Estimating the global economic and social impacts of counterfeiting and piracy

A REPORT COMMISSIONED BY BUSINESS ACTION TO STOP COUNTERFEITING AND PIRACY (BASCAP)

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Foreword

Government efforts to stabilize the economy and stimulate economic growth, trade and employment must include the critical and pervasive role that intellectual property (IP) protection plays in driving, innovation, development and jobs.

The massive infiltration of counterfeit and pirated products, or *IP theft,* creates an enormous drain on the global economy – crowding out billions in legitimate economic activity and facilitating an "underground economy" that deprives governments of revenues for vital public services, forces higher burdens on tax payers, dislocates hundreds of thousands of legitimate jobs and exposes consumers to dangerous and ineffective products.

Reliable information on the scope, scale, costs and impacts of counterfeiting and piracy is critical for helping policymakers to better understand that the trade in fake goods is damaging their economies, threatening the health and safety of their citizens and stifling innovation and creativity. Policymakers with better information on of how counterfeiting and piracy undermine IP, innovation, economic growth and employment are better able to make the fight against IP theft a higher public policy priority and take the actions needed to prevent the damage inflicted by counterfeiting and piracy.

In this regard, government efforts to strengthen IP enforcement regimes can more appropriately be considered as investments that pay tangible dividends to economic development and society.

Because counterfeiters and pirates operate outside the law, estimating the extent of counterfeiting and piracy and the harm these activities cause is extremely challenging. Illegal businesses do not report information on their activities to any government agency so measuring their size must be done using indirect methods.

For this reason, Business Action to Stop Counterfeiting and Piracy (BASCAP), an initiative of the International Chamber of Commerce, is commissioning experts (including Frontier for this report) to examine the issue and to develop methodologies for estimating the economic and social impacts of counterfeiting and piracy. No one report or approach will yield a complete picture or provide all the answers, but BASCAP is committed to learning from as many sources of expertise as possible.

BASCAP is a business initiative, created, led and funded by the world business community, specifically brand owners, and organized by the International Chamber of Commerce, to raise public and political awareness about counterfeiting and piracy, encourage government action and promote respect for intellectual property. For more information or to download a copy of this report, visit www.iccwbo.org/bascap

Executive Summary

Counterfeiting and piracy has increased substantially over the last two decades. Today, counterfeit and pirated products can be found in almost every country in the world and in virtually all sectors of the global economy. As policymakers grapple with allocating resources across multiple public policy challenges, better information on the full scope, scale, costs and impacts of counterfeiting and piracy is necessary to ensure that the appropriate resources and prioritization are given to combating counterfeiting and piracy.

Estimates of the level of counterfeiting vary but all estimates agree that counterfeiting represents a multi-billion dollar underground economy with hundreds of billions of dollars of counterfeit product being produced every year.

Building on the OECD's work

Most recently, the OECD endeavoured to address the lack of in-depth systematic evidence on counterfeiting and piracy and provide governments with a reliable, data-based assessment.

The OECD published an extensive report on the subject in 2008[1], and concluded that the value of counterfeited and pirated goods moving through international trade alone equalled $200 billion annually, a number they updated in 2009 to $250 billion[2].

In releasing their findings, the OECD stated,

"This total does not include the value of domestically produced and consumed counterfeit and pirated products and the significant volume of pirated digital products being distributed via the Internet. If these items were added, the total magnitude of counterfeiting and piracy worldwide could well be several hundred billion dollars more."

In addition the OECD explained that,

Counterfeiting and piracy "can have broader economy-wide effects on trade, foreign investment, employment, innovation, criminality, environment […] and with respect to governments, counterfeiting and piracy have direct effects on tax revenues and government expenditures."

Taken together, the OECD report delineated four categories of impact, of which they provided quantitative estimates for only one: Counterfeit and pirated goods moving through international trade.

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1 OECD, The Economic Impact of Counterfeiting and Piracy, 2008 (hereinafter "OECD Report").

2 OECD, Magnitude of Counterfeiting and Piracy of tangible products: An Update, November 2009.

This study seeks to build on the OECD's work, by updating their estimates and more importantly, introducing and examining categories of impacts identified and discussed but not quantified by the OECD report – the value of domestically produced and consumed counterfeit products, the value of digital piracy, and impacts on society, governments and consumers.

- **Category 1: Counterfeit and pirated goods moving through international trade.** We update the OECD's estimate of the value of counterfeit and pirated goods moving through international trade, drawing on new customs seizure data indicating that the incidence of counterfeiting and piracy has increased relative to the 2005-based customs data used in the OECD's 2008 study.

- **Category 2: Value of domestically produced and consumed counterfeit and pirated products.** We develop a methodology, derived from the OECD's modeling work, to generate an estimate of the value of domestic manufacture and consumption of counterfeit and pirate products – thereby capturing an estimated value of fake products that do not cross borders.

- **Category 3: Volume of pirated digital products being distributed via the Internet.** We describe, evaluate and contextualize industry reports and academic studies on the value of digital piracy of recorded music, movies and software. We then use these studies to produce an estimate of the total value of digital piracy that has been calculated using consistent assumptions and methodology across these industries.

- **Category 4: Broader economy-wide effects.** We provide a summary of previous analysis aimed at identifying the broader economy-wide effects of counterfeiting and piracy.

Before discussing our findings, it is important to be clear about the nature and context of the analysis presented in this report. Since counterfeiting operates outside the law, estimating the exact level of counterfeiting and the harm it brings is extremely challenging. The activities of illegal businesses cannot be measured using the same techniques used for legitimate business concerns.

We have therefore used a variety of analytical approaches to reach our estimates, drawing on a range of sources of information and making conservative assumptions. Our methodologies are described in detail, and we are explicit about the assumptions that have been required to reach the estimates we present and their limitations. While the methods used cannot yield precise estimates, the results do offer compelling evidence of the broad global magnitude of counterfeiting and piracy.

Key findings

The following Table 1 compiles the set of findings we refer to as *the complete picture*, drawing together estimates for the total value of counterfeit and pirated products in 2008, along with projections for 2015. Notably, our estimates of impacts on the broader economy only include estimated impacts on the twenty G20 economies and are presently limited to 2008.

Table 1. The Complete Picture. Estimate of the total value of counterfeit and pirated products in 2008 and 2015, and impacts on the broader economy and employment

OECD Category	Estimate in $ billions (2008)	Estimate in $ billions (2015)
Internationally traded counterfeit and pirated products	$285 - $360	$770 - $960
Domestically produced and consumed counterfeit and pirated products	$140 - $215	$370 - $570
Digitally pirated products	$30 - $75	$80 - $240
sub total	**$455 - $650**	**$1,220 - $1,770**
Broader economy wide effects†*	$125	*$125 +*
Employment losses*	2.5 million	*2.5 million +*

Source: Frontier Economics

† Effects on government tax revenues, welfare spending, costs of crime health services, FDI flows

* Estimate limited to G20 economies

Global economic value

We estimate that, based on 2008 data, the total global economic value of counterfeit and pirated products is as much as $650 billion every year. Table 2 below provides a breakdown of our estimate. It shows that international trade accounts for more than half of counterfeiting and piracy (our updated estimate is $285 billion to $360 billion), domestic production and consumption accounts for between $140 billion and $215 billion and digitally pirated music, movies and software accounts for between $30 billion and $75 billion.

Table 2. Estimate of the total value of counterfeit and pirated products (2008)

OECD Category	Estimate (2008 data)
Internationally traded counterfeit and pirated products	$285 billion - $360 billion
Domestically produced and consumed counterfeit and pirated products	$140 billion - $215 billion
Digitally pirated products	$30 billion - $75 billion
Total	**$455 billion - $650 billion**

Source: Frontier Economics

It is important to note that these estimates are likely to provide a conservative estimate of the impact of counterfeiting and piracy. The estimates of the value of counterfeiting are based on 2008 data (the last year for which complete data was available), and given the rapid increase in counterfeiting and piracy observed between 2005 and 2008, this is likely to under-estimate the level of counterfeiting and piracy beyond 2008. It is for this reason that we have provided estimates to 2015.

It is also important to note that this study, following in the footsteps of the OECD report, has not attempted to estimate business losses associated with counterfeiting and piracy. This is primarily because the likely variations and other difficulties associated with estimating substitution effects across substantially different countries and industries introduces an additional level/degree of variables which could undermine our aim to as accurately as possible characterize the magnitude of counterfeiting and piracy.

Broader economy-wide effects

In addition to their work on economic impacts, the OECD examined – but did not provide quantitative estimates for a range of broader economy-wide effects: *"Counterfeiting and piracy can have broad economy-wide effects on trade, foreign investment, employment, innovation, criminality and the environment. Concerning the microeconomic effects, the sales volume, prices and costs of rights holders are impacted, as are investment, royalties and brand value. For consumers, counterfeit and pirated products may offer cheap alternatives to genuine goods but are usually of inferior quality. For certain types of infringing goods, the health and safety of consumers may be put at significant risk. With respect to governments, counterfeiting and piracy have effects on tax revenues, government expenditures, and, when corruption takes place, the effectiveness of public institutions. (p. 133)*

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These social costs are far from insignificant and merit treatment sufficient to ensure that they are not overlooked when considering the full range of negative impacts resulting from counterfeiting and piracy. In an associated study[3] (excerpted in Chapter 3 of this report), Frontier explored the value and impact of these broader economy-wide effects. Notably, this work did not capture all of the thirteen "broader economy wide effect" cost-categories identified by the OECD; we only tackled impact of counterfeiting and piracy on government tax revenues, legitimate employment, increased costs of crime, economic costs on consumer health and safety, and downward pressures on FDI flows. Moreover, the scope of this report was limited to only the 20 countries comprising the "group of 20", and so will be an under-estimate of the global impact of counterfeiting and piracy. The findings, however, are relevant to this report and serve to complete the picture of the total impacts to "economy and society".

We found counterfeiting and piracy are estimated to cost G20 governments and consumers over $125 billion every year:

- of this, the G20 economies lose approximately $77.5 billion in tax revenues and higher welfare spending, $25 billion in increased costs of crime, $18.1 billion in the economic cost of deaths resulting from counterfeiting and another $125 million for the additional cost of health services to treat injuries caused by dangerous fake products; and
- a number of G20 economies may be missing out on higher FDI as a result of concerns over IPR enforcement. That lost investment could give rise to additional tax losses of more than $6.25 billion across the G20.

Employment

This report has not considered explicitly the impact of counterfeiting and piracy on employment. However, Frontier's previous study, which focused on the wider social and economic impacts of counterfeiting and piracy found that counterfeiting and piracy has significant negative impacts on employment across the G20 economies. Our previous analysis found that **approximately 2.5 million jobs have been destroyed by counterfeiting and piracy** – alternatively, if counterfeiting and piracy could be eradicated or seriously reduced, up to 2.5 million jobs could be created in the legitimate economies of the G20. It should also be noted that these estimates do not include secondary impacts on employment that may well be experienced by suppliers, retailers and other sectors in the supply chain.

[3] Frontier Economics, The Impact of Counterfeiting on Governments and Consumers, December 2009

While it is likely that many of those who lost their jobs have gone on to find reemployment, the personal and family trauma associated with even temporary unemployment should not be lightly discounted. For example, people may quickly get into arrears on mortgages or personal debts, have difficulty paying medical expenses (as benefits are often linked to employment) or be forced to relocate to find alternative employment.

Finally, it is important to note that our previous analysis focused only on the G20 economies and so are likely to under-estimate the negative global impacts of counterfeiting and piracy on employment.

A growing problem – projections to 2015

Based on the OECD's analysis, our work to update the OECD figures and a range of analysis by industry and academics, it would appear that the value and volume of counterfeiting and digital piracy is increasing rapidly. In order to understand the potential impact of this rapid increase, we have developed an estimate of the value of counterfeiting and piracy in 2015. Obviously, estimating what will happen to counterfeiting and piracy is a difficult exercise, and depends on many factors, including developments in the world economy, and action by business and governments to try to counter such activities. Nevertheless, it is helpful to understand what the total magnitude of counterfeiting and piracy would be in 2015, were current growth rates to continue.

The OECD's original report (based on 2005 data) estimates that the value of counterfeit and pirated products in trade equated to $200 billion. In 2009, the OECD increased this figure to $250 billion. Updating these trends using 2008 data to reflect increases in trade *and* seizures since 2005, we find that the value of counterfeit and pirated products in trade has increased by up to $160 billion (to $360 billion) over this period – this is an increase of around 22% per year. Were counterfeiting and piracy to continue to grow at even the much lower rate of 15% per year, it would imply that traded counterfeit and pirated products could be worth up to **$960 billion by 2015.** Similar increases for domestic counterfeit production and consumption imply estimates of up to **$570 billion by 2015**.

The findings also suggest that digital piracy has grown substantially over the last decade, to the point where it now accounts for between 6.5% and 12% of the total value of counterfeit and pirated products consumed. In some sectors, such as music, movies and software, digital piracy accounts for a substantially greater share of the total. It is also likely that digital piracy will continue to grow rapidly over the next decade as internet access grows and ever-faster broadband speeds facilitate illegal downloads and file sharing. Even using a highly conservative assumption, that digital piracy maintains its share of total counterfeiting and piracy, it could account for $210 billion by 2015. Alternative projections based on internet traffic growth suggest this figure could reach **$240 billion by 2015.**

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Together these estimates imply that the global value of counterfeit and pirated products could be up to **$1.77 trillion by 2015**.

