Chapter 1.

Quantifying the UK impacts of the global trade in counterfeit products: methodological background

The entire UK economy relies on some form of intellectual property (IP), because virtually every industry either produces or uses it. The flipside of the value of IP is the harm caused by IP theft, involving creating and selling counterfeit and pirated products. Information on the magnitude, scope and trends of counterfeit and pirated trade is critical to understand the nature of the problem and how the situation is evolving. It is also essential for designing and implementing effective policies and measures to combat illicit operations. This report describes an analysis conducted by the OECD of the economic impact on the UK economy of the global trade in counterfeit and pirated goods. This chapter takes a step-by-step approach to explain the unique methodology used for the analysis.

Introduction

Industries relying intensively on intellectual property (IP) play a significant role in the economy of the United Kingdom (UK), and serve as a primary driver of UK economic growth and national competitiveness. These important industries rely on the recognition and effective enforcement of a variety of intangible assets and products of the mind and human intellect, which we refer to collectively as "intellectual property."

The story of IP is a story of economic growth, high-paying jobs, economic competitiveness, innovation and creative expression. The entire UK economy relies on some form of IP, because virtually every industry either produces or uses it. In addition to being a major driver of UK economic growth, IP provides the incentive to create, invest in, and commercialize new inventions, products, and services, while supporting artists and authors in disseminating their works, be it literary, artistic, musical, cinematic, or other creative forms of human expression.

Alongside this remarkably positive story of economic growth, ingenuity and creativity lies the less positive story of IP theft and the harm it does. It is essential to understanding these threats and the impediments to effective IP enforcement at the macro-level—that is, their global scope and magnitude—and at the micro level—the nature of the complex schemes used by illicit actors to accomplish IP theft on a commercial scale. Without it, developing and implementing an effective strategy to tackle it would be impossible.

Information on the magnitude, scope and trends of counterfeit and pirated trade is critical to understand the nature of the problem and how the situation is evolving. Information is also essential for designing and implementing effective policies and measures to combat illicit operations. This report describes an analysis conducted by the OECD of the economic impact on the UK economy of the global trade in counterfeit and pirated goods. This chapter outlines the general methodology developed through a step-by-step approach. Chapter 2 presents the findings of the methodology applied to the UK. Chapter 3 reviews the next steps needed to improve the evidence base for future studies. Chapter 4 concludes with a round-up of the policy-relevant findings.

Where do data on counterfeit and pirated trade come from?

Precise quantification and measurement of the global reach and economic scale of counterfeiting and commercial piracy, and the losses attributable to trade secret theft, can prove elusive. This is because counterfeiting and commercial-scale piracy are illicit activities, making data on such activities and their impact inherently difficult to obtain.

The clandestine and illicit nature of counterfeiting and piracy imply that the available data falls far short of what is needed for robust analysis and policy making (Box 1.1). It means that the statistical information on the magnitude, scope and trends of counterfeit and pirated trade becomes the critical component in the design process of any methodology that sheds some light on this phenomenon. Put differently, the starting point for any quantitative analysis in the area of counterfeit trade is to verify what sort of statistical data are available for analysing this issue.

This report required three types of data, each discussed in the sections which follow:

- data on counterfeit and pirated trade
- international trade statistics
- other data, including on consumer behaviour regarding counterfeit and pirated fakes, and other background micro and macroeconomic data.

Box 1.1. Data limitations

It is important to highlight that the data on counterfeiting and piracy are scarce and incomplete. Even though some progress in data collection has been observed over recent years, available statistics on counterfeiting and piracy still need significant improvement. Consequently, there are three things that should be kept in mind when developing and applying a methodological framework to quantify the effects of counterfeit trade.

1. The framework developed here does not claim to quantify all the impacts of counterfeit and pirated trade on the UK economy. It looks at areas where quantification was possible, while identifying areas of work needed to improve the understanding of how counterfeit and pirated trade affects economies and societies overall.

Box 1.1. Data limitations *(continued)*

2. In areas where quantification was possible, the framework relies on a set of methodological assumptions. For transparency purposes all are clearly spelt out in the text.
3. The framework leaves scope for further methodological amendments subject to future data improvements. There are several areas where improvements could be done, for example gauging consumers' rates of substitutions between fake and genuine goods (Chapter 3).

Data on counterfeit and pirated trade

The best available information on counterfeit and pirated trade comes from the OECD database on customs seizures. This was constructed by combining three separate datasets, received from the World Customs Organisation (WCO), the Directorate-General for Taxation and Customs Union (DG TAXUD) of the European Commission, and the US Department of Homeland Security. The database includes detailed information on seizures of IPR-infringing goods made by customs officers in 99 economies around the world between 2010 and 2013. For each year, there are more than 100 000 observations entered into the database (in most cases one observation corresponds to one customs seizure). These statistics were used in a large-scale assessment by the OECD and European Union Intellectual Property Office (EUIPO), which revised the global estimate of international trade in counterfeit and pirated goods (OECD-EUIPO, 2016).

The database contains a wealth of information about IPR-infringing goods and can be used for detailed quantitative and qualitative analysis. In most cases, the database reports general information, such as the date of seizure, the provenance and destination economies, the conveyance method, the product category, as well as more detailed descriptions, such as the name of legitimate brand owner, the number of seized products and their approximate value.

Importantly, the three original customs datasets rely on data entries collected and processed by customs officers. These data are primarily designed to improve the work of customs, e.g. to prepare risk profiling processes and share national experiences. As with any other administrative data they need careful consideration before use in quantitative analysis. A detailed analysis of the data revealed a set of limitations with this dataset, including inconsistencies in product classification levels, anomalies in terms of seized goods' provenance economies and valuations. All these issues were addressed in OECD-EUIPO (2016).

Concerning valuation of seized goods, it should be recalled that structured interviews with customs officials and descriptive analysis of values of selected products conducted as part of the OECD-EUIPO project revealed that the declared values are reported in most cases. The issue of valuation of seized goods is discussed in more detail in Chapter 3 of this report.

Trade statistics

The trade statistics used in this report are based on the United Nations (UN) Comtrade database. With 171 reporting economies which report data, and 247 partner economies (76 economies in addition to reporting economies), the database is considered the most comprehensive trade database available. Products are registered on a six-digit Harmonized System (HS)[1] basis, meaning that the level of detail is high. Data used in this study are based on landed customs value, which is the value of merchandise assigned by customs officials. In most instances this is the same as the transaction value appearing on accompanying invoices. Landed customs value includes the insurance and freight charges incurred when transporting goods from the economy of origin to the economy of importation.

In most economies, import statistics are compiled from the records filed with local customs authorities. This is particularly important in the context of this report as all datasets used in the statistical exercise (trade statistics and data on customs seizures of infringing products) originate from the same source – customs offices at the destination.

