

**Jobs, tax and contribution to the UK
economy: the impacts of reducing
illicit peer-to-peer file-sharing**

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1 BACKGROUND

Our brief

- 1.1 Europe Economics has been requested to provide an independent assessment of the impact of digital piracy, with a particular focus on peer-to-peer (P2P) file sharing of films, TV, music and software on the UK economy.
- 1.2 It has long been recognised that piracy is damaging not only to the competitiveness, profitability and innovative capacity of the audiovisual (AV) and software industries but also to the wider economy through “spillover effects”, and through the stifling of innovation and new business models. The few studies that have attempted to quantify this effect are mostly of US origin.
- 1.3 The timing of this study coincides with the British government’s commitment to consider legislation by April 2009 to deter piracy, and is contemporaneous with EU-level deliberations.
- 1.4 We were asked to use as our starting point UK information which is already in the public domain.
- 1.5 Our report provides a summary of the UK information sources we have relied on, the direct impacts on the industry of piracy through illegal file sharing, and a high-level quantification of the wider economic impact.

About Europe Economics

- 1.6 Europe Economics is an independent private sector consultancy, based in London, which specialises in the application of economics and econometrics to problems arising predominantly in the fields of public policy, regulation, and competition.
- 1.7 Our clients include government departments, regulators and competition authorities, companies large and small, professional and trade associations, charities, law firms and public affairs firms. About half our work comes from outside the UK. More about us can be found at <http://www.europe-economics.com>.

2 EXECUTIVE SUMMARY

- 2.1 Our report calculates the likely economic impacts – measured as employment, tax revenue and contribution to national output – of substantial reductions in copyright theft by what is known as peer-to-peer (P2P) file-sharing, i.e. the illegal downloading and sharing by digital means, of film, TV, music and software.
- 2.2 Collectively, these three sectors form part of what has become known as the “creative economy” segment of the UK economy as a whole. The creative economy represents at least 7 per cent of the national economy. We estimate that the sectors we have been asked to consider account for at least half a million jobs and probably more.
- 2.3 In relation to films, TV and music we were asked to explore two scenarios:
- the complete elimination of illegal P2P file sharing, since this would illustrate the full extent of the economic damage it currently inflicts; and
 - a reduction of 75 per cent, a figure that sits within the target of 70 per cent to 80 that the UK government has set.
- 2.4 In relation to software, we have used a single lower rate of 37 per cent, derived from other expert industry analysis.
- 2.5 We have relied for our calculations wholly on source information available in the public domain, all of it provided by organisations which, like ourselves, are independent of industry interests.
- 2.6 To assess employment and output impacts we applied a standard methodology using the UK Input-Output Tables, and then adjusted for induced effects. The resulting employment calculations represent the gross effects, not the net effects after adjustment for re-absorption. We have adopted this approach because the other published studies we have seen appear to calculate gross effects rather than net, and it seemed to us that there was some merit in placing ours on an comparable basis.
- 2.7 To calculate tax revenue effects we have made simple assumptions (explained in the text) as regards likely changes in personal incomes, National Insurance contributions, corporate incomes, and the volumes of goods or services that would yield VAT if they were legitimately purchased.
- 2.8 Our calculations show that:
- 2.9 If illegal P2P file sharing could be completely eliminated (the 100% scenario) we calculate that across the three industry segments – film and TV, music, and software – there would be a gross increase of 9,300 jobs, an increase in tax revenue of £248 million per annum to central government, and an increase of some £1.4 billion in national economic output.**

- 2.10** If 75% of illegal P2P file-sharing could be eliminated, there would be a gross increase of just over 8,000 jobs, an increase in tax revenue of £227 million per annum to central government, and an increase of some £1.2 billion in national economic output. Some 57 per cent of the increased employment would arise in the software segment, 34 per cent in music, and 9 per cent in film and TV.
- 2.11** Assuming three years of growth at 7 per cent per annum in revenue recovered by the film, TV and music sectors only, the total of jobs added after three years would be just over 10,300 gross.
- 2.12 In economics terms, illegal P2P file-sharers may be thought of as “free-riders” – a term that describes those who consume more than their fair share of a resource and/or contribute less than their fair share to the cost of its production. Free-riding gives rise to the under-production, or in extreme cases, the non-production of goods or services. Such effects are highly undesirable; they usually (and rightly) attract counter-measures. Given the straitened economic circumstances that currently grip the UK economy, the need for counter-measures is more compelling now than it might otherwise be.