Analytical approach

In this report we have sought to build on the work of the OECD to provide up to date estimates of the impact of counterfeiting and piracy in the four categories identified in the OECD's work. In some cases this has involved updating the OECD's analysis with more recent data, whereas in others it has involved developing new analysis, much of which is based on the OECD's analytical approach. The analysis in relation to each of the four impact categories is based on a combination of publicly available data and assumptions.

The publicly available data is from reputable sources such as national governments and the OECD, and is supplemented where necessary with data and analysis from industry associations, businesses and academia. We have based the assumptions used in the analysis on existing data and analysis where possible and have in all cases made the assumptions used as conservative as possible. For instance, in projecting the value of counterfeiting and piracy to 2015, we have assumed growths rates considerably below those observed between 2005 and 2008. The main body of the report sets out in detail the assumptions used in the analysis, the basis of those assumptions, and the impact that they have on our analysis.

It is important to note that the model does not include any multipliers, nor does it attempt to estimate the wider effects that counterfeiting may give rise to in terms of impact on the wider supply chain, investment by firms to prevent counterfeiting and piracy or potentially reduced investment and R&D incentives.

The analysis has been developed so that it can be used by national governments, independent agencies, industry sector associations or any other bodies seeking to identify and examine the costs and impacts of counterfeiting. Over time, we hope that if this approach is implemented by policymakers and other stakeholders at a national level, the reliance on assumptions in developing estimates can be substantially reduced.

Agenda for future research

Looking to the future research agenda, we believe that while it is important to have an understanding of global magnitudes in order to highlight the increasing threat to the global economy, more fine grained and detailed analysis is required on a country by country basis.

Only when the analysis is conducted on a country by country basis, can one identify in detail the negative impacts of counterfeiting and piracy, and the relative costs and benefits of significantly increasing enforcement activities.

Moreover, analysis carried out at the country level is likely to provide better quality, more accurate estimates, due to greater and more robust data. To demonstrate the extent to which the types of approach identified in this report can be applied at a country level, Annexe 1 provides an illustrative assessment of the magnitude of counterfeiting and piracy in the US economy.

Finally, we believe an important next step in the work to identify the impact of counterfeiting and piracy will be to develop a robust methodology for understanding the relationship between the magnitude of counterfeiting and piracy and business losses.

1 Introduction

The OECD published an extensive report on counterfeiting and piracy in 2008[4]. The report, based on 2005 data, found that the value of international trade in counterfeit and pirated goods was at least $200 billion. In 2009, the OECD updated this figure to $250 billion[5].

In releasing their findings, the OECD stated,

"This total [$250 billion] does not include the value of domestically produced and consumed counterfeit and pirated products and the significant volume of pirated digital products being distributed via the Internet. If these items were added, the total magnitude of counterfeiting and piracy worldwide could well be several hundred billion dollars more." In addition the OECD explained that counterfeiting and piracy "can have broader economy-wide effects on trade, foreign investment, employment, innovation, criminality, environment […] and with respect to governments, counterfeiting and piracy have direct effects on tax revenues and government expenditures." (p.13)

Taken together, the OECD Report delineated four categories of impact, which serve as a roadmap for additional research and a blueprint for this report:

- **Category 1:** Counterfeit and pirated goods moving through international trade;
- **Category 2:** Value of domestically produced and consumed counterfeit and pirated products;
- **Category 3:** Volume of pirated digital products being distributed via the Internet; and
- **Category 4:** Broader economy-wide effects.

The OECD Report provided detailed estimates of only the first category of impact – international trade. The International Chamber of Commerce (ICC), through its BASCAP initiative, commissioned Frontier Economics to build on the OECD's work to develop estimates of the magnitude of categories 1-3 above. Frontier has previously carried out analysis to estimate the magnitude of category 4 effects, which we provide a summary of later in this report. Additionally, we were asked to develop estimates for the US' share of counterfeiting and piracy, which appear in Annexe 1 as a model for future worked needed at the national level.

[4] OECD, The Economic Impact of Counterfeiting and Piracy, 2008 (hereinafter "OECD Report").

[5] OECD, Magnitude of Counterfeiting and Piracy of tangible products: An Update, November 2009.

Clearly, making estimates for any of the categories of impact identified above is extremely challenging. The activities of illegal businesses cannot be measured using the same techniques used for legitimate business concerns. Legitimate businesses tend to provide the authorities with information about their revenues, unit sales, prices, employment, imports and exports amongst other things. Illegal businesses do not report any such information.

For this reason, we must use indirect methods to estimate the magnitude of counterfeiting and piracy. We have used a variety of methodological and analytical approaches to reach our estimates, drawing on a range of sources of information and making conservative assumptions to reach a total figure for the value of counterfeiting and piracy activity. While the estimates generated using these methods cannot yield the same detailed, high quality measures of activity as those provided for legitimate businesses, they offer an extremely useful approach for gauging the scale of these activities and their impact.

Building on the OECD work, we have focused on developing estimates of the *value* of counterfeiting and piracy for the three impact categories above. To translate these figures into estimates of business losses involves making assumptions about the degree of substitution between counterfeit and pirated products and their legitimate counterparts. This area is fraught with difficulties because robust estimates of substitution rates are difficult to generate and vary from sector to sector. In order to produce credible estimates, we have opted to continue down the path taken by the OECD and focus on estimating the *value* of counterfeiting and piracy rather than attempt to estimate the business losses associated with it. This approach also enables us to eliminate the additional level/degree of variables which could undermine our aim to as accurately as possible characterize the magnitude of the unfair competition for legitimate economic activity and the unchecked growth of an emerging "underground economy".

Below we provide a high-level overview of the techniques that we have used for our estimates. The findings section that follows provides extensive details for each.

1.1 Methodologies

This section sets out the methodology used to develop measures of value in relation to:

- internationally traded counterfeit and pirated products;
- domestically produced and consumed counterfeit and pirated products; and
- digitally pirated products.

1.1.1 Updating the OECD's estimates of counterfeit and pirated products

Our estimate of the effect of changes in the incidence of counterfeiting and piracy on internationally traded goods is based on information on the ratio of customs seizures to real imports since 2005.

We examine how the ratio of seizures to imports has changed since 2005 and assess the possible drivers of the observed changes. Notably, the more recent data indicates an increase in border seizures. We assess the impact and appropriateness of attributing different proportions of the increase in seizures to increased counterfeiting and piracy activity. These different allocations are applied to the OECD's 2009 figure of $250 billion (which was based on updated trade values only) to give an updated estimate of the total commercial value of counterfeiting and piracy in international trade.

1.1.2 The domestic manufacture and consumption of counterfeit and pirated products

The approach we have taken to developing an estimate of the value of domestic counterfeiting draws from and builds on the methodology employed by the OECD to reach their estimate of the value of counterfeiting and piracy in world trade. We take the OECD's estimate of the *maximum* proportion of counterfeit products in world trade and make a number of assumptions to translate these estimates into an estimate of the value of domestic counterfeit production and consumption. Specifically, we have taken a three step approach.

- **Step 1:** Calculation of counterfeiting/piracy propensities for each product category in each source economy, drawing on the OECD's original estimates.
- **Step 2:** Identification of the relevant categories of GDP that are likely to be exposed to counterfeit products.
- **Step 3:** Estimation of the value of domestic counterfeiting production and consumption for each country by applying the trade related counterfeiting rates to the relevant components of GDP for each source economy.

Step 3 above makes the assumption that there is a strong relationship between the ratio of counterfeit products in a country's exports and the ratio of counterfeit products in its domestic production[6]. In recognition of the fact that there are likely to be some countries for which this assumption is inappropriate, we have drawn on a range of other sources to understand and vary the assumed

[6] We are also implicitly assuming that there are no countries that produce counterfeits for domestic production only.

relationship between counterfeiting and piracy in international trade and that of domestic counterfeiting and piracy production and consumption. The sources used include a study by the Japan Patent Office and a study by the State University Graduate School of Economics for the Brand Manufacturers Association in Russia. These studies are used to build an appropriate range for our estimates.

1.1.3 Digital piracy of recorded music, movies and software

Estimating the value of digital piracy in recorded music, movies and software is complex. This report draws on the most recent industry and academic studies to provide the first aggregated estimate of the value of digital piracy across these three critical "copyright-based" industries. In so doing, it builds on the methodologies and findings of the most recent industry studies. Where available, we draw on more recent data to update the industry studies, and use consistent assumptions and methodologies (regardless that the specific industry dynamics are likely to differ) in order to produce digital piracy estimates that are more consistent across the three industries. Estimated values for pirated recorded music, movies and software are considered in turn below and then aggregated.

2 Analysis and Findings

This section sets out the findings from our analysis of the value of counterfeiting and piracy. Specifically, it sets out:

- an update of the OECD's estimate of the value of internationally traded counterfeit and pirated products;
- an estimate, derived from the OECD's methodology, of the value of domestically consumed counterfeit and pirated products; and
- an estimate, based on industry and academic analyses, of the value of digital piracy.

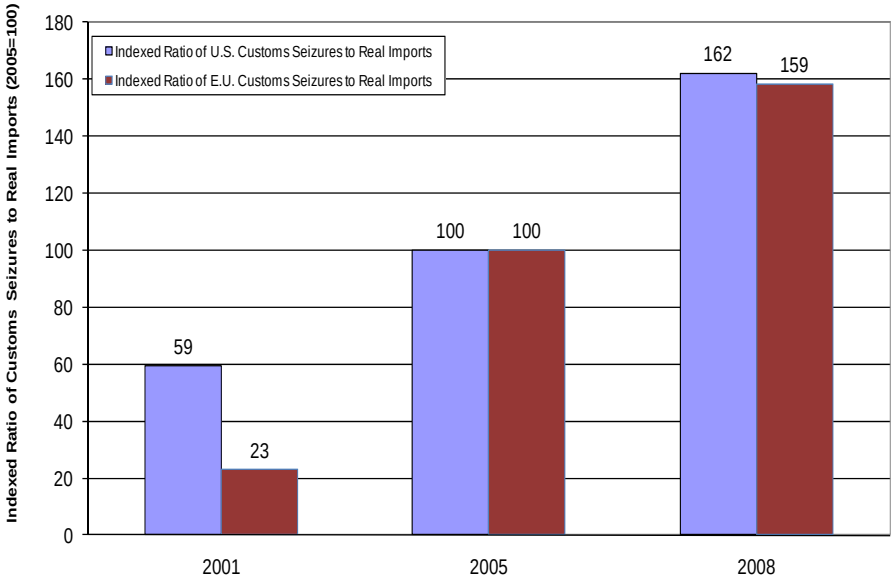
2.1 Internationally traded counterfeit and pirated products

As described in the Introduction, the OECD's original report, based on 2005 data, estimated that the value of counterfeiting and piracy in international trade was $200 billion. In 2009, the OECD updated their estimate to $250 billion based on increases in the volume of world trade after 2005.

The research underpinning these estimates by the OECD was extremely thorough, based on survey data collected from custom authorities in 70 countries from 1999 to 2005 and information on world trade from 2005 to 2008. Accordingly, this section only seeks to update this estimate by factoring in more recent data, specifically that which indicates an increased incidence (seizures) of counterfeiting and piracy since 2005.

Data on customs seizures by the US and the EU since 2005 indicate that there has been a sharp increase in seizures relative to international trade volumes between 2005 and 2008. Figure 1 shows an index of the ratio of the number of customs seizures against the real value of imports in the US and the EU for 2001, 2005 and 2008. The index of the ratio is defined to equal 100 in 2005 for the US and the EU. In 2008, the US index equals 162, which indicates that seizures increased 62% relative to US real imports between 2005 and 2008. Similarly, for the EU, seizures increased 59% relative to real imports between 2005 and 2008.

Figure 1
Indexed Ratio of Customs Seizures to Real Imports in the U.S. and the E.U. (2005=100)



Sources:
U.S.: U.N. ComTrade figures in U.S. dollars deflated by the GDP deflator.
E.U.: Eurostats

There are two potential reasons for the documented increase in seizures:

- an increase in the incidence of counterfeiting and piracy; and/or
- improved scrutiny and enforcement by the US and EU agencies.

Given the significant increase in seizures and the limited time frame for implementation of more rigorous enforcement policies, we believe that a significant proportion of the increase is likely to be due to an increase in the incidence of counterfeiting and piracy in international trade. Moreover, we are not aware of any significant policy shift or increase in resources in either the US or EU that would be likely to result in such an increase through improved detection of seizures.

If the full increase in seizures is assumed to be as a result of an increase in the incidence of counterfeiting and piracy, then a further $150 billion of counterfeit and pirated goods could be traded globally on an annual basis. A more conservative assumption is that between 25% and 75% of the increase in seizures relative to imports is due to counterfeiting and piracy. This would allow for the possibility that some of the increase is accounted for by operational improvements. On this basis an additional $37.5 billion to $112.5 billion of counterfeit and pirated goods could be traded globally on an annual basis.

Combining this with the OECD's updated estimate of $250 billion leads to an estimate of the value of counterfeiting and piracy in international trade of between **$287 billion and $362 billion**.

