Trade in Counterfeit ICT Goods

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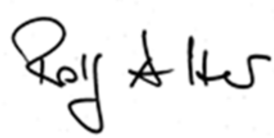
Preface

Recent years have witnessed a constant rise in the spread of ICT infrastructure and growing demand for ICT goods worldwide. The development of ICT products is highly knowledge-intensive and the industry relies extensively on intellectual property (IP) rights. Strong, growing demand for ICT goods, coupled with their IP dependence, makes them an attractive target for counterfeiters. Consequently, trade in fake ICT goods gives rise to significant challenges to effective governance, efficient business and the well-being of consumers.

The OECD has prepared this report with the aim of improving decision-makers' understanding of the nature and scale of the trade in fake ICT goods. We are confident that this research will assist policy makers in formulating evidence-based policies to combat ICT counterfeiting.



Rolf Alter
OECD, Director
Public Governance and Territorial Development Directorate

Foreword

Trade in counterfeit goods is a longstanding socio-economic problem that continues to grow in scope and magnitude. Counterfeiting gives rise to significant challenges to effective governance, efficient business and the wellbeing of consumers, and is becoming a key source of income for organised criminal groups. It represents a threat to legitimate business and economic activity and should be addressed as part of government efforts to counteract illicit trade.

This report looks at the scope and volume of trade in counterfeit information and communication technology (ICT) goods. It also identifies and quantifies the categories of these goods affected by counterfeiting, and charts and analyses the evolution of counterfeit trade routes in terms of origins, key transit points and destinations. The fake ICT goods were found to account for up to 6.5% of total ICT trade, well above the 2.5% average of fake goods' share in total trade. The range of fake ICT goods is very broad, ranging from headphones and smartphones to transistors and printed circuits, and some of them, such as batteries, can pose serious health and safety threats. The report also finds that while China and Hong Kong (China) are the main sources of counterfeit ICT goods, companies registered in the United States and several other OECD countries are hit the hardest by this trade in counterfeits.

The findings outlined in this report will provide ICT stakeholders, including governments and experts tasked with counteracting illicit trade, with a clear view of the technical and operational challenges to be addressed in the battle against ICT counterfeiting. The report will thus help public and private-sector decision-makers develop a cohesive response to the challenge of ICT counterfeiting, and support their efforts to build confidence and security in the use of ICT.

The report is based on a global database of customs seizures provided by the World Customs Organization and supplemented with regional data submitted by the European Commission's Directorate-General for Taxation and Customs Union, the US Customs and Border Protection Agency, and the US Immigration and Customs Enforcement.

In parallel, OECD has been carrying out an overall economic assessment of the counterfeiting challenge in co-operation with the European Union Intellectual Property Office, identifying the main governance "gaps" that create opportunity for counterfeiting. This study has allowed OECD to build a comprehensive database on seized counterfeit goods – in partnership with the World Customs Organization, the EU DG TAXUD, and the US Customs and Border Protection – as part of the work of the Task Force on Countering Illicit Trade of the OECD High Level Risk Forum. The study also benefited from OECD expertise on the digitalisation of the economy as well as the findings of its Digital Economy Outlook.

The report was prepared by Piotr Stryszowski, Senior Economist, and Florence Mouradian, Economist, with overall guidance from Stéphane Jacobzone, Deputy Head of Division at the OECD Directorate for Public Governance and Territorial Development. The authors wish to thank experts from the OECD member countries for their valuable assistance provided. The authors would also like to thank Marie-Claude Gohier, Fiona Hinchcliffe, Jennifer Stein and Andrea Uhrhammer for their editorial and production support.

The authors express their gratitude for the data and valuable support of the World Customs Organization, the European Commission's Directorate-General for Taxation and Customs Union, the US Customs and Border Protection Agency and the US Immigration and Customs Enforcement.

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Acronyms and abbreviations

CBP/ICE	US Immigration and Customs Enforcement
DG TAXUD	Directorate-General for Taxation and Customs Union, European Commission
EUIPO	European Union Intellectual Property Office
GTRIC	General Trade-Related Index of Counterfeiting
HS	Harmonised system
ICT	Information and communications technology
IP	intellectual property
ITU	International Telecommunications Union
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
USD	United States dollars
WCO	World Customs Organization

Executive summary

The information and communications technology (ICT) sector is marked by strong growth. Demand for ICT goods is high and growing worldwide, and ICT infrastructure is constantly expanding. Unfortunately, ICT goods are also an attractive target for counterfeiters. ICT products are highly knowledge-intensive, and protected with intellectual property, and therefore vulnerable to copying.

Counterfeits are goods that infringe trademarks. The ICT industry relies heavily on intellectual property (IP) rights. ICT counterfeiting preys on consumers' trust in established brands, and poses dangers to their health, safety and privacy. ICT manufacturers and authorised ICT vendors have experienced revenue losses and erosions in brand value as a result of trademark infringement. Fake components cause network operators to contend with low quality of service, network disruptions and failures in electromagnetic compatibility. Governments forfeit tax revenues and incur great expense in ensuring compliance with national anti-counterfeiting legislation and reacting to threats to public safety and distortions in labour markets. Counterfeiting activities can also be a source of revenue for organised crime.

According to the best estimates calculated in this study, world trade in counterfeit ICT goods accounted for as much as USD 143 billion in 2013, and 6.5% of ICT products traded worldwide were fake. Furthermore, the number and range of affected products are growing. The share of fakes in ICT imports is well above the average share of counterfeit goods in total trade (around 2.5%); this reflects the highly globalised nature of the ICT industry.

While the range of fake ICT goods is very broad, some products are targeted more often and many can pose serious health and safety threats. The ICT goods that are most frequently targeted by counterfeiters include memory cards and sticks, cards with magnetic stripe, and solid state drives; sound apparatus; and video game consoles and controllers. In the product category "sound apparatus, excluding MP3 and MP4 players", more than 14% of traded goods are fakes. Batteries are also frequently counterfeited, and there have been numerous reports of fake batteries posing serious health and safety risks.

Both intermediary ICT devices and consumer ICT goods are targeted by counterfeiters. These fake products include not only end-consumer ICT goods, but also ICT infrastructure components, such as batteries, transistors, printed circuits or even radio masts.

China and Hong Kong (China) are the main sources of counterfeit ICT goods. China appears to be the primary producer of counterfeit ICT products, with rapidly growing export flows that today account for more than 25% of global ICT exports. The role of Hong Kong (China) is less clear – it is certainly an important hub of international trade, and could serve as a transit economy for fake ICT goods. However, it may also produce some of them.

Companies registered in the United States are hit the hardest by this trade in counterfeits, but those in other OECD countries are also strongly affected (notably Finland, Japan, Korea and Germany). Almost 43% of all seized fake ICT goods infringe the IP rights of firms registered in the United States. Rights holders in Hong Kong (China) are also having their IP rights infringed. This highlights how all innovative ICT companies, no matter where they are located, can suffer revenue losses and erosions in brand value as a result of trademark infringement.

Almost two-thirds of counterfeit ICT goods are shipped by express and postal services. This significantly complicates the screening and detection processes and enables counterfeiters to lower the risk of detection and minimise the expected penalty.

Chapter 1

The study scope, definitions and rationale

This case study identifies and quantifies the categories of information and communications technology (ICT) products affected by counterfeiting, and charts and analyses the evolution of counterfeit trade routes in terms of origins, key transit points and destinations. It also explores methodologies and techniques that could be used to improve the measurement of the magnitude of counterfeit trade in the ICT sector. This chapter defines some key terms used in the report, including ICT and counterfeiting, and introduces some of the threats posed by the trade in fake ICT products and components.

Information on the magnitude, scope and trends of counterfeit trade in ICT products is critical to understanding the nature of the problems being faced and how the situation is evolving. This information is also essential for designing and implementing effective policies and measures to combat illicit operations.

This case study identifies and quantifies the categories of information and communications technology (ICT) products affected by counterfeiting, and charts and analyses the evolution of counterfeit trade routes in terms of origins, key transit points and destinations.

One of the principal objectives of this report is to explore methodologies and techniques that could be used to improve the measurement of the magnitude of counterfeit trade in the ICT sector. To this end, this study builds on approaches developed by the OECD and others. It primarily relies on a quantitative assessment of the trade in counterfeit ICTs (OECD, 2013). It also modifies the methodology developed for a joint study by the OECD and the European Union Intellectual Property Office (EUIPO) on counterfeit trade, taking advantage of the comprehensive OECD database on seizures of counterfeit goods (OECD-EUIPO, 2016).

Defining ICT

It is not simple to provide a clear and unambiguous definition of ICT and the ICT sector, although some general principles exist. In 1998, OECD member countries agreed to define the ICT sector as a "combination of manufacturing and services industries that capture, transmit and display data and information electronically" (OECD, 2002). This definition, based on an international standard classification of activities (ISIC Rev. 3),[*] was considered to be a first step towards obtaining some initial measurements of ICT sector core indicators.

The principles underlying the definition are the following. For manufacturing industries, the products of a candidate for ICT industry:

- Must be intended to fulfil the function of information processing and communication including transmission and display.
- Must use electronic processing to detect, measure and/or record physical phenomena or control a physical process.

*. "International Standard Industrial Classification of All Economic Activities", Rev.3 (ISIC Rev. 3), see http://unstats.un.org/UNSD/cr/registry/regcst.asp?Cl=2.

The current OECD ICT sector definition that was mentioned above was originally approved in 1998. It was amended slightly in 2002 to reflect ISIC Rev. 3.1 changes to Wholesale category (OECD, 2003). In this study, ICT refers to the following goods: computers and peripheral equipment, communication equipment, consumer electronic equipment, electronic components, electrical equipment, cases/covers; packing material; labels and certificates; and some miscellaneous articles such as lasers and remote controls (see Annex C, Table C.3 for a detailed list).

The threats posed by counterfeiting

Counterfeiting is used to describe a range of illicit activities related to intellectual property (IP) rights infringement. By following the approach presented in the previous OECD studies (OECD, 2008; OECD-EUIPO, 2016), this report looks at infringement of trademarks as described in the World Trade Organization Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement).[*] Consequently, this study uses the term "counterfeit" to describe tangible goods that infringe trademarks. It should be emphasised that this project does not include intangible infringements, such as online piracy, or infringements of other intellectual property rights. A trademark is a distinctive sign that identifies certain goods or services as those produced or provided by a specific person or enterprise. Trademarks may include words, personal names, letters, numerals, figurative elements and combinations of colours, as well as any combination of these signs.

The terms "counterfeit" and "sub-standard" also need to be clarified. A counterfeit ICT device infringes the trademark under national law. A counterfeit product bears a trademark (without permission) that is identical or indistinguishable from a registered trademark for that product under the laws of the importing country, with the intent to defraud and give the impression of authenticity. An ICT device is sub-standard if it does not comply with national and/or international technical standards, conformance and interoperability assessments, or legislative or regulatory requirements.

Consequently, it is technically possible for an ICT device to be counterfeit but not sub-standard, and vice versa. While genuine ICT products are subject to strict safety norms and certification, fake goods are

*. Sub-standard, adulterated or mislabelled ICT products that do not violate a trademark are thus beyond the scope of the study, as are, for example, replacement automotive oil filters and head lamps that are made by firms other than the original equipment manufacturer (provided the replacement parts do not violate a trademark).

often sub-standard, and bear counterfeit safety certification marks (OECD, 2009 and 2013). They have been found to contain inferior components and low quality materials that may cause the device to easily overheat, sometimes leading to explosions and burns.

Recent research by the Nokia Institute of Technology in Brazil (INdT), an independent research and development entity, found that counterfeit phones generally do not comply with the EU directive on the restriction of use of certain hazardous substances in electronic equipment (RoHS Directive 2002/95/EC). These phones contain more lead and cadmium in both external and internal components than the genuine ones (ITU, 2014). Another example is a recent study by the power safety compliance firm, UL, of fake iPhone chargers. This found that almost all the adapters in the sample failed to meet the norms, posing potential health and safety risks (Box 1.1).

Box 1.1. **The dangers of counterfeit Apple iPhone adapters**

An adapter is a device that takes any input voltage an electrical outlet ranging from 100 to 240 volts of alternating current (AC) and converts it to 5 volts of direct current (DC) to charge the device safely. The design of the adapter and the materials used in its construction are critical to its safe use.

A recent study by UL assessed the danger associated with the use of counterfeit iPhone adapters. Four hundred counterfeit iPhone adapters were tested to identify the potential risk of electric shock. The counterfeit adapters were obtained from multiple sources in eight different countries around the world, including the US, Canada, Colombia, China, Thailand and Australia.

In the sample of 400 adapters the overall failure rate exceeded 99%. Only three adapters (1.3%) passed the basic safety tests, and were free from fire and shock hazards. Twelve adapters were so poorly designed and constructed that they posed a risk of lethal electrocution to the user.

Source: UL (2016), "Counterfeit iPhone adapters" UL, Montreal, http://library.ul.com/wp-content/uploads/sites/40/2016/09/10314-CounterfeitiPhone-WP-HighRes_FINAL.pdf.

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Chapter 2

The importance of the ICT sector and threats posed by counterfeiting

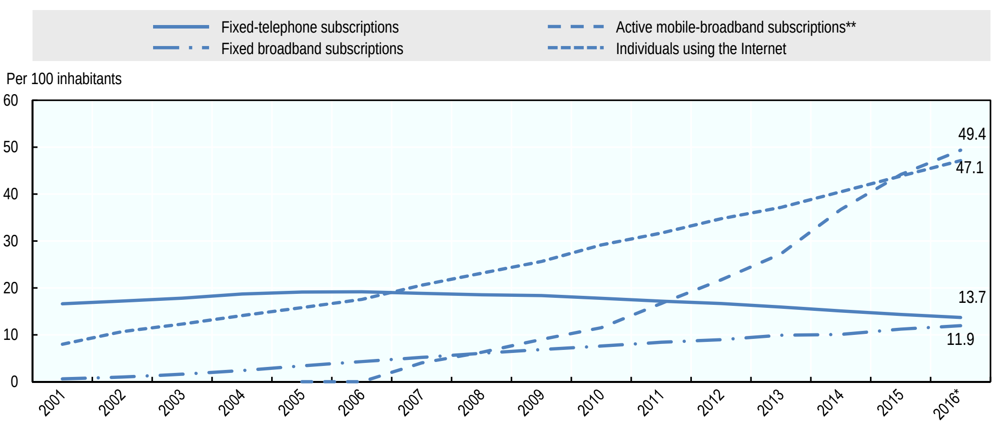
The information and communications technology (ICT) sector is important and rapidly growing, accounting for 5.5% of the OECD's total value added in 2013, equivalent to about USD 2.4 trillion. This chapter provides the economic context for the sector, including the universal strong and growing recent demand for ICT goods, and the sector's transformational potential. It explores reasons behind the prevalence for counterfeiting in the sector, as well as outlining some of the threats this poses.