3 THE CREATIVE INDUSTRIES

- 3.1 We are aware from our own background research that much recent debate about the protection of the rights of individuals and organisations who own creative or intellectual property has focussed on legal and moral issues. Our focus here is on the economic importance of protecting and developing such property, and on the adverse consequences of failure to do so for creators, for consumers, for governments and for society at large. As economic conditions in and beyond the UK deteriorate and the prospect of large-scale unemployment looms, it is arguably timely to consider the benefits – particularly to job creation and to tax revenues – that the creative sectors generate, and the extent to which these benefits are undermined by “piracy” – a somewhat unsatisfactory term covering a variety of illegal copying and sharing techniques, all of which amount effectively to theft.
- 3.2 The sectors we are concerned with here are part of a larger creative economy which is important to the UK as a whole by virtue of its sheer size. Several recent published documents attest to this fact, although two stand out:
- In its publication *Creative Britain: New Talents for the New Economy*, the Department for Culture, Media and Sport (2008) reported that the creative industries as broadly defined now account for some 7 per cent of UK GDP.¹
 - The Work Foundation, in a 2007 report entitled *Staying Ahead: The Economic Performance of the UK’s Creative Industries*, identified thirteen sectors which make up the UK’s creative economy, and reported that together they account for 1 million direct jobs and another 800,000 in related upstream and downstream sectors.^{2 3} All the sectors on which we report in this study are included in the Work Foundation’s thirteen.
- 3.3 Employment in the creative industries is dominated (in the Work Foundation’s nomenclature) by “software, computer games and electronic publishing”. Figures dating back to 2004 suggest that this category employed some 600,000 people at that time. Employment in radio and TV accounted for just over 100,000, and employment in video, film and photography for about 70,000.
- 3.4 Interestingly for UK policy-makers, the Work Foundation also calculates that employment in the video, film, and photography category is heavily dependent on SMEs, which account for some 50 per cent of sector turnover; but that it is little dependent on non-UK firms, which account for only 10 per cent of sector turnover. By contrast, in software,

¹ The document may be downloaded from http://www.culture.gov.uk/reference_library/publications/3572.aspx

² See <http://theworkfoundation.com/research/publications/publicationdetail.aspx?oItemId=176&parentPageID=102&PubType=>

³ The Work Foundation also relays a finding of the OECD that “the UK’s creative industries make up a greater share of GDP than in other nations. According to UNESCO, the UK is the biggest exporter of cultural goods, surpassing the US. In 2002 it exported \$8.5 billion of cultural goods (compared with \$7.6 billion by the US and \$5.2 billion from China).”

SMEs account for under 20 per cent of sector turnover, while non-UK firms account for just over 40 per cent.⁴

- 3.5 Although sector definitions are somewhat fuzzy and vary from study to study, we are confident in saying that, from these and the other reports we have seen, current *direct* employment in the three sectors considered in this report totals at least half a million and probably more: about 40,000 in film⁵, 60,000 in TV⁶, 90,000 in music⁷, and at least 300,000 in software⁸.
- 3.6 We have considered a number of recent studies which assess the scale of piracy of creative output in the UK. The most useful to us have been:
- EMR's *Digital Entertainment Survey* (2008) for Wiggins, referred to in more detail in Sections 4 and 5 of this study.
 - The Ipsos survey on *Piracy in GB: Wave 5* (2007) covering film and TV piracy, also referred to in more detail in Sections 4 and 5 of this study.
 - The Work Foundation study (2007) for DCMS referred to in 3.2 above.
 - The *Fifth Annual BSA and IDC Global Software Piracy Study* (2007), referred to in Sections 4 and 5 of this study.
- 3.7 No study that we have seen provides a comprehensive breakdown of piracy by type of medium pirated or by method of piracy. We can therefore summarise what is known in fairly broad terms.
- 3.8 Survey-based research normally assesses how many people participate in piracy as broadly defined. Ipsos found that in relation to film and TV, 32 per cent of the population aged 15 to 68 more had participated, or continued to participate, in piracy of one kind or another, and that 16 per cent had participated in digital piracy (which includes P2P file-sharing). EMR found that that 21 per cent of people aged between 15 and 54 had illegally file-shared movies or TV programmes or both; and that 29 per cent had illegally file-shared music. TNS, in a further survey for the British Phonographic Industry, found that 15 per cent of people aged 12 to 74 had illegally shared or downloaded music tracks.
- 3.9 Depending on which survey evidence one takes, the number of UK citizens involved in infringing copyright in relation to films, TV and music is between 5 million and 10 million –