Analysis and Findings

2.2 The domestic manufacture and consumption of counterfeit and pirated products

The OECD explicitly stated that an accounting of *domestically* manufactured and consumed counterfeit and pirated products could increase the total value of counterfeiting and piracy significantly. However, they did not attempt to develop an equivalent detailed estimate for this category either as part of their original 2008 study or their 2009 update.

As with estimating the value of internationally traded counterfeit and pirated products, estimating the value of domestically produced and consumed counterfeit products is challenging. It is also not clear from a conceptual perspective how large the domestic manufacture and consumption of counterfeit goods is expected to be relative to the international trade in those goods. Therefore, an analysis of this category begins with an investigation of the decision of whether to import a counterfeit good as opposed to producing it for consumption domestically. This decision lies in the balance of two key factors, profitability and risk:

- **Profitability:** Is it more profitable to produce the good within the country in which you wish to sell it or produce it outside of that country and import it?[7]

- **Risk:** Is there a greater risk (and hence cost) attached to importing the good and potentially having it seized by customs, or producing it within the consuming country and risking local detection (by law enforcement agencies)?

The balance of these two factors is likely to vary significantly depending on the characteristics of the product and also on the country of origin and country of destination for the good. For example, some goods may be relatively amenable to import through customs without detection, but their production might attract significant law enforcement attention in consuming countries. Furthermore, the existence of Free Trade Zones may mitigate some risk associated with export/import in some areas.

A useful approach for estimating domestic production and consumption of counterfeit and pirated products would involve a joint survey of customs agencies and domestic law enforcement agencies. Such an approach would parallel the approach taken by the OECD in estimating the value of counterfeit and pirated goods moving in international trade. However, the scale of work required for this type of exercise is extensive and therefore beyond the scope of this study.

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7 An assessment of profitability would take into a range of factors including the cost base, manufacturing capability and capacity of different countries.

Instead, to develop an indicative estimate, we have built on the methodology developed by the OECD and used evidence currently available in a range of forms to derive an estimate. In the rest of this section we describe the calculations we have undertaken to derive these estimates. In turn we describe:

- the methodology used to calculate the estimate, including the key assumptions;
- the data sources used to derive the estimate; and
- the results of our simulations.

2.2.1 Methodology

The approach we have taken to developing an estimate of the value of domestic counterfeiting and piracy builds upon the methodology used by the OECD to reach their estimate of the value of counterfeiting and piracy in world trade.

The OECD methodology

The OECD estimate was built on survey evidence collected from custom authorities in 70 countries containing details about the number of interceptions and infringements they had recorded between 1999 and 2005. This information was used to build up a picture of the flows of counterfeit and pirated products originating from a wide range of different source countries. Using this information, the OECD developed two indices to capture flows of counterfeit products in world trade:

- the GTRIC-p index which captures the relative flows of different counterfeit products in world trade; and
- the GTRIC-e index which captures the relative flows of counterfeit products originating from different source economies.

These indices inform us about the relative frequencies with which different types of counterfeit products from different source countries appear in world trade. For example, they tell us that 1.5 times as many counterfeit headgear products (primarily baseball caps) originate from Hong Kong relative to Pakistan. These indices are clearly useful but, to reach an absolute estimate of the value of counterfeit production in world trade they must be combined with an estimate of the absolute value of counterfeits of one product type from one source economy.

As it is extremely difficult to generate an absolute value for any product category or economy, the OECD identified the product category and source economy where counterfeit production was thought to be most pronounced. It used an estimate of the *maximum* likely value of counterfeiting in this category to generate

counterfeiting rates for all product and source country combinations[8]. Counterfeiting rates were then applied to the value of imports for each importing country to generate the $200 billion estimate[9] of the value of counterfeiting and piracy in world trade.

Building on the OECD methodology

To calculate the value of domestic counterfeiting and piracy, we take the OECD's estimates of the proportion of counterfeit and pirated products in world trade as our starting point. We make a number of assumptions to translate these figures into an estimate of the value of domestic counterfeit and pirated production and consumption. Specifically, our methodology follows three steps:

- **Step 1:** Take the simulated counterfeiting propensities for each product category in each source economy estimated and applied by the OECD. We start with the OECD's estimates[10] of the relative propensities of different counterfeit products that originate from each of a range of source countries.

- **Step 2:** Identify the relevant categories of GDP that are likely to be exposed to counterfeit products. Only a limited amount of total economic activity is likely to be exposed to counterfeit activity[11]. The OECD identified a number of sensitive product categories[12]. We map these sensitive product categories to relevant GDP statistics for each source country.

- **Step 3:** Estimate the value of domestic counterfeit and pirated production and consumption for each country. We apply the counterfeiting propensities from step 1 to the categories of GDP identified in step 2 for each source economy[13]. We sum over all source economies to give a global estimate of domestic counterfeit production and consumption.

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8 As the most counterfeited product and source economy combination, a 10% counterfeiting rate for headgear originating from Hong Kong, China was used as a baseline from which all other counterfeiting rates were calculated.

9 Updated to $250 billion in the 2009 OECD update.

10 Specifically, the GTRIC matrix developed by the OECD that sets out estimated propensities of counterfeiting by product and source economy.

11 GDP captures more than the production of goods, so while counterfeiting and piracy impacts virtually every product category, only part of GDP is affected.

12 These were categories of products believed to be exposed to counterfeiting and piracy activity.

13 This makes the assumption that there is a strong relationship between the ratio of counterfeit products in a country's exports and the ratio of counterfeit products in its domestic production (we are also implicitly assuming that there are no countries that produce counterfeits for domestic production only). In recognition of the fact that there are likely to be some countries for which this assumption is inappropriate, we have drawn on a range of other sources to understand and vary the assumed relationship between counterfeiting and piracy in international trade and domestic

2.2.2 Data sources

Two main sources of information were used for the calculations outlined above:

- the OECD's estimates of counterfeiting and piracy propensities by product category and source economy; and
- data on GDP in the relevant areas of economic activity for each of the source economies identified by the OECD.

We describe each in turn below.

OECD estimates of counterfeiting and piracy propensities

The OECD provides details of the counterfeiting and piracy propensities that underpin its estimates of counterfeiting activity in world trade in their report[14]. Two separate indices are reported, the GTRIC-p index and the GTRIC-e index. The GTRIC-p index provides the counterfeiting baseline factors for each counterfeit-sensitive product category. The GTRIC-e index provides the baseline counterfeiting factors for each source economy. The two indices can be combined to form the GTRIC matrix which provides counterfeiting and piracy propensities by product category and source economy. Mimicking the assumptions made by the OECD, we have used the same baseline counterfeiting rate to calculate the maximum likely counterfeiting rate for each product category and source economy represented within the GTRIC matrix[15].

GDP data

The data on GDP was collected from the UN Statistics Division Statistical Database[16]. This database includes gross value added statistics broken down according to the International Standard Industrial Classification of All Economic Activities (ISIC). The breakdown of economic activity presented in the table below is reported consistently for each source economy.

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counterfeiting/piracy production and consumption. The sources used include a study by the Japan Patent Office and a study by the State University Graduate School of Economics for the Brand Manufacturers Association in Russia. These studies are used to calculate an appropriate range for our estimates.

14 OECD, *The Economic Impact of Counterfeiting and Piracy*, 2008 (hereinafter "2008 OECD Piracy Study").

15 In practice as GDP information was only available at an aggregated product level, we have calculated an import-weighted counterfeiting propensity across all product categories for each source economy.

16 UN Statistics Division Statistical Databases - National Accounts Main Aggregates - Value added by Economic Activity

Table 3. Breakdown of economic activity

ISIC category	Description of economic activity
ISIC A & B	Agriculture, hunting, forestry, fishing
ISIC C, D & E	Mining, manufacturing, utilities
ISIC D (also reported separately)	Manufacturing
ISIC F	Construction
ISIC G & H	Wholesale, retail trade, restaurants and hotels
ISIC I	Transport, storage and communication
ISIC J, K, L, M, N, O & P	Other activities

The OECD identified 63 sensitive product categories17: so called because they were likely to contain counterfeit and pirated products. This classification was made using HS chapters, which are relevant to world trade. There is not an exact match between the HS classification and the ISIC classification, which is relevant for classifying GDP, but the majority of sensitive product categories identified by the OECD fall within ISIC D: manufacturing. We used this ISIC category as a proxy for the sensitive product categories contained within GDP. This captures the majority of sensitive products identified by the OECD but it will also include some sub-categories of manufacturing that are not deemed to be sensitive. For this reason, the value of domestic counterfeiting and piracy calculated using this measure is likely to be an upper estimate.

2.2.3 Results and simulations

Using the methodology and data described above and assuming a strong relationship between the ratio of counterfeit products in exports and domestic production, we estimate that the maximum global value of domestic counterfeiting and piracy production and consumption is **$170 billion**[18].

17 At the 2 digit HS level.

18 Rounded to the nearest billion and including an uplift to reflect those source countries where data was unavailable to make accurate estimates.

The above estimate is based on the assumption that the ratio of domestic consumption to exports is consistent across countries. However, this may not always be the case. In particular, an analysis carried out by the Japan Patent Office[19] suggests that the ratio may differ across countries. The Japan Patent Office surveyed Japanese companies regarding their experience involving competition with counterfeit and pirated products when selling in other countries. The survey respondents reported the number of incidents where they had encountered competition from counterfeit and pirated goods. They specifically identified the country where such competition was encountered and also the country where the counterfeit good was produced.

The results of the study suggest that counterfeiting and piracy is, on average, more prevalent in traded products than it is in domestic production and consumption. The study shows that the number of incidents of Japanese firms encountering counterfeit products produced domestically was around half (55%) the number of incidents of Japanese firms encountering counterfeit products imported into the country. However, it is possible to break this figure down further to show that the relationship between domestic counterfeiting and counterfeiting in trade may not be the same in every counterfeit-producing economy. In fact, the results of the study show that:

- in Asia, domestically produced counterfeit products are more likely to be exported to other countries than to be consumed domestically; but
- outside of Asia, domestically produced products are more likely to be consumed domestically than to be exported

Table 4 below shows key estimates calculated using the information contained within the study by the Japan Patent Office. According to the data from this study, of all counterfeit and pirated goods produced within Asia, around a third (34%) are consumed domestically with two thirds (66%) being traded internationally. In contrast, outside of Asia, over half (55%) of counterfeits that are produced are consumed domestically, with the remainder traded internationally. The figure for outside Asia is further supported by a 2008 study[20] in Russia. It suggested that between 2004 and 2007, domestic production and consumption of counterfeited goods was more than 150% of imports of counterfeited goods in Russia.

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19 Japan Patent Office, FY2004 Survey Report on Losses Caused By Counterfeiting, March 2005 (hereinafter "Japanese Counterfeiting Study").

20 "Changing Scale and Pattern of Anti-Counterfeit Measures in Russia's Consumer Market," prepared by State University Graduate School of Economics for Brand Manufacturers' Association (RusBrand), page 20. RusBrand is a partnership of 54 consumer goods manufacturers operating in Russia.

Table 4. Breakdown of the ratio of domestic and traded counterfeit and pirated products

	% of all counterfeit goods produced	
	Consumed domestically	Exported
Asia	34%	**66%**
Outside of Asia	55%	**45%**

Using the Japan Patent Office study we have adjusted the domestic counterfeit rates in our calculation to account for the differences between countries inside of Asia and outside of Asia. Applying these differential rates to the relevant source economies leads to an estimate of the value of domestic counterfeiting and piracy production and consumption of **$110 billion.**

As discussed above, the OECD did not change their estimates of the incidence of counterfeiting and piracy when they reached their $250 billion estimate of the value of counterfeiting and piracy. As the OECD's simulated propensities of counterfeiting underpin our domestic estimate, changes in the incidence of counterfeiting and piracy will also affect this estimate. If we take account of the likely increased incidence of counterfeiting activity since the OECD work was undertaken, our estimates of the total domestic value of counterfeiting and piracy production and consumption increase to **$140 - $215 billion**.

We recognize that there may be additional important variations by country in the propensity for counterfeit products to appear in exports versus domestic production, not currently captured by the studies we have examined. For example, there are likely to be key differences between developing and developed countries. However, there is currently not enough data to allow our estimates to be further refined to take account of such differences. In consequence, the estimate of $140 to $215 billion represents our best estimate based on currently available information.

2.3 Digital piracy

Over the last decade there has been a notable increase in digital piracy. The rapid growth in piracy has particularly affected the recorded music, movie and software industries, all of which have suffered significant and rapidly increasing losses as a result of digital piracy. The increase in digital piracy has been driven by two main factors:

- technological advances mean that it is now much easier to illegally reproduce music, movies and software; and
- the growth of the internet and the emergence of online websites that facilitate file sharing and downloading have greatly increased the ability to illegally distribute pirated music, movies and software.

As ever with counterfeiting and piracy, estimating the value of unlicensed digital files available on line is complex. Although they noted the prevalence of digital piracy, the OECD was unable to include an estimate in their 2008 report. Throughout this section we follow the methodology used by the OECD's study – we try to get a robust and consistent picture of the value of digital piracy across the three industries.

We note that the value of unlicensed digital files available on line (hereinafter referred to as commercial value) is largely dependent on estimations of volume and will inevitably be greater than business losses, which depend crucially on the assumed substitution rates. We have focused here on value as a first step in understanding the impact of pirated goods, and to remove from debate the controversy that normally surrounds assumptions regarding substitution rates.