Demand for ICT products is strong

Information and communication technologies (ICT) are transforming the ways social interactions and personal relationships are conducted. They affect all sorts of sectors of the traditional economy, including banking, retail, energy, transportation, education, publishing, media and health.

Recent years have been characterised by uninterrupted growth in the spread of ICT infrastructure and in its uptake by citizens, public and private organisations. Between 2000 and 2015, global Internet penetration grew sevenfold, from 6.5% to 43%. The proportion of households with Internet access at home increased from 18% in 2005 to 46% in 2015. The proportion of the global population covered by a 2G mobile-cellular network grew from 58% in 2001 to 95% by the end of 2015.* While the global mobile-cellular market is approaching saturation, mobile-broadband uptake continues to grow at high rates in all regions, and mobile broadband remains the most dynamic market segment. In 2015 it reached a penetration rate of 47%: 12 times larger than in 2007. The total number of mobile-broadband subscriptions is expected to reach 3.6 billion by the end of 2016 (ITU, 2016) (Figure 2.1).

Figure 2.1. **Global ICT Developments, 2011-16**



Notes: *2016 data are estimates; **active mobile-broadband subscriptions refer to the sum of active handset-based and computer-based (USB/dongles) mobile-broadband subscriptions to the public Internet that have been used in the last three months. It includes subscriptions to mobile-broadband networks that provide download speeds of at least 256kbits per second (e.g. WCDMA, HSPA, CDMA200 1xEV-DO, WiMAX IEEE 802.16e and LTE).

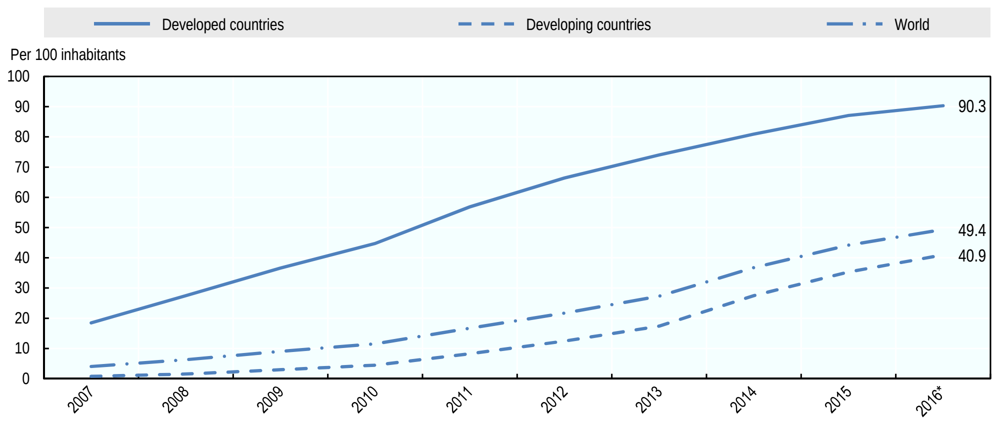
Source: ITU World Telecommunication (2016), *ICT Indicators* (database), www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx (accessed 9 December 2016).

*. Mobile network coverage refers to the population that is covered by a mobile network.

The data also show a continuous increase in Internet use, with growth in the number of Internet users in all countries and increasing availability of online content, much of which is user-created through social media applications and platforms (Figure 2.2).

This trend is accompanied by a slowdown in fixed broadband uptake in the developing world, where mobile broadband services meet the demand for high-speed Internet access where fixed broadband services are not affordable. In the developed world both fixed and mobile broadband uptake are growing continuously.

Figure 2.2. **Active mobile-broadband subscriptions per 100 inhabitants, 2007-2016**



Notes: The developed/developing country classifications are based on the UN M.49; *2016 data are estimates.

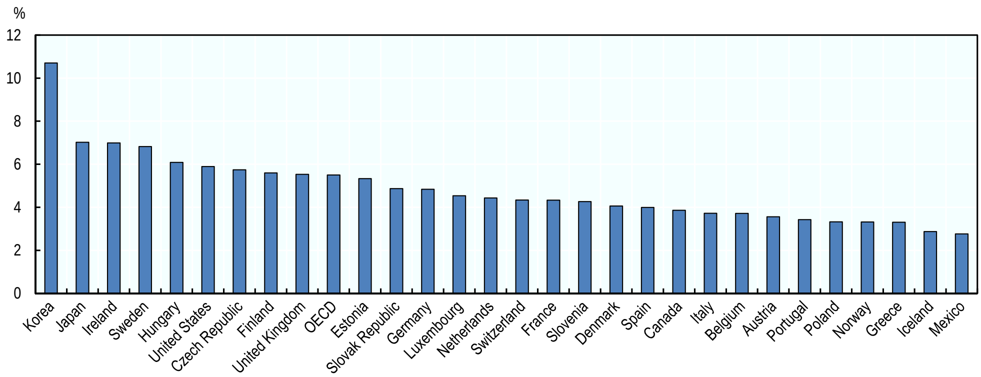
Source: ITU (2016), ICT Indicators, (database), www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx (accessed 9 December 2016).

The ICT sector is highly economically significant

Most economic statistics refer to OECD countries – they paint a picture of a dynamic and highly economically relevant sector. In 2013 the ICT sector in the OECD accounted for 5.5% of total value added, equivalent to about USD 2.4 trillion (Figure 2.3). This share varies considerably across countries, ranging from 10.7% of value added in Korea to less than 3% in Iceland and Mexico. Ireland and Japan have the second largest share (7%), followed by Sweden and Hungary (over 6%).

Figure 2.3. **Share of ICT sector in total value added, 2013**

As a percentage of total value added at current prices



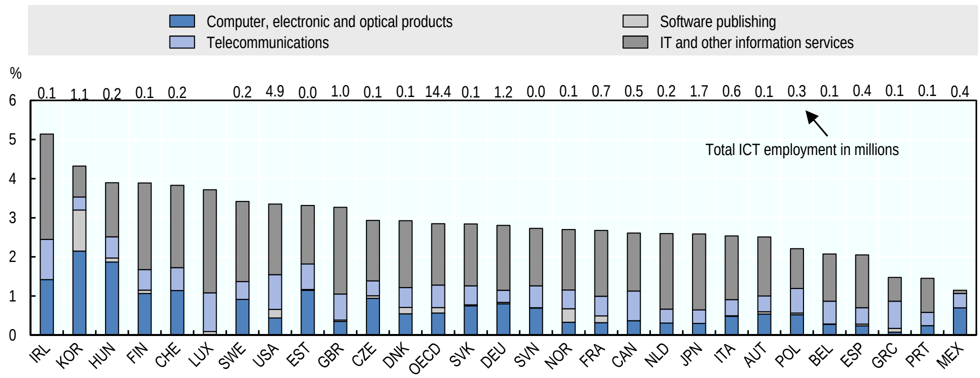
Notes: The ICT sector is defined here as the sum of the following industrial activities classified in the International Standard Industrial Classification, Revision 4 (ISIC rev.4): computer, electronic and optical products (26), software publishing (582), telecommunications (61), computer programming, consultancy and related activities (62), and information service activities (63). For Germany, Iceland, Ireland, Japan, Mexico, Poland, Spain, Sweden, Switzerland and the United Kingdom, data refer to 2012. For Canada and Portugal, data refer to 2011. For Ireland and the United Kingdom, data refer to the United Nation's System of National Account (SNA) 1993 and were extracted in October 2014. For the rest of countries, data refer to SNA 2008. For Canada, Iceland, Ireland, Japan and Mexico, data for software publishing are not available, and are therefore not included in the definition. The figure for Switzerland shows the ICT sector share as defined by the OECD (2011). In this particular case, the share is not totally comparable with the rest of the countries.

Source: OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264232440-en.

In 2013, the ICT sector employed more than 14 million people, accounting for almost 3% of total employment in the OECD (Figure 2.4). This share ranges from over 4% in Ireland and Korea to less than 2% in Greece, Portugal and Mexico. IT and other information services, together with the telecommunications industry, account for 80% of ICT employment in the OECD area. Between 2001 and 2013, ICT's share in employment decreased in countries with a large ICT sector and increased in countries with a smaller ICT sector. One likely explanation is that the recent financial crisis fostered rationalisation in large national ICT sectors and favoured ICT firms in countries with lower labour costs. Belgium and Hungary are the only exceptions to this general trend.

Figure 2.4. **Employment in the ICT sector and sub-sectors, 2013**

As a percentage of total employment



Source: OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris http://dx.doi.org/10.1787/9789264232440-en.

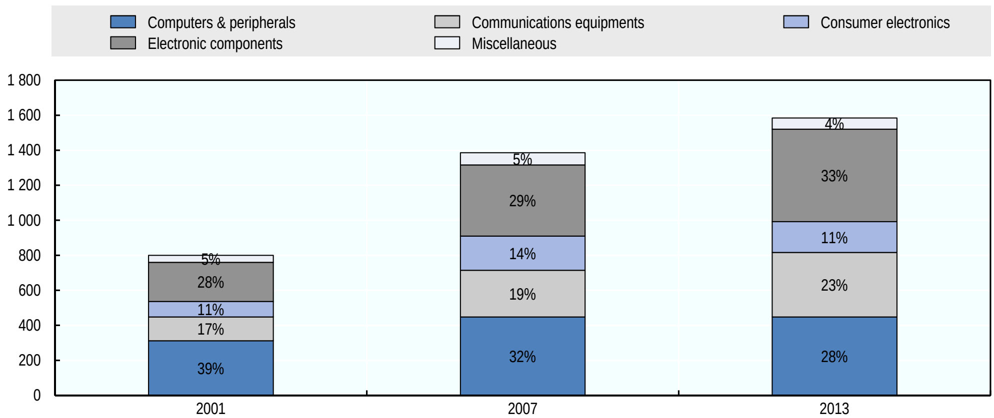
Business enterprise expenditures on research and development and the recent increase in ICT-related patents reveal the key role played by the ICT sector in innovation. Broadband markets are expanding, with wireless broadband subscriptions reaching close to 1 billion in the OECD area. These are offsetting a decrease in fixed telephony.

International trade in ICT goods and services underscores the positive developments mentioned above. Global trade in ICT manufacturing, and especially ICT services, continues to grow. Trade data from 2001 to 2013 presented in Figure 2.5 show continued growth in ICT trade, with exports in ICT services growing faster than exports in ICT goods.

More precisely, world exports of manufactured ICT goods grew by 6% per year between 2001 and 2013, reaching USD 1.6 trillion (Figure 2.5). Production and exports of ICT goods are increasingly concentrated in a few economies, with China accounting for the lion’s share (Figure 2.6). The shares of Japan and the United States in world exports of ICT goods halved from 2001 to 2013 (Figure 2.7), due in part to offshoring of production. Korea is the only OECD country to have increased its share of the world market for ICT goods over the same period.

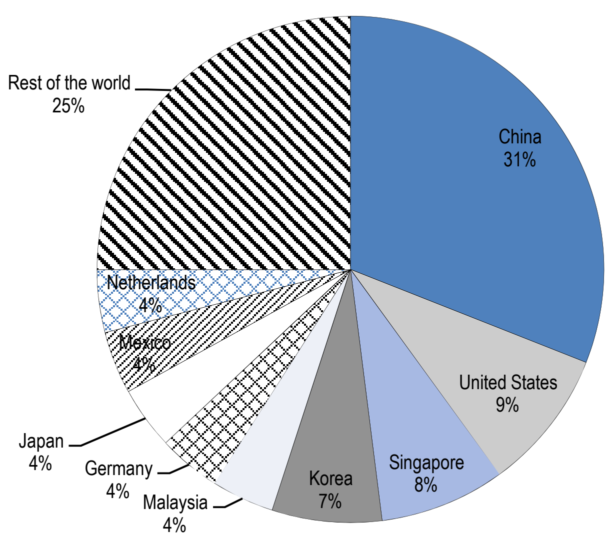
Figure 2.5. **The growth in world exports of ICT products, 2001-2013**

Billions of USD and as percentage of total ICT goods exports



Source: OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264232440-en.

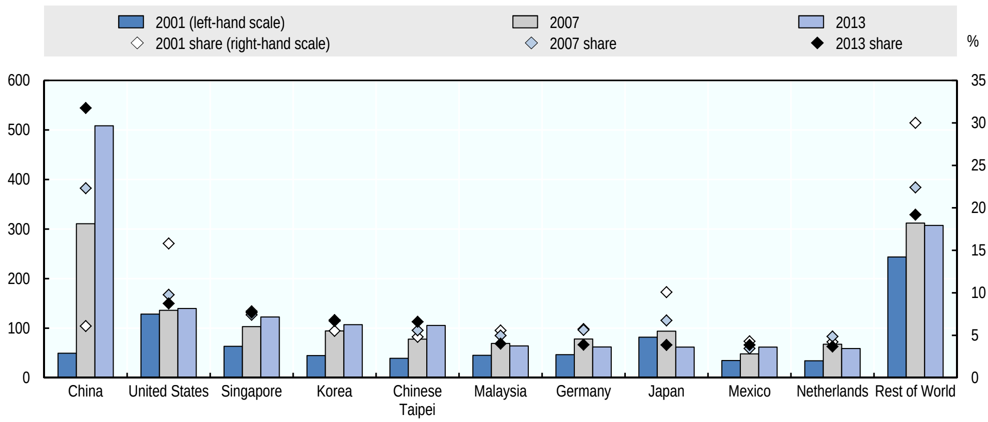
Figure 2.6. **The main exporters of ICT goods, 2013**



Source: Adapted from OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264232440-en.

Figure 2.7. **Changes in world exports of ICT goods for the top ten exporters, 2001-2013**

Billions of USD (left-hand scale) and percentage share (right-hand scale)



Source: OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264232440-en.

To a large extent, these trends are due to trade in intermediate inputs (i.e. goods used in production). The dramatic increase in ICT exports from the People's Republic of China, for example, has been matched by a proportional increase in imports of ICT intermediate inputs – notably in its processing zones. Consequently, China's share of ICT goods and services valued added embodied in foreign final demand is significantly lower than its share of gross world exports. In 2011, US exports of ICT goods and services were higher than those of China in value added terms – driven partly by the high presence of US ICT services embodied in final demand products.

The ICT sector can promote development

The general transformational character of ICTs is often seen by policy makers as an efficient tool to drive competitiveness and economic growth and to promote development (Box 2.1). In the last decade, ICTs, particularly mobile phones, have also opened up new channels for the free flow of ideas and opinions, and for public engagement, playing an important role in open government. In many jurisdictions, ICT policies have changed considerably over the past decade and have been embraced by mainstream economic and social policy priorities looking to create positive framework conditions for growth and development.

Encouraging higher uptake of ICTs and higher proliferation of ICT goods, particularly by government and businesses (including SMEs), is often a policy priority and embraced as part of national digital strategies. According to the OECD Digital Economy Policy Questionnaire on countries' ICT policy priorities, 26 out of 29 countries considered their current top priority to be rolling out broadband Internet infrastructure (OECD, 2015).