⁴ See Chapter 2, p.45, Figure 2.12.

⁵ UK Film Council Statistical Yearbook, 2008, p.156, Table 19.1.

⁶ Arts and Humanities Research Council, see <http://www.ahrc.ac.uk/About/Policy/Documents/Sec%20interaction%20tv.pdf>, p.20.

⁷ BPI Music Education Directory, 2006/07, <http://www.bpi-med.co.uk/map5.asp>. We have excluded employment in instrument making and training.

⁸ We have seen two figures of 600,000: one from IDC, the other from the Work Foundation. The first includes trade in IT hardware, the second trade in electronic publishing. We feel confident that at least 300,000 of the 600,000 totals in each study are accounted for by software as defined in this study.

by any objective standard a very large number. It compares with the total of 10 million crimes reported in 2007-2008 by the British Crime Survey and just under 5 million crimes recorded by the police.⁹

- 3.10 As regards software, the single major piracy study that we have been able to review, the *Fifth Annual BSA and IDC Global Software Piracy Study (2007)* already referred to, suggests that the UK software piracy rate is in the region of 26 per cent, down from 29 per cent five years ago. Substantial though that figure is, it is some way lower than the equivalent for some other EU and non-EU jurisdictions – for example, 33 per cent in Canada, 42 per cent in France, 49 per cent in Italy, 65 per cent in Turkey, 73 per cent in Russia and 82 per cent in China. IDC nevertheless estimates the revenue loss to the UK software sector as approximately £1 billion annually.
- 3.11 Our own estimates of job numbers that could be recovered if all illegal P2P file-sharing of films, TV programmes, music could be stamped out, together with the more modest hypothesis of a 37 per cent reduction in software piracy that IDC uses, UK employment would increase by about 9,000 jobs at the gross level (i.e. before re-absorption effects). Putting it another way, that figure of 9,000 jobs sets the scene for the damage currently being done to the UK economy through copyright theft in these three sectors.

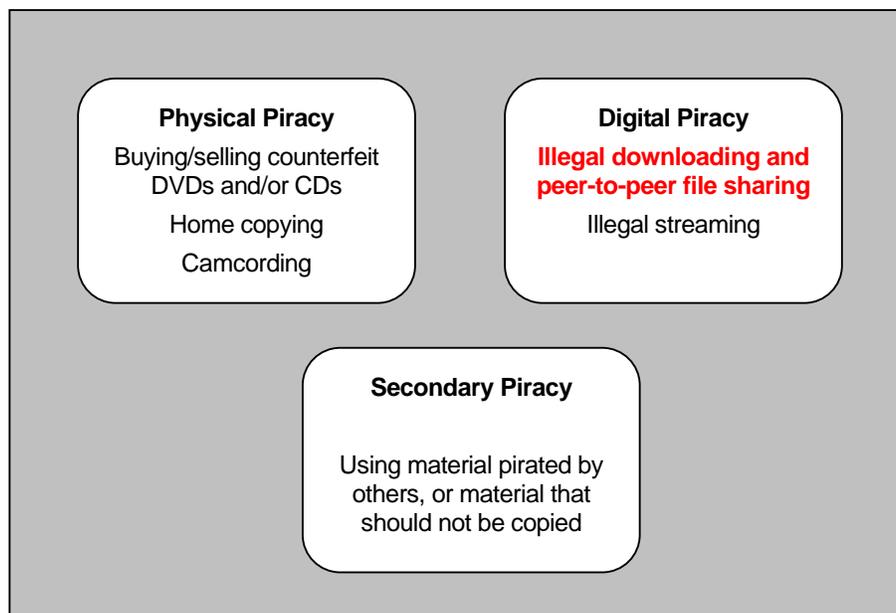
⁹ See *Crime in England and Wales 2007-2008*, Home Office, <http://www.homeoffice.gov.uk/rds/pdfs/hosb0708.pdf>.