Other data

Other statistical information was used to develop a methodology to gauge the economic impact of trade in fake goods. These include:

- Statistical information on sectoral production, sales, jobs, and wages, extracted from national statistics offices.
- Information on consumers' substitution rates (see below) between genuine goods and fake goods contained in various academic studies and consumers surveys.

A more detailed discussion of these datasets is presented later in this chapter.

How to measure the economic impact of trade in counterfeit products?

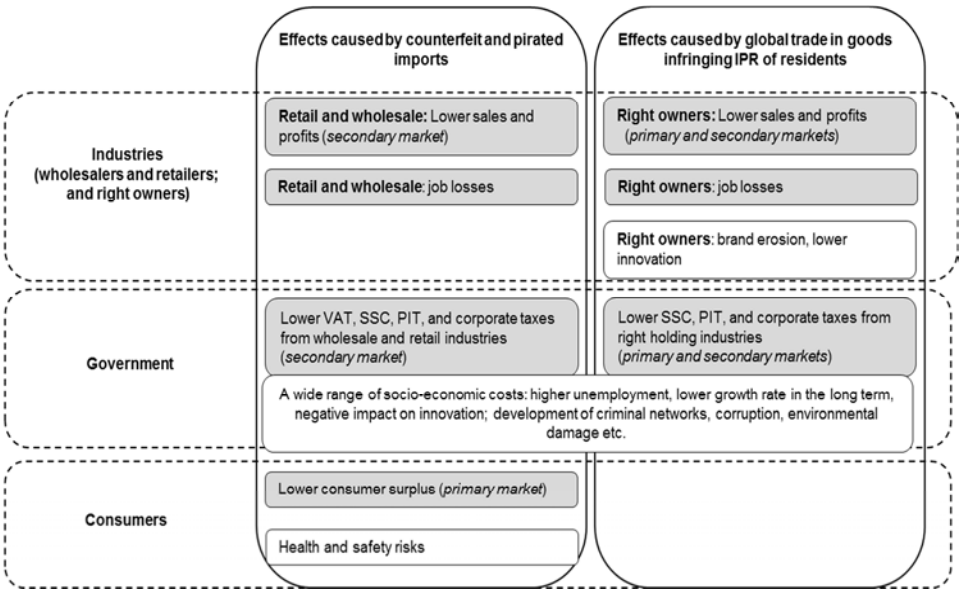
There are two ways in which counterfeit products affect the UK (Figure 1.1):

1. the effects of imports of counterfeit and pirated products on consumers, industries (including manufacturing, wholesale and retail) and government.
2. the effects of infringements of intellectual property rights (IPRs) on right holders and government.

Three important things should be kept in mind when analysing these impacts. Firstly, the methodology refers to the notion of ***primary*** and ***secondary markets*** for counterfeit and pirated goods, i.e. it distinguishes between fake products that *deceive* consumers (primary markets) and those that are *openly sold* as fakes to consumers (secondary markets: see OECD-EUIPO, 2016). The markets for deceptive and non-deceptive products have significantly different characteristics, and these differences have important implications for the overall assessment.

Whereas in primary markets consumers pay the full (or approximately) retail price for a fake product thinking that it is genuine, consumers knowingly purchasing IPR-infringing products in secondary markets are likely to pay a lower price, and would have not necessarily substituted the fakes for the genuine goods given the choice. Obviously, these differences in price and substitution rates have different implications for the estimation of lost sales and lost taxes, and for the valuation of consumers' detriment (the price premium unjustly paid by consumers in the belief that they are buying a genuine product).

Figure 1.1. How counterfeit and pirated trade affects industries, government and consumers



Notes:

1. Grey indicates areas for which quantitative analysis of impact is possible (with different degree of robustness of final results). White indicates areas for which quantitative analysis of impact is currently not possible.
2. VAT refers to value-added taxes, SSC to social security contributions, PIT to personal income taxes.

Other impact areas are hard to measure quantitatively, or are likely to occur in the long term, and are therefore excluded from the analysis. These include, for example, the negative effects of counterfeiting and piracy on consumer health and safety, on the environment, on the proliferation of criminal networks or on long-term innovation and growth.

Who is affected and how?

Industry

There are numerous industry groups that are affected badly by global counterfeiting and piracy. Legitimate wholesalers and retailers record lower sales because customers sometimes prefer to buy a fake product. Legitimate IP right holders suffer from lower revenues and profits, and in the long term they face significant brand erosion,

because of unfair competition from counterfeiters that free ride on their IP (see Box 1.2).

On the other hand, some industries can actually benefit from counterfeiting and piracy. In countries producing fake goods, counterfeiting generates significant economic activity that could be beneficial for many industry players. In addition some intermediaries, such as express and shipping companies, may record higher demand for their services because of counterfeit trade.

This methodology focuses only on *losses* incurred by the industry due to counterfeiting and piracy, and does not take into account either the positive impact of production of counterfeit products, or potential gains that intermediaries derive from counterfeit trade. There are two main reasons for this. Firstly, there are not enough data to determine precisely the potentially positive impact on producers and intermediaries. Too little is still known about the exact nature of counterfeit operations to establish a sound econometric framework that could quantify it. Secondly, parties that gain from counterfeiting and piracy often operate in an illegal economic environment. Hence, the benefits they derive do not contribute to social welfare, and result in a set of negative externalities, such as erosion of the legal system, corruption of governance structures and emergence of criminal networks.

Consequently, this methodology looks at two industry groups in the UK specifically affected by counterfeiting and piracy: (1) wholesale and retail businesses; and (2) right owners.

The wholesale and retail sector is affected by the sale of fake products on secondary markets, i.e. by consumers who intentionally buy fake products. This is because their sale implies lower legitimate sales for retailers, and consequently, lower profits and less jobs.

IP rights holders are affected by world trade in those counterfeit and pirated products that infringe their rights. In the short term, such trade reduces sales volumes and hence lowers profits made by the right holders. These losses happen due to sales of counterfeit and pirated products on both primary and secondary markets. However, each market has a different rate of sales displacement. Finally, lower sales and profits might also lead to lower levels of employment.

Government

For governments, the principal effects of counterfeit and pirated trade are foregone tax revenues. Firstly, lower sales volume and profits made by rights holders, wholesalers and retailers directly reduce corporate income taxes. Secondly, sales on secondary markets are not likely to be registered, resulting in reduced sales taxes and value-added taxes on sales made by wholesalers and retailers. Finally, job losses induced by counterfeiting reduce payroll taxes, social security contributions, and personal income taxes.

In the longer term, counterfeit trade can also have some broader, more general socio-economic effects for governments, including effects on trade, innovation and growth, employment, the environment, and criminal activity. However, due to lack of sufficient and consistent cross-economy statistics, quantification of these impacts is not possible at this stage (see Box 1.2).