This section draws on the most recent industry and academic studies to provide a consistent aggregated estimate of the value of digital piracy across these three industries. In so doing, we build on the methodologies and findings of the most recent industry studies. Where available, we draw on more recent data to update the industry studies and to improve the consistency of the digital piracy estimates across the three industries. In order to be consistent with the OECD's approach used elsewhere in this report, our approach has been to identify the volume of digital piracy and to place a value on that digital piracy using the average price of legitimately available digital products.

In order to test the robustness of the industry findings, the analysis also considers relevant academic literature to generate a range of estimates for each industry. Estimated values for counterfeited and pirated recorded music, movies and software are considered first individually in turn before being aggregated.

2.3.1 Recorded music

Recorded music sales have diminished significantly over the last decade. According to the International Federation of the Phonographic Industry (IFPI), the annual amount of retail music sales have fallen by almost $15 billion dollars between 1999 and 2008. While the widespread development of online file sharing sites from 1999 is clearly associated with the decline in sales of CDs, digital piracy has continued to escalate despite considerable industry and consumer education initiatives, the availability of a wide variety of legal online services for consumers, lawsuits and other actions against the most visible file sharing sites.

Unsurprisingly, trying to understand the extent to which digital piracy is driving the substantial sales losses has attracted considerable attention from the music industry and from academics. In this report, we have drawn on the most recent industry figures about legal download prices and the volume of illegal music downloads to generate an estimate of the commercial value of digital music piracy. To test the robustness of these estimates we have also considered the evidence from a range of academic papers on digital piracy.

Drawing these sources together we find that the commercial value of recorded music digital piracy was between **$17 billion and $40 billion** in 2008, and was most likely closer to $40 billion. It is important to note again that these figures provide an estimate of the total value of unlicensed digital files available on line; they are not an estimate of the business losses associated with digital piracy, and should not be interpreted as doing so. The rest of this section sets out the basis of our estimate.

Industry estimates of the value of digital piracy of recorded music

The latest industry study on piracy of recorded music was published by IFPI in July 2006[21]. It estimated that in 2005, 20 billion songs were illegally downloaded on a global basis. This number was based on consumer research in 10 music markets (including the US, Germany, UK and Brazil) as well as a number of third party surveys. In 2008[22], IFPI updated its estimate of the number of files illegally shared on a global basis at more than 40 billion. This figure was based on collating two key pieces of information from studies for each of 16 separate countries[23]:

- the number of consumers illegally downloading music; and

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21 International Federation of the Phonographic Industry ("IFPI"), The Recording Industry 2006 Piracy Report: Protecting Creativity in Music, July 2006; (hereinafter "IFPI Piracy Report"), http://www.ifpi.org/content/library/piracy-report2006.pdf.

22 International Federation of the Phonographic Industry ("IFPI"), IFPI Digital Music Report 2009: Key Statistics

23 Canada: CRIA Consumer Study of Radio and Music, Pollara, Feb 2006, US: NPD Group, 2007, Jupiter Research (Denmark, France, Italy, Netherlands, Sweden), 2007/2008, France: GfK research, 2007 + IPSOS research, May 2008, Germany: Brenner-Studie 2008, GfK Consumer Panel, Jan 2008, Italy: Luigi Einaudi Foundation, 2008 + AC Nielsen, 2008, Poland: Gemius Research, ZPAV, Sept 2008, Spain: Estudio Base Sobre la Pirateria en la Industria de Contenidos, GfK, June 2008 + Spanish Ministry of Culture Report, Oct 2007, UK: Music Industry Losses Project, Jupiter Research, BPI, 2007 + Music Piracy in GB, IPSOS, BPI, Mar 2006, Australia: AusCERT, Home Users Computer Security Survey 2008 + ARIA 2006 Music Survey, Quantum Research, Legal and Illegal Downloading Behaviour, Jan 2007, Japan: Report on Current Situation of Use of File-Sharing Software, Media Interactive, RIAJ, Dec 2008 + Report on Current Situation of Usage of Illegal Mobile Music Distribution, Nomura Research Intitute, RIAJ, Dec 2008, Argentina: Los Argentinos y La Musica, Cuore Research, CAPIF, Nov 2005, Chile: Descarga de Musica por Internet, IPSOS, IFPI, June 2004, Brazil: Estudo de Pirataria, IPSOS, ABPD, May 2007, Mexico: Illegal Music Downloads over the Internet in Mexico, IPSOS, AMPROFON, Sep 2008

- the average number of music files downloaded per month.

Notably, the figure of 40 billion estimated by IFPI may be on the conservative side. It is based on consumer responses, which may be understated. It also relates to illegal music downloads only, thereby excluding mobile piracy and illegal streaming, which appear to be growing areas, especially with the ever increasing download speeds and the advent of 3G, high speed mobile technology[24].

Following the OECD value approach, estimating the commercial value of digital piracy of recorded music involves multiplying the estimated volume of illegally downloaded songs by a reasonable commercial price for their legitimate counterparts. Data from the Recording Industry Association of America (RIAA)[25] reports average retail prices of a legal single download in the US is approximately $1.

Using the information on download volumes from IFPI and on retail prices reported by RIAA, we are able to estimate the commercial value of illegal downloads of recorded music. To be conservative, we have assumed that all of the 40 billion illegal downloads in the IFPI data are single, rather than album, downloads[26]. If these 40 billion illegal downloads per year have an average retail price of $1, the basic analysis suggests that the commercial value of illegal downloads of recorded music is approximately $40 billion.

Academic evidence on the value of digital piracy of recorded music

To test the robustness of these estimates we have also considered the evidence from a range of academic papers on digital piracy. We have reviewed the academic literature to generate an alternative estimate of the value of digital piracy, which can be used to frame the data collected by IFPI. While the papers we have identified do not look specifically at the value of digital piracy in this industry, we can use the results from a combination of studies to estimate the likely commercial value of digitally pirated music.

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24 IFPI do not currently have estimates of the magnitude of this illegal activity.

25 Recording Industry Association of America (RIAA) 2008 Year-End Shipment Statistics

26 The average retail price for an album is likely to be approximately $10. Source: Recording Industry Association of America (RIAA) 2008 Year-End Shipment Statistics

Academic findings

- **Liebowitz 2006**[27]: concludes that file sharing has brought significant harm to the recording industry in the US. The birth of online file sharing mid-1999 and the very large decline in CD album sales that immediately followed provide powerful evidence on their own. Notably, Liebowitz also finds that the two music genres that are less likely to be downloaded in file-sharing systems, classical and jazz, did not participate in the sales decline up to 2004, whereas other genres, more likely to be affected by file sharing (hard rock, rap, alternative, R&B) generally did participate. Liebowitz investigates key alternative explanations for the observed impact on recorded music sales other than file sharing including album prices, income, music quality, markets for substitutes and complements, portability and librarying. He concludes that none of these explanations individually hold much weight.

- **Zentner (2005)**[28]: finds that counties with higher internet and broadband penetration have experienced larger reductions in music sales, which supports the correlation between the rise in digital piracy and the fall of music industry sales. He also finds evidence that file sharing may explain a change in the composition of legitimate sales by repertoire, with a higher reduction of sales of types of music that are shared more heavily. His analysis, based on data from 1997 to 2002, suggests that, at the average level of internet usage, a country is likely to have experienced a decline in legitimate music sales of up to 24%.

- **Rob and Waldfogel (2006)**[29]**:** use individual-level data on album downloads and purchases by 500 college students in the US. They find evidence that each album download reduces purchases by about 0.2 in their sample (a displacement rate of approximately 1 in 5), although possibly by much more. Their data also suggests that downloading reduces the per capita expenditure of the sample (on hit albums released between 1999-2003) from $126 to $101 (approx. 20%).

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27 Liebowitz, S., (2006) File Sharing: Creative Destruction Or Just Plain Destruction?, *Journal of Law and Economics*, vol. XLIX, The University of Chicago.

28 Zentner, A. (2005). File Sharing and International Sales of Copyrighted Music: An Empirical Analysis with a Panel of Countries. *Topics in Economic Analysis and Policy* 5, 21, pp/ 1-15.

29 Rob, R. and Waldfogel, Joel. (2006). Piracy on the High C's: Music Downloading, Sales Displacement and Social Welfare in a Sample of College Students. *Journal of Law and Economics*, Vol. 49: Issue: 1, pp. 29-62

- **Michel (2004)[30]:** uses micro-level data from the Consumer Expenditure Survey, from 1995 to 2003, to examine the impact of Internet file sharing on music sales. He finds that file sharing may explain a reduction in sales of up to 13% for some consumers.

- **Oberholzer-Gee and Strumpf (2007)[31]**: provides the most notable exception to the finding that digital piracy has generated significant losses to the music industry. The study uses a matched sample of downloads and U.S. sales data for a large number of albums. They estimate that the impact of digital piracy on music sales could not have been larger than 0.7% of sales. They hypothesize that there are several other plausible candidates to explain the decline in sales including growing competition from other forms of entertainment such as recorded movies. However, their more recent study[32] recognizes that the empirical evidence of the effect of file sharing on sales is mixed and acknowledges that many studies conclude that music piracy can explain as much as 20% of the recent decline in industry sales.

While none of the studies we have considered estimates directly the total commercial value of digital piracy, two key findings emerge from the literature which allow us to derive such an estimate:

- Digital piracy is estimated to have had a significant negative impact on retail music sales. Work by Zentner (see above), for example, suggests that as much as a quarter of the total decline in music sales may be attributable to digital piracy. Applying this to the $14.8 billion sales decline in 2008, identified by IFPI would suggest industry losses associated with digital piracy of over $3.5 billion. To put this figure in context, total global retail sales of digital music amounted to $6.3 billion in 2008, which suggests that digital music sales could have been more than 50% higher in 2008 in the absence of digital piracy. Moreover, the data used in the Zentner study covers the period 1997 to 2002, and so likely under-estimates the impact of digital piracy today, given digital piracy's well documented increase over the last decade.

- Academic estimates suggest that the displacement rate for music sales is between 15% and 20%. This means that every 5-6 illegal downloads

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30 Michel, N. J., (2006). The Impact of Digital File Sharing on the Music Industry: An empirical analysis, *Topics in Economic Analysis and Policy,* Vol. 6: No: 1, Article 18.

31 Oberholzer-Gee, F. and Strumpf, K. (2007). The Effect of File Sharing on Record Sales: An Empirical Analysis, *Journal of Political Economy,* Vol. 115, pp. 1-42

32 Oberholzer-Gee, F., and Strumpf, K. (2010). File Sharing and Copyright. *NBER Innovation Policy & the Economy* (MIT Press) 10.

displaces a legal sale. Note, this factor is fundamentally different to the work described above, which sought to identify directly the proportion of revenue loss associated with digital piracy. The displacement analysis seeks to identify the extent to which users substitute illegal downloads for music which they would otherwise have purchased legitimately – it therefore seeks to identify sales that were never realized by the music industry due to digital piracy. For example, if this displacement rate were applied to the documented number of downloaded tracks reported by IFPI in 2008, then the academic literature would suggest that unrealized sales attributed to digital piracy equaled approximately $8 billion. As a result, the two academic approaches suggest a range of losses to the music industry attributable to digital piracy in 2008 -- from $3.5 billion to $8 billion in a single year.

As discussed above, and in keeping with the OECD methodology, our focus is however on identifying the total commercial value of digitally pirated music rather than the associated business losses. We therefore need to translate the evidence gathered from the academic studies (loss figures) into a commercial value figure using both the estimates for the proportion of business losses associated with digital piracy and the academic estimates of the likely displacement rate between legal and illegal music downloads.

Starting with the reported sales decline of $14.8 billion in 2008, if digital piracy could be responsible for 24% of this loss, then this suggests industry losses attributed to digital piracy equaled approximately $3.5 billion. Using the estimated displacement rates to derive an estimate of value[33] implies a commercial value of unlicensed digital files available on line of $17 – $21 billion[34].

This estimated range is likely to be conservative and represents the lower bound of the value of digital piracy. This is because many of these studies estimate the effect of digital piracy based on data for the period only up to 2003 and they proxy digital piracy with data on internet penetration. However, average global internet penetration[35] has increased significantly, by around 15% per year between 2003 and 2007[36]. We therefore expect that the commercial value of unlicensed digital files available on line in 2008 is significantly higher.

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33 In line with the studies by Leibowitz (2004) and Rob and Waldfogel (2004). Liebowitz (2004) estimates that between 5 and 6 illegal downloads are likely to be required to replace a single legitimate album purchase. Rob and Waldfogel (2004) also estimate that around 5 illegal downloads are required to replace a single legitimate album purchase.

34 Estimated by multiplying the $3.5 billion sales decline by 5 and 6 respectively. Note again, that this is not a loss figure, rather it provides an estimate of the value of illegal downloads, using the price of their legitimate counterparts.

35 As measured by internet users per capita.

36 Data taken from Nationmaster.com drawing on information from the CIA World Factbooks for 2003 and 2008

Findings

As noted above, it is extremely difficult to get an accurate estimate of the commercial value of digital piracy of recorded music and no single approach currently provides the answer. For this reason, we have drawn on both the most recent industry figures and the most recent academic literature to provide a range of estimates. We find that the commercial value of unlicensed digital files available on line and attributable to digital piracy is likely to lie somewhere between **$17 billion and $40 billion** in 2008, as noted on p. 28 and p. 24, respectively . However, because the lower end of this estimate is based on academic studies that make use of out of date data, we expect that the estimate is likely to lie towards the upper end of this range.