4 “PIRACY” – AN UNSATISFACTORY TERM

What is “piracy”?

- 4.1 Piracy in the context we are dealing with here is essentially the unauthorised copying or sharing of material for which the originator and/or the originator's distributors are lawfully entitled to payment. Put simply, it is theft. Piracy is practised upon several different types of content: films, TV programmes, software (including video games) and music, any of which can be captured digitally and transferred between computers over private or public networks, most commonly the internet.
- 4.2 However, the single word “piracy” has become overworked to the extent that it no longer correctly captures the different forms of illegal use that now take place. Figure 3.1 below explains these various forms

Figure 4.1: The different forms of piracy



- 4.3 In place of the word “piracy” we use, as appropriate, the terms “digital copyright theft”, “online copyright infringement” or “illegal peer-to-peer (P2P) file-sharing”.
- 4.4 This study's main focus is on P2P file-sharing and illegal downloading, highlighted in bold red above. Although file-sharing software can have legitimate uses, we understand that most content currently downloaded via file-sharing networks has been obtained illegally through physical piracy.
- 4.5 Once a user has downloaded the file, or has a legitimate copy of a file, he/she can make it available to other users, who in turn can share the material again.

- 4.6 The nature of the product and the ready availability of suitable technology means that the marginal cost of producing copies is close to nil. Further, the quality of copies and copies of copies and so on need not diminish (although in practice some pirated material is of poor quality). These factors have given birth and impetus to the theft of intellectual property on a substantial and rising scale.

The harm that digital copyright theft causes

Who loses?

- 4.7 The primary direct effect of piracy falls upon the industry that creates the source material. To the extent that the originator does not receive all the revenue to which he is lawfully entitled, he is deprived of revenue either to recover the costs of producing his material or for reinvestment in new material, so that in the end consumers are deprived too.
- 4.8 But the harm does not stop there. Content originators have suppliers and customers too. Those who are harmed upstream thus include (for example) manufacturers of film stock, makers of blank DVDs, cases and covers, makers of replicating equipment, and, in turn, their suppliers – all of whom give rise to employment. Downstream, the manufacturers, distributors and retailers of DVDs are harmed, and cinemas are likely to lose especially heavily and all these employ people too. And their losses in turn have knock-on effects on other participants.
- 4.9 On top of these revenue losses are the broader ripple effects through the wider economy as employees of the participating organisations spend their income. The way in which the impacts work their way through the economy is broadly similar for TV material and for music. In the case of software, the downstream distribution channels are somewhat different, and there is an interaction of sorts between the suppliers of software and the suppliers of hardware on which the software runs.
- 4.10 Across all these media, there are of course tax effects on government. When copyright theft gives rise to tax revenue shortfalls, then, for any given level of public expenditure, government needs to recover them from elsewhere.

Who would gain from a reduction in piracy?

- 4.11 In a word, society at large. The most immediate and most obvious beneficiaries would be the originators of content, their legitimate distributors (not only physical distributors but also online distributors who would be able to build new and innovative online retail businesses) and the companies that supply and are supplied by them. The additional revenue made available would find its way back up the chain and result, over time, in more content to the benefit of consumers. The wider economy gains through the ripple effect of increased economic activity generally, and the government gains through the receipt of additional tax revenue.

- 4.12 The gains from reducing digital copyright theft are thus a mirror-image of the losses that arise from the presence of piracy. Reducing such theft turns a vicious circle into a virtuous circle.