Box 1.2. The long-term effects of counterfeiting and piracy

Counterfeit and pirated products can have profound long-term implications. For industries, the continued presence of counterfeit products may damage the value of the brand and image of the producers of genuine products. For instance, consumers who purchase fake items in the belief that they are genuine will be likely to blame the manufacturer of the genuine product if the fake does not fulfil expectations, thus damaging goodwill. If consumers never discover that they have been deceived, they may be reluctant to buy another product from that manufacturer, and may communicate the information to other potential buyers. Also consumers who purchase the genuine article may be put off by the availability of counterfeited products. Given that consumers are aware of potential deception on the primary market, they could adjust their expectation about future consumption patterns.

In addition, lower revenues and profits induced by counterfeiting and piracy lead in turn to lower investments by rights holders, including investments in research and development (R&D). This could translate into less innovation, slowing technical progress and lowering the rate of economic growth in the longer term.

These long-term effects cannot be quantified for two main reasons. Firstly, to do so would generally require data spanning several years. Such data are unavailable. Secondly, existing studies that could contribute to producing an adequate, alternative methodology are mostly theoretical and do not provide robust empirical support.

Consumers

For consumers, counterfeit and pirated trade might reduce the value or satisfaction that they derive from the concerned products. This is based in large measure on differences in product quality and/or performance for similarly-priced products. This is likely to occur, for instance, when a consumer buys a low-quality fake product on the primary market, believing it to be a high-quality genuine good.

In addition, counterfeit and pirated trade dramatically increases the potential for negative effects on the health and safety of consumers. Counterfeiters who target the primary market while seeking to maximise profits have limited or no interest in ensuring the quality, efficacy or safety of their products (Box 1.3.). However, because data are not collected systematically, most evidence on negative health and safety effects is anecdotal; more work is needed to measure the effects more broadly.

Box 1.3. Health risks and counterfeit hair straighteners

Hair straighteners are very commonly counterfeited, with a number of premium brands regularly being faked. A genuine version of these usually retails at around GBP 90-100, whilst the counterfeit can be purchased from a market stall for approximately GBP 30. However, counterfeits have been sold online for around GBP 70, which may seem to close enough to the real price to suggest to consumers that the product is genuine, but offered at a discount.

A detailed examination of a sample of fake hair straighteners done by Electrical Safety First showed that the internal components of fake products were compromised and severely lacking in both function and basic essential safety features. In addition, unlike the genuine product, the fake product did not have any additional safety features, such as an automatic cut-off which turns off the heating plates after a given amount of time to reduce the risk of fire and burns to the user.

Source: Electrical Safety First (2016), "A shocking rip off: The true cost of counterfeit electrical products", http://www.electricalsafetyfirst.org.uk/mediafile/100492991/True-Cost-of-a-Counterfeit.pdf.

To summarise, there are seven impact areas that this study is able to quantify with a relatively high degree of robustness. Four of them are the impacts of imports of fake goods on a specific economy: (1) loss of sales, (2) job losses, (3) lower tax revenues, and (4) loss of consumer welfare. The three remaining areas are impacts caused by global trade in products that infringe the IPR of the economy's residents. These include: (5) lower sales for the industry, (6) job losses, and (7) lower tax revenues.

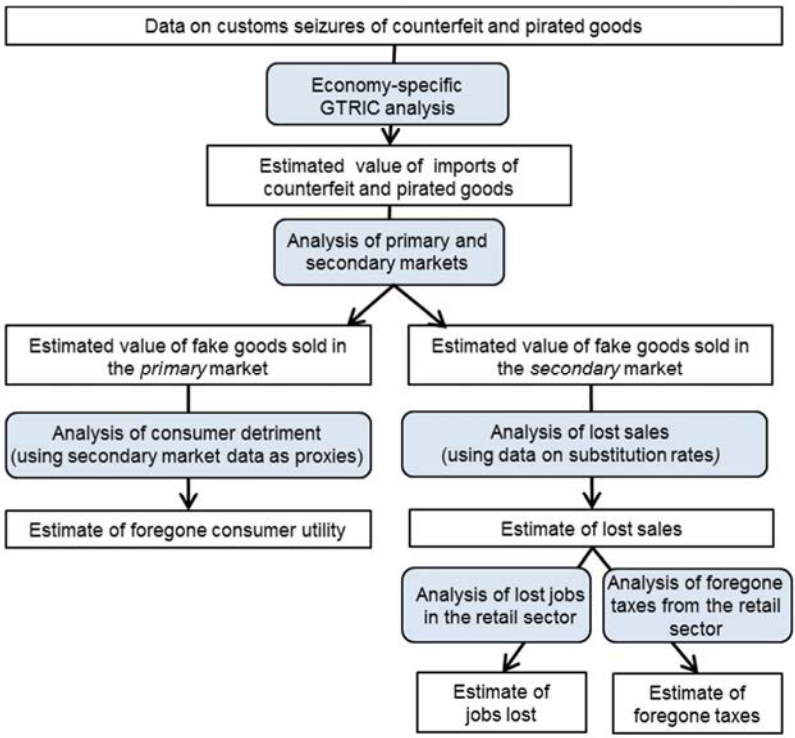
The methodological framework developed to calculate all these effects is presented step by step in the subsections below. Note that this methodology takes into account the "double-counting" issue which arises from the existence of imports of fake products in the UK economy that infringe the IPRs of its own residents.

How to quantify the direct effects of imports of fake products?

The first four impact areas listed above, can be calculated from the database on worldwide customs seizures of IPR-infringing products. The methodology follows a number of steps:

1. Estimating the value of imports of counterfeit and pirated products.
2. Estimating the value of fake imported products sold in the primary and secondary markets.
3. Estimating consumer detriment.
4. Estimating lost sales for retailers and wholesalers.
5. Estimating job losses in the retail and wholesale sector.
6. Estimating taxes foregone.

Figure 1.2. Steps involved in analysing the economic effects of counterfeit and pirated imports



Step 1: Estimating the value of imports of counterfeit and pirated products

This first step involved tailoring the databases on customs seizures of IP-infringing products and on imports of genuine goods to estimate the import value of counterfeit and pirated goods by product category and provenance economy. This partial dataset then formed the basis for further analysis of impacts.

The first task was to select out of the general database on customs seizures of IP-infringing goods observations that refer to the UK as "destination economy". The second task was to apply the General Trade-Related Index of Counterfeiting (GTRIC) methodology to this data selection in order to gauge the value of fake imports for each product category and provenance economy identified. The GTRIC methodology allows the economy-specific

trade context to be taken into account, and relies on two key econometric components (see Annex A and OECD-EUIPO, 2016 for more detail):

- The GTRIC indices for economies (GTRIC-e) and for products (GTRIC-p). GTRIC-e is an index which ranks economies according to their relative propensity to be an economy of provenance for counterfeit products. GTRIC-p is an index of industries according to their relative propensity to be targeted for counterfeiting.
- The GTRIC matrix, obtained by combining GTRIC-e and GTRIC-p. This matrix assigns the relative probability that a given type of product imported from a given trading partner will be counterfeit or pirated compared to the most sensitive to counterfeiting "product category-provenance economy" pair.