Box 2.1. **ICTs and the Sustainable Development Goals**

In the context of international development, promoting ICT use is seen as an efficient policy tool to reduce poverty, improve access to health and education services and create new sources of income and employment for the poor. This has been recognised by the United Nations, reflected in UN General Assembly Resolutions 60-252 (UN, 2006) and 68/302. In September 2015 the post-2015 UN development agenda was launched with a new set of targets, the Sustainable Development Goals (SDGs), designed to replace and build on the Millennium Development Goals (MDGs). The ICTs appeared in the MDGs in the context of a "global partnership for development", as a sub-target of Goal 8.45. The SDGs place a stronger emphasis on increased access to ICTs as a means to create an inclusive and global digital economy: Goal 9c underlines the need to "significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020" (UN, 2015).

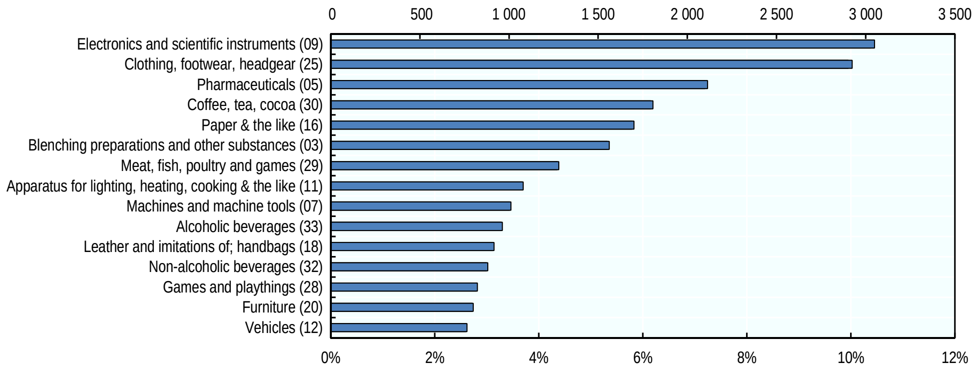
Intellectual property rights and counterfeiting in the ICT sector

Counterfeits are goods that infringe trademarks. The ICT industry relies heavily on intellectual property (IP) rights. Trademarks are of particular importance for protecting IP rights. The category "Electronic and scientific instruments" attracts the highest share of trademark protection via the Madrid International Trademark System (Figure 2.8). Generally this category is used as a proxy for the ICT sector in the Nice classification[*] and accounted for the highest share (10.4%) of all filing activity in the Madrid System in 2013 (WIPO, 2015).

*. The Nice Classification, established by the Nice Agreement (1957), is an international classification of goods and services applied for the registration of trademarks (see www.wipo.int/classifications/nice/en).

Figure 2.8. **World trademark applications by Nice class in the manufacturing industry, 2004-2013**

As a percentage share of all applications and in thousands



Statlink: http://dx.doi.org/10.1787/888933461598

Note: For the complete Nice classification, see www.wipo.int/classifications/nivilo/nice/index.htm

Source: WIPO (2016), *WIPO Statistics on Trademark Application* (database), World Intellectual Property Organization (WIPO), Geneva, http://ipstats.wipo.int/ipstatv2/index.htm?tab=trademark (accessed 10 December 2016).

ICT counterfeiting preys on consumers' trust in established brands, and poses dangers to their health, safety and privacy. Importantly, it is not only ICT consumer products that suffer from counterfeiting. A detailed analysis of seizure data shows that intermediary ICT products are also frequently targeted by counterfeiters. Customs data report numerous seizures of IP infringing diodes, transistors, or printed circuits, and there was even an instance of seized counterfeit radio masts. When substantial intermediary parts are fake – especially network components – operators can experience degradation in the quality of service, network disruptions and failures in electromagnetic compatibility.

ICT manufacturers and authorised ICT vendors have experienced revenue losses and erosions in brand value as a result of trademark infringement. Fake components cause network operators to contend with low quality of service, network disruptions and failures in electromagnetic compatibility. Governments forfeit tax revenues and incur great expense in ensuring compliance with national anti-counterfeiting legislation and reacting to threats to public safety and distortions in labour markets. Counterfeiting activities can also be a source of revenue for organised crime.

There are numerous examples of recent actions taken by enforcement authorities against counterfeiters dealing with fake ICT components. For example, in 2016 in the United States federal law enforcement officers arrested the owner of a wholesale supply operation in California called Flexqueen, which for several years had been selling counterfeit iPhone components and other counterfeits to mobile phone repair shops around the US. At the same time, the US police arrested the Flexqueen's Chinese supplier. Both pleaded guilty, and admitted to selling millions of dollars of counterfeit ICT components (US Immigration and Customs Enforcement, 2016). Another example is the case US v. Doan. In 2016, after numerous seizures by US Customs of counterfeit Apple and Samsung parts and accessories, the defendant was convicted and sentenced to one year in prison (Offices of the United States Attorneys, 2016).

The ICT industry recognises the growing problem of fake ICT devices. Importantly, the industry is developing successful hardware solutions, such as network solutions for fake mobile phones, to counter this threat (Box 2.2).

Box 2.2. **Network blocking solutions: the case of Brazil**

International mobile equipment identifiers (IMEI) are 15-digit numbers that are used to uniquely identify mobile phones. IMEI numbers were originally introduced as a type-approval mechanism by which regulators could certify equipment. Systems have been implemented in a number of countries, such as the Ukraine, Turkey and Brazil, using the IMEI eco-system as a blocking solution to prevent counterfeit phones from connecting to networks.

For instance, in Brazil, mobile operators have successfully been using IMEI identifiers to curb the use of non-certified mobile devices, including counterfeit devices. The implementation of similar blocking activities has been encouraged by the Brazilian telecom regulator (Anatel). In recent years, Brazil has further reinforced its regulatory framework to better address the issue of counterfeit mobile devices. Current policies require end-users to only use mobile devices certified by the regulator, and telecom operators must take the necessary measures to prevent non-certified mobile equipment (including counterfeit phones) to connect to their networks. IMEI numbers are among the solutions deployed by telecom operators to comply with these policies, and address the growing problem of counterfeit and non-certified mobile phones.

An important step in the fight against ICT counterfeiting is to understand the patterns underlying it. That is the goal of the analysis presented in the rest of this report.

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Chapter 3

Mapping global patterns in counterfeit ICT goods

This chapter presents a wealth of information on the global scope of counterfeit ICT goods, their provenance economies, and the economies of registration of right holders whose IP rights were infringed. It draws on a unified database created from three regional and global databases of customs seizures between 2011 and 2013.

1. Note by Turkey:

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

2. Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

This chapter summarises customs seizures of counterfeit ICT products worldwide over the period 2011-2013. It is based on a unified dataset containing data entries collected and processed by national customs officers. This unified dataset combines information received from:

- The World Customs Organization (WCO)
- The European Commission's Directorate-General for Taxation and Customs Union (DG TAXUD)
- The United States Department of Homeland Security (DHS), which contains the seizure data from the US Customs and Border Protection and from the US Immigration and Customs Enforcement (CBP/ICE).

There are some differences between the WCO, the DG TAXUD and the CBP/ICE databases, notably in terms of product classification level (Box 3.1). This meant that the datasets needed to be harmonised (Annex A). The overview on ICT-related counterfeiting presented in this chapter is drawn from this harmonised database.

Box 3.1. **Variations in customs seizures datasets**

Data on customs seizures originate from national customs administrations. These data are aggregated and harmonised at the national or regional level and then submitted to national and international agencies that hold datasets on seizures. This study relies on three datasets that were received from three public institutions: the WCO, the DG TAXUD and the US CPB-ICE.

The WCO dataset includes data from 92 economies around the world.[1] Each observation contains the following information: year of seizure; the exact date of offence (seizure); reporting economy; conveyance method; departure economy; destination economy; import/transit; status (stopped, seized); type of infringed IP right; general category of goods; detailed description of seized goods; name of trademark owner; quantity; reporting unit. WCO data are gathered on a voluntary basis; hence, not all seizures are reported. It should be highlighted that some data in the WCO database reflect customs dedicated actions, such as regional and international enforcement operations in some developing economies that were promoted and co-ordinated by the WCO.

The DG TAXUD dataset includes data from all 28 EU member countries.[2] Each observation contains the following information: reporting economy; product category (35 categories); type of good (only for 2012 and 2013); brand owner; mode of transport (only for 2012 and 2013); type of IP right that is infringed; provenance economy; quantity and value of seized goods. DG TAXUD data are

Box 3.1. **Variations in customs seizures datasets** (*cont.*)

gathered on a mandatory basis, meaning that all seizures should be reported. Data are entered directly by customs officers into the anti-counterfeit and anti-piracy information system (COPIS) database.

The CBP-ICE dataset contains only US data, with each observation reporting information on: the date of seizure; provenance economy; harmonised system (HS) category of the seized good at a seven-digit level (Annex A); description of the seized goods; their value; and the number of seized products.

For this study, the three datasets were first merged and harmonised into one uniform dataset on customs seizures (Annex A). In a second step, ICT products were identified within this unified dataset. Table 3.1 compares the DG TAXUD, CBP-ICE and WCO datasets.

Table 3.1. **Customs seizures datasets compared**

	DG TAXUD	CBP-ICE	WCO
Years covered	2011-13	2009-2014	2011-13
Time reporting	Quarterly data	The exact date of seizure	The exact date of seizure
Geographical coverage (number of reporting economies)	The European Union	The United States	Worldwide (the number of reporting economies varies per year, the total number is 92)
Voluntary reporting?	No	No	Yes
Taxonomy of product categories	35 product categories + other (description of "other available")	Harmonised Tariff System, seven-digit level	18 product categories with complementary exact description of detained product
Seizure values?	Yes	Yes	Yes (for some economies only)

1. Including: Albania; Algeria; Angola; Argentina; Australia; Bahrain; Benin; Bosnia and Herzegovina; Brazil; Bulgaria; Cameroon; Chile; Colombia; Costa Rica; Côte d'Ivoire; Croatia; Czech Republic; Democratic Republic the of Congo; Denmark; Djibouti; Dominican Republic; Ecuador; El Salvador; Estonia; Finland; Former Yugoslav Republic of Macedonia; France; French Guiana; Gabon; Georgia; Germany;

Box 3.1. **Variations in customs seizures datasets** (*cont.*)

Ghana; Guadeloupe; Guatemala; Guinea; Honduras; Hong Kong, China; Hungary; Iceland; India; Ireland; Israel; Italy; Japan; Jordan; Kenya; Democratic People's Republic of Korea; Kuwait; Latvia; Lebanon; Madagascar; Malta; Mauritius; Mexico; Montenegro; Morocco; Mozambique; Namibia; Netherlands; New Zealand; Nicaragua; Nigeria; Norway; Panama; Paraguay; Peru; Poland; Portugal; Qatar; Réunion; Romania; Russia; Saudi Arabia; Senegal; Serbia; Slovak Republic; Slovenia; South Africa; Spain; Sudan; Sweden; Switzerland; Tanzania; Togo; Uganda; Ukraine; United Arab Emirates; United States; Uruguay; Venezuela; Yemen. For the analysis the DG TAXUD and CBP databases are used instead of the WCO data for the United States and for the EU countries.

2. Austria, Belgium, Bulgaria, Cyprus (see disclaimer on page 33), Croatia (from 01 July 2013), Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and the United Kingdom.

Data on counterfeit seizures reveal a wealth of information

Over the period 2011-13, the total number of global customs seizures of counterfeit ICT goods exceeded 60 000, equivalent to a value of almost USD 805 million (Table 3.2). These seizures of fake ICT products accounted for 14.1% of all customs seizures worldwide, and 11.3% of their value.*

Table 3.2. **Value and number of global customs seizures of counterfeit ICT products in the harmonised database, 2011-13**

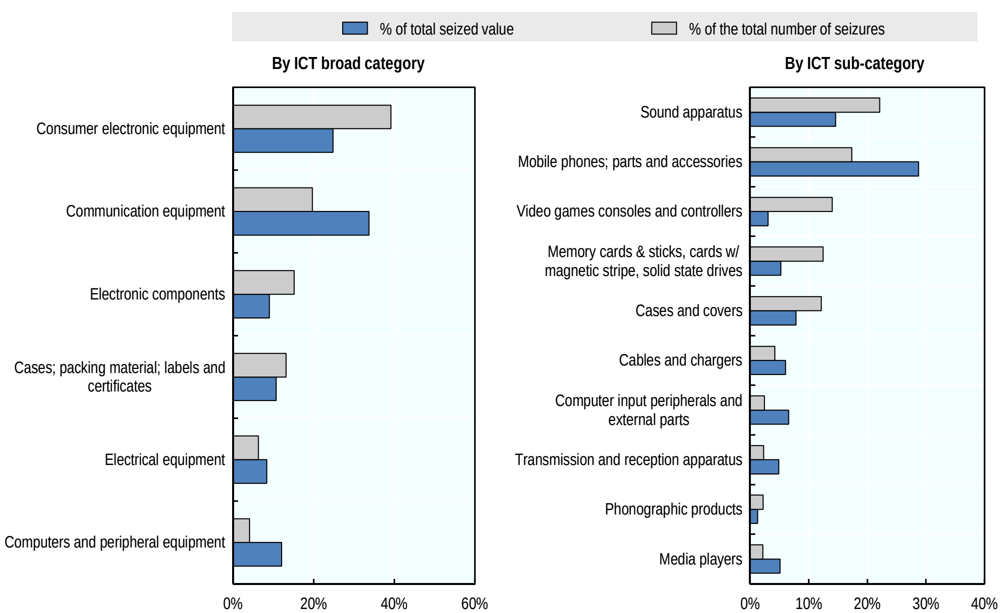
Period	Value in USD million	Number of seizures	% of total seized value	% of total number of seizures
2011	263.43	17 558	12.70%	12.50%
2012	271.73	20 846	14.30%	10.90%
2013	309.43	21 960	15.40%	10.40%
2011-13	804. 59	60 364	14.10%	11.30%

* Following several quantitative checks and a set of interviews it is assumed that the whole dataset reports declared value as indicated on customs declarations, and that this correspond to the values in trade statistics. See Annex A for more details.

The unified dataset provides a wealth of information on the scope of counterfeit ICT goods, their provenance economies, and the economies of registration of right holders whose IP rights were infringed. First, it can quantify which ICT product categories are most often infringed. It should be noted that each broad category of ICT products is subject to counterfeiting (Figure 3.1). This means that any type of ICT product for which IP adds economic value to rights holders becomes a target for counterfeiters. Items in some ICT categories are more likely to be counterfeit than others, however.

The most frequently seized counterfeit ICT goods over the period 2011-13 fell into two categories: i) the communication equipment category, which represents 34% of the total value and 20% of the total number of seized counterfeit ICT devices; and ii) the consumer electronic equipment category (25% and 40% respectively).