Sources of information

Films and TV

- 4.13 We considered two recent UK surveys that provide information about the types and extent of digital copyright theft:
- (a) Ipsos: *Digital and physical piracy in GB, Wave 5, November 2007*
 - (b) Entertainment Media Research for law firm Wiggin: *Digital entertainment survey: full report, January 2008*
- 4.14 The Ipsos survey, conducted in November 2007, involved interviews with 2000 respondents aged 15 years and over. The main objective of the survey was to assess the extent to which film and TV series copyright was being infringed in the UK, as well as its impact on industry. The survey was also designed to capture elements of consumer behaviour such as their motivation in infringing copyright and what respondents would have done had piracy not been available as an option.
- 4.15 The second survey is broader in scope and aims to provide comprehensive coverage of all forms of digital entertainment including trends, preferences, behaviour and attitudes. An online survey methodology covering 1,608 respondents in the UK was used. The sample consisted of males and females aged 15 to 54, and was weighted to reflect the national demographics of the UK. For the purposes of this study, the survey includes a section on piracy as broadly defined, covering such themes as pirates' attitudes and levels of file sharing.
- 4.16 We chose the Ipsos survey as our starting point because it explicitly includes illegal P2P file-sharing. This is not to imply that the Wiggin/EMR survey does not cover valuable ground. It certainly does, but because its scope is wider than that of Ipsos it misses some detail that is useful to our own study. Furthermore Ipsos conducts well-reasoned calculations of revenue losses arising from the volume calculations. These form valuable input to our estimates of the wider economic impacts.
- 4.17 From this starting point we draw out the following factors which feed into our impact calculations:
- (a) The extent of P2P file-sharing (and other forms of digital copyright infringement) in the UK.
 - (b) The split between different forms of copyright theft and the different types of content on which they are practised.

- (c) As a basis for downstream calculations, the impact of digital copyright theft on the creative industry itself.
- (d) An assumption on consumer behaviour i.e. the percentage of consumers who would drop out of the market if the pirated source(s) became unavailable.

Music

- 4.18 The sources of information we can draw on for the file-sharing of music in the UK are scarcer than those available for film and TV and therefore we will be relying more heavily on assumptions. We derive much of our information from the following two sources:
- (a) BPI Statistical Handbook 2006. This reports the results of an Ipsos survey conducted in 2006, focusing on counterfeit CDs, and the results of a TNS survey on music downloading. (The 2007 and 2008 handbooks do not contain equivalent material.)
 - (b) Entertainment Media Research and Wiggin; “2008 Digital entertainment survey: full report”, January 2008. As with film and TV, this survey also contains an estimate of the extent of file sharing of unauthorised music.
- 4.19 In 2006, the BPI commissioned Ipsos to carry out a survey on music copyright theft in the form of counterfeit CDs similar to Ipsos’ survey on film and TV material.¹⁰ In this survey, Ipsos consider the extent of the practice, the motivations and behaviour of individuals engaged in infringements, and go on to calculate the direct loss to the music industry arising out of this practice. Clearly, for our purposes, we would ideally need a survey on a similar scale on the extent of file sharing in music. However, given the non-availability of such data, we had to work backwards from the counterfeit CD survey and combine it with other sources of information on file sharing.
- 4.20 The TNS survey, as reported in the BPI Statistical Handbook, was designed to capture the impact of music downloading on the industry. Conducted in 2005 and based on a sample of 3,317 respondents aged between 12 and 74, it collected information on downloader characteristics, impact on sales, and downloading activity.

Software

- 4.21 The first document on which we rely is “The Fifth Annual BSA and IDC Global Software Piracy Study”, published by the Business Software Alliance (BSA) in 2007.¹¹ BSA describes itself as “a nonprofit trade association created to advance the goals of the software industry and its hardware partners”. It is headquartered in Washington, DC, USA. IDC is described on its own website (<http://www.idc.com>) as “The premier global market intelligence firm”. It is headquartered in Massachusetts, USA.

¹⁰ In this instance, Ipsos interviewed 2,000 adults aged 15+.