Importantly, two assumptions are made to calculate the GTRIC vectors. The first one is that the volume of seizures of a given product or from a given source economy is positively correlated with the actual intensity of trade in counterfeit and pirated goods in this product category or from that economy. The second assumption acknowledges that this relationship is not linear, as there might be some biases in the detection and seizure procedures. For instance, the fact that infringing goods are detected more frequently in certain categories could imply that differences in counterfeiting factors across products merely reflect that some goods are easier to detect than others, or that some goods, for one reason or another, have been specially targeted for inspection.

While the GTRIC matrix does not provide a direct measure of the overall magnitude of counterfeit and pirated imports, it establishes statistical relationships that are useful for this purpose. More specifically, applying the GTRIC matrix to statistics on imports of genuine products allows the upper limit value for imports in counterfeit and pirated goods to be gauged.

Similar to OECD-EUIPO (2016), this approach is taken by establishing an upper limit of counterfeit trade (in percentages of the economy's imports) for the key "provenance economy-product category" pairs that are the most vulnerable to counterfeiting, i.e. with the highest relative likelihood of being counterfeit or pirated.

Following OECD-EUIPO (2016), these values are called "fixed points".

In their main report on counterfeit trade, the OECD and EUIPO (2016) gauged the fixed point for a range of six "industry-provenance" pairs where shares of counterfeit products are the highest, based on a focus group meeting and on interviews with customs officials. The results were refined using a set of supplementary data on seizures in dedicated actions provided by the European Anti-Fraud Office (OLAF).

Once established, "the fixed points" combined with the relative probabilities included in GTRIC matrix allow the share of fake imports contained in every "product category-provenance economy" pair to be determined. These shares are then applied to existing statistics on trade in genuine products to estimate the total value of counterfeit and pirated imports.

Step 2: Estimating the value of fake goods sold in the primary and secondary markets

Two questions are crucial in assessing the economic impact of counterfeit and pirated imports for domestic retail and wholesale industries, consumers, and the government. First, what is the proportion of counterfeit and pirated imports that are sold on primary versus secondary markets? Second, within secondary markets, what is the rate at which UK consumers are substituting counterfeit goods for legitimate products?

The distinction between primary and secondary markets described earlier is crucial for analysing the effects of counterfeit and pirated imports on an economy. Every sale of a fake good on a primary market clearly represents a direct loss for the retail and wholesale industry. In secondary markets, however, only a share of consumers would have deliberately substituted their purchases of counterfeit products for legitimate ones, because in secondary markets they know what they are buying is fake. The key issue is then how to calculate the consumers' substitution rate, i.e. the extent to which every illegal purchase displaces a legal sale.

Estimating the share of fakes sold on primary and secondary markets

In order to distinguish fake products that counterfeiters and pirates intended to sell on the primary market from those intended for sale on the secondary market, the price gap between both types of fakes is exploited. For each case of custom seizure specified in the database, customs authorities report the declared value of goods (see Box 1.4. Valuation of fake goods: declared and replacement values), the quantity seized, the product's HS code, and the infringed trademark. This allows the unit value of each seized "product type-brand" pair[2] to be calculated. These unit values can then serve as a proxy for the retail prices of the fake goods.

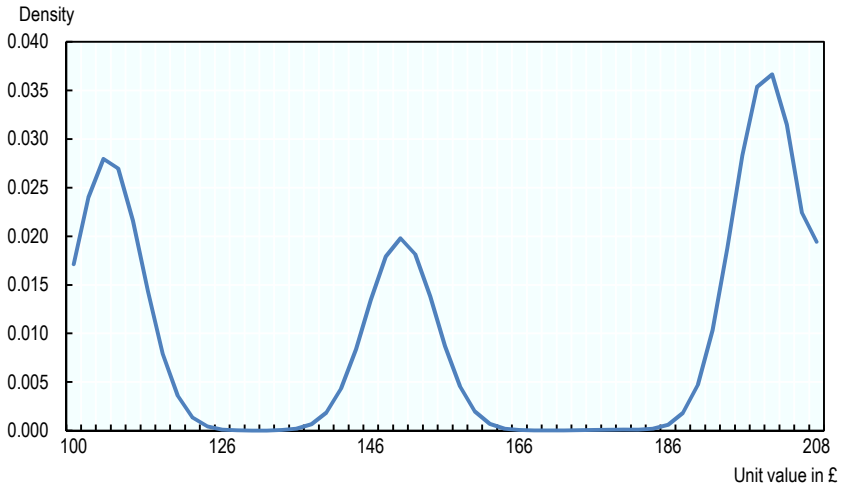
Box 1.4. Valuation of fake goods: declared and replacement values

In general, there are two principles followed by customs officials when reporting the value of counterfeit and pirated goods: 1) declared value (value indicated on customs declarations), which corresponds to values reported in the general trade statistics; and 2) replacement value (price of original goods). However, it is often unclear ex ante whether the reported value relates to transaction or replacement. The structured interviews with customs officials and the descriptive analysis of values of selected products conducted in OECD/EUIPO (2016) reveal that the declared values are reported for most cases.

Thus, for each type of product associated with a given trademark or patent, the prices of seized goods are used to estimate a confidence interval that contains the actual retail price of the corresponding genuine item. Counterfeit and pirated items whose unit price, calculated as described above, are higher than or included in this interval are then classified as intended for sale on the primary market. Those whose price is below this interval are classified as targeting the secondary market.[3]

For example, Figure 1.3 shows the price distribution of fake UGG boots produced by the American brand Deckers Outdoor Corporation that were seized by UK customs between 2011 and 2013. Using the methodology outlined indicates that fakes with prices lower than GBP 165 were destined for the secondary market, while those with values higher than GBP 165 pounds (the peak on the right hand side of the distribution) were targeted at the primary market. For more examples, see Annex A.3.

Figure 1.3. Price distribution of fake UGG boots seized worldwide, 2011-2013



Substitution rates on secondary markets

In primary markets, consumers pay the full retail price for a fake product thinking that it is the genuine good. The assumption can be made that a legitimate item would have been bought in the absence of the fake product. This represents a one-to-one substitution rate (a 100% displacement rate) and thus, a one-to-one direct loss for the industry. Note that this one-to-one substitution rate requires three important conditions: (1) the consumer is paying full retail price (or near enough) for the fake product; (2) the consumer is not aware he/she is purchasing a counterfeit product; and (3) the fake good is almost identical in quality to the genuine one.

In secondary markets, consumers knowingly purchase IP infringing products (Box 1.5.). The issue is then to estimate the likelihood that consumers would have purchased the genuine product at its full price. Clearly, these substitution rates vary by industry and economy, since factors such as product quality, distribution channels, and information available about the product can differ significantly. They also depend on the consumer's motives for purchasing counterfeit and pirated goods. For example some consumers buy counterfeits for fun, which may not provide any guidance on specific values to use.