Figure 3.1. **Seizures of counterfeit ICT goods by ICT category and sub-category, 2011-13**



Statlink: http://dx.doi.org/10.1787/888933461606

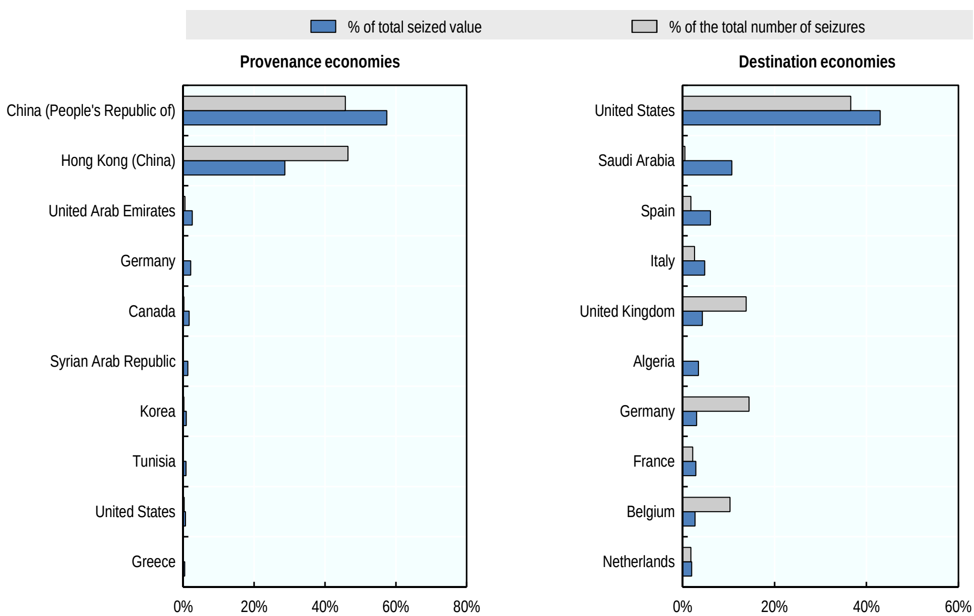
Note: For a complete list of ICT broad categories and sub-categories, see Table C.3 in Annex C.

The bottom graph in Figure 3.1 gives further details by plotting the share of the ICT sub-categories that are most subject to counterfeiting in the total value and the total number of customs seizures of fake ICT goods.

Clearly, the value and the number of interceptions are concentrated in a relatively limited number of ICT sub-categories. In particular, the top three types of fake ICT products seized worldwide are sound apparatus (e.g. headsets, headphones, speakers, or stereos), mobiles phones and video game consoles and controllers.

The unified dataset on customs seizures identifies 113 provenance economies and 125 destination economies for counterfeit ICT products worldwide.* A large range of developing and developed countries are indicated as major sources of counterfeit ICT products. However, some economies clearly tend to dominate (Figure 3.2). The highest number of seized counterfeit shipments originates from east Asia, especially the People's Republic of China and Hong Kong (China). Counterfeit ICT goods are shipped to almost every country around the world, though higher income economies tend to be the top targets.

Figure 3.2. **Top provenance and destination economies for seizures of fake ICT products, 2011-13**



Statlink: http://dx.doi.org/10.1787/888933461614

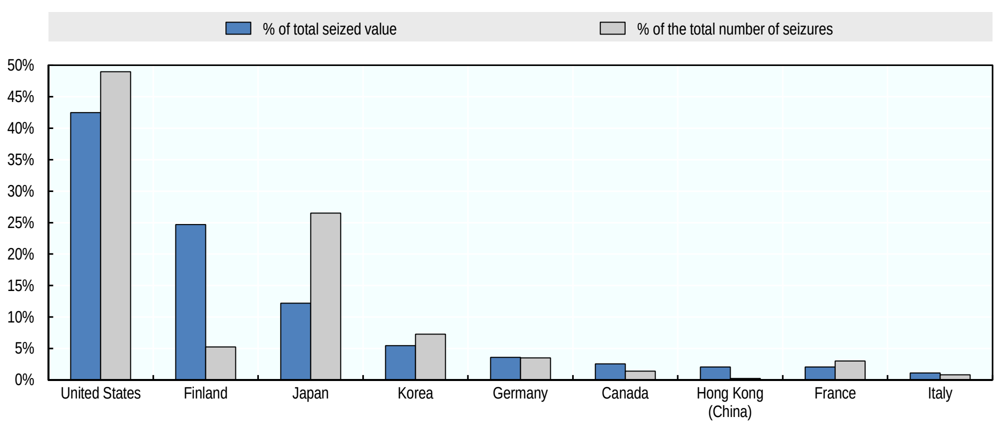
*. Following OECD (2008), the terms provenance and destination economies refer to economies detected and registered by any reporting customs agency as a source or destination of any ICT goods that has been intercepted in violation of an IP right, whatever the amount or value concerned.

The dataset also identifies the economies in which the headquarters of a right holder of ICT brands is registered. This helps to determine whose IP rights are being infringed. This analysis was done only for the WCO and DG TAXUD data, as the CBP-ICE data do not report the brand owners. In the combined WCO-DG TAXUD dataset, this information is available for 92% of all the seizures by value.

Almost 42.5% of the total seized value of counterfeit ICT devices infringed the IP rights of holders registered in the United States (Figure 3.3), followed by Finland (24.7%), Japan (12.2%), Korea (5.4%) and Germany (3.6%).

Interestingly, rights holders in Hong Kong (China) – ranked second as a provenance economy for counterfeit ICT products – also have their IP rights infringed: about 1.2% of the total seized value of counterfeit ICT products concerns violations of the IP rights of companies based in Hong Kong (China). This indicates the very strong threat posed by counterfeiting in undermining the innovative efforts of companies based in Hong Kong (China) relying on knowledge capital and using IP rights in their business strategies.

Figure 3.3. **Economies most affected by violations of intellectual property rights, 2011-13**



Statlink: http://dx.doi.org/10.1787/888933461629

Counterfeiters adapt their strategies to their target markets

The WCO and DG TAXUD databases both report on infringed trademarks. These data can be used to analyse the market segments being targeted by counterfeit ICT products.

In principle, there are two market segments targeted by counterfeiters: primary markets and secondary markets. In primary markets, consumers and firms demand genuine, non-IP infringing goods, and counterfeiters compete head-on with these legitimate products intending to deceive consumers. Hence, prices of counterfeit ICT products are likely to be similar to those of genuine products. In secondary markets, consumers knowingly purchase IP-infringing products, and expect to pay a lower price than for a genuine product. Hence, in secondary markets lower price ranges and larger price dispersions are more likely than in primary markets.

In the unified dataset, these sub-markets can be identified for "product – brand" pairs that are intensely targeted by counterfeiters. In particular, Beats Electronics headphones, Apple and Samsung mobile phones, and Kingston Technology memory cards were relatively common in the database of customs seizures. This allowed for some basic statistical checks to be performed on the type of sub-markets that may be targeted by IP-infringing ICT devices to find out if the declared values of these infringing product-brand pairs illustrate the emergence of primary and secondary sub-markets.

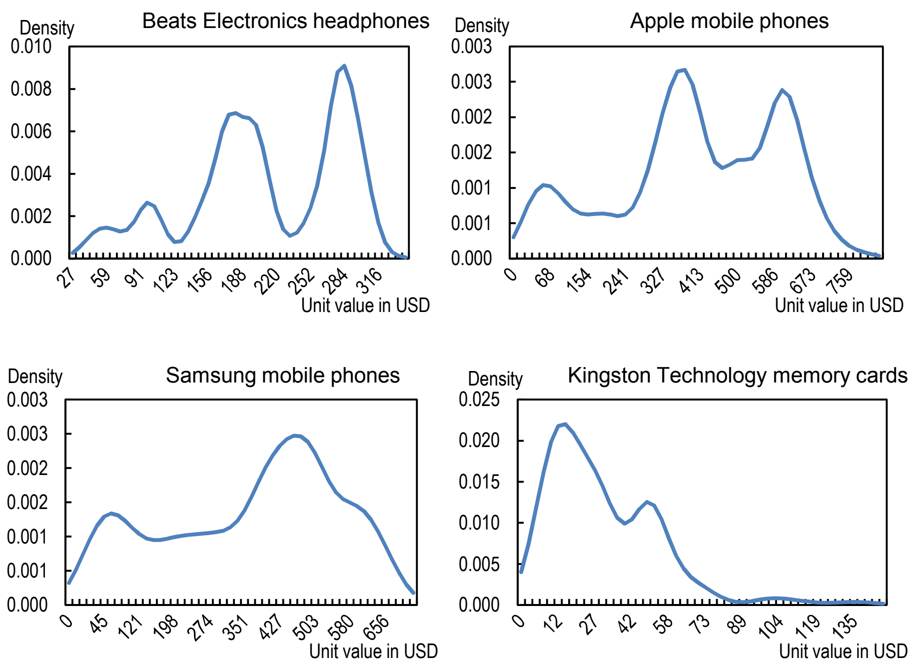
A basic distribution value analysis of these IP infringing ICT products shows a wide range of item values: between USD 25 and 350 for counterfeit Beats Electronics headphones, USD 5 and 850 for an Apple mobile phone, between USD 1 and 150 for a counterfeit Kingston Technology memory card, and between USD 3 and 720 for a counterfeit Samsung mobile phone (Figure 3.4).

Some of these infringing ICT products with higher values were very likely going to be offered in primary sub-markets, where consumers are deceived and prices are equal or close to those of genuine ICT products. The values can also sometimes be slightly lower if, for instance, a counterfeit deceiving ICT device is offered as a "special deal".

Conversely, it is likely that counterfeit Beats Electronics headphones, Apple and Samsung mobile phones, and Kingston Technology memory cards with very low prices targeted secondary sub-markets, where prices are much lower and consumers may willingly purchase IP infringing goods. Some may be advertised as "replicas", which refer to ICT products that do not pretend to be genuine but attempt to convince a buyer that it is of a high quality that is identical to the original good.

To reiterate, the analysis of the unified dataset shows that counterfeits of all four types of product are being sold in both primary and secondary markets.

Figure 3.4. **Prices distribution of counterfeit Beats Electronics headphones, Apple and Samsung mobile phones and Kingston Technology memory cards**

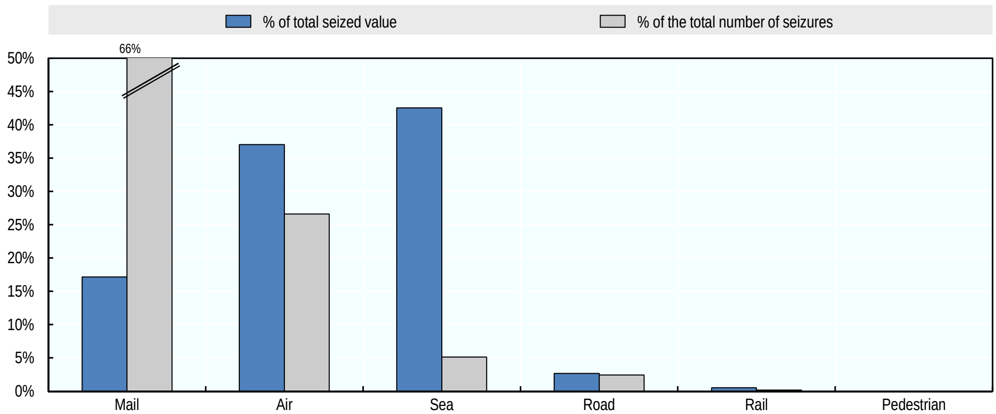


Statlink: http://dx.doi.org/10.1787/888933461633

Counterfeit ICT goods are mostly sent by mail, and in small quantities

The data highlight that the most popular way of shipping counterfeit ICT products is as a parcel in the post (Figure 3.5). Between 2011 and 2013, an average of almost 66% of the total number of customs seizures of counterfeit ICT products worldwide concerned posted parcels, while 27% concerned air shipments. Sea transport and road transport lag far behind, with slightly more than 5% and 3% of customs seizures respectively. Other methods of conveying counterfeit ICT devices, such as being carried by pedestrians or by rail, were negligible.

Figure 3.5. **Conveyance methods of counterfeit ICT products, 2011-13**

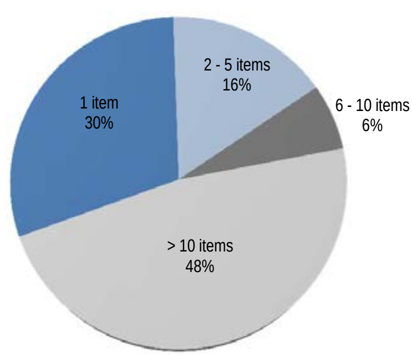


Statlink: http://dx.doi.org/10.1787/888933461648

Interestingly, the predominance of postal parcel shipments implies that the size of seized shipments of counterfeit ICT products tends to be small. Between 2011 and 2013, shipments of fewer than ten items accounted for about 52% of the total number of shipments (Figure 3.6).

Figure 3.6. **Size of seized shipments of counterfeit ICT products, 2011-13**

As a % of total seizures



Statlink: http://dx.doi.org/10.1787/888933461658

The large volume of small shipments sent by mail or express parcels seems to be related to the recent fast growth of the Internet, and particularly e-commerce. While e-commerce can vastly enhance business productivity, it also provides a powerful platform for counterfeiters to cost effectively reach large numbers of potential consumers.

For enforcement authorities, postal and express shipments containing counterfeit ICT products tend to be more difficult to detect and to detain. Consequently, the misuse of e-commerce for counterfeiting purposes imposes an additional significant burden on enforcement authorities.

The role of the online environment and e-commerce in the context of counterfeiting of physical goods is nuanced, however. On the one hand, the online environment has, for a long time, been very attractive to counterfeiters for reasons such as anonymity, flexibility or market scope (OECD, 2008; OHIM-Europol, 2015). On the other hand, for rights holders, e-commerce has become an additional and cost-effective channel for distributing genuine ICT products, which may reduce the relative attractiveness of infringing goods to some consumers.

Packaging and labels can also be counterfeit

The unified database also shows a large number of seized IP-infringing packaging and labels for ICT products on their own. This confirms findings about the domestic assembly of counterfeit ICT devices from imported materials, formulated in a study by the Office for Harmonization in the Internal Market (OHIM) and Europol (2015). The large number of IP-infringing packaging and labels seized by customs authorities worldwide merits further attention, as packaging and labels have a significantly lower value than the final ICT products. In addition, the trade data do not distinguish between packaging and labels for ICT products and packaging for non-ICT products. Hence, the methodology presented in the next chapter is not able to estimate the worldwide value of trade in counterfeit packaging and labels for ICT devices. This calls for a more detailed analysis of trademark infringing packages and labels in the future.