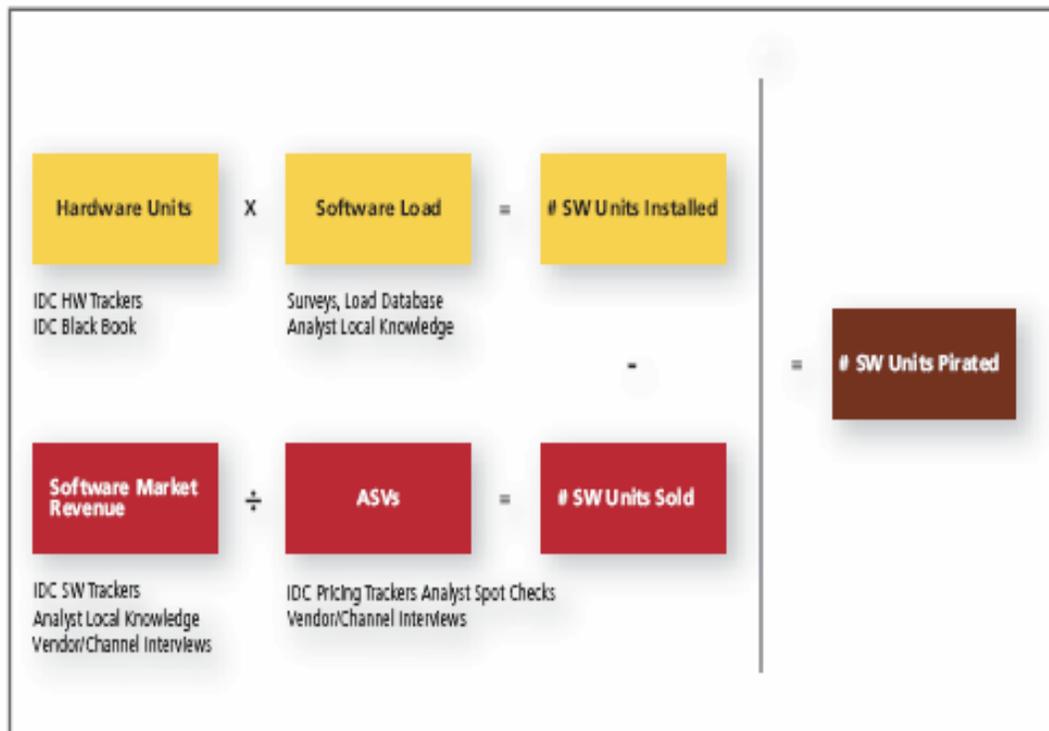
¹¹ See http://www.bsa.org/country.aspx?sc_lang=en-GB

“Piracy” – an unsatisfactory term

4.22 The methodology adopted by IDC is described as follows:

- “1. Determine how much PC packaged software was deployed in 2007.
2. Determine how much PC packaged software was paid for/legally acquired in 2007.
3. Subtract one from the other to get the amount of pirated software.”

4.23 Diagrammatically, IDC’s methodology is represented by Figure 4 on page 14 of the study, which we reproduce below:



4.24 As to the scope of the research, IDC reports that it:

“...calculates piracy on all software that runs on personal computers, including desktops, laptops, and ultra-portables. The categories include operating systems, systems software such as databases and security packages, and applications software such as office automation packages, finance and tax packages, PC computer games and industry-specific applications. IDC excludes routine device drivers and free downloadable utilities, such as screen savers.” (p.12)

4.25 As can clearly be seen, IDC’s approach is very different from that of the Ipsos study of film and TV material referred to above: IDC relies on industry returns, while Ipsos derives its results from a sample of consumers.

- 4.26 What IDC calculates is, essentially, a gross loss arising from copyright theft across all types of software. It does not attempt, for example, to distinguish between operating software and video games, nor does it estimate how many individuals or businesses that provide or use pirated software would purchase the products legitimately if the thefts could somehow be stamped out.
- 4.27 Nor does IDC attempt to distinguish between physical, digital and secondary forms of “piracy” – which means that we are unable to estimate how much of it takes the form of P2P file sharing.
- 4.28 On the other hand, a strength of the BSA/IDC study is that it provides international comparisons of the rates of software copyright theft, and that it does so for each of the years 2003 to 2007. Thus, IDC reports that the UK rate fell from 29 per cent in 2003 to 26 per cent in 2007, although the annual value of losses over the same period rose, from US\$1.6 billion in 2003 to US\$1.8 billion in 2007 (because of rising software prices and/or an increasing number of users).¹²
- 4.29 The BSA/IDC global study does not itself attempt to calculate UK employment lost as a result of copyright theft, but a later BSA/IDC publication, based on the global study, does. This later publication is one of a series of 42 country studies released in January 2008, and is entitled “The Economic Benefits of Lowering Software Piracy – United Kingdom” (http://www.bsa.org/idcstudy.aspx?sc_lang=en, then scroll down to United Kingdom). All the separate country studies take as their starting point the piracy rates established in the 2007 global study. We rely on the UK study to a much lesser extent than on the global study.
- 4.30 The reason for this is that we found it impossible to relate the UK country study to the global study. In particular, the revenue loss ascribed to software copyright theft in the UK – the figure of \$1.8 billion referred to above – does not appear in the UK country study, which deals with the whole IT sector rather than with software on its own.
- 4.31 We reviewed IDC’s methodology publication but it did not assist us in reconciling the two reports.¹³ It refers to IDC’s more detailed proprietary Piracy Impact Model, to which we do not have access. We therefore used the figure of \$1.8 billion for UK software copyright theft as representing the starting point for our own impact assessment.