As mentioned previously, the substitution rate is the assumed rate at which a consumer is willing to switch from purchasing a fake good to the genuine product. In other words, this displacement analysis seeks to identify the extent to which consumers substitute purchases of counterfeit and pirated products for legitimate ones. The main goal is to identify sales that were never realised by industries due to counterfeiting and piracy. Formally, a displacement rate of $x\%$ means that every $100/x$ illegal purchases of a given counterfeit product displace a legal sale.

Box 1.5. Why do people buy fakes knowingly?

There are numerous reasons identified in the scientific literature for why people buy fakes. Firstly, if the genuine product is hard to get hold of, this greatly influences the perception of its value. Furthermore, the willingness of consumers to purchase a counterfeit product seems to increase if they can rate the quality of a product before purchase and to decrease if they cannot. The situation surrounding the purchase also determines purchase intentions. The situational mood explains why some people are more prone to buy counterfeits even if that this is illegal or the lack of post-purchase satisfaction with a product of low quality. Recent psychological research illustrates a number of other motivations, such as the "thrill of the hunt," being part of a "secret society" and genuine interest. Buyers of counterfeit products also try to legitimise their behavior and give reasons for justifications.

Sources: Bian, et al., (2016), "New insights into unethical counterfeit consumption", *Journal of Business Research,* 69(10): 4249-4258; Bian, X., Haque, S. and Smith, A. (2015), "Social power, product conspicuousness and the demand for luxury brand counterfeit products", *British Journal of Social Psychology*, 54(1): 37-54; Eisend, M. and Schuchert-Güler, P. (2006), "Explaining counterfeit purchases, a review and preview", *Academy of Marketing Science Review*, 12: 1–25.

Information on substitution rates can be obtained from two different sources: academic research on consumers' social-economic behaviour, and consumer surveys. The majority of academic research has however focused on intangible pirated products, such as digital piracy.[4] Findings are rarer for tangible products, with the exception of luxury products. For example, Yoo and Lee (2005) studied the behaviour of Korean female college students and found a substitution rate of 21% for luxury fashion clothing and accessories.

In another study consumers were presented with an opportunity to purchase counterfeit products in a simulated shopping experience (Tom et al., 1998). When given the choice between a counterfeit or legitimate version of the product, 32% of the consumers selected the counterfeit version and 68% opted for the legitimate version.[56] The preference for counterfeit or legitimate versions differs by product category. Counterfeit t-shirts were the most popular (42% stated a preference for the counterfeit version), while counterfeit software was the least popular (17% stated a preference for the fake software).

The issue of the variability of substitution rates between product categories has been barely addressed in consumer surveys. One of the exceptions is a survey conducted by the Anti-Counterfeiting Group (2007), in which a sample of 1 003 representative UK consumers aged 16 and over were asked if they would have bought anything had the fake item not been available. Among this sample, 39% of consumers responded that they would have bought a genuine alternative (either made by the brand or another brand) in the case of clothing or footwear products, 49% in the case of fragrance, and 27% in the case of watches.[7]

Given the scarcity of data, the empirical exercise performed in Chapter 2 relies on three different scenarios. The first scenario assumes substitution rates that follow the results of the Anti-Counterfeiting Group's (2007) consumer survey. In this scenario, a substitution rate of 39% has been chosen for product category related to clothing and footwear, meaning that every GBP 2.5 spent on fake clothes, accessories or footwear in secondary markets translate into GBP 1 in lost sales for the retail and wholesale industry. Also in accordance with this consumer survey, the selected rates in scenario 1 are 49% for products related to the perfumery and cosmetics sector, and 27% for products belonging to the watch and jewellery industries. Finally, according to the study carried out by Tom et al. (1998), the selected substitution rate is 32% for all other fake products sold on secondary markets. The second scenario is more conservative, and assumes substitution rates 10 percentage points lower. The third scenario is the most conservative one, and assumes the substitution rates to be 20 percentage points lower than in the first scenario.

In order to test the robustness of the results, the estimates of lost sales, lost jobs and lost taxes will rely on three alternative scenarios

based on lower assumed consumers' substitution rates. These are presented in Table 1.1below.

Table 1.1 Assumed consumers' substitution rates in the three performed scenarios

Sector	Scenario 1	Scenario 2	Scenario 3
Perfumery and cosmetics	49%	39%	29%
Watches and jewellery	27%	17%	7%
Clothing, accessories, leather and related products	39%	29%	19%
Other sectors	32%	22%	12%

Step 3: Estimating consumer detriment

An individual consumer detriment is the price premium unjustly paid by the consumer in the belief that they are buying a genuine product. As consumers who choose to purchase counterfeit products on secondary markets deliberately make a cost-quality trade-off, consumer detriment only occurs in primary markets. For each product category the individual consumer detriment is estimated by calculating the difference between average price paid in the primary market (by deceived consumers) and in the secondary market (by consumers who knowingly buy fake goods). This individual consumer detriment is then multiplied by the total volume of transactions in the primary market in a given product category. Finally, for all product categories the detriments are added together to give a general estimate of consumer detriment.[8]

Step 4: Estimating lost sales for retailers and wholesalers

In order to measure lost sales for retailers and wholesalers due to counterfeit imports, three sets of information are used:

1. The estimated value of counterfeit imports by industry, as obtained in Step 1.
2. The shares of primary and secondary markets, which are estimated at the most detailed level (ideally, by brand and product type) using the methodology described in the first part of Step 2.
3. Information on consumers' substitution rates, which are extracted from consumer surveys, as explained in the second part of Step 2.

The estimated value of counterfeit imports combined with the share of the primary market gives us the total volume of lost sales for retailers and wholesalers due to the unsuspecting purchase of counterfeit products. The estimated value of counterfeit imports, combined with the shares of the secondary market and consumers' substitution rates gives us the total volume of lost sales for retailers and wholesalers due to the knowing purchase of counterfeit products. This takes into account the fact that those consumers would not have necessarily bought the genuine alternatives if the fakes had not been available.[9] Finally, the sum of both estimates gives us the total value of lost sales for wholesalers and retailers due to counterfeit imports.

Step 5: Estimating jobs lost in the retail and wholesale sector

The economic literature does not make clear links between the values of lost sales and lost jobs for each industry. This study therefore developed a simple econometric model to address this issue (see Annex A.3 for an in-depth description). The aim is to explain the extent to which the retail and wholesale industry adjusts their employment when their sales vary.

This econometric exercise was first implemented for the UK retail and wholesale industries (Table A.1 Annex A). The main insight at the aggregate level is that an increase in 1% of sales in the retail and wholesale sector implies on average a 0.46% increase in the number of employees within the sector.