2.4.2 Movies

Digital piracy took slightly longer to become a significant problem in the movie, than in the movie industry. For movies, digital piracy began to become a serious problem from 2003 and was widely associated with the rapid increase in broadband penetration and broadband speed which made downloading movies both feasible and attractive. Without broadband or with a low broadband speed downloading a movie took a long time and appears to have deterred widespread piracy.

Up to now, movie revenues have not suffered as significantly as recorded music revenues. However, there has been a marked slowing in revenue growth rates since 2003, coinciding with the increased penetration of broadband internet. Between 1990 and 2003, global movie industry revenues grew at an average rate of 6.4% per annum[37]. Between 2003 and 2008 global movie industry revenues grew at an average rate of just 2.6% per annum[38].

As before, we have focused on developing an estimate of the *value* of digital piracy of movies, rather than estimating the associated business losses. The most recent estimates for digital piracy in movies are from 2005. We estimate that the commercial value of digital movie piracy was likely to be between **$10 billion and $16 billion** in 2005.

These figures are likely to be highly conservative given the significant increase in internet penetration and broadband speeds that has taken place since 2005. Moreover, given the continuing rapid growth in broadband penetration and speed it is highly likely that the value of digitally pirated movies will grow rapidly in the years to come.

The rest of this section provides details of how we have reached this estimate.

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37 PriceWaterhouseCoopers

38 ibid.

Industry estimate of business losses associated with digital movie piracy

The most recent industry study on the recorded movie industry was published by the Motion Picture Association (MPA) and L.E.K in 2006[39]. The study involved a major survey effort where 20,600 movie consumers in 22 countries were interviewed. This information was used to estimate:

- the number of pirated units[40];
- the number of these units that would have been purchased if they had not have been pirated[41]; and
- the commercial value of the units that would have been purchased absent piracy[42].

The results obtained for these 22 countries were extrapolated to 42 additional countries using a regression model[43]. The study estimated that consumer spending on the movie industry was $18.2 billion lower in 2005 than it would have been in the absence of *all* counterfeiting and piracy activity. The study estimated that $7 billion of the estimated consumer spending losses were associated with digital piracy in the form of illegally downloaded movies from the internet.

Translating the loss figures into value figures

The MPA L.E.K. study has gone beyond what we are trying to do in this study, and has estimated substitution rates for digital piracy to arrive at estimates of the losses associated with digital piracy. To allow comparison with music and software, however, we need to transform the business loss estimates from the MPA L.E.K. study into the commercial value of piracy. To do so, we use estimates of the likely substitution rate between legal and illegal movie downloads.

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39 The Cost of Movie Piracy, an analysis prepared by L.E.K. for the Motion Picture Association, May 2006, http://www.mpaa.org/researchStatistics.asp, (hereinafter "MPA-L.E.K. Study").

40 Based on survey estimates of the movie-watching population, the incidence of piracy in the population of movie-watchers and the number of units pirated.

41 Based on consumer evidence of substitution rates and their split by window. For example, theatrical, home entertainment (rental), home entertainment (sell-through) and Pay-Per-View/Video-On-Demand.

42 Average retail price based on a range of secondary research including Screen Digest, Wilkofsky Gruen, Kagan, Euromonitor and IDC.

43 It is worth noting that the directly researched countries accounted for approximately 95% of the total legitimate market (percentage of consumer spending on feature film) and approximately 80% of the total loss from piracy.

While academic research into the impact of illegal movie downloads is relatively limited, the studies we have found suggest that substitution rates are likely to be relatively high and may lie somewhere between 45% and 67%. This implies that only 1.5 to 2.2 illegal purchases are required to replace a legitimate movie purchase (see the box below for details). This is in line with the findings from a recent study by the UK film council which estimated substitution rates of 53% for movies.

Academic Findings

- **Rob and Waldfogel, (2007)**[44]: estimate the substitution rate between paid and unpaid consumption of movies for a sample of US undergraduate students in 2005. The study estimates that on average 5.2% of the movie consumption of students in the sample is unpaid for. Of this 5.2% unpaid consumption, 3.5% replaces legitimate movie consumption, implying a substitution rate of approximately 67%.

  Clearly we need to be careful when applying results from a sample of students as they may not be representative of the total population of illegal movie downloaders. However, we can take some comfort from the MPA L.E.K. finding that a typical downloader is a male aged between 16 and 24. As such the typical downloader may closely resemble the students contained within the Rob and Waldfogel dataset.

- **Rob and Waldfogel, (2006)**[45] and **Rob and Waldfogel, (2007)**[46]: As there are so few academic studies on the movie industry, it is worth comparing the results of the study above with a similar study undertaken by Rob and Waldfogel on the music industry in 2006.

  For their study of the music industry they found a substitution rate of around 20% between illegal recorded music purchases and legitimate ones. This compares to the substitution rate of around 67% they estimated for their movie sample and implies that the substitution rate for movies may be around three times as high as the substitution rate

44 Rob, R. and Waldfogel, Joel. (2006). Piracy on the Silver Screen. The Journal of Industrial Economics, Vol. LV: No. 3, pp. 379-395

45 Rob, R. and Waldfogel, Joel. (2006). Piracy on the High C's: Music Downloading, Sales Displacement and Social Welfare in a Sample of College Students. *Journal of Law and Economics*, Vol. 49: Issue: 1, pp. 29-62

46 Rob, R. and Waldfogel, Joel. (2006). Piracy on the Silver Screen. The Journal of Industrial Economics, Vol. LV: No. 3, pp. 379-395

for recorded music[47].

Other academic studies of the recorded music industry (described in the music section above) suggest substitution rates of between 15% and 20%. If we assume that the substitution rate for movies is three times higher than for recorded music (in line with the Rob and Waldfogel findings), we find that movie substitution rates could be between 45% and 67% (this implies that between 1.5 and 2.2 illegal movie purchases are required to replace a legitimate movie purchase.

Applying the figures on substitution rates to the $7 billion loss figure estimated by the MPA L.E.K. study implies a total commercial value of illegal downloads of between $10 billion and $16 billion[48].

Again, we would expect these estimates to be conservative. The $7 billion loss figure on which they are based was estimated in 2006. The global number of internet users has increased by around 18% per year since 2000[49]. Broadband speeds have also been improving significantly with time, making the illegal download of files of significant size, such as movies, increasingly feasible and attractive. We therefore expect that the commercial value of digital piracy in 2008 could be significantly higher than suggested here.

Findings

As noted above, it is difficult to get an accurate estimate of the commercial value of digital piracy of movies. To construct our estimate we have taken the industry estimates of consumer spending losses associated with digital movie piracy. We have then used estimates of the substitution rates between legal and illegal movie purchases (based on the academic literature) to translate these figures into an estimate of the value of digitally pirated movie products. Based on this evidence, we estimate that the commercial value of digital movie piracy was somewhere between **$10 billion and $16 billion** in 2005. We expect that these figures are likely to be conservative given the significant increase in internet penetration and broadband speed in recent years.

2.5.2 Software

The software industry also suffers significantly as a result of piracy in both its physical and digital forms. Most illegal software use occurs in otherwise legal

47 Rob and Waldfogel (2007) attribute the differences between music and movies to different costs of obtaining unpaid copies and different total costs of consuming them (largely the cost of time required for downloading and watching or listening to the file).

48 Estimated by multiplying the $7 billion sales decline by 1.5 and 2.2 respectively.

49 World Internet Usage Statistics, 2000 to 2010.

businesses that may, for example, buy licenses to install a program on 10 PCs but then install it on 50 or 5,000. This issue of "under-licensing" is the most serious piracy problem for the software industry, and is somewhat unique when compared to the piracy issues of other digital industries. There are also covert criminal enterprises that sell cheap counterfeit copies of software programs online and offline. The internet is among the many means by which unauthorized software can be acquired by consumers and businesses.

Similar to the other forms of digital piracy we have already discussed, estimating the value of *digital* software counterfeiting and piracy is extremely difficult. Although there are numerous academic studies that look at software piracy, there appears to be a lack of academic research on the scale and impact of the problem. However, a number of recent studies by the Business Software Alliance (BSA) and IDC help to shed some light on this challenging area.

In this section we summarize the methodology and results from the work by BSA and IDC, which provide an estimate of the *total* commercial value of software piracy. We then draw on related data collected by BSA which provide a preliminary indication of the contribution of digital piracy to this total[50].

Our findings suggest that the value of digitally pirated software products is likely to be between **$1.5 billion and $19 billion**. We note the size of this range, but anticipate that the true value is likely to be towards the upper end.

An estimate of the value of all software piracy

The Business Software Alliance (BSA) and IDC published a study on piracy of software products in 2008[51]. The study estimates the prevalence of *all* software piracy (digital and physical) and the commercial value of that software in the market. The study uses the concept of complementary goods (those that are used together) to estimate the volume of software piracy. The basic principle is that the size of the market for the illegal product can be estimated from understanding the market for another complementary product, personal computers, which are supplied legally. As the complementary product is supplied by legal businesses, new sales and the existing stock of the product can more readily be determined.

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50 No information available at present allows us to estimate the volume of digitally pirated software illegally installed on computers. We therefore draw on information related to the availability of illegal software on the internet. Specifically, we make use of information on the number of take down notices issued by BSA in relation to suspicious software available on P2P and BitTorrent sites. In so doing, we note the significant issues surrounding the use of this information. Given the vast range of pricing for software programs, estimating an average retail value for illegally downloaded software is also extremely difficult. For that reason, we have used a range of estimates of retail prices to generate our estimates of the commercial value of digital software piracy.

51 Business Software Alliance (BSA) and IDC, *2008 Piracy Study*, May 2009, (hereinafter, BSA/IDC 2008 Piracy Study.").

Specifically, the study estimates the number of pirated software units installed in a given year by understanding the relationship between new sales and the existing stock of personal computers (PC)[52] and the software installed on these computers.

The study makes use of a range of data sources to determine:

- the amount of PC packaged software installed in a given year[53]; and
- the amount of packaged software paid for or otherwise legally acquired in a given year[54].

The difference between the two is the estimated volume of pirated software installed and put into use in a given year[55]. The estimated number of pirated software units in each country is multiplied by an average value that represents a blend of software distribution prices to determine the commercial value of pirated software put into the market in that year. The price used is based on a country-specific matrix of software prices including retail, volume license, OEM, free/open source and a matrix of products including security, office automation, operating systems and more. These matrices are multiplied together to get a final blended software price. In practice, because of the many methods of deploying software, this price is likely to be lower than retail prices one would find in stores.

On this basis, the study estimates that the commercial value of *all* counterfeit and pirated software installed and put into use was $53 billion in 2008.

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52 IDC tracks the number of computers in a country quarterly across 105 countries, either in products called "PC Trackers" or as part of custom assignments. The remaining few countries are researched annually for the study.

53 To ascertain the total software installed on PCs, both proprietary "paid for" software and legally acquired free and open source software, IDC conducts an annual survey totalling 6000 consumer responses and 4300 business user responses across a mix of 28 countries. For countries that are not surveyed, IDC relies on a correlation between the number of software units per PC and an emerging market measure published by the International Telecommunications Union called the Information Development Index.

54 IDC measures the size of the legitimate and "paid-for" software market each year using data it routinely publishes from about 80 countries as well as 20 or so more countries studied on an annual basis for the purpose of this study.

55 The IDC study measures the volume and value of pirated software actually *installed* in a given year. It does not track the availability of pirated software or illegal software that is acquired but not installed. If, for example, a software program was illegally downloaded but not subsequently installed onto the PC, it would *not* be counted by the IDC study.

A preliminary estimate of the value of digital software piracy

For this study, we are specifically interested in the value of digital software piracy rather than total software piracy[56]. We therefore need to estimate how much of the $53 billion estimated by BSA and IDC is related to digitally acquired software products. In line with the OECD methodology, we therefore need to estimate the volume of digitally pirated products and multiply this volume by a reasonable retail price.

Estimating the volume of illegally downloaded software products is complex. BSA currently collects information on two alternative measures of the volume of illegal activity on the internet:

- the number of BSA member company offerings of illegal software available on various P2P and BitTorrent sites[57]; and
- the volume of downloading of BSA member software available on these P2P and BitTorrent sites.

Neither of these measures accurately reflects the volume of this software illegally installed on computers, nor does it capture the broad availability of pirated software online around the world. The first measure is likely to be an underestimate because it does not reflect the multiple times a single piece of software may be accessed via these sites. On the other hand, the second measure is likely to be an overestimate because not all occurrences of leeching are likely to result in software that is subsequently installed and used[58].

To be conservative, we have used the volume of suspicious software BSA has identified as being available on P2P and BitTorrent sites to generate our estimates. BSA issued 7.3 million take-down notices for P2P sites and 152,286 take down notices for BitTorrent sites in 2009. This brings the total take down notices issued in 2009 to 7.5 million.

Ascertaining an average retail value for the software title catalogue covered by the take-down notices issued by BSA is also extremely complex. Prices can range from $50 to more than $5000 per product depending on the type of product considered. To generate a range of estimates for the value of digital software

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56 Physical software products which are illegally distributed should be captured within the OECD estimates of international trade and the estimates in this study of domestic counterfeiting and piracy. However, illegal use of software will not be captured by these estimates.