Other sources of information

- 4.32 In addition to the studies referred to above, we have reviewed further literature that has enhanced our understanding of the context. In a (very) few instances the wider literature

¹² Interestingly, the UK appears to have one of the lowest rates of software piracy in the EU. It sits in a group of ten Member States whose rate is close to 25 per cent. By contrast, a further seven Member States, including France, Italy and Spain, exhibit rates of between 40 and 58 per cent.

¹³ http://www.bsa.org/upload/idc_methodology_final.pdf

“Piracy” – an unsatisfactory term

has allowed us either to fill in some gaps in the data or to cross-check one source against another.

4.33 The other principal sources we have used are:

- (a) A study published by the Institute of Policy Innovation (IPI) entitled *The true cost of motion picture piracy to the US economy*. (Policy Report 186, September 2006)
- (b) The Statistical Yearbook of the UK Film Council.
- (c) A 2008 report (in French) by Tera Consulting, Paris, entitled *Impact économique de la copie illégale des biens numérisés en France* (The Economic Impact of Illegal Copying of Digital Material in France)
- (d) *Creative Britain*, a report published in February 2008 jointly by DCMS, DBERR and DIUS
- (e) The Gowers Review of Intellectual Property, published in 2006 by H M Treasury
- (f) *The Recording Industry 2006 – Piracy Report*, published by the International Federation of the Phonographic Industry.
- (g) *National enforcement priorities for local authority regulatory services* (the “Rogers Review”), Cabinet Office, March 2007

5 THE IMPACTS OF ELIMINATING ILLEGAL P2P FILE-SHARING

- 5.1 We have carried out calculations separately for three categories of material: films and TV, music, and software (which covers both operating and applications software for personal computers as well as video games). We then aggregate the impacts to produce a final total.
- 5.2 The separation of the categories is in our view important because the estimates of copyright theft we have used as starting points are themselves not strictly comparable: they have been conducted by different organisations working to different briefs at different times. We have had to make some estimates and adjustments from the source material in order to provide the necessary inputs to an impact analysis.

Film and TV

Revenue effects of reducing copyright theft

- 5.3 Research firm Ipsos (2007) found that 32 per cent of the population aged between 15 and 68 have been involved in some form of piracy relating to film and/or TV, with 16 per cent having undertaken digital piracy.
- 5.4 In its 2008 study Entertainment Media Research (EMR) produces higher estimates – 21 per cent of people between 15 and 54 reporting that they had engaged in the unauthorised file sharing of movies and TV programmes, and 27 per cent saying they had watched full movies via streaming sites.
- 5.5 Both surveys emphasise that illegal downloading is practised predominantly by younger people. Ipsos found that 64 per cent of illegal downloaders were male and that the majority of all downloaders were in the 15-34 age group. EMR reported that the incidence of illegal downloading was much stronger among males under 25 than in any other group.
- 5.6 Our chosen starting point is the Ipsos survey of November 2007, which provides useful numbers as to (a) the value and (b) the volume of film and TV piracy, broken down by different forms of piracy. Here we are concerned only with P2P file sharing.
- 5.7 Ipsos reports that digital piracy accounts for one quarter of all piracy of film material and for over a half of piracy of TV series. The total value of film piracy is given as £404 million and of TV piracy £82 million. P2P piracy (as we read the Ipsos survey) represents half of film and TV digital piracy. So if copyright theft of this type were to be eliminated entirely the film industry would benefit by one eighth of £404 million of extra revenue, i.e. £50.5 million and the TV industry by a quarter of £82 million, i.e. £20.5 million. The total benefit would thus be £71 million.
- 5.8 The next step in the impact calculation is to use Government-published Input-Output Tables in order to calculate what the wider economic effects are of this increase in revenue to the industry. The Input-Output (“I-O”) Tables tell us, for a given change in

revenue in one sector, what the estimated revenue effects are on other sectors. The sum of effects on all sectors give us the total effect on the whole economy.