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Chapter 4

Assessing the trade in counterfeit ICT products

This chapter uses econometric analysis to look behind the descriptive data in Chapter 3. The analysis identifies the key provenance economies of ICT products, indicates the scope of counterfeit trade in ICT products, and estimates the total value of trade in counterfeit ICT products.

The main objective of this study is to use existing methodologies and techniques to gauge the magnitude of world trade in counterfeit ICT products. The previous chapter has presented descriptive statistics which paint a general picture of aspects of this world trade. These relied only on the total volumes of seizures and did not take into account the general economic context, however. This chapter combines an econometric methodology developed by the OECD and EUIPO (2016) with the unified dataset on seizures of counterfeit ICT items described in Chapter 3 to provide more detail on the countries and values involved in the trade.

The core idea underlying the methodological framework is as follows: by establishing the propensity[1] to which different types of infringing ICT goods are imported from different provenance economies, then these propensities can be applied to statistics on international trade in ICT products to estimate both the relative intensities and the overall magnitude of counterfeiting of ICT products.

This methodology allows the general context of international trade in ICT goods[2] to be taken into account and relies on three key econometric components:

1) The General Trade-Related Index of Counterfeiting for economies (GTRIC-e): an index of economies according to their relative propensity to be an economy of provenance for counterfeit ICT products.
2) The General Trade-Related Index of Counterfeiting for ICT products (GTRIC-p): an index of ICT industries according to their relative propensity to be targeted for counterfeiting.
3) The general matrix that assigns relative likelihood of containing counterfeit products to each pair: “ICT product category” and “provenance economy” (GTRIC).

All results presented in this chapter thus rely on these GTRIC indices to:

- Identify key provenance economies of ICT products (GTRIC-e).
- Identify the scope of counterfeit trade in ICT products (GTRIC-p).
- Estimate the total value of trade in counterfeit ICT products.

The analysis of each of these areas is presented in turn in the sections which follow, and the methodology of each index is presented in Annex B.

Certain economies are significant sources for fake ICT goods

Information developed in the previous chapter suggests that a large range of developing and developed economies can be the provenance of counterfeit ICT products, either as places that produce infringing goods or as points of transit through which infringing goods pass. The descriptive analysis of the unified dataset of customs seizures identified 113 provenance economies of counterfeit ICT products.

The large number of provenance economies is a first indication of the significance of counterfeit ICT devices in international trade. However, an economy-specific index can give more detail.

The propensity of each economy to be a source of provenance of counterfeit ICT products is captured by the index GTRIC-e. The goal of this index is to compare the intensity of customs seizures of counterfeit ICT products from a provenance economy with the share of this provenance economy in international trade in ICT products (Annex B). Thus, GTRIC-e assigns a high score to an economy which is a source of high values of counterfeit ICT products in absolute terms, or as a share of world imports of ICT goods.

Table 4.1 shows the 15 economies that are most likely to be a provenance of counterfeit ICT products, based on data from 2011-13 (see Annex C, Table C.1 for a complete list). Clearly, some of these provenance economies appear to be huge sources of infringing ICT devices, led notably by the People's Republic of China and Hong Kong (China). Note that this could be because they are either important producers of counterfeit ICT goods, or because they are strategic points of transit (see Chapter 5).

Table 4.1. **Top 15 provenance economies in terms of GTRIC-e score**

Average 2011-13

Provenance economy	GTRIC-e
China (People's Republic of)	1.000
Hong Kong (China)	1.000
Canada	0.866
United Arab Emirates	0.799
India	0.774
Korea	0.763
Turkey	0.619

Table 4.1. **Top 15 provenance economies in terms of GTRIC-e score** (*cont.*)

Provenance economy	GTRIC-e
Germany	0.586
Serbia	0.511
Sweden	0.503
Morocco	0.500
Brazil	0.445
Tunisia	0.386

Notes: A high GTRIC-e score indicates that an economy has a high propensity to be a source of fake ICT products, either in absolute terms, or as a share of world imports.

Importantly, the term "provenance economy" refers to an economy detected and registered by any reporting customs agency as a source of any item that has been intercepted for violating an IP right, whatever the amount or value concerned. In this study, this can include both economies where the actual production of infringing goods is taking place, as well as economies that function as ports of transit through which infringing goods pass.[3]

Certain types of ICT products are more likely to be counterfeit

While many types of ICT goods are sensitive to infringement, counterfeiting is particularly intensive in some ICT product categories. This is supported by seizure statistics which indicate that interceptions are concentrated in a relatively limited number of ICT categories. To obtain a meaningful measure of the propensity for different types of infringing ICT products to be imported, the GTRIC-p index compares the likelihood for products in one ICT category to be counterfeit relative to another. As for GTRIC-e, this is done by comparing global customs seizures intensities of a given ICT product category with the share of this ICT product category in international trade in ICT equipment. As a result, ICT products can be ranked by their propensity for being counterfeit (Annex B).

Table 4.2 reports the GTRIC-p obtained for each of the broad categories of ICT products, while Table 4.3 lists the top 15 sensitive ICT product sub-categories according to their general counterfeiting factor over the period 2011-13 (see Table C.2 in Annex C for a complete list). A high GTRIC-p score implies either that a given product category contains high values of counterfeit ICT products in absolute terms (e.g. USD), or that a large share of imports of that ICT product category is counterfeit products.

Consumer electronic equipment is the most counterfeit ICT product category (Table 4.2), with notably sound apparatus (e.g. headsets, headphones), and video games consoles and controllers being particularly sensitive to counterfeiting (Table 4.3). Communication equipment ranks second (Table 4.2). The latter includes particularly mobile phones, their parts and accessories, which appear to be especially targeted by counterfeiters (Table 4.3).

Table 4.2. **ICT product categories ranked by their GTRIC-p score**

Average 2011-13

ICT broad category	GTRIC-p
Consumer electronic equipment	0.992
Miscellaneous	0.989
Communication equipment	0.791
Electrical equipment	0.551
Computers and peripheral equipment	0.328
Electronic components	0.308

Notes: A high GTRIC-p score implies that a given product category has a high propensity to be counterfeit with respect to the others, i.e. it contains high values of counterfeit ICT products in absolute terms (e.g. USD), or a large share of imports of that ICT product category is counterfeit. For a full description of ICT broad categories and sub-categories see Table C.3 in Annex C.

Table 4.3. **Top 15 ICT product subcategories in terms of GTRIC-p score**

Average 2011-13

ICT sub-category	GTRIC-p
Memory cards and sticks; cards with magnetic stripe, and solid state drives	1.000
Sound apparatus	1.000
Video games consoles and controllers	0.999
Phonographic products	0.999
Mobile phones; parts and accessories	0.898
Media players	0.878

Table 4.3. **Top 15 ICT product subcategories in terms of GTRIC-p score** (*cont.*)

Average 2011-13

Batteries	0.875
Remote controls	0.503
Transmission and reception apparatus	0.422
Cables and chargers	0.399
Computer input peripherals and external parts	0.362
Laptops, desktops, tablets	0.325
Printers, copiers, scanners	0.311
Optics and imaging products	0.268
Electronic integrated circuits	0.259

Notes: A high GTRIC-p score implies either that a given product category has a high propensity to be counterfeit with respect to the others, i.e. it contains high values of counterfeit ICT products in absolute terms (e.g. USD), or a large share of imports of that ICT product category is counterfeit products. For a full description of ICT broad categories and sub-categories see Table C.3 in Annex C.

Counterfeit products represent a significant share of world ICT trade

While the GTRIC does not directly provide a measure of the overall magnitude of counterfeit ICT products in world trade, it establishes statistical relationships that are useful for this purpose.

More specifically, for each type of ICT good from a given provenance economy, the GTRIC matrix assigns a probability of it being counterfeit, relative to the most intensive combination of "ICT product category-provenance economy" (Annex B). Once the upper limit of counterfeit trade (in percentages of world imports) from the key provenance economies in ICT product categories that are the most vulnerable to counterfeiting (i.e. with the highest GTRIC scores) can be established, then the "ceiling" value of international trade in counterfeit ICT goods can be gauged. Following OECD and EUIPO (2016), these upper limits are called "fixed points".

In their study of counterfeit trade, the OECD and EUIPO (2016) used focus group meetings and interviews with customs officials to gauge the fixed points for a range of six "industry-provenance" pairs where shares of counterfeit products are the highest. The results were refined using a set of supplementary data on seizures provided by the European Anti-Fraud Office (OLAF).

Once established, the fixed points are combined with the relative probabilities included in the GTRIC matrix to recover the share of fake world imports from each provenance economy contained in each ICT product category. These shares are then applied to existing statistics on trade in genuine ICT products to estimate the total value of counterfeit world imports by ICT product category and provenance economy. The latters are finally aggregated to reveal the upper possible limit of trade in counterfeit ICT goods.

The best estimates of this study, based on the GTRIC methodology, indicate that **counterfeit ICT products accounted for as much as USD 143 billion in world trade in 2013**. The term “as much as” is crucial in this context as it refers to the upper boundary of counterfeit trade in ICT devices.

Given that total imports of ICT products in world trade in 2013 amounted to USD 2 180 billion, this number implies that **as much as 6.5% of world trade in ICT products in 2013 was in counterfeit products**. Note however that as world trade is very dynamic, especially since the financial crisis, this percentage cannot be directly applied to values for other years. In addition, this figure does not include domestically produced and consumed counterfeit ICT products.

The GTRIC methodology also allows values to be estimated for each broad category of ICT products (Table 4.4). The proportion of counterfeit ICT products traded worldwide within each of these categories varies greatly. In 2013, world trade in counterfeit communication equipment accounted for as much as USD 68.3 billion, the equivalent of 14% of global trade in genuine communication devices. This number falls to USD 15 billion for counterfeit electronic components, the equivalent of 3.2% of world trade in genuine electronic components.

Table 4.4. **Estimated value and share of counterfeit ICT products in world trade, 2013**

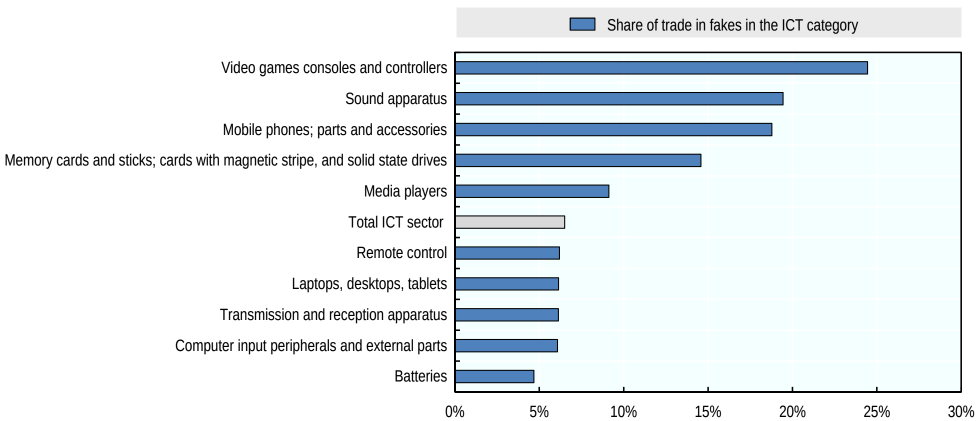
ICT category	Share of counterfeits in trade	Value in USD billion
Computer and peripheral equipment	6.2%	29.9
Communication equipment	13.9%	68.3
Consumer electronic equipment	14.1%	22.4
Electronic components	3.2%	15.1
Electrical equipment	4.2%	7.5
Total ICT sector	6.5%	143.1

Note: For the full list of ICT broad categories see Table C.3 in Annex C.

A more detailed analysis by specific product categories indicates that video games consoles and controllers were the most common counterfeit ICT products (Figure 4.1). Almost one-quarter of trade in this category was in counterfeit goods in 2013. This was followed by sound apparatus, such as headphones (19.4% of world trade were fake); mobile phones and their parts (18.8%); and memory cards and sticks, cards with magnetic stripe, and solid state drives (14.6%).

Figure 4.1. **Share of counterfeit ICT goods in world trade, 2013**

As a percentage share of world imports in each product category



Statlink: http://dx.doi.org/10.1787/888933461667

Notes: The figures should be interpreted as follows: In 2013, 6.5% of world trade in ICT products was in fake goods; 18.8% of globally traded mobile phones were fake etc. For a full description of ICT sub-categories see Table C.3. in Annex C.

Notes

1. The likelihood that a particular type of counterfeit ICT products is imported from a particular trading partner is counterfeit.

2. For a complete description of trade data, see Annex A.

3. This definition of "provenance economies" is only used in this study. It should not be confused with the World Customs Organization's definition which refers to the last economy through which the goods passed. See for example www.wcoomd.org/en/topics/origin/overview/challenges.aspx.

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Chapter 5

Charting the trade routes of fake ICT goods

This chapter charts the trade routes of fake ICT goods. It identifies which provenance economies appear to be producing fake ICT goods, and which are transit points in international trade. It does so by comparing the General Trade-Related Index of Counterfeiting (GTRIC) indices calculated in the previous chapter with data on ICT industrial activities.

In the previous chapter, the application of the General Trade-Related Index of Counterfeiting (GTRIC) methodology to world trade and custom seizures data identified the key provenance economies of counterfeit trade in ICT products. However, it did not indicate whether these provenance economies are source (producing) countries or transit economies.

By comparing the GTRIC indices calculated in the previous chapter with data on ICT industrial activities, this chapter charts trade routes of counterfeit ICT products to identify which provenance economies are more likely to be producers of infringing ICT devices, and which are more likely to be transit points.

The counterfeit trade routes are deliberately complex

Parties engaging in the trade of counterfeit ICT equipment tend to ship infringing products via complex trade routes, often using transit points in jurisdictions with little or no risk of IP-related enforcement actions (OECD – EUIPO, 2016). This is done to:

- "falsify" all the documents and camouflage the original point of production and/or departure
- establish distribution centres for counterfeit goods (e.g. in free trade zones), and for transhipping them in smaller orders to their final destinations
- process products, usually in the free trade areas, often by adding counterfeit trademarks and/or repackaging or re-labelling goods.

Consequently, in most cases it is difficult for customs officers to determine the producing economy, not only because of document cleansing, but also because the actual process of counterfeiting may not take place in the same economy as the good was produced. A fake product may be produced in one economy, while its labelling with counterfeit logos or packaging into trademark-infringing packages may take place in another economy that is closer to destination markets and has weaker IP enforcement.

While imports of counterfeit ICT products are, in most cases, targeted by local enforcement authorities, goods in transit are not within their scope, which means they are less likely to be intercepted.[*]

*. Since 23 March 2016, customs authorities in the EU can take action in relation to goods coming from third countries and brought into the customs territory of the Union without being released for free circulation, including transit, and bearing a trade mark being identical or essential identical to an EU trade mark.

Identifying possible producers and transit points is complex

Given the very good quality of customs seizures data overall, quantitative analysis can shed light on which provenance economies are more likely to be producers of infringing ICT goods, and which are more likely to be the transit points.