The estimates of the sales elasticity of employment for each category of the UK retail and wholesale industry are reported in Table 1.2. Clearly, a decrease in sales is not translated into the same proportion of lost jobs in each sector. For instance, while a decline of 1% in sales for the wholesale and retail sector of chemical products induce a 0.37% decline in the number of employees within this sector, the elasticity is far higher for the wholesale and retail sector of clothing, accessories and footwear, with an estimated transmission rate of 0.58%.

Table 1.2. Elasticity of employment with respect to sales for the UK wholesale and retail sector, 2011-2013

Sector	Sales elasticity of employment*
Food, beverages and tobacco	0.53
Mineral products (e.g. fuels, ores)	0.45
Chemical and allied products;	0.37
Pharmaceutical and medicinal chemical products	0.45
Perfumery and cosmetics	0.45
Textiles and other intermediate products	0.51
Clothing, footwear, leather and related products	0.58
Watches and jewellery	0.44
Non-metallic mineral products	0.48
Basic metals and fabricated metal products	0.48
Electrical household appliances, electronics and telecommunications	0.49
Machinery; computers and peripheral equipment; ships and aircrafts	0.52
Motor vehicles and motorcycles	0.57
Household cultural and recreation goods;	0.53
Furniture, lighting equipment, carpets and other manufacturing n.e.c	0.58

Once estimated, these transmission rates between sales and jobs can be used to estimate the share of lost jobs due to counterfeit imports in total employment. For each retail and wholesale industry, this is done by multiplying the transmission rate with the share of lost sales into the total sales of genuine products. Finally, applying these shares of lost jobs onto data on the level of employment in a given sector allows us to estimate the number of jobs lost in the wholesale and retail industries due to counterfeit imports.[10]

Step 6: Determining taxes foregone

Lower genuine sales due to counterfeit and pirated imports reduce several sources of revenue for government:

- value-added taxes (VAT) that would have been collected on consumption
- corporate income taxes (CIT) that would have been collected on firms in the wholesale and retail industries

- social security contributions (SSC) for employees and employers in the retail and wholesale industries
- personal income taxes (PIT) for employees and employers in the retail and wholesale industries.

In order to calculate the lost VAT, one simply needs to apply the VAT rate on the amount of total lost sales due to counterfeit and pirated imports estimated in Step 4. The amount of government taxes lost from CIT is calculated by multiplying the average profit rates within each category of retail and wholesale industry with the average rate of corporation tax and the estimated value of lost sales.

To calculate losses in social security contributions, the share of the actual average amount of SSC paid by employees and employers for one unit of employment is multiplied by the amount of estimated lost jobs due to counterfeit and pirated imports estimated in Step 5. The PIT foregone is calculated by multiplying the average salary in a given industry by the average income tax rate times the amount of lost jobs.

Note that in order to estimate the results as accurately as possible, these four types of lost revenues were calculated by industry. The final result at the national level was obtained by summing the estimated amounts of foregone tax revenues across industries.

Box 1.6. The OECD BEPS programme

The OECD base erosion and profit shifting (BEPS) programme tackles tax avoidance strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations. Although some of the schemes used are illegal, most are not. However, the practice undermines the fairness and integrity of tax systems because businesses that operate across borders can use BEPS to gain a competitive advantage over enterprises that operate at a domestic level. Moreover, when taxpayers see multinational corporations legally avoiding income tax, it undermines voluntary compliance by all taxpayers.

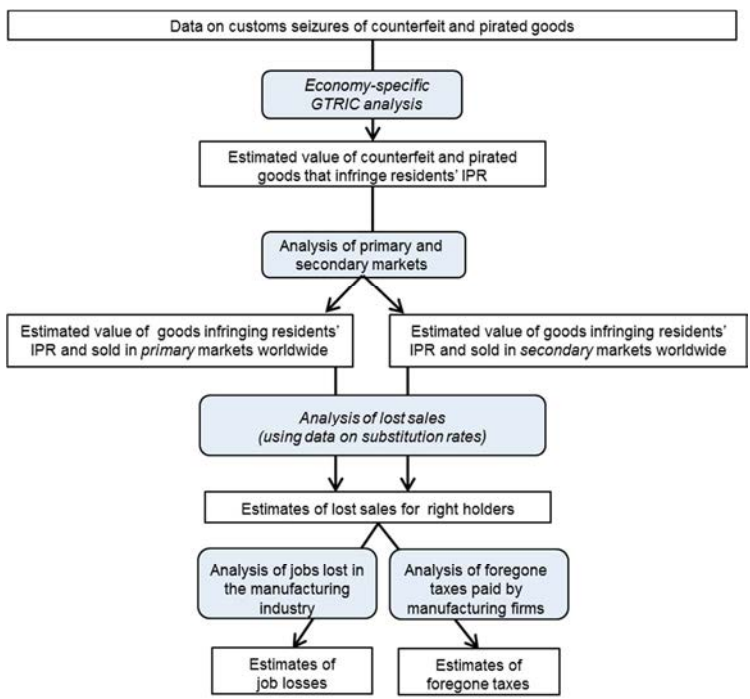
Under the BEPS framework, over 100 economies collaborate to implement measures to counter tax planning strategies that exploit these gaps and mismatches. The Inclusive Framework on BEPS has released information on the domestic legal frameworks for country-by-country (CbC) reporting around the world. This provides a high-level snapshot for tax administrations on currently implemented measures to counter such tax planning strategies.

Finally, one should keep in mind that the degree of tax losses also depends on the efficiency of tax collection schemes. An inefficient fiscal system might allow companies to exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations where there is little or no economic activity. The OECD base erosion and profit shifting programme (BEPS) was designed to tackle this problem (Box 1.6.). According to its recent findings referring to the country-by-country reporting, the UK is one of the countries with the most advanced legislative framework to counter this problem.

How to gauge the direct effects of trade in fake goods on UK IP right holders?

There are three ways global trade in counterfeit and pirated products can affect IP right holders: (1) loss of sales, (2) job losses, and (3) foregone tax revenues. These can be calculated using a harmonised methodology that is very close to the previous analysis.

Figure 1.4. Analysis of the impacts on IP right holders of global trade in fakes



Just as for the analysis of the effects of fake imports, this analysis draws on the database on worldwide seizures of IPR-infringing products. The methodology follows a number of steps:

- Step 7: Evaluating the worldwide volume of infringement of UK IPR rights holders.
- Step 8: Market analysis of residents' IPR infringing goods sold worldwide (primary/secondary).
- Step 9: Analysis of lost sales for IP right holders.
- Step 10: Estimation of lost jobs for manufacturing industries.
- Step 11: Estimation of foregone taxes.

Step 7: Evaluating the worldwide volume of infringements of IPRs of UK right holders

The first step is to estimate the value of counterfeit goods traded worldwide that infringe trademarks or patents held by UK right owners. For this purpose, observations in the database that refer to trademarks or patents whose right holders' address is registered in the UK were selected. Note that the identification of right holders' location was done using the Global Brand Database (WIPO, 2016a) and the PATENTSCOPE database (WIPO, 2016b), both provided by the World Intellectual Property Organisation. The former gathers around 30 million records of brand registration from 35 national and international collections worldwide, while the latter provides access to more than 59 million patent documents of participating national and regional patent offices.