- 5.9 The number of sectors that the I-O Tables deal with is quite limited. There are 11 in all, as follows.

- Agriculture
- Mining and quarrying
- Manufacturing
- Electricity, gas and water supply
- Construction
- Wholesale & retail trade
- Transport and communication
- Financial intermediation
- Public administration
- Education, health and social work
- Other services

- 5.10 Additional revenue arising in films and TV could go into the “Wholesale and retail trade” category, or into “Other services”. For this report we have used “Wholesale and retail trade”. (The choice makes negligible difference to the results.)
- 5.11 The I-O Tables tell us that, in total, the economic effect of adding £71 million of revenue to the wholesale and retail trade sector is £123 million, i.e. an additional £52 million.
- 5.12 To this £123 million we must add what are known as “induced effects”, i.e. the wider (but weaker) ripple effects that spread across the whole economy. The range of multipliers used is again derived from Government studies, and a normal figure is 1.1, implying that the ripple effects are valued at about 10 per cent of the direct and indirect effects combined.
- 5.13 Ten per cent of £123 million is £12.3 million, so the total economic impact comes to £135 million – roughly double the value of the £71 million additional revenue going to the industry.

Employment effects

- 5.14 The I-O Tables also provide coefficients for calculating employment effects from revenue effects. These coefficients are based on empirical relationships established between the value of output (revenue) and the numbers of people employed in the eleven sectors described above.
- 5.15 For an additional £71 million of revenue in the Wholesale and Retail Trade sector, the I-O Tables indicate a gross increase of 449 jobs in that sector, and for the whole economy an increase of 895 jobs (including the 449).

- 5.16 The gross increase in employment ought to be adjusted for what is known as the “re-absorption factor”. Re-absorption may perhaps be more easily understood in the context of a reduction in output, e.g. when companies go out of business. Over time, some of those displaced by a company closure find alternative employment, so the net loss is smaller than the gross. The same phenomenon is apparent when there are increases in revenue and therefore in employment: in these circumstances, employment increases in some sectors are satisfied by people moving out of other sectors, so again the net increase in employment is smaller than the gross. The standard re-absorption factor is 52 per cent. Thus the gross increase in employment needs to be roughly halved to give a true net effect.
- 5.17 We understand, however, that this report may be compared with other recent calculations for other jurisdictions, where the re-absorption factor has not been applied. For this reason, we do not explicitly apply it here.

Summary of revenue and employment effects

- 5.18 In summary we estimate that the elimination of illegal P2P file-sharing in film and TV would produce revenue benefits to the industry of £71 million per annum, benefits to the wider economy of £135 million per annum, and a gross employment increase of 895 jobs.
- 5.19 We now move on to estimating tax effects.

Tax effects

- 5.20 If the piracy of film and TV material by P2P file sharing can be eliminated, the additional revenues accruing to the AV industry will produce additional tax revenue for the Government in the following ways:
- The additional revenue should logically result in higher profits among AV companies, producing higher corporation tax revenues.
 - The additional products sold are subject to VAT, so increased VAT becomes a second source of additional revenue to Government.
 - The additional employment created will produce additional contributions of income tax and National Insurance to the Government.
- 5.21 Estimating the tax effects here requires us to make a number of assumptions which are set out below.

Corporation tax

- 5.22 In relation to corporation tax, our assumption is that the additional £71 million revenue calculated above produces a net taxable profit increase of £7.1 million. In very round terms, corporation tax on £7.1 million is £2.1 million.

VAT

5.23 In relation to VAT, our starting point is the 52 million film downloads (presumably all attributable to P2P file sharing) that Ipsos calculates from its survey. Ipsos reports that