57 BSA make use of a number of tools to monitor BitTorrent networks and P2P networks for suspicious activity in countries where scanning is permitted by law. Once BSA has identified offerings of illegal software via various websites and P2P networks it may issue takedown notices to the Internet Service Providers asking them to remove the pirated software.

58 The improvement in upload and download speeds for P2P and BitTorrent users associated with having a wide catalogue of software available, make this a particular issue.

piracy, we have applied estimates of the *average* retail value ranging between $200 per product (likely to be extremely conservative) and $2,500 per product.

Combining our assumptions on volume and value imply that the total value of digital software piracy is between **$1.5 billion and $19 billion**. The lower end of this estimate is likely to be extremely conservative for the following reasons:

- the volume estimates rely on BSA monitoring activity across only those countries where it is legal to scan for suspicious activity;
- the estimates relate to a selection of BSA member software titles and not the broader universe of pirated software available online;
- the specific piece of software for which a takedown notice has been issued may have been accessed and installed by multiple individuals, so the number of take down notices may significantly underestimate the number of illegal copies installed[59]; and
- given the range of retail prices for illegally downloaded software, an average value of $200 is likely to be extremely conservative.

We would therefore expect the true value of digital software piracy to lie towards the upper end of this range. However, in the absence of additional evidence to refine our estimate, the range of $1.5 billion to $19 billion represents our best current estimate of the commercial value of digital software piracy. Work is ongoing within the industry to try to understand more fully the magnitude of digital piracy.

2.5.3 The total value of digital piracy

This section has brought together information from the most recent industry and academic studies for recorded music, movies and piracy to provide the first aggregated estimate of the value of digital piracy across these three industries. The underlying industry and academic studies have used a range of different techniques, as appropriate to their industries, to generate estimates of the scale and impact of digital piracy.

We have used the information provided within these studies to generate a consistent set of estimates that can be combined to provide an initial estimate of the total value of digital piracy. Our findings suggest that the total value of digital piracy for 2008 is likely to be between $21.5 billion and $75 billion. We expect

[59] On the other hand, it is also possible that for some take-down notices, no illegal software was actually installed.

that the estimates for each of the industries are likely to lie towards the upper end of the ranges presented, which implies that the total value of digital piracy may be closer to $75 billion than to $21.5 billion.

Table 5. Global value of digital piracy

	Global value of digital piracy (billions of US dollars)
Digital piracy of recorded music	$17 billion - $40 billion
Digital piracy of recorded movies	$10 billion - $16 billion
Digital piracy of software	$1.5 billion - $19 billion
Total	**$28.5 billion - $75 billion**

3 The broader economy-wide effects of counterfeiting and piracy

This section of the report provides a brief summary of previous analysis carried out by Frontier[60] in relation to the OECD's Category 4: Broader economy-wide effects. In doing so, we bring together estimates for the four key categories identified in the OECD's report.

The objective of our previous analysis was to develop a simple model based on publicly available data to estimate the cost to governments and consumers of counterfeit products. In other words, these somewhat hard-to-define impacts on governments, consumers and society in general have largely been conveyed through case studies, anecdotes and product or country specific data. Our objective was to tell the story with numbers, by introducing methodologies to give the limited data an empirical foundation.

Counterfeiting clearly impacts legitimate businesses, causing lost sales, lower profits and loss of brand trust and value. However, in an interconnected economy, consumers and governments also suffer. Governments see lower tax revenues and higher spending on welfare, health services and crime prevention. Consumers receive poorer quality products that are unregulated and unsafe. Moreover, as businesses suffers lower income and damaged brands, it may have to cut jobs and reduce investment leading in turn to lower economic growth. These wider economic and social effects of counterfeiting and piracy were the primary focus of our previous analysis. The analysis focused on two countries in detail – the UK and Mexico – and provided illustrative estimates for the G20.

3.1 Key findings

Counterfeiting and piracy are estimated to cost G20 governments and consumers over €100 billion every year.[61] The G20 economies lose approximately €62 billion in tax revenues and higher welfare spending, €20 billion in increased costs of crime, €14.5 billion in the economic cost of deaths resulting from counterfeiting and another €100 million for the additional cost of health services to treat injuries caused by dangerous fake products. Finally, a number of G20 economies may be missing out on higher FDI as a result of concerns over IPR enforcement. That lost investment could give rise to additional tax losses of more than €5 billion across the G20.

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60 Frontier Economics, The Impact of Counterfeiting on Governments and Consumers, December 2009

61 Note, the original study was conducted in with a Euro basis and are republished here. Conversions to US$ at an average exchange rate of 1.25 US$ to Euro were used for presentation in the Executive Summary and Conclusions of this Report.

Counterfeiting also has a big impact on employment across the G20 economies. Our analysis suggests that approximately 2.5 million jobs have been destroyed by counterfeiting and piracy – alternatively, if counterfeiting and piracy could be eradicated or seriously reduced, up to 2.5 million jobs could be created in the legitimate economies of the G20.

While it is likely that many of those who lost their jobs have gone on to find reemployment, the personal and family trauma associated with even temporary unemployment should not be lightly discounted. For example, people may quickly get into arrears on mortgages or personal debts, have difficulty paying medical expenses (as benefits are often linked to employment) or be forced to move to find alternative employment. Even when workers do find new jobs, they are likely to pay less. Moreover, our estimates suggest that 160,000 workers will fail to find new jobs, with devastating consequences for their personal financial situations and harmful consequences for government as welfare bills rise and taxes fall.

- Counterfeiting and piracy cost the G20 economies approximately €62 billion annually in lost tax revenues and higher welfare spending. This is based on the analysis showing the cost in the UK of €4.1 billion and in Mexico of €1.4 billion.

- For the G20 overall, the economic and social costs of crime increases by more than €20 billion for every 1 % increase in the crime rate caused by the trade in counterfeit and pirated goods. In the UK a 1% increase in crime costs society approximately €1.7 billion, while in Mexico a 1% increase in crime leads to costs of €290 million.

- The economic cost of lives lost to counterfeiting and piracy can add up to €14.5 billion each year across the G20 economies, not including a cost for additional health services caused by dangerous fake products of more than €100 million each year.

- Lost taxes associated with lower FDI could be more than €5 billion per year. This is based on estimates of tax losses for Mexico of over €500 million.

- In the UK 380,000 jobs are destroyed as a result of counterfeiting. 31,000 workers are unlikely to be able to find reemployment. In Mexico 480,000 jobs are destroyed with 26,000 unlikely to find alternative employment.

3.2 Headline findings – UK

Applying our methodology to the four sectors (luxury goods, pharmaceuticals, food and beverages and software) in the UK we find that counterfeiting costs the government €500 million in lost taxes and higher welfare payments. This is made

up of losses in sales tax, corporation tax, excise duty and income tax and by increases in benefit payments.

To extrapolate these findings to the total UK economy, we based our estimate on the fact that these four industries account for 6% of UK GDP. However, we also accounted for the fact that these four sectors may be more prone to counterfeiting than the economy as a whole.[62] With this as the base, a conservative estimate of the cost for the UK economy as a whole could be in the order of €4.1 billion. For comparison, this is equivalent to 2.5% of total UK government tax receipts.

Another relevant comparison is the fact that €4.1 billion in lost tax revenue and increased welfare spending is more than 1.5 times what the UK currently spends in total on Customs activity. It also represents just less than half the UK's overseas aid commitment in 2010.

Because firms producing legitimate products lose sales to counterfeits, counterfeiting can also lead to job losses. In the short term (less than a year) around 15,000 jobs in the UK in the four sectors are lost due to the impact of counterfeits. The impact of these losses on the government's tax receipts and benefit payments are captured above. Longer term, in an economy with low overall unemployment like the UK, we would expect to see the majority of these workers obtaining employment elsewhere in the economy. Long term unemployment is likely to affect around 1,200 jobs across the four sectors.

It is important to note again that these job losses relate only to the four sectors we have analysed. A conservative estimate for the UK economy as a whole would be in the order of 380,000 jobs lost in the short run, and almost 31,000 permanent job losses.

The links between counterfeiting and other forms of criminal activity are becoming better identified. There is widespread evidence that the huge profits from counterfeiting are used to fund other criminal activities. Obviously, we cannot measure this effect directly. However, even taking the most modest assumption that counterfeiting were to be responsible for raising the UK crime rate by just 1%, the economic and social cost of crime in the UK would increase by €1.7 billion. This figure captures the cost imposed on the criminal justice system as well as other social costs such as the cost of lives lost (homicides) and the cost of insurance and security to protect against crime.

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62 A simple scaling up from the four sectors to the economy as a whole would suggest a loss to government of approximately €10 billion. To account for the fact that the industries under consideration might be more prone to counterfeiting than the economy as a whole, the loss to government was discounted by 50%.

The broader economy-wide effects of counterfeiting and piracy

The €1.7 billion in additional cost represents more than 80% of total expenditures on the courts service in the UK and almost 5% of total expenditure on the criminal justice system in the UK.

In summary, conservative estimates suggest that counterfeiting costs the UK:

- €4.1 billion in lost taxes and higher welfare spending;
- 380,000 jobs in the short term and 31,000 in the long term; and
- €1.7 billion for every 1% increase in crime caused by counterfeiting.

3.3 Headline findings – Mexico

In Mexico counterfeiting across the four sectors (luxury goods, pharmaceuticals, food and beverages and software) costs the government approximately €145 million per year. This loss is made up of losses in sales tax, corporation tax, excise duty and income tax.

The four sectors account for approximately 8% of Mexican GDP. On conservative estimates, the total revenue impact for the Mexican government could be in the order of €1.4 billion or 1% of government tax receipts. This is equivalent to 30% of what Mexico spends in pre-primary education or 10% in secondary education.

As with the UK, the impact of counterfeiting also leads to job losses in the short and long term. Across the four industries short term job losses in Mexico are estimated to be approximately 10,000. Longer term jobs losses are estimated to be around 500 for the four industries. Looking at the economy as a whole, short term job losses are likely to exceed 480,000 while in the long term approximately 26,000 jobs are likely to be lost.

As well as losing tax receipts from Mexico-based companies as a result of counterfeiting, the Mexican government may also be missing out on significant tax payments from multinationals that would invest in the Mexican economy if there was stricter IPR enforcement. Technologically intensive sectors are the most likely to lose out on key technology transfer and foreign direct investment.

If better IPR enforcement could create the conditions that would attract foreign direct investment, this would have a clear impact on the output of the Mexican economy and on productivity. Estimates from recent academic work on the determinants of FDI suggest that for developing countries exports could increase by as much as 20% as a result of better IPR enforcement. For Mexico that would suggest an increase in total economic output of 11%. Even if we were to assume that Mexican output increased by only a more modest 2% in technologically intensive sectors, government tax receipts would still increase by around €520 million.

The cost to the economy and society of crime linked to counterfeiting is also significant in Mexico. If criminal activities linked to counterfeiting were to cause the crime rate to increase by just 1%, the total cost of crime in Mexico would increase by over €290 million.

In summary, conservative estimates suggest that counterfeiting costs Mexico:

- €1.4 billion in lost taxes and higher welfare spending;
- €520 million of tax losses from lost FDI;
- 480,000 jobs in the short term and 26,000 in the long term; and
- €290 million for every 1% increase in crime caused by counterfeiting.

3.4 Illustrative findings - G20

This study has also considered what these findings could imply at a G20 level, deriving assumptions from the more focussed research conducted on the UK and Mexico.

Obviously, more accurate results would be generated by implementing the methodology for each of the G20 countries. However, to illustrate the potential magnitude of the impact on government and consumers, we have extrapolated the findings of our analysis from the UK and Mexico to the G20.

Estimated on this basis, total estimated tax losses and increased expenditure across the member economies of the G20 could be in the order of €14 billion for the four sectors (luxury goods, pharmaceuticals, food and beverages and software) studied. Applying this approach to the G20 economies in their entirety, suggests that each year governments must find approximately €62 billion in order to cover tax losses and higher welfare spending.

Job losses could be around 540,000 in the short term and 34,000 in the longer term for the four sectors analysed. For the G20 economies as a whole short term losses are approximately 2.5 million. Alternatively, if counterfeiting and piracy could be eradicated or seriously reduced, up to 2.5 million jobs could be created in the legitimate economies of the G20. It should also be noted that these estimates do not include secondary impacts on employment that may well be experienced by suppliers, retailers and other sectors in the supply chain.

While it is likely that many of those who lost their jobs have gone on to find reemployment, the personal and family trauma associated with even temporary unemployment should not be lightly discounted. For example, people may quickly get into arrears on mortgages or personal debts, have difficulty paying medical expenses (as benefits are often linked to employment) or be forced to relocate to find alternative employment.

Finally, it is important to note that our previous analysis focused only on the G20 economies and so are likely to under-estimate the negative global impacts of counterfeiting and piracy on employment.

The links between counterfeiting and other criminal activities may also be leading to substantial costs for the G20 governments and their citizens. For the G20 as a whole, the economic and social costs of crime increase by over €20 billion for every 1% increase in the crime rate caused by counterfeiting.