Data on the ICT-related industrial activities of the top provenance economies were compared with the GTRIC-p index on the propensity of various ICT product categories to be counterfeit (Annex B). The logic behind this exercise is as follows: if a given economy is an important provenance economy of counterfeit ICT products in international trade, and is also an important manufacturer of these products, it is likely to be a producer of counterfeit ICT goods, rather than just a point of transit. Conversely, an economy that is a significant provenance according to the GTRIC-e score, but that simultaneously reports low ICT-related industrial production, is more likely to be a transit point.

The exercise was carried out in four steps:

1. ICT-related industry data (output) were extracted from the industrial statistics database of the United Nations Industrial Development Organization (UNIDO). These data are classified according to the categories of industrial activity ISIC-Rev3.
2. ISIC-Rev3 categories were matched with the main broad categories of ICT products that refer to the GTRIC-p indices.[*] As a result, each ICT-related industrial category (ISIC-Rev3) was assigned an index of propensity to counterfeiting from the corresponding GTRIC-p table.

*. The correspondences are the following: Computers and peripheral equipment – Manufacture of office, accounting and computing machinery (ISIC 3000); Communication equipment – Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy (ISIC 3220); Consumer electronic equipment – Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods (ISIC 3230); Electronic components – Manufacture of electronic valves and tubes and other electronic components (ISIC 3210); Electrical equipment – Manufacture of accumulators, primary cells and primary batteries (ISIC 3140).

3. A set of significant provenance economies of counterfeit ICT products was identified by listing all those with a GTRIC-e index larger than 0.3. For each provenance economy, data on ICT-related industrial outputs were weighted with the indices of propensity to counterfeiting calculated in Step 2. The results for each economy were summarised into total output of ICT industries, controlled for propensity to counterfeiting.
4. These results were then normalised for each year covered by the sample of customs seizures: 2011, 2012 and 2013.

This exercise resulted in assigning an index value of between 0 and 1 for each important provenance economy of counterfeit ICT products in international trade. Large values of this index indicate a high probability that an economy is a producer of counterfeit ICT goods. Low values indicate a high probability that an economy is an important transit point for the trade in counterfeit ICT goods (Table 5.1).

The People's Republic of China emerges as the clear main producer economy of counterfeit ICT products in international trade, while the exact role of the other important provenance economies is unclear. These provenance economies may be producers (e.g. for some sensitive ICT goods), transit economies (e.g. for other sensitive ICT goods), or both.

In addition, variations in reporting schemes and data quality mean that all these results should be considered as general indications only. The schemes used for data on industrial production (ISIC) and for propensities to counterfeit (ICT categories based on HS) are different. Moreover, the counterfeiting propensities are reported at an aggregate level, which reduces the precision of a match between both datasets.

The data on industrial production are also incomplete for many ICT sectors and economies. Only about 80% of all sectors sensitive to counterfeiting identified by GTRIC-p have a corresponding category in the industrial dataset. Available data are also lacking at the economy level, as there are still no credible data on ICT-related industrial output for many important provenance economies.

Table 5.1. **Potential producers and transit points of fake ICT goods**

Status	Provenance economy	Index
Potential **producers** of counterfeit ICT goods	**China (People's Republic of)**	1.000
Potential **transit points** for the trade in counterfeit ICT goods	**Germany**	0.419
	Korea	0.407
	Sweden	0.356
	Turkey	0.304
	Canada	0.301
	Brazil	0.298
	India	0.298
	Uruguay	0.295
	Chile	0.265
	Hong Kong (China)	0.244
	Serbia	0.238
	Morocco	0.217
	United Arab Emirates	0.208
	Tunisia	0.206
	Greece	0.198

Notes: The index assigns a relative score of between 0 and 1 to each important provenance economy of counterfeit ICT products in international trade. Large values of this index indicate a high probability that an economy is a producer of counterfeit ICT goods. Low values indicate a high probability that an economy is an important transit point for the trade in counterfeit ICT goods.

Reference

OECD/EUIPO (2016), *Trade in Counterfeit and Pirated Goods: Mapping the Economic Impact*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264252653-en.

Chapter 6

Trade in counterfeit ICT goods: Conclusion

The findings of the quantitative assessment of the trade in counterfeit information and communications technology (ICT) products detailed in this report have serious implications for businesses, consumers and governments. This concluding chapter summarises the key implications and proposes some next steps for policy makers as part of their efforts to counter illicit trade.

This study has compiled and analysed a unique international set of customs seizure data, combined with structured interviews with trade and customs experts, to quantitatively assess the value, scope and trends of trade in counterfeit information and communications technology (ICT) products. It finds that world trade in counterfeit ICT goods accounted for as much as USD 143 billion in 2013, and 6.5% of ICT products traded worldwide were fake. Furthermore, the number and range of affected products are growing. The ICT sector appears to be particularly susceptible to counterfeiting. The share of fakes in ICT imports is well above the average share of counterfeit goods in total trade.

The ICT consumer goods most frequently targeted by counterfeiters include memory cards and sticks, cards with magnetic stripe, and solid state drives; sound apparatus; video games consoles and controllers; and batteries. Counterfeiters also target fake ICT infrastructure components, such as batteries, transistors, printed circuits or even radio masts. Fake, substantial network components mean that operators may face a lower quality of service, network disruptions and failures in electromagnetic compatibility. They also pose a significant health and safety threat.

The People’s Republic of China and Hong Kong (China) are the main sources of counterfeit ICT goods. China appears to be the primary producer of counterfeit ICT products, with rapidly growing export flows of counterfeits ICT that account for more than 25% of global ICT exports. The role of Hong Kong (China) is unclear, as it is certainly an important hub of international trade, and could also serve as a transit economy for fake ICT goods. However, it may also produce some of them. Express courier and postal parcels – driven by the rising popularity of e-commerce – are the most popular ways of shipping counterfeit ICT products, significantly complicating the screening and detection processes and lowering the risk of detection and penalties.

Companies registered in the United States are hit the hardest by this trade in counterfeits, but those in other OECD countries are also strongly affected (notably Finland, Japan, Korea and Germany). Almost 43% of all seized fake ICT goods infringe the intellectual property (IP) rights of firms registered in the United States. Rights holders in Hong Kong (China) are also having their IP rights infringed. This highlights that all innovative ICT companies, no matter where they are located, can suffer revenue losses and erosions in brand value as a result of trademark infringement.

The consequences for governments include loss of tax revenues and an increase in costs for ensuring compliance with national anti-counterfeiting legislation and reacting to threats to public safety and distortions in labour markets. Counterfeiting activities can also be a source of revenue for organised crime.

Next steps

Policy makers and the private sector should be concerned about the significant scope of this threat to legitimate businesses and economic activity, and to consumer safety. It should be addressed by governments as part of their efforts to counter illicit trade.

The mapping of trade in counterfeit ICT goods presented here provides a foundation on which to formulate and propose a set of issues for policy makers and industry to consider. These issues could include the lack of deterrent penalties, the emergence and role of e-commerce, and factors related to transnational crime. This analysis would inform policy discussions that governments can take individually or in co-ordination to prevent, reduce or deter trade in counterfeit ICT goods.

The unique dataset of trade in counterfeit ICT goods developed for this study could also be used in a set of follow-up exercises, such as a more detailed mapping of the trade routes of counterfeit ICT products, and the analysis of the impact on governments, industry and consumers. This would provide additional information on the actual harm caused by counterfeiting and could guide the development and strengthening of risk-based enforcement practice.

Annex A

Data issues

Data overview

Information on the magnitude, scope and trends of counterfeit trade in ICT products is critical to understanding the nature of the problems being faced and how the situation is evolving. Information is also essential for designing and implementing effective policies and measures to combat illicit operations.

One of the principal objectives of this report is to explore methodologies and techniques that could be employed to improve the measurement of the magnitude of counterfeit trade in the ICT sector. To this end, this study follows the OECD (2008) and the OECD and EUIPO (2016) approaches. These were based on two sources of information:

- International trade statistics.
- Customs seizures of infringing products.

Trade data

ICT-related trade data are based on the United Nations (UN) Comtrade database (landed customs value). With 168 reporting economies and 234 partner economies, the database covers the largest part of world trade in ICT products and is considered the most comprehensive trade database available. Products are registered on a six-digit Harmonised System (HS) 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 (imports statistics and data on customs seizures of infringing ICT products) originate from the same source – customs offices at the destination.

Trade statistics may entail certain biases that should be fully understood. These refer in particular to methodological discrepancies between exports and imports data, and to misrepresentation of the points of origin. This reinforces the choice for import statistics as the reference point for this exercise, as both imports data and seizure data refer to the same observed incoming trade flows.

Seizure data

The DG TAXUD, CBP-ICE and WCO datasets rely on data entries collected and processed by customs officers. These data are primarily designed to improve the work of customs, e.g. prepare risk profiling processes and share national experiences. As with any other administrative data they need careful consideration before being used in quantitative analysis.

These data were discussed in detailed in OECD-EUIPO (2016). In this study two issues related to the ICT context are of particular relevance: i) classification levels of ICT goods; and ii) valuations of detained fake ICT goods. These issues are discussed below.

Classification levels

All the source databases were created and are run independently. Even though all of them report product categories of seized goods, they differ in the taxonomies used:

- The DG TAXUD database uses its own classification scheme with 35 product categories. This is complemented with manually entered descriptions of a detained product.
- The WCO database has 15 main categories, including 4 main categories related to ICT devices: computers and accessories, electronic appliances, mobile phones and accessories, and phonographic products. Each category is divided into numerous sub-categories. The WCO database also includes an “other” category with detailed product description.

- The CBP-ICE database relies on the Harmonised Tariff Schedule (HTS)* at a very detailed seven digit level. The HTS is based on HS taxonomy.

This study uses a classification of ICT products that relies directly on the HS taxonomy. This is done for two reasons. First, the HS/CN taxonomy is the common denominator for the WCO and DG TAXUD datasets, and the HTS classification scheme used by CBP-ICE is directly based on it.

Second, this taxonomy is directly related to the new OECD definition of ICT products (OECD, 2011) and to the classification of ICT goods categories used by the United Nations (UNCTAD, 2011). This allows a system of classification for ICT goods to be established that is consistent with both of these previous works.

For the DG TAXUD and WCO databases, mapping product infringement onto HS classification was a complex process that was structured along the following steps:

1) An algorithm was developed that matches the general seizures categories of the DG TAXUD and WCO database with detailed descriptions of HS chapters, headings and subheadings (up to an eight digit HS code). Since the detailed description in the DG TAXUD and WCO datasets is not limited to English, matches were made based on detailed descriptions in three languages: English, German and French. All descriptions of ICT items in individual seizures and HS classification were then normalised (i.e. set to upper case, special characters and stop words removed). For each description of a seized ICT item, each word was checked against the detailed HS code description. The HS chapter with the highest degree of similarity with the description of the seized ICT good was then matched with a given seizure.
2) The results of this automatised assignment were also checked manually. Regular expression lists were manually created for multiple matches, for no exact matches, and for certain popular categories of ICT products. These lists matched certain expressions used for describing seized ICT products with corresponding HS codes.

*. The HTS comprises a hierarchical structure for describing all goods in trade for duty, quota, and statistical purposes. This structure is based upon the international Harmonized Commodity Description and Coding System (HS), administered by the World Customs Organization in Brussels.

Valuation issues

One of the main goals of this study is to estimate the share of counterfeit ICT products in the total volume of international trade in ICT goods. Consequently, the value of counterfeit ICT devices should be reported in terms that are similar to those used for legitimate imports, which primarily involve the transaction value of goods.

There are two main value types for seized counterfeit goods:

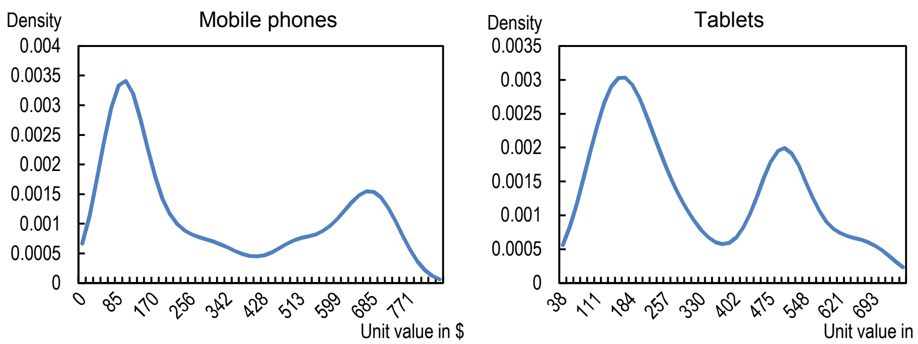
- declared value (value indicated on customs declarations)
- replacement value (the retail price of the goods had they been genuine).

The WCO does not issue any recommendations on valuation methods, while DG TAXUD recommends that valuations should reflect the replacement value. However, a descriptive analysis of the data suggests that this recommendation is not always taken into account.

Using the example in Chapter 4 of Beats Electronics headphones, Apple and Samsung mobile phones, and Kingston Technology memory cards in the “Multiple segments of targeted brand markets”, it can be seen that reported values of customs seizures of these items are often distributed well below the market value of genuine articles. These unreasonably low values do not seem to be correlated with any ICT product category or provenance economy. Hence, both datasets appear to contain declared value rather than replacement value.

Similarly to DG-TAXUD, CBP-ICE recommends that valuations should reflect the manufacturer's suggested price for merchandise sold at retail to the consumer (MSRP), i.e. the replacement value. A quantitative analysis of seizures of selected ICT product categories, however, indicated that this recommendation was not always taken into account either. The check was done for counterfeit items which are relatively likely to be purchased knowingly by consumers on secondary markets, such as mobile phones and tablets. In some cases of seizures, the very low values associated with these products indicate that these correspond to the declared value rather than replacement value. This was striking for instance in the case of mobiles phones and tablets, for which some seizures reported unit values below USD 15 and USD 50 respectively (Figure A.1).

Figure A.1. **Unit value distribution of seized mobile phones and tablets in the CBP-ICE database**



Statlink: http://dx.doi.org/10.1787/888933461676

Importantly, the lack of clarity on the valuation of seized good concerns those goods that tend to be knowingly bought by customers as counterfeits. For ICT goods that are supposed to deceive consumers the transaction value is usually close to the replacement value.

To summarise, a quantitative check of valuations of selected ICT products shows that often the declared value is reported. This was also noted during a set of structured interviews with customs officials as part of the OECD-EUIPO (2016) study. Consequently, the entire dataset is considered to contain declared values.