In total more than 60% of seizures data were able to be matched with the right holder information. From this data selection, the value of global counterfeiting targeting the IPRs of UK residents can be assessed by product category and destination economy, by adapting the GTRIC methodology for exports and domestic sales.

This time, the propensities included in the GTRIC matrix refer to the likelihood that a counterfeit product of a brand or patent whose right holders' location is registered in the UK is exported to a given destination. These propensities are then applied to existing statistics on exports and domestic sales to estimate the overall magnitude of global trade in counterfeit and pirated products that infringe UK residents' IPRs.

This methodology allows the general exporting and selling behaviour of industries to be taken into account, and relies on three key econometric components:

- The General Trade-Related Index of Counterfeiting for economies (GTRIC-e): an index which lists economies according to their propensity to be a destination for counterfeit and pirated products of brands registered in the UK.
- The General Trade-Related Index of Counterfeiting for ICT products (GTRIC-p): an index which lists industries according to their propensity to sell products that are sensitive to global counterfeiting and piracy.
- The General Trade-Related Index of Counterfeiting matrix (GTRIC) that compares the likelihood of products sold by a given industry in a given destination economy to be counterfeit or pirated with the most sensitive "product category-destination economy" pair.

Again, applying the GTRIC matrix to data on exports and domestic sales allows the "ceiling" value to be gauged for trade in counterfeit and pirated goods infringing the IPR owned by UK residents. One issue, however, is how to establish a "fixed point", i.e. an upper limit of counterfeit trade, in percentage of exports, for the "product category–destination economy" pairs that are the most sensitive to global counterfeiting and piracy.

Since the interviews with customs officials and experts could not determine these "fixed points", the empirical application is based on three scenarios, with selected values of 10%, 15% and 20%. Note that all of these scenarios take much more conservative values of "fixed points" than the actual "fixed points" applied for imports in OECD-EUIPO (2016).

These "fixed points", when combined with the relative likelihood included in the GTRIC matrix allow us to calculate the share of exports and, importantly, of domestic sales of products infringing residents' IPRs. Applying these shares to statistics on the value of exports and domestic sales gives the estimated value of goods infringing residents' IPR by product category and destination economy.

Step 8: Market analysis of fake goods infringing the UK's IPRs

As with the previous analysis, two issues need now to be addressed in order to assess the economic impact of infringements of domestic right owners' trademarks and patents in global trade. First, what share of these counterfeit products is traded on primary versus secondary markets worldwide? Second, within secondary markets, what is the rate at which consumers across the world would have substituted counterfeit goods for their legitimate copies?

The first issue is addressed with the exact same methodology as described in the first part of Step 2. The only slight difference is that the unit value distributions are estimated for each "product category-trademark (or patent)-destination economy" triplet, in order to take into account differences in retail prices between economies. Finally, because of a lack of data, the consumers' substitution rates chosen are the same as those selected in the second part of Step 2. Again, different scenarios of lost sales, lost jobs and lost taxes will be presented depending on the assumed rates.

Step 9: Estimation of lost sales for IP right holders

In order to discover the value of lost sales for domestic IPR owners, the estimated value of products sold worldwide which are fake versions of these brands or patents are combined with information on (1) the share of primary and secondary markets for these products by destination economy; and (2) consumers' substitution rates (see Step 8).

The calculation is very close to the one described in Step 4, with the only exception being that it is first performed by destination economy before being aggregated. The total value of lost sales for domestic right owners is given by adding the value of sales of fake products on primary markets to the value of sales on the secondary market, adjusted for consumers' substitution rates.[11]

Step 10: Estimating lost jobs in the domestic manufacturing industry

This step requires estimating the extent to which employment in the UK manufacturing sector responds to changes in sales on export markets and on the domestic market. This is done by applying the econometric model developed in Step 5 (explained Annex A.3), to data specific to the manufacturing industries. The results of this

estimation for the UK manufacturing sector are displayed in Table A.2 in the Annex. The estimated transmission rates between lost sales and jobs lost by the UK manufacturing industry are displayed in Table 1.3.

These transmission rates appear to vary considerably across UK manufacturing industries, ranging from 0.24% for raw hides, skin and leather (HS 41) to 0.64% for domestic manufactured machinery and mechanical appliances (HS 84). This confirms that a robust and industry-specific estimation of these transmission rates is crucial in order to assess properly the impact of global trade in counterfeit and pirated products on employment.

Table 1.3. Degree of employment response to sales variations, UK manufacturing sector, 2011-2013

HS category	Sales elasticity of employment*
Foodstuff (02-21)	0.64
Beverages (22)	0.43
Residues from the food industries (23)	0.51
Tobacco (24)	0.64
Salt; sulphur; earths and stone; lime and cement (25)	0.53
Ores, slag and ash (26)	0.64
Mineral fuels (27)	0.48
Organic and inorganic chemicals (28/29)	0.54
Pharmaceutical products (30)	0.61
Fertilisers (31)	0.39
Tanning or dyeing extracts (32)	0.54
Perfumery and cosmetics (33)	0.54
Soap; albuminoidal substances; glues; explosives (34-37)	0.56
Miscellaneous chemical products (38)	0.43
Plastic and articles thereof (39)	0.63
Rubber and article thereof (40)	0.56
Raw hides, skins and leather (41)	0.24
Articles of leather; handbags (42)	0.41
Furskins and artificial fur (43)	0.38
Wood and articles thereof (44)	0.59
Cork; straw and articles thereof (45/46)	0.45
Pulp and paper (47/48)	0.59

Table 1.3. Degree of employment response to sales variations, UK manufacturing sector, 2011-2013 (*continued*)

HS category	Sales elasticity of employment*
Printed articles (49)	0.64
Silk; wool; and other vegetable textile fibres (50-53)	0.48
Man-made filaments and staple fibres (54/55)	0.64
Wadding; cordage; ropes and articles thereof (56)	0.25
Carpets and rugs (57)	0.47
Finishing of textiles (58)	0.46
Other textiles n.e.c. (59)	0.48
Knitted or crocheted fabrics (60)	0.28
Clothing, knitted or crocheted (61)	0.46
Clothing and accessories, not knitted or crocheted (62/65)	0.57
Other made-up textile articles (63)	0.54
Footwear (64)	0.43
Articles of stone, plaster and cement (68)	0.58
Ceramic products (69)	0.55
Glass and glassware (70)	0.54
Jewellery (71)	0.47
Iron and steel; and articles thereof (72/73)	0.58
Copper; nickel; aluminium; lead; zinc; tin; and articles thereof (74-81)	0.61
Tools and cutlery of base metal (82)	0.57
Miscellaneous articles of base metal (83)	0.59
Machinery and mechanical appliances (84)	0.64
Electrical machinery and electronics (85)	0.63
Railway (86)	0.50
Vehicles (87)	0.61
Aircraft (88)	0.62
Ships (89)	0.59
Optical; photographic; medical apparatus (90)	0.64
Watches (91)	0.23
Musical instruments (92)	0.24
Arms and ammunition (93)	0.56
Furniture (94)	0.62
Toys and games (95)	0.51
Miscellaneous manufactured articles (66/67/96)	0.55

Note: *The sales elasticity of employment indicates the scale of drop in employment (in percentage), as a consequence of a one-percent drop in sales.

Step 11: Estimating taxes foregone

Unlike counterfeit and pirated imports, jobs lost due to infringements of IPRs affect only three types of tax revenues: corporate income taxes (CIT) of right holders; and social security contributions (SSC) and personal income taxes (PIT) paid by employers and employees in the manufacturing sector. The value-added taxes (VAT) on domestic sales of residents' IPR-infringing products are not calculated, since they have already taken into account when estimating the value of foregone tax revenues induced by lost sales due to counterfeit and pirated imports.

The methodologies applied to calculate each of these foregone tax revenues are exactly the same than those described in Step 6. Again, this is done industry by industry in order to obtain as accurate estimates as possible.

Notes

1. The Harmonized System (HS) is an international commodity classification system, developed and maintained by the World Customs Organization.

2. Each type of fake product and its associated trademark or patent.

3. Formally, let s_c and $\bar{s}_c$ denote, respectively, the import value and quantity of any custom seizure of counterfeit products, with $c \in \{1, \ldots, N\}$ the range of customs seizures, and N their total number. $p_c = s_c/\bar{s}_c$ then refers to the unit value of each custom seizure, and can serve as a proxy for their unit price. Let $p_{bp} = \left(\sum_{c \in \{bp\}} p_c\right)/N_{bp}$ defines the (unweighted) price average of any type of product p associated with the brand or patent b, with N_{bp} the total number of custom seizures reported for this "product category - brand" combination. The standard deviation of this price is denoted σ_{bp} .

   X_c is defined as a dichotomous (binary) variable that takes the value of 0 if the fake goods included in the seized shipment were intended to be sold on the primary market, or 1 if they were intended to be sold on the secondary market. In accordance

with the arguments mentioned in the main text, X_c is assumed to be defined as follows:

$$X_c \begin{cases} = 0 \text{ if } p_c \in \left[p_{bp} - \dfrac{1.96 \times \sigma_{bp}}{\sqrt{N_{bp}}};\ \max\limits_{c\epsilon\{bp\}} p_c \right] \\ = 1 \text{ if } p_c \epsilon \left[\min\limits_{c\epsilon\{bp\}} p_c\ ;\ p_{bp} - \dfrac{1.96 \times \sigma_{bp}}{\sqrt{N_{bp}}} \right[\end{cases}$$

$\forall c\{bp\}$. It follows that the share of products sold on the primary market can be calculated by product category, τ_p^1, and/or for the entire mass of fake imports, and is given by:

$$\left(\sum_b \sum_c {}^{X_c s_c}\right) / \left(\sum_b \sum_c {}^{s_c}\right), \quad \forall c \epsilon \{bp\}$$

4. In two distinct studies, Rob and Waldfogel (2006, 2007) found, for instance, a displacement rate between illegal recorded music and video purchases and legitimate ones of around 20% and 67%, respectively, for a sample of US undergraduate students in 2005. Other academic studies of the recorded music industry suggest a displacement rate between 15% and 20% (Liebowitz, 2006; Zentner, 2006; Michel, 2006; Oberholzer-Gee and Strumpf, 2007). This means that every 5-6 illegal downloads displaces a legal sale.

5. The purposes of this exercise were: (i) to assess the proportion of consumers who, when given the opportunity to purchase either a counterfeit or legitimate version of consumer goods, would choose to purchase the counterfeit item; (ii) to determine their product attitudes; and (iii) to obtain demographic characteristics.

6. Note that 39% of the sample stated that they had knowingly purchased counterfeit products; 61% stated that they have never knowingly purchased counterfeit goods.

7. The remaining share of consumers is split as follows: 45% of fake buyers would not have bought anything and 16% would have bought another fake item in the case of clothing and footwear. These figures are 39% and 33%, respectively, in the case of watches; and 37% and

   14%, respectively, in the case of fragrance. No additional investigation about potential price differences between genuine and fake offerings was made.

8. More formally, the principle behind the measure of consumer detriment is as follows. First, for any type of product p related to the brand b, the average price paid on primary market, p_{bp}^1, and the average price paid on secondary market, p_{bp}^2, are calculated. Since the gap between these prices represents the "value of consumers' deception", it can be used as a proxy for consumer detriment of purchasing a given

branded product bp on the primary market: $d_{bp} = p^1_{bp} - p^2_{bp}$. Finally, these detriments can be aggregated by product category, or at the national level, multiplying them by the estimated volume of sales on primary markets, "Q^1_{bp}, as follows:$D = \sum_b \sum_p \left(d_{bp} Q^1_{bp}\right)$.

9. Formally, for each product type p, the loss of sales incurred by domestic wholesalers and retailers due to counterfeit and pirated imports, S_p, is given by adding the estimated value of counterfeit and pirated imports sold on the primary market – i.e. the total value of counterfeit and pirated imports, C_p, estimated in Step 1, times the share of the primary market, τ^1_p , estimated in Step 2 – to the estimated value of fakes sold on the secondary market times the consumers' substitution rates, ρ_p:

$$S_p = \left[\tau^1_p \times C_p\right] + \left[(1 - \tau^1_p) \times C_p \times \rho_p\right]$$

10. More formally, the estimated transmission rates between sales and jobs, ε_p, allow recovering the number of lost jobs as follows. First, the share of lost jobs due to counterfeit and pirated imports into the total employment within each retail and wholesale industry, ϑ_p, is calculated by multiplying the share of lost sales into the total sales of genuine products in the industry, $S_p/\hat{S}_p$, with the transmission rates:

$$\vartheta_p = \varepsilon_p \times \left(S_p/\hat{S}_p\right)$$

Second, these shares of lost jobs are applied onto data on the level of employment, $\hat{L}_p$. This give us the amount of lost jobs in the wholesale and retail industries due to counterfeit and pirated imports, J_p:

$$J_p = \vartheta_p \times \hat{L}_p$$

11. Formally, by denoting τ^1_{pd} the share of the primary market in destination economy d for all products of type p that infringe residents' IPR, and C_{pd} the estimated value of fake sales of those products in that destination, the estimated value of lost sales for domestic right holders by product category p is given by:

$$S_p = \sum_d \left[\tau^1_{pd} \times C_{pd}\right] + \left[(1 - \tau^1_{pd}) \times C_{pd} \times \rho_p\right]$$

with ρ_p denoting the product type-specific consumers' substitution rates.

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