Finally, counterfeit products are unregulated and unsafe. Every year thousands of consumers living and working in countries throughout the G20 suffer accidents and injuries as a result of unregulated counterfeit products. Many, if not most, of these products have been purchased unwittingly by consumers. Unfortunately, 3,000 consumers lose their lives every year as a result of their exposure to dangerous counterfeit products (primarily through counterfeit food and medicines). On conservative assumptions, the economic cost of lives lost to counterfeiting can add up to €14.5 billion each year across the G20 economies.

Accidents and ill-health relating to counterfeiting also put a strain on health services across the G20. While there are few good sources of information on the total incidence of accidents and ill-health caused by counterfeiting, even the most modest assumptions suggests that across the G20 the costs to the health services are likely to exceed €100 million.

For the G20 as a whole therefore our analysis suggests that counterfeiting costs governments and consumers:

- approximately €62 billion annually in lost tax revenues and higher welfare spending;
- approximately 2.5 million jobs across the G20 countries in the short term (less than 1 year);
- €20 billion for every 1 % increase in the crime rate caused by the trade in counterfeit and pirated goods; and
- €14.5 billion each year as a result of the 3,000 deaths linked to counterfeit products, not including a cost for additional health services caused by dangerous fake products of more than €100 million each year.

The broader economy-wide effects of counterfeiting and piracy

4 Conclusions

The previous chapters of this report have focused on generating estimates of the commercial value of counterfeiting and piracy associated with four categories of impacts delineated in the OECD's 2008 report, namely:

- **Category 1: Counterfeit and pirated goods moving through international trade.** We updated the OECD's estimate of the value of counterfeit and pirated goods moving through international trade, drawing on new customs seizure data indicating that the incidence of counterfeiting and piracy has increased relative to the 2005-based customs data used in the OECD's 2008 study.

- **Category 2: Value of domestically produced and consumed counterfeit and pirated products.** We developed a methodology, derived from the OECD's modeling work, to generate an estimate of the value of domestic manufacture and consumption of counterfeit and pirate products – thereby capturing an estimated value of fake products that do not cross borders.

- **Category 3: Volume of pirated digital products being distributed via the Internet.** We described, evaluated and contextualized industry reports and academic studies on the value of digital piracy of recorded music, movies and software. We then used these studies to produce an estimate of the total value of digital piracy that has been calculated using consistent assumptions and methodology across these industries.

- **Category 4: Broader economy-wide effects.** We provided a summary of previous analysis aimed at identifying the broader economy-wide effects of counterfeiting and piracy.

And, because the value and volume of counterfeiting and digital piracy appears to be increasing rapidly, we have also undertaken to estimate these impacts in 2015. This work is delineated in section 4.3, below.

4.1 Estimates of total value of counterfeit and pirated products

Chapter 2 of this report focused on generating estimates of the commercial value of counterfeiting and piracy in three of the impact categories excluded from the OECD's 2008 report, namely:

- increases in the estimate of counterfeit and pirated products moving through international trade due to increases in the incidence of counterfeiting and piracy since 2005;

- the value of domestic manufacture and consumption of counterfeit and pirated goods (the OECD's $250 billion figure focuses on counterfeiting in international trade alone, that is fakes seized at border crossings); and
- the value of digital piracy of recorded music, movies and software (not captured in trade statistics).

We have combined our estimates for each of these three areas with the original OECD estimate to generate a total estimate of the value of counterfeiting and piracy for 2008 of between **$455 billion and $650 billion**. The breakdown of this estimate is shown in Table 6 below.

Table 6. Estimate of the total value of counterfeit and pirated products (2008)

OECD Category	Estimate
Internationally traded counterfeit and pirated products	$285 billion - $360 billion
Domestically produced and consumed counterfeit and pirated products	$140 billion - $215 billion
Digitally pirated products	$30 billion - $75 billion
Total	**$455 billion - $650 billion**

Source: Frontier Economics

It is important to note that these estimates are likely to provide a conservative estimate of the impact of counterfeiting and piracy. The estimates of the value of counterfeiting are based on 2008 data (the last year for which complete data was available), and given the rapid increase in counterfeiting and piracy observed between 2005 and 2008, is likely to under-estimate the level of counterfeiting and piracy beyond 2008. It is for this reason that we have provided estimates to 2015.

It is also important to note that this study, following in the footsteps of the OECD report, has not attempted to estimate business losses associated with counterfeiting and piracy. This is primarily because the likely variations and other difficulties associated with estimating substitution effects across substantially different countries and industries introduces an additional level/degree of variables which could undermine our aim to as accurately as possible characterize the magnitude of the unfair competition for legitimate economic activity and the unchecked growth of an emerging "underground economy".

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4.2 Broader economy wide effects of counterfeiting and piracy

In addition to their work on economic impacts, the OECD examined – but did not provide quantitative estimates for a range of broader economy-wide effects: *"Counterfeiting and piracy can have broad economy-wide effects on trade, foreign investment, employment, innovation, criminality and the environment. Concerning the microeconomic effects, the sales volume, prices and costs of rights holders are impacted, as are investment, royalties and brand value. For consumers, counterfeit and pirated products may offer cheap alternatives to genuine goods but are usually of inferior quality. For certain types of infringing goods, the health and safety of consumers may be put at significant risk. With respect to governments, counterfeiting and piracy have effects on tax revenues, government expenditures, and, when corruption takes place, the effectiveness of public institutions. (p. 133)*

These social costs are far from insignificant and merit treatment sufficient to ensure that they are not overlooked when considering the full range of negative impacts resulting from counterfeiting and piracy. In an associated study[63] (excerpted in Chapter 3 of this report), Frontier explored the value and impact of these broader economy-wide effects. Notably, this work did not capture all of the thirteen "broader economy wide effect" cost-categories identified by the OECD; we only tackled impact of counterfeiting and piracy on government tax revenues, legitimate employment, increased costs of crime, economic costs on consumer health and safety, and downward pressures on FDI flows. Moreover, the scope of this report was limited to only the 20 countries comprising the "group of 20", and so will be an under-estimate of the global impact of counterfeiting and piracy. The findings, however, are relevant to this report and serve to complete the picture of the total impacts to "economy and society". We found:

- **Counterfeiting and piracy are estimated to cost G20 governments and consumers over $125 billion every year. Of this:**
  - the G20 economies lose approximately $77.5 billion in tax revenues and higher welfare spending, $25 billion in increased costs of crime, $18.1 billion in the economic cost of deaths resulting from counterfeiting and another $125 million for the additional cost of health services to treat injuries caused by dangerous fake products; and
  - a number of G20 economies may be missing out on higher FDI as a result of concerns over IPR enforcement. That lost investment could give rise to additional tax losses of more than $6.25 billion across the G20.

[63] Frontier Economics, The Impact of Counterfeiting on Governments and Consumers, December 2009

Employment

This report has not considered explicitly the impact of counterfeiting and piracy on employment. However, Frontier's previous study, which focused on the wider social and economic impacts of counterfeiting and piracy found that counterfeiting and piracy has significant negative impacts on employment across the G20 economies. Our previous analysis found that **approximately 2.5 million jobs have been destroyed by counterfeiting and piracy** – alternatively, if counterfeiting and piracy could be eradicated or seriously reduced, up to 2.5 million jobs could be created in the legitimate economies of the G20. It should also be noted that these estimates do not include secondary impacts on employment that may well be experienced by suppliers, retailers and other sectors in the supply chain.

While it is likely that many of those who lost their jobs have gone on to find reemployment, the personal and family trauma associated with even temporary unemployment should not be lightly discounted. For example, people may quickly get into arrears on mortgages or personal debts, have difficulty paying medical expenses (as benefits are often linked to employment) or be forced to relocate to find alternative employment.

Finally, it is important to note that our previous analysis focused only on the G20 economies and so are likely to under-estimate the negative global impacts of counterfeiting and piracy on employment.

4.3 A growing problem – projections to 2015

The estimates provided above indicate the significant scale of counterfeiting and piracy. However, they are based on data from 2008. Given the trend of rapid increases in counterfeit and pirated products, it is instructive to consider an illustration of the extent to which counterfeiting and piracy may continue to grow over the next few years. Specifically, using observed growth rates for the past decade we forecast forward to provide an illustration of the potential magnitude of counterfeiting and piracy in 2015.

Product counterfeiting

The value of counterfeiting and piracy appears to be increasing rapidly over time. The OECD's original estimate was based on 2005 data. Updating this estimate to reflect increases in trade and seizures since 2005, we find that the value of counterfeit and pirated products in trade has increased by up to 22% per year over this period. Even if we assume that this growth rate were to slow considerably, say to 15%, it would still result in a significant increase in the total value of counterfeit and pirated products. Given the methodology used to estimate domestically produced and consumed counterfeiting and piracy, we use

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the same growth rate to estimate the potential level of domestic production and consumption of counterfeit and pirated goods in 2015.

Table 7 shows that if physical production of counterfeit and pirated products were to grow at 15%, then the value of internationally traded and domestically produced and consumed counterfeit and pirated products could be between $1.14 and $1.53 trillion in 2015.

Digital piracy

Our findings for 2008 also suggest that digital piracy accounts for between 6.5% and 12% of the total value of counterfeit and pirated products consumed. However, it is worth recalling that digital piracy is a relatively new problem compared to physical piracy (emerging only in the last decade). Against this back drop, this scale of impact is concerning. It indicates the extent to which the problem has grown over a short period of time. Evidence on digital piracy also suggests that it is a problem that is likely to continue growing quickly over the next few years with increased internet access and broadband speeds.

There are two approaches we can take to projecting digital piracy into the future:

1. The global number of internet users has increased from around 361 million in 2000 to almost 2 billion in 2010[64], implying a compound annual growth rate of approximately 18% per annum. If digital piracy was to increase at the same rate, it would be expected to have a value of between $90 and $240 billion by 2015.
2. Alternatively, if we use the relatively conservative assumption that digital piracy will maintain its total share of counterfeiting and piracy (i.e. growth will not continue to outstrip physical counterfeiting and piracy), we find that by 2015, digital piracy is likely to have a value of between $80 billion and $210 billion.

64 World Internet Usage Statistics, 2000 to 2010.

Table 7. Estimate of the value of physical counterfeit and pirated products (2015)

OECD Category	Estimate
Internationally traded counterfeit and pirated products	$770 billion - $960 billion
Domestically produced and consumed counterfeit and pirated products	$370 billion - $570 billion
Digital piracy	$80 billion - $240 billion
Broader economy wide effects†*	*$125 +*
Employment losses*	*2.5 million +*
Total	**$1,220 billion - $1,770 billion**

Source: Frontier Economics

† Effects on government tax revenues, welfare spending, costs of crime health services, FDI flows

* Estimate limited to G20 economies

Overall, these estimates imply that the upper bound of the global value of counterfeit and pirated could be **$1.77 trillion.** According to the IMF forecasts, international GDP is forecast to be over $80 trillion in 2015.[65] Considering our estimates for the value of international counterfeited and pirated goods, this suggests that global production of counterfeit and physical products could make up as much as 2% of global GDP.

4.4 The complete picture

The OECD report was seminal in its effort to develop analytical, data-based methodologies for estimating the value of internationally traded counterfeit and pirated products.

Moreover, its delineation of four key categories of economic and social impact are widely understood to represent a more complete picture of the full impact of counterfeiting and piracy on the economy, society and development.

65 International Monetary Fund, World Economic Outlook Database, October 2010, http://www.imf.org/external/pubs/ft/weo/2010/02/weodata/weorept.aspx?sy=2008&ey=2015&scsm=1&ssd=1&sort=country&ds=.&br=1&c=001&s=NGDPD&grp=1&a=1&pr.x=91&pr.y=12

However, the lack of quantitative analysis of three of these additional impact categories is likely to result in a substantial underestimate of the scope of counterfeiting and piracy.

For these reasons, this report has endeavoured to account for these shortcomings by:

(1) drawing out the additional impacts left un-quantified in the OECD report;

(2) introducing methodologies for estimating the magnitude of these additional cost categories;

(3) projecting forward the magnitude of the problem;

(4) providing a starting point for future analytical work, to be taken up by OECD, intergovernmental organizations, national governments and/or academia.

By filling in the gaps left by the OECD, we present a more practical and complete picture of the economic and social impacts of counterfeiting and piracy. The following table compiles the set of findings we refer to as *the complete picture*, drawing together estimates for the total value of counterfeit and pirated products in 2008, along with projections for 2015.

Table 8. The Complete Picture. Estimate of the total value of counterfeit and pirated products in 2008 and 2015, and impacts on the broader economy and employment

OECD Category	Estimate in $ billions (2008)	Estimate in $ billions (2015)
Internationally traded counterfeit and pirated products	$285 - $360	$770 - $960
Domestically produced and consumed counterfeit and pirated products	$140 - $215	$370 - $570
Digitally pirated products	$30 - $75	$80 - $240
sub total	**$455 - $650**	**$1,220 - $1,770**
Broader economy wide effects†*	$125	*$125 +*
Employment losses*	2.5 million	*2.5 million +*

Source: Frontier Economics

† Effects on government tax revenues, welfare spending, costs of crime health services, FDI flows

* Estimate limited to G20 economies

Conclusions

Annexe 1: US Analysis and Findings

As noted in the main body of the report, an important next stage in the analysis is to start developing more granular country level estimates of the impact of counterfeiting and piracy. In the annexe below, we provide an illustrative assessment of the value of counterfeiting and piracy in the US, based on the findings from our global analysis.