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Annex B

Methodological notes

Construction of GTRIC-p

In this study, GTRIC-p refers to an index of ICT products categories according to their relative propensity of being counterfeit. This index is built in four steps – the calculations for each are described in the sections which follow:

1) For each reporting economy, the seizure percentages for sensitive ICT products categories are calculated.
2) For each ICT product category, aggregate seizure percentages are calculated, taking the reporting economies' share of total sensitive ICT-related imports as weights.
3) From these, a counterfeit source factor is established for each ICT category, based on the category's weight in terms of total trade in ICT goods.
4) Based on these factors, the GTRIC-p is formed.

Step 1: Measuring reporter-specific product seizure intensities

$\widetilde{v}_i^k$ and $\widetilde{m}_i^k$ are, respectively, the seizure and import values of ICT product type *k* in economy *i* from *any* provenance economy in a given year. Economy i's relative seizure intensity (seizure percentages) of product type *k,* denoted below as γ_i^k, is defined as:

$$\gamma_i^k = \frac{\widetilde{v}_i^k}{\sum_{k=1}^{\overline{K}} \widetilde{v}_i^k}, \text{ such that } \sum_{k=1}^{\overline{K}} \gamma_i^k = 1 \quad \forall i \in \{1,\ldots,\overline{N}\}$$

$k = \{1,...,\overline{K}\}$ is the range of sensitive ICT products categories (the total number of ICT products categories is given by *K*) and $i = \{1,..., \overline{N}\}$ is the range of reporting economies (the total number of economies is given by *N*).

Step 2: Measuring general product seizure intensities

The general seizure intensity for ICT product category *k*, denoted Γ^k, is then determined by averaging seizure intensities, γ_i^k, weighted by the reporting economies' share of total sensitive imports in a given ICT product category *k*. Hence:

$$\Gamma^k = \sum_{i=1}^{\overline{N}} \omega_i \gamma_i^k \ , \ \forall k \in \{1,..., \overline{K}\}$$

The weight of reporting economy *i* is given by:

$\omega_i = \dfrac{\widetilde{m}_i^k}{\sum_{i=1}^{\overline{N}} \widetilde{m}_i^k}$, where $\widetilde{m}_i$ is *i*'s total registered import value of sensitive ICT goods, such that $\sum_{i=1}^{\overline{n}} \omega_i = 1$

Step 3: Measuring product-specific counterfeiting factors

$\widetilde{M}^k = \sum_{i=1}^{N} \widetilde{m}_i^k$ is defined as the total registered imports of sensitive ICT product category *k* for *all* economies, and $\widetilde{M} = \sum_{k=1}^{\overline{K}} \widetilde{M}^k$ is defined as the total registered world imports of *all* sensitive ICT goods.

The world import share of ICT product category *k* in total world imports of ICT goods, denoted s^k, is therefore given by:

$$s^k = \frac{\widetilde{M}^k}{\widetilde{M}}, \text{ such that } \sum_{k=1}^{\overline{K}} s^k = 1$$

The general counterfeiting factor of ICT product category *k*, denoted CP^k, is then determined as the following.

$$CP^k = \frac{\Gamma^k}{s^k}$$

The counterfeiting factor reflects the sensitivity of product infringements occurring in a particular ICT product category, relative to its share in international trade in ICT goods. These are based on the seizure percentages calculated for each reporting economy and constitute the foundation of the formation of GTRIC-p.

Step 4: Establishing GTRIC-p

GTRIC-p is constructed from a transformation of the general counterfeiting factor and measures the relative propensity of different types of ICT product categories to counterfeiting in international trade. The transformation of the counterfeiting factor is based on two main assumptions:

1) The first assumption (A1) is that the counterfeiting factor of a particular ICT product category is positively correlated with the actual intensity of international trade in counterfeit ICT goods covered by this category. The counterfeiting factors must thus reflect the real intensity of actual counterfeit trade in the given ICT product category.

2) The second assumption (A2) acknowledges that the assumption A1 may not be entirely correct. For instance, the fact that infringing goods are detected more frequently in certain categories could imply that some goods are easier to detect than others; or that some goods, for one reason or another, have been specially targeted for inspection. The counterfeiting factors of ICT products categories with the lower values could therefore underestimate actual counterfeiting intensities in these cases.

In accordance with assumption A1 (positive correlation between counterfeiting factors and actual infringement activities) and assumption A2 (lower counterfeiting factors may underestimate actual activities), GTRIC-p is established by applying a positive monotonic transformation of the counterfeiting factor index using natural logarithms. This standard technique of linearisation of a non-linear relationship (in the case of this study between counterfeiting factors and actual infringement activities) allows the index to be flattened and gives a higher relative weight to lower counterfeiting factors (see Verbeek, 2000).

There may be some outliers at either end of the counterfeiting factor index; i.e. some ICT products categories may be measured as particularly susceptible to infringement even though they are not, whereas others may be measured as insusceptible although they are. To address these it is assumed that GTRIC-p follows a left-truncated normal distribution, with GTRIC-p only taking values of zero or above.

The transformed counterfeiting factor is defined as:

$$cp^k = \ln(CP^k + 1)$$

assuming that the transformed counterfeiting factor can be described by a left-truncated normal distribution with $cp^k \geq 0$; then, following Hald (1952), the density function of GTRIC-p is given by:

$$f_{LTN}(cp^k) = \begin{cases} 0 & \text{if } cp^k \leq 0 \\ \dfrac{f(cp^k)}{\int_0^\infty f(cp^k)\,dcp^k} & \text{if } cp^k \geq 0 \end{cases}$$

where $f(cp^k)$ is the non-truncated normal distribution for cp^k specified as:

$$f(cp^k) = \frac{1}{\sqrt{2\pi\sigma_{cp}^2}} \exp\left(-\frac{1}{2}\left(\frac{cp^k - \mu_{cp}}{\sigma_{cp}} \right)^2 \right)$$

The mean and variance of the normal distribution, here denoted μ_{cp} and σ_{cp}^2 , are estimated over the transformed counterfeiting factor index, cp^k, and given by $\hat{\mu}_{cp}$ and $\hat{\sigma}_{cp}^2$. This enables the calculation of the counterfeit import propensity index (GTRIC-p) across ICT products categories, corresponding to the cumulative distribution function of cp^k .

Construction of GTRIC-e

In this study, GTRIC-e refers to an index of economies according to their relative propensity to be an economy of provenance for counterfeit ICT products. This index is built in four steps – the calculations for each are described in the sections which follow:

1) For each reporting economy, the seizure percentages for provenance economies are calculated.
2) For each provenance economy, aggregate seizure percentages are calculated, taking the reporting economies' share of total sensitive imports of ICT products as weights.
3) From these, each economy's counterfeit source factor is established, based on the provenance economy's weight in terms of total trade in ICT goods.
4) Based on these factors, the GTRIC-e is formed.

Step 1: Measuring reporter and provenance-specific seizure intensities

$\widetilde{v}_i^j$ is economy *i*'s registered seizures of all types of infringing ICT goods (i.e. all *k*) originating from economy *j* at a given year in terms of their value. γ_i^j is economy *i*'s relative seizure intensity (seizure percentage) of all infringing ICT items that originate from economy *j*, in a given year:

$$\gamma_i^j = \frac{\widetilde{v}_i^j}{\sum_{j=1}^{\bar{J}} \widetilde{v}_i^j} \text{ such that } \sum_{j=1}^{\bar{J}} \gamma_i^j = 1 \quad \forall i \in \{1,..., \overline{N}\}$$

where $j = \{1,...,\bar{J}\}$ is the range of identified provenance economies (the total number of exporters is given by *J*), and $i = \{1,..., \overline{N}\}$ is the range of reporting economies (the total number of economies is given by *N*).

Step 2: Measuring general seizure intensities of provenance economies

The general seizure intensity for economy *j*, denoted Γ^j, is then determined by averaging seizure intensities, γ_i^j, weighted by the reporting economy's share of total imports of ICT goods from known counterfeit origins. Hence:

$$\Gamma^j = \sum_{i=1}^{\overline{N}} \varpi_i \gamma_i^j \ , \ \forall j \in \{1,..., \bar{J}\}$$

The weight of reporting economy *i* is given by:

$$\varpi_i = \frac{\widetilde{m}_i^j}{\sum_{i=1}^{\overline{N}} \widetilde{m}_i^j}, \text{ such that } \sum_{i=1}^{\overline{N}} \varpi_i = 1$$

Step 3: Measuring partner-specific counterfeiting factors

$\overline{M}^j = \sum_{i=1}^{N} \widetilde{m}_i^j$ is defined as the total registered world imports of all sensitive ICT products from *j*, and $\overline{M} = \sum_{j=1}^{\overline{J}} \overline{M}^j$ is the total world import of sensitive ICT goods from all provenance economies.

The share of imports from provenance economy *j* in total world imports of sensitive ICT goods, denoted s^j, is then given by:

$$s^j = \frac{\overline{M}^j}{\overline{M}}, \text{ such that } \sum_{j=1}^{J} s^j = 1$$

From this, the economy-specific counterfeiting factor is established by dividing the general seizure intensity for economy *j* with the share of total imports of sensitive ICT goods from *j*.

$$CE^j = \frac{\Gamma^j}{s^j}$$

Step 4: Establishing GTRIC-e

Gauging the magnitude of ICT-related counterfeiting from a provenance economy perspective can be undertaken in a similar fashion as for sensitive goods. Hence, a general trade-related index of counterfeiting for economies (GTRIC-e) is established along similar lines and assumptions:

- The first assumption (A3) is that the intensity by which any counterfeit ICT article from a particular economy is detected and seized by customs is positively correlated with the actual amount of counterfeit ICT articles imported from that location.
- The second assumption (A4) acknowledges that assumption A3 may not be entirely correct. For instance, a high seizure intensity of

counterfeit ICT articles from a particular provenance economy could be an indication that the provenance economy is part of a customs profiling scheme, or that it is specially targeted for investigation by customs. The importance of provenance economies with low seizure intensities in actual counterfeiting activity could therefore be under-represented by the index and lead to an underestimation of the scale of counterfeiting.

As with the product-specific index, GTRIC-e is established by applying a positive monotonic transformation of the counterfeiting factor index for provenance economies using natural logarithms. This follows from assumption A3 (positive correlation between seizure intensities and actual infringement activities) and assumption A4 (lower intensities tend to underestimate actual activities). Considering the possibilities of outliers at either end of the GTRIC-e distribution – i.e. some economies may be wrongly measured as being particularly susceptible sources of counterfeit ICT products imports, and vice versa – GTRIC-e is approximated by a left-truncated normal distribution as it does not take values below zero.

The transformed general counterfeiting factor across provenance economies on which GTRIC-e is based is therefore given by applying logarithms onto economy-specific general counterfeit factors (see, for example, Verbeek, 2000):

$$ce^j = \ln(CE^j + 1)$$

In addition, as for GTRIC-p it is assumed that GTRIC-e follows a truncated normal distribution with $ce^j \geq 0$ for all *j*. Following Hald (1952), the density function of the left-truncated normal distribution for ce^j is given by:

$$g_{LTN}(ce^j) = \begin{cases} 0 & if\ ce^j \leq 0 \\ \dfrac{g(ce^j)}{\int_0^\infty g(ce^j)dce} & if\ ce^j \geq 0 \end{cases}$$

where $g(ce^j)$ is the non-truncated normal distribution for ce^j specified as:

$$g(ce^j) = \frac{1}{\sqrt{2\pi\sigma_{ce}^2}} \exp\left(-\frac{1}{2}\left(\frac{ce^j - \mu_{ce}}{\sigma_{ce}}\right)^2\right)$$

The mean and variance of the normal distribution, here denoted μ_{ce} and σ_{ce}^2, are estimated over the transformed counterfeiting factor index, ce^j, and given by $\widehat{\mu}_{ce}$ and $\widehat{\sigma}_{ce}^2$. This enables the calculation of the counterfeit import propensity index (GTRIC-e) across provenance economies, corresponding to the cumulative distribution function of ce^j.

Construction of GTRIC

Following the OECD and EUIPO (2016) study, the propensity to import a given infringing ICT product type from a specific trading partner is obtained by combining the two indices: GTRIC-p and GTRIC-e. In this regard, it is important to emphasise that the index resulting from this combination does not account for differences in infringement intensities across different types of goods that may exist between reporting economies. For instance, imports of certain counterfeit ICT goods could be particularly large from some trading partners and small from others. An index taking such "infringement specialisation", or concentration, into account is desirable and possible to construct; but it would require detailed seizure data. The combined index, denoted GTRIC, is therefore a generalised index that approximates the relative propensities for particular ICT product types, imported from specific trading partners, to be counterfeit.

Establishing propensities for product and provenance economy

In this step, the propensities to contain counterfeit ICT products will be established for each trade flow from a given provenance economy and in a given ICT product category.

The general propensity of importing infringed items of ICT product category *k*, from any economy, is denoted P^k, and is given by GTRIC-p so that:

$P^k = F_{LTN}(cp^k)$, with $F_{LTN}(cp^k)$ is the cumulative probability function of $f_{LTN}(cp^k)$

Furthermore, the general propensity of importing any type of infringing goods from economy *j* is denoted P^j , and given by GTRIC-e, so that:

$P^j = G_{LTN}(ce^j)$, with $G_{LTN}(cp^j)$ is the cumulative probability function of $g_{LTN}(cp^j)$

The general propensity of importing counterfeit items of type *k* originating from economy *j* is then denoted P^{jk} and approximated by:

$$P^{jk} = P^k P^j$$

Therefore, $P^{jk} \in [\varepsilon_p \varepsilon_e ;1)$, $\forall j, k$, with $\varepsilon_p \varepsilon_e$ denoting the minimum average counterfeit export rate for each sensitive ICT product category and each provenance economy. It is assumed that $\varepsilon_p = \varepsilon_e = 0.05$.

Calculating the absolute value

α is the fixed point, i.e. the maximum average counterfeit import rate of a given type of infringing ICT good, *k*, originating from a given trading partner, *j*. α can be applied onto propensities of importing infringing ICT goods of type *k* from trading partner *j* (αP^{jk}). As a result, a matrix of counterfeit import propensities **C** is obtained.

$$\mathbf{C} = \begin{pmatrix} \alpha P^{11} & \alpha P^{21} & & & \alpha P^{1K} \\ \alpha P^{12} & \ddots & & & \\ & & \alpha P^{jk} & & \\ & & & \ddots & \\ \alpha P^{J1} & & & & \alpha P^{JK} \end{pmatrix} \text{ with dimension } J \text{ x } K$$

The matrix of world imports of ICT goods is denoted by **M.** Applying **C** on **M** yields the absolute volume of trade in counterfeit ICT goods. Formally, the import matrix **M** is given by:

$$\mathbf{M} = \begin{pmatrix} \mathbf{M}_1 \\ \vdots \\ \mathbf{M}_i \\ \vdots \\ \mathbf{M}_n \end{pmatrix} \text{ with dimension } n \text{ x } J \text{ x } K$$

Each element is defined by economy *i*'s unique import matrix of ICT good *k* from trading partner *j*:

$$\mathbf{M}_i = \begin{pmatrix} m_{i1}^1 & m_{i1}^2 & & & m_{i1}^K \\ m_{i2}^1 & \ddots & & & \\ & & m_{ij}^k & & \\ & & & \ddots & \\ m_{iJ}^1 & & & & m_{iJ}^K \end{pmatrix} \text{ with dimension } J \text{ x } K$$

Hence, the element m_{ij}^k denotes *i*'s imports of ICT product category *k* from trading partner *j*, where $i = \{1,..., n\}$, $j = \{1,..., J\}$, and $k = \{1,..., K\}$.

Denoted by Ψ, the product-by-economy percentage of counterfeit imports of ICT goods can be determined as the following:

$$\Psi = \mathbf{C}'\mathbf{M} \div \mathbf{M}$$

Total trade in counterfeit ICT goods, denoted by the scalar **TC**, is then given by:

$$\mathbf{TC} = \mathbf{i}_1{}'\Psi\mathbf{i}_2$$

Where $\mathbf{i}_1$ is a vector of one with dimension *nJ* x 1, and $\mathbf{i}_2$ is a vector of one with dimension K x 1. Then, by denoting total world trade in ICT products by the scalar $\mathbf{TM} = \mathbf{i}_1{}'\mathbf{M}\mathbf{i}_2$, the share of counterfeit ICT products in world trade in ICT goods, s_{TC}, is determined by:

$$s_{\mathbf{TC}} = \frac{\mathbf{TC}}{\mathbf{TM}}$$

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Annex C

Tables

Table C.1. **Propensity of economies to export counterfeit ICT products**

GTRIC-e for world trade in ICT products, based on the unified seizure dataset

Economy	2011	2012	2013	Economy	2011	2012	2013
Afghanistan	0.034	0.049	0.046	Cameroon	0.035	0.049	0.047
Albania	0.035	0.049	0.047	Canada	0.845	0.879	0.874
Argentina	0.034	0.048	0.046	Chile	0.288	0.341	0.333
Armenia	0.038	0.054	0.051	China (People's Republic of)	1.000	1.000	1.000
Australia	0.119	0.153	0.148	Colombia	0.120	0.153	0.148
Austria	0.085	0.112	0.108	Cote d'Ivoire	0.074	0.099	0.095
Azerbaijan	0.137	0.174	0.169	Curacao	0.035	0.049	0.047
Bahamas	0.038	0.054	0.051	Cyprus[1, 2]	0.034	0.048	0.046
Bahrain	0.074	0.099	0.095	Czech Republic	0.078	0.103	0.099
Belarus	0.078	0.104	0.100	Democratic People's Republic of Korea	0.141	0.178	0.173
Belgium	0.035	0.049	0.047	Denmark	0.083	0.109	0.105
Belize	0.038	0.054	0.051	Dominican Republic	0.074	0.099	0.095
Bolivia	0.058	0.079	0.076	Ecuador	0.119	0.153	0.147
Bosnia and Herzegovina	0.035	0.049	0.047	Egypt	0.161	0.201	0.195
Brazil	0.410	0.467	0.459	Ethiopia	0.000	0.000	0.000
Bulgaria	0.040	0.056	0.053	Fiji	0.074	0.099	0.095
Burundi	0.000	0.000	0.000	France	0.120	0.153	0.148
Cambodia	0.035	0.049	0.047	Georgia	0.105	0.137	0.132

Table C.1. **Propensity of economies to export counterfeit ICT products** (*cont.*)

Economy	2011	2012	2013	Economy	2011	2012	2013
Germany	0.551	0.608	0.600	Libya	0.083	0.109	0.105
Ghana	0.038	0.054	0.051	Macau (China)	0.119	0.153	0.147
Greece	0.299	0.352	0.345	Malaysia	0.166	0.207	0.201
Guyana	0.034	0.049	0.046	Mali	0.034	0.048	0.046
Honduras	0.074	0.099	0.095	Malta	0.038	0.054	0.051
Hong Kong (China)	1.000	1.000	1.000	Mauritius	0.000	0.000	0.000
Hungary	0.035	0.049	0.047	Mexico	0.207	0.253	0.246
India	0.746	0.792	0.785	Micronesia	0.000	0.000	0.000
Indonesia	0.127	0.162	0.157	Morocco	0.464	0.522	0.513
Iran	0.118	0.152	0.147	Netherlands	0.162	0.202	0.196
Iraq	0.133	0.169	0.164	New Caledonia	0.080	0.106	0.102
Ireland	0.035	0.049	0.047	New Zealand	0.079	0.104	0.100
Israel	0.034	0.048	0.046	Nigeria	0.079	0.104	0.100
Italy	0.120	0.154	0.149	Oman	0.037	0.052	0.050
Jamaica	0.035	0.049	0.047	Pakistan	0.121	0.155	0.150
Japan	0.122	0.157	0.151	Panama	0.093	0.122	0.117
Jordan	0.038	0.054	0.051	Paraguay	0.039	0.054	0.052
Korea	0.733	0.780	0.774	Peru	0.045	0.063	0.060
Lao People's Democratic Republic	0.000	0.000	0.000	Philippines	0.206	0.252	0.245
Latvia	0.038	0.053	0.051	Poland	0.035	0.049	0.047
Lebanon	0.119	0.153	0.147	Portugal	0.035	0.049	0.047

Table C.1. **Propensity of economies to export counterfeit ICT products** (*cont.*)

Economy	2011	2012	2013	Economy	2011	2012	2013
Qatar	0.095	0.124	0.119	Tunisia	0.352	0.407	0.399
Romania	0.042	0.059	0.056	Turkey	0.585	0.641	0.633
Russia	0.108	0.139	0.135	Ukraine	0.123	0.158	0.152
Saint Helena	0.035	0.049	0.047	United Arab Emirates	0.772	0.815	0.810
Saudi Arabia	0.090	0.118	0.114	United Kingdom	0.126	0.160	0.155
Senegal	0.078	0.104	0.100	United States	0.246	0.295	0.288
Serbia	0.475	0.534	0.525	Uruguay	0.555	0.612	0.604
Singapore	0.175	0.217	0.210	Venezuela	0.105	0.136	0.131
Slovenia	0.163	0.204	0.197	Viet Nam	0.139	0.176	0.170
South Africa	0.074	0.099	0.095				
Spain	0.093	0.121	0.117				
Sri Lanka	0.035	0.049	0.047				
Suriname	0.039	0.055	0.052				
Swaziland	0.035	0.049	0.047				
Sweden	0.466	0.525	0.516				
Switzerland	0.154	0.193	0.187				
Syrian Arab Republic	0.078	0.104	0.100				
Thailand	0.184	0.227	0.221				
Trinidad and Tobago	0.036	0.051	0.049				

1. Note by Turkey:

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

2. Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Table C.2. **Propensity of ICT categories to suffer from counterfeiting**

GTRIC-p for world trade in ICT, based on the unified seizure dataset

ICT product category	2011	2012	2013
Batteries	0.829	0.937	0.858
Cables and chargers	0.322	0.513	0.363
Cash registers	0.000	0.000	0.000
Computers, input peripherals/external parts	0.286	0.474	0.326
Diodes, transistors and tubes	0.086	0.213	0.109
Electronic integrated circuits	0.191	0.362	0.225
Hard disk drives	0.090	0.218	0.113
Indicator panels incorporating LCD or LED	0.090	0.218	0.113
Laptops, desktops, tablets	0.251	0.435	0.289
Lasers	0.079	0.200	0.100
Media players	0.832	0.939	0.862
Memory cards and sticks; cards with magnetic stripe, and solid state drives	1.000	1.000	1.000
Mobile phones	0.858	0.952	0.884
Other office machines	0.000	0.000	0.000
Optics and imaging products	0.198	0.372	0.233
Phonographic products	0.998	1.000	0.999
Printers, copiers, scanners	0.238	0.419	0.275
Remote control	0.424	0.618	0.467
Smart cards	0.045	0.136	0.060
Sound apparatus	1.000	1.000	1.000
Transmission and reception apparatus	0.344	0.536	0.385
Video game consoles and controllers	1.000	1.000	1.000

Table C.3. **ICT product categories and sub-categories**

HS correspondence
A. Computers and peripheral equipment
A.1. Computer input peripherals and external parts
8471.60 - Input/output units, whether/not containing storage units in the same housing
8471.80 - Other units of automatic data processing machines, excluding 8471.50
8471.90 - Magnetic/optical readers, machines for transcribing data onto data media
8528.41 - Cathode-ray tube monitors, of a kind solely/principally used in an automatic data processing system
8528.51 - Other monitors, of a kind solely/principally used in an automatic data processing system of heading 8471
8528.61 - Projectors of a kind solely/principally used in an automatic data processing system of heading 8471
8473.30 - Parts and accessories of the machines of heading 8471
8473.50 - Parts and accessories equally suitable for use with machines of two/more of the heading 8469 to 8472
A.2. Laptops, desktops, tablets
8471.30 - Portable automatic data processing machines, weighing not more than 10 kg
8471.41 - Other automatic data processing machines comprising in the same housing at least a central processing unit […]
8471.49 - Other automatic data processing machines, presented in the form of systems
8471.50 - Processing units other than those of sub-heading 8471.41 or 8471.49
A.3. Printers, copiers, scanners
8443.31 - Machines which perform two/more of the functions of printing, copying or facsimile transmission
8443.32 - Other printers, copying machines & facsimile machines
8443.99 – Other parts and accessories of printing machinery
A.4. Cash registers
8470.50 - Cash registers
A.5. Other office machines (e.g. hectograph/stencil etc.)
8472.90 - Other office machines

Table C.3. **ICT product categories and sub-categories** (*cont.*)

HS correspondence

B. Communication equipment
B.1. Indicator panels incorporating LCD or LED
8531.20 - Indicator panels incorporating liquid crystal devices (LCD's) or light emitting diode (LED's)
B.2. Mobile phones; parts and accessories (except for cases/covers and the like)
8517.11 - Line telephone sets with cordless handsets
8517.12 - Telephones for cellular networks/for other wireless networks
8517.18 - Other telephone sets, incl. telephones for cellular networks
8517.70 - Parts of telephone sets, incl. telephones for cellular networks
B.3. Transmission and reception apparatus
8525.50 - Transmission apparatus for radio-broadcasting or television
8525.60 - Transmission apparatus for radio-broadcasting or television incorporating reception apparatus
8517.61 - Base stations for transmission/reception of voice, images/other data, including apparatus communication
8517.62 - Machines for the reception, conversion and transmission or regeneration of voice, images or other data
8517.69 - Other apparatus for transmission/reception of voice
8527 - Reception apparatus for radiobroadcasting, whether or not combined with sound recording apparatus

C. Consumer electronic equipment
C.1 Media players
8519.50 - Telephone answering machines
8519.81 - Other sound recording/reproducing apparatus, using magnetic, optical or semiconductor media
851989 - Other sound recording/reproducing apparatus, other n.e.s. in heading 8519
8521.90 - Video recording/reproducing apparatus other than magnetic tape-type
8528.72 - Other colour reception apparatus for television
8528.73 – Other monochrome reception apparatus for television
C.2 Optics and imaging products
8521.10 - Video recording/reproducing apparatus of magnetic tape-type
8521.90 - Video recording/reproducing. apparatus other than magnetic tape-type
8525.80 - Television cameras, digital cameras and video camera recorders
9006 - Photographic (other than cinematographic) cameras
9007 - Cinematographic cameras and projectors

Table C.3. **ICT product categories and sub-categories** (*cont.*)

HS correspondence

C.3 Sound apparatus , excluding MP3 and MP4 players
8518.10 - Microphones and stands therefor
8518.21 - Single loudspeakers, mounted in their enclosures
8518.22 - Multiple loudspeakers, mounted in the same enclosure
8518.29 - Loudspeakers n.e.s. in 85.18, whether/not mounted in their enclosures
8518.30 - Headphones and earphones, whether/not combined with a microphone
8518.40 - Audio-frequency electric amplifiers
8518.50 - Electric sound amplifier sets
8518.90 - Parts of the apparatus and equipment of 85.18
C.4 Video game consoles and controllers
9504.10 - Video games of a kind used with a television receiver

D. Electronic components
D.1 Electronic integrated circuits
8542.31 - Electronic integrated circuits, processors and controllers
8542.32 - Electronic integrated circuits, memories
8542.33 - Electronic integrated circuits, amplifiers
8542.39 - Other electronic integrated circuits
8542.90 - Parts of electronic integrated circuits
D.2 Hard disk drives
8471.70 - Storage units
D.3 Memory Cards, memory sticks, cards with magnetic stripe, solid state drives
8523.51 - Semiconductor media, solid-state non-volatile storage devices
8523.21 - Magnetic media for the recording of sound/of other phenomena
D.4 Smart cards
8523.52 - “Smart cards”
8523.59 - Other semi-conductor media, for the recording of sound/of other phenomena
D.5 Diodes, transistors and tubes
8540 - Thermionic, cold cathode or photo-cathode valves and tubes
8541 - Diodes, transistors and similar semiconductor devices

Table C.3. **ICT product categories and sub-categories** (*cont.*)

HS correspondence

E. Electrical equipment
E.1 Batteries
8507 - Electric accumulators, including separators therefor
E.2 Cables and chargers
8504.40 - Static converters
8504.50 - Other inductors
8544.42 - Electric conductors, for a voltage not exceeding 1,000V fitted with connectors
8544.49 - Electric conductors, for a voltage not exceeding 1,000V, others
8544.60 - Other electric conductors, for a voltage exceeding 1,000V
8544.70 - Optical fibre cables

F. Cases/Covers; packing material; labels and certificates
F.1 Adhesive labels
3919.90 - Other Self-adhesive Plates, Sheets, Film, Foil, Tape, Strip of Plastics
F.2. Cases and covers
4202.31 - Articles carried in pocket or handbag of leather, composition leather
4202.32 - Articles carried in pocket or handbag of plastics, textile materials
4202.39 - Articles carried in pocket or in handbag of other materials
F.3. Certificates
4907.00 - Unused postage; stamp-impressed paper
F.4. Holders
8529.90 - Other parts of transmission apparatus
F.5. Packing material
4819.50 - Other packing containers, including record sleeves

G. Miscellaneous
G.1. Lasers
9013.20 - Lasers (excluding laser diodes)
G.2. Phonographic products
8523.80 - Discs, tapes and other media for the recording of sound or of other phenomena
G.3 Remote control
8526.92 - Radio remote control apparatus

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Trade in Counterfeit ICT Goods

Recent years have witnessed a constant rise in the spread of ICT (information and communication technologies) infrastructure and a growing demand for ICT goods. The production of these goods is knowledge intensive and the industry relies extensively on intellectual property (IP) rights. This strong and growing demand for ICT goods, and their IP dependence, makes them an attractive target for counterfeiters. This study looks at the trade in counterfeit ICT goods, including the size of the trade, the main sources of fake goods, and the countries whose companies are most affected.

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