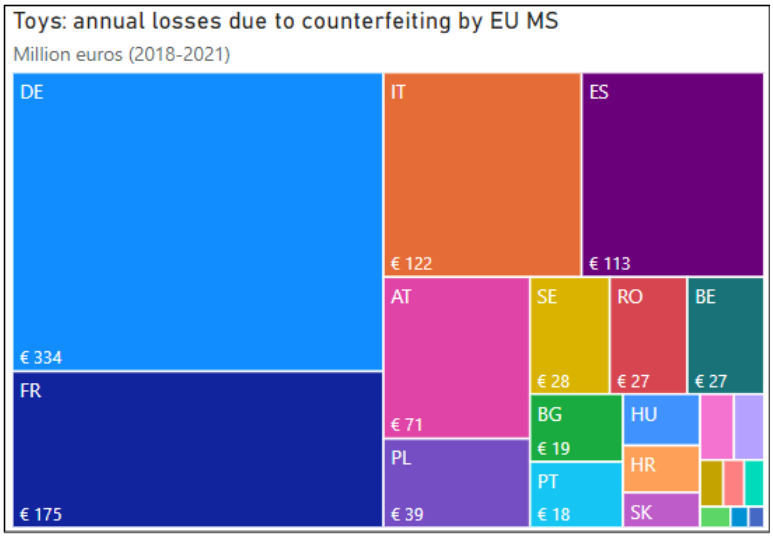
Source: author's calculations.

Total lost sales in the toys sector are dominated by Germany, with one third of all sales lost due to counterfeiting and an even greater share of total toy sales. The ranking of countries by the relative impact of counterfeiting on lost sales is quite different from the ranking for the clothing and cosmetics sectors. This is explained by the different counterfeiting variables as result of the econometric analysis explained in the appendix.

The results at MS level shown in Table 3 reveals many cells with the symbol 'na' ('not available'), due to a lack of data on production or employment in the SBS. This is due to the low number of firms in this manufacturing sector, or a high concentration of production in a few economic units.

([25]) The toy sector is defined in this report as the NACE class 3240 'Manufacture of games and toys'.

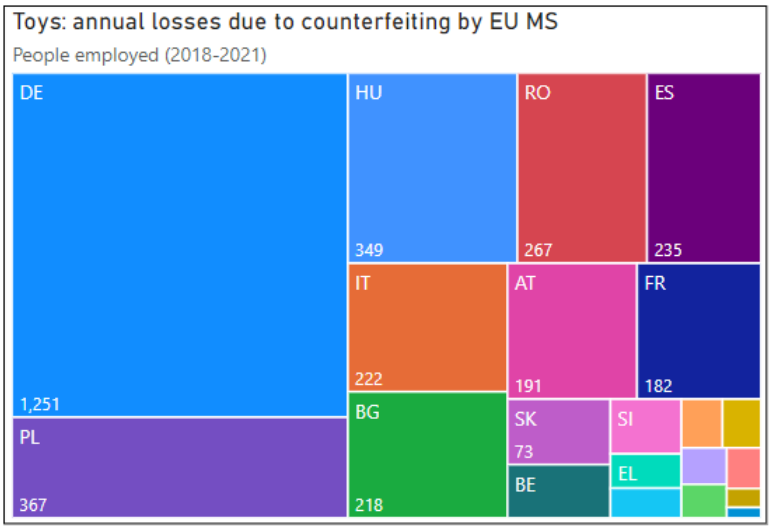
Figure 16. Annual sales lost due to counterfeiting in the toy sector (millions EUR) in EU MS, average 2018-2021.



Source: author's calculations.

Lost employment in the EU due to the presence of counterfeit toys is equivalent to 3 600 people employed, of which 1 250 represent lost employment in the German toy sector.

Figure 17. Annual lost employment due to counterfeiting in the toy sector (number of people employed) in EU MS, average 2018-2021.



Source: author's calculations.

Hungary, Poland and Romania are notable for high employment losses due to their specialisation in the internal market.

5.4 Summary of lost sales and employment in the EU in the clothing, cosmetics, and toy sectors

This report presents estimated economic losses due to counterfeiting in three sectors: clothing, cosmetics, and toys. The estimation of lost sales in each EU MS is based on econometric models that rely on statistical counterfeiting indicators, such as an EUIPO survey of citizens on IP infringement, border detentions of counterfeit goods, recorded offences associated with counterfeiters, and perceptions of corruption. The models' estimates help to determine the extent to which legitimate industries have suffered a reduction in sales due to the presence of counterfeit goods in the EU market. These lost sales translate into direct employment loses in the same industries.

The relative impact of counterfeiting on sales in the legitimate industries is estimated at about 5 % in the clothing and cosmetics industries and close to 9 % in the toy industry. Throughout this report, various characteristics of the three sectors have come to light: the size of the markets and main producer countries, the impact of the COVID-19 pandemic and subsequent recovery, and the significant indicators or drivers of counterfeiting that can explain the differing economic impact of counterfeiting in each sector.

The annual average value of total clothing sales in 2018-2021 is EUR 230 billion; cosmetics sales surpassed EUR 65 billion (or 30 % of the value of clothing sales); and toy sales equate to 5 % of clothing sales in the EU (EUR 12 billion). Germany is the largest economy in the EU, with more than 20 % of the total Gross Domestic Value (GDP), followed by France (15 %), Italy (13 %) and Spain (9 %). With regard to the economic size of the three sectors analysed here, Italy equals the value of clothing sales in Germany; France is the top-ranked producer and consumer of cosmetics; and toy sales in Germany are more than double the sales in France. This should be borne in mind when comparing absolute sales losses in each EU MS.

The impact of the COVID-19 pandemic on sales shows differences among the three sectors, as explained in Section 2, with clothing sales in 2021 still below the level two years before. Finally, Table 2 in Section 4 details the counterfeiting indicators used to estimate the impact of counterfeiting in each sector. The clothing and cosmetics models are based on the same indicators, while the toy model does not include the results from the EUIPO survey on IP Perception, and does include the perception of corruption trends.

Table 3. Annual sales and employment lost due to counterfeiting in three sectors, EU and 27 MS, average 2018-2021.

	Lost sales (%)			Lost sales (millions EUR)			Lost employment (number of people employed)		
	Clothing	Cosmetics	Toys	Clothing	Cosmetics	Toys	Clothing	Cosmetics	Toys
AT	7.7	5.9	9.8	580	133	71	4 292	970	191
BE	6.6	5.1	8.9	275	134	27	3 424	654	60
BG	8.1	8.7	9.2	88	37	19	7 336	576	218
CY	10.7	7.9	14.1	49	12	3	766	107	..
CZ	4.8	4.2	10.3	125	45	na	2 696	1 289	na
DE	6.2	4.6	7.4	2 913	724	334	31 339	6 946	1 251
DK	4.7	3.5	10.6	201	38	na	1 772	690	na
EE	8.7	7.2	5.6	33	9	1	657	76	..
EL	8.0	6.5	7.4	267	80	3	6 297	1 446	26
ES	3.7	5.5	11.1	1 000	398	113	11 208	3 601	235
FI	5.6	2.5	6.8	126	14	6	806	159	..
FR	4.5	4.7	8.8	1 719	801	175	11 860	2 385	182
HR	8.1	6.0	14.2	108	16	11	2 393	211	22
HU	6.2	7.6	13.7	126	51	12	3 247	870	349
IE	10.2	6.0	10.4	349	na	na	3 196	na	na
IT	3.7	3.1	10.3	1 700	260	122	19 081	4 938	222
LT	9.1	7.4	8.5	76	20	3	2 015	248	..
LU	9.2	6.9	5.2	50	7	1	320	39	..
LV	3.7	6.6	7.3	17	15	2	487	283	..
MT	5.8	4.8	16.2	na	4	na	na	69	na
NL	4.8	4.2	10.9	526	116	na	5 786	950	na
PL	7.6	5.7	6.6	549	140	39	15 378	2 499	367
PT	6.1	7.7	9.5	337	83	18	9 495	705	23

RO	8.2	7.9	12.2	256	76	27	11 442	1 085	267
SE	4.4	3.0	11.8	443	40	28	2 497	569	20
SI	7.9	6.8	13.1	49	9	7	631	150	42
SK	7.7	6.7	11.4	107	39	8	1 934	201	73
EU	**5.2**	**4.8**	**8.7**	**11 944**	**3 169**	**1 022**	**160 352**	**31 717**	**3 608**

Source: author's calculations.

.. low values (< 20 people employed)

na not available

6 Conclusions and suggestions for further research

The analysis of sales trends in three sectors that are victims of counterfeiting has shown the scale of the counterfeiting problem for legitimate business, which suffers decreased sales and, as a direct consequence, employs fewer people.

The EUIPO's previous research into and knowledge of various aspects of counterfeiting has been used in this report: surveys among citizens who have experienced counterfeiting (IP Perception studies); results of enforcement at the EU's borders; and connections between counterfeiters and other crimes. The economic consequences of counterfeiting have been estimated based on the economic analysis of sales trends in legitimate industries, complemented with non-economic indicators of counterfeiting.

One of the results that emerges from an analysis of 2018-2021 is the major impact of the COVID-19 pandemic on sales of both legitimate and counterfeit goods, especially in the clothing sector. A longer analysis period is needed to confirm a return to pre-crisis levels or a structural change. The different impact of counterfeiting by sector reinforces the advantage of sectorial studies focusing on specific sectors.

It must be also stressed that the impact of counterfeiting estimated in this report is based on losses due to the presence of fake goods in the internal market. EU firms also suffer reduced exports to third countries as a consequence of counterfeit goods sold in their markets, and this may have a significant impact on some exporter countries (e.g. France, in the case of cosmetics). In future

analyses, sales in the EU market could be combined with international trade flows to complete the picture of the impact of counterfeiting on EU firms, regardless of the destination country.

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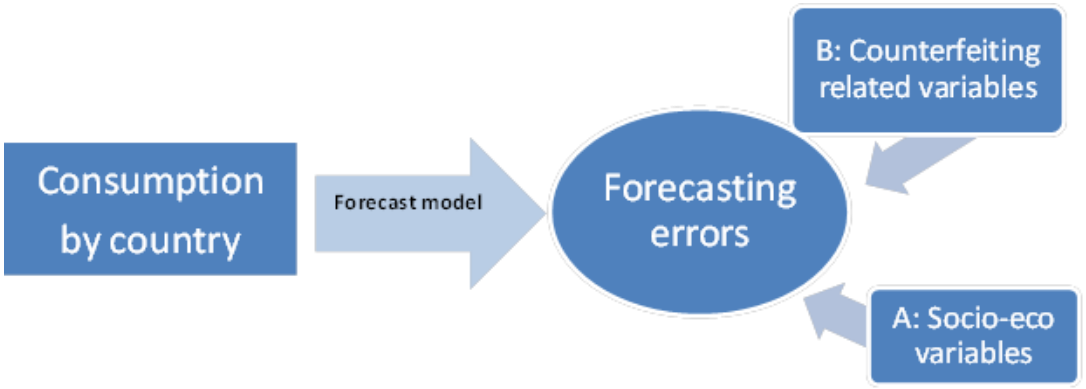
Appendix: Methodological Notes

The methodology used to estimate sales lost due to counterfeiting in a sector consists of two stages.

Figure 18. Two-stage methodology.



The first stage is comprised of a forecasting model of sales or consumption for each sector. Time series of sales in each sector and each EU MS for 2008-2021, based on Eurostat databases, allows the creation of a forecasting model that explains the past trends in each time series and predicts the value of sales in subsequent years. The simplest available comparable forecasts, across all MS, are produced using univariate ARIMA modelling. These models only use past consumption values to produce a forecast of future consumption. The forecast error – that is to say, the difference between the ARIMA forecast and observed sales – represents an estimate of the expected lost sales.

The forecast error is the difference between predicted and actual consumption; for the purposes of comparability, it is expressed as a proportion of actual consumption, as shown in the following equation:

$$q^*_{it} = \frac{\hat{Y}_{it} - Y_{it}}{Y_{it}}$$

where Y_{it} is consumption in country *i* and year *t* (measured in EUR) and $\hat{Y}_{it}$ is the forecast of Y_{it} obtained from the univariate model using consumption expenditure information up to and including the period *t*-1.

The relative error q^*_{it} measures the extent to which the forecasting model has predicted a higher or lower value (as a share of actual consumption) versus the actual level of consumption observed from the Eurostat data. Stepwise forecast errors for the 4 years from 2018 to 2021 are constructed for each sector and MS.

The second stage consists of a panel data ([26]) econometric model explaining the forecasting errors estimated in the first stage.

Counterfeiting might be one of a number of factors affecting the level of legal sales of clothing, cosmetics, and toys, but there are other socioeconomic factors that can explain the differential, such as variables related to the economic capacity of households, changing trends in consumer habits (e.g. e-commerce), or any other driver of consumption expenditure.

Having accounted for the influence of socioeconomic variables on the sales differential, an attempt is made to assess the extent to which counterfeiting variables, or relevant proxies, can explain the propensity to purchase fake goods. These variables might include consumers and market characteristics, as well as the evolution of a country's enforcement efforts.

Combining the socioeconomic and counterfeiting variables allows the specification of an econometric model whose aim is to explain the aggregate differential (forecast errors) between expected and real sales. The model is specified in the following format:

$$q^*_{it} = \alpha * X_{it} + \beta * Z_{it} + \varepsilon_{it}$$

where X_{it} is a matrix of explanatory variables unrelated to counterfeiting, and Z_{it} a matrix of variables related to counterfeiting. Finally, $\mathcal{E}_{it}$ is the remaining error.

Only those variables with explanatory power are included in the final model. Various methods have been applied, and the preferred models are estimated using Weighted Least Squares (WLS) with the inverse of Standard Errors of forecasts from ARIMA models used as weights. With this method,

([26]) Panel data refers to MS data on four different years.

observations with a large standard deviation are given less weight than observations with a smaller standard deviation. At the same time, WLS estimations solve potential problems of heteroscedasticity as stability of variance of estimated residuals is a requirement for an acceptable accuracy in the coefficients estimation. Finally, residuals were analysed to check compliance with the usual assumptions of regression models ([27]).

Model results

Table 4. Results of the estimated panel data models, counterfeiting-related variables.

Variables	Clothing	Cosmetics	Toys
Purchase of fakes	0.36845***	0.32515***	
Border detentions	-0.00098***	0.00029*	-0.00085***
Unlawful drug offences	0.18041***	0.09069***	
Corruption offences			0.95486**
Perceived increased corruption			0.21581***

* significant at 90 % confidence level

** significant at 95 % confidence level

*** significant at 99 % confidence level

Based on coefficients estimated for the counterfeiting-related variables presented in Table 4, the relative impact of counterfeiting on sales is estimated via the following relationship:

$$C^*_{it} = \widehat{\beta_1} * Z_{1_{it}} + \widehat{\beta_2} * Z_{2_{it}} + \widehat{\beta_3} * Z_{3_{it}}$$

where C^*_{it} represents the sales lost due to counterfeiting in country *i* in year *t* (expressed as the fraction of the sector's actual sales), Z_{it} is the value of each of the counterfeiting-related variables for country *i* and year *t*, and the *β*s are the estimated coefficients of each sector from Table 4.

The counterfeiting effect is then calculated for all EU Member States, applying the coefficients estimated in the model above to the values of the explanatory variables for each sector.

([27]) All results of the diagnostic tests are available on request.

Employment impacts are calculated at the MS level across the entire EU internal market. The impact on employment is not only explained by the presence of fake goods in the producer MS. The flow of goods among EU MS (intra-EU trade) must be considered to estimate employment losses regardless of the destination of goods.

Employment lost due to counterfeiting in each MS is then estimated based on SBS employment data and lost sales ratios in the producer and destination countries of intra-EU exports.

Lost employment of retailers in clothing and cosmetics sectors is totally assigned to the MS where products are sold, as this is a non-tradable service. Lost employment of wholesale and manufacture sectors is estimated based on lost sales ratios in each MS applied to employment-to-sales ratios. The employment losses corresponding to extra-EU exports cannot be estimated in this report due to the absence of lost sales ratios for non-EU countries.

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