This section provides estimates of what the global findings set out above imply for the US. We set out preliminary estimates of the share of global counterfeit and pirated goods accounted for by the US. For the purposes of this report, we focus on understanding the US share of *consumption* of counterfeit and pirated goods. It would also be possible to examine the US share of counterfeit and pirated goods *production*, but the consumption-based share is more likely to be relevant to US-based businesses. It is also consistent with the methodologies used to generate the global estimates set out above.

We find that the US consumption-based share of counterfeit and pirated goods is between **$66 billion and $100 billion** (based on 2008 data). We find that the US consumes between $45 billion and $60 billion of internationally traded counterfeit and pirated products, $12 billion to $14 billion domestically produced counterfeit products and between $9 billion and $25 billion digitally pirated products.

The rest of this section provides details of how these estimates have been derived.

4.4.1 International trade

Earlier in this report, we estimated that global counterfeit and pirated products in international trade were worth between $287 and $363 billion in 2008. In this section we estimate the US share of this figure by taking the US share of total world imports as a proxy for their share of counterfeit and pirated world imports. On this basis, we estimate that the US imports between **$46 billion and $58 billion** in pirated and counterfeit products**.**

A proxy for the US share of global counterfeit and pirated imports

To estimate the US share of internationally traded counterfeit and pirated products we need to understand how many such products are imported into the US. The OECD estimates of internationally traded counterfeit products do not help us in this respect as they are organized by source economy rather than destination economy. This tells us where the counterfeit goods were produced rather than where they were consumed.

To reach a preliminary estimate we have therefore taken the US share of total world imports as a proxy for its share of total counterfeit imports. In 2007, the

US imported approximately $2 trillion worth of goods, which equates to roughly 16% of total world value of imports. So long as the US propensity to import counterfeit products is broadly equivalent to its overall propensity to import, this provides a reasonable proxy for the US consumption-based share. To be clear, we are not saying that the rate at which the US imports counterfeit and pirated goods is the same as for all other goods. Rather, this assumption implies that, if for every $100 of world imports the US consumes $16, then for every $100 of counterfeit imports the US would also consume $16 worth.

Findings

Taking 16% of the total value of counterfeit and pirated goods in international trade implies that the US consumes $46-$58 billion of internationally traded counterfeit and pirated products. Clearly, if the US has a greater propensity to import counterfeit products than all products in general then this measure will understate the value of counterfeit and pirated goods in the US. We would anticipate that the US may, in fact, have a lower propensity to import counterfeit products than to import all products in general, so the US share is more likely to be at the lower end of the range we have estimated.

4.4.2 Domestic production and consumption

As detailed earlier, we estimated that the global value of domestically produced and consumed counterfeit and pirated products was between $140 and $215 billion in 2008. In this section we estimate the US share of this number by extracting the US figures directly implied by our global analysis. On this basis, we find that the US consumes between **$12 billion and $14 billion** domestically produced counterfeit and pirated products.

Extracting the US figures implicit in our global analysis

The global estimate of $140 billion to $215 billion domestically produced and consumed counterfeit and pirated products was generated by:

- **Step 1:** Taking the simulated counterfeiting propensities for each product category and each source economy estimated by the OECD.
- **Step 2:** Identifying the relevant categories of GDP that are likely to be exposed to counterfeit products for each economy.
- **Step 3:** Estimating the value of domestic counterfeit and pirated production and consumption for each economy by applying the counterfeiting propensities from Step 1 to the categories of GDP identified in Step 2.

This methodology then involved aggregating each of the country-specific estimates to reach a global estimate. This means that we are able to extract the US number directly from the global analysis we undertook. For our global

analysis we also varied the assumption about the link between the propensity for a source economy to export counterfeit and pirated products and its propensity to produce them for local consumption. Specifically, we used evidence from a study by the Japan Patent Office to support the hypothesis that counterfeiting is *less prevalent in trade* than in domestic production and consumption outside of Asia. The range of estimates produced for the US also reflects this variation in assumptions.

Findings

The US figures implied by our global analysis suggest that the US consumes between $12 and $14 billion worth of domestically produced and consumed counterfeit products.

4.4.3 Digital piracy

Earlier in this report we provided estimates of the global value of digital piracy. In this section, we look specifically to understand the value of digitally pirated products consumed by the US. We cover recorded music, movies and software in turn.

Recorded music

We estimated that the global value of digitally pirated recorded music was between $17 and $40 billion in 2008 but more likely to be towards the upper end of this range. In this section we apply the two alternative approaches used to generate the global estimates to US-specific recorded music figures. On this basis, we find that the US consumes between **$7 - $20 billion** worth of digitally pirated recorded music.

Updating industry estimates to be US specific

Our starting point for estimating the global value of digitally pirated recorded music was to take IFPI estimates of the number of illegal music downloads and to multiply these by the commercial value of $1 per single.

Following the same approach for the US involves estimating the volume of US illegal music downloads and an appropriate value for their legal counterparts. We continue to use the average retail price of a legal single download in the US[66] as the appropriate measure of value for our analysis. But, it is more difficult to get an accurate estimate of the volume of illegal downloads made by US consumers.

We can proxy the volume of US illegal music downloads by assuming that US consumers account for a similar proportion of legal and illegal music downloads.

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66 Recording Industry Association of America (RIAA) 2008 Year-End Shipment Statistics

IFPI[67] estimate that US consumers account for 50% of all music downloads in the legitimate market. If we assume that they also account for a similar proportion of downloads in the illegal market, this implies that around 20 billion songs are illegally downloaded by US consumers[68].

Using the estimates of US download volumes and the average retail price described above, we estimate that the commercial value of illegal downloads of recorded music is approximately $20 billion. Again, we have been conservative in our estimate by assuming that all of the 20 billion illegal US downloads are singles[69].

Using academic studies to generate US specific estimates

- To complement the industry specific analysis set out above, we also drew on a range of academic studies that have examined the issue of digital music piracy. These papers are described in detail in the main digital piracy section above.

- There appears to be an emerging consensus amongst these papers about the impact of digital piracy on the music industry. Specifically, they appear to agree that:
  - digital piracy is responsible for around 24% of the global sales decline that has occurred in the music industry; and
  - between 5 and 6 illegal downloads are required to replace a single legitimate album purchase[70].

Whilst these studies attempt to measure business losses rather than the value of digital piracy, their findings have implications for the scale of digitally pirated music available. The findings suggest that digital piracy could be responsible for approximately $1.45 billion (24%) of the $6 billion sales decline experienced by the US between 1999 and 2008[71]. As between 5 and 6 illegal downloads are

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67 International Federation of the Phonographic Industry ("IFPI"), The Recording Industry 2006 Piracy Report: Protecting Creativity in Music, July 2006; (hereinafter "IFPI Piracy Report"), http://www.ifpi.org/content/library/piracy-report2006.pdf.

68 50% of the total 40 billion illegal downloads estimated by IFPI.

69 The average retail price for an album is likely to be approximately $10. Source: Recording Industry Association of America (RIAA) 2008 Year-End Shipment Statistics

70 In line with the studies by Leibowitz (2004) and Rob and Waldfogel (2004). Liebowitz (2004) estimates that between 5 and 6 illegal downloads are likely to be required to replace a single legitimate album purchase. Rob and Waldfogel (2004) also estimate that around 5 illegal downloads are required to replace a single legitimate album purchase.

71 Recording Industry Association of America (RIAA) 2008 Year-End Shipment Statistics

required to replace a single legitimate album purchase[72], this implies a total commercial value of illegal downloads of between $7.2 and $8.6 billion[73].

As for our global analysis, we suggest that this estimate is likely to be extremely conservative. Many of the academic studies used here estimate the effect of digital movie piracy based on data for the period up to 2003 and proxy digital piracy with data on internet penetration. The global number of internet users has increased by around 18% per year since 2000[74]. We therefore expect that the commercial value of US digital piracy in 2008 could be significantly higher than suggested here. This could be an area for further investigation in the future.

Findings

As noted in the global estimate section, it is extremely difficult to get an accurate estimate of the commercial value of digital piracy of recorded music and no single approach currently provides the answer. For this reason, we have drawn on industry figures and the academic literature to provide a range of estimates. We find that the US consumed $7 - $20 billion digitally pirated recorded music in 2008. However, because the lower end of this estimate is based on academic studies that make use of out-of-date data and do not account for the rapid growth of broad band penetration and mobile technologies, we expect that the estimate is likely to lie towards the upper end of this range.

Movies

We estimated that the commercial value of global digital movie piracy was likely to be between $10 billion and $16 billion in 2005. In this section we make use of the US specific estimates of movie business losses from digital piracy to provide an estimate of the US share of this global figure. We find that the US consumed between **$1.4 billion and $2 billion** worth of digitally pirated movies in 2005. As for the global figures above, we note that these figures are likely to be extremely conservative.

Industry estimate of US business losses associated with digital movie piracy

The global estimate described above made use of the study published by the Motion Picture Association (MPA) and L.E.K in 2006[75]. This study estimated

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72 In line with the studies by Leibowitz (2004) and Rob and Waldfogel (2004). Liebowitz (2004) estimates that between 5 and 6 illegal downloads are likely to be required to replace a single legitimate album purchase. Rob and Waldfogel (2004) also estimate that around 5 illegal downloads are required to replace a single legitimate album purchase.

73 Estimated by multiplying the $1.2 billion sales decline by 5 and 6 respectively.

74 World Internet Usage Statistics, 2000 to 2010.

75 The Cost of Movie Piracy, an analysis prepared by L.E.K. for the Motion Picture Association, May 2006, http://www.mpaa.org/researchStatistics.asp, (hereinafter "MPA-L.E.K. Study").

that there were $7 billion of estimated consumer spending losses associated with digital piracy in the form of illegally downloaded movies from the internet.

The study also provided a US specific figure for business losses. It found that the US share of the $7 billion global losses was approximately $918 million (13% of total global losses).

Translating the loss figures into value figures

As indicated earlier, we need to transform the business loss estimates from the MPA L.E.K. study into a commercial value of digital movie piracy. To do so, we use estimates of the likely substitution rate between legal and illegal movie downloads.

While academic research into the impact of illegal movie downloads is relatively limited, the studies that exist suggest that substitution rates are likely to be relatively high and may lie somewhere between 45% and 67%. This implies that only 1.5 to 2.2 illegal purchases are required to replace a legitimate movie purchase (see the earlier section on digital movie piracy for details). Applying the figures on substitution rates to the $918 million US loss figure estimated by the MPA L.E.K study implies a total commercial value of US illegal downloads of between $1.4 billion and $2 billion[76].

Findings

We find that the US consumes between **$1.4 billion and $2 billion** worth of digitally pirated movies. As for the global estimates above, we would expect these estimates to be conservative. The $918 million loss figure on which they are based was estimated in 2006. The global number of internet users has increased by around 18% per year since 2000[77]. Broadband speeds have also been improving significantly with time, making the illegal download of files of significant size, such as movies, increasingly feasible and attractive. We therefore expect that the US consumption-based value of digital piracy in 2008 could be significantly higher than suggested here.

Software

Earlier in the report, we estimated that the global value of digitally pirated software products was likely to be between $1.5 billion and $19 billion in 2008. By using information on the US share of total software piracy, we have been able to translate this figure into an estimate of the US share of digital software piracy. On this basis, we estimate that the US consumes between **$320 million and $3 billion** of digitally pirated software. Again, we note the size of this range, which

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76 Estimated by multiplying the $918 million sales decline by 1.5 and 2.2 respectively.

77 World Internet Usage Statistics, 2000 to 2010.

are due to the difficulties in estimating this figure, but anticipate that the true value is likely to be towards the upper end.

A preliminary estimate of the value of US digital software piracy

The global estimate made use of information on the number of take down notices issued by BSA and the range of retail values for software products as measures of the volume and value of digital software piracy.

To produce a US specific estimate using the same methodology would require specific information on the number of take down notices related to US consumers and also on US specific retail prices for the relevant software. This information is not currently available.

Our estimate is therefore based on estimating the US share of digitally pirated software by assuming that the US share of digitally pirated software is the same as its share of total pirated software. The study on the piracy of software products published by the Business Software Alliance (BSA) and IDC in 2008[78] provides us with relevant information on which to base our estimate. It estimates that the commercial value of *all* counterfeit and pirated software was $53 billion in 2008. The US was estimated to account for approximately $9.1 billion (17%) of this total. Assuming that the US accounts for 17% of our estimated global figure, we find that the US consumes between $64 million and $3 billion of digitally pirated software.

Findings

We estimate that the US consumes between **$64 million and $3 billion** of digitally pirated software. However, because of the conservative assumptions behind the lower bound of this estimate (discussed above) we would expect the true value of US digital software piracy to lie towards the upper end of this range.

The total value of US counterfeiting and piracy

In this section of the report we have focused on generating US specific estimates of the value of counterfeiting and piracy. Our estimates cover international trade in counterfeit and pirated goods, domestically produced and consumed goods and digitally pirated products. Overall, we find that the US consumes between **$66 billion and $100 billion** worth of counterfeit and pirated products.

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78 Business Software Alliance (BSA) and IDC, *2008 Piracy Study*, May 2009, (hereinafter, BSA/IDC 2008 Piracy Study.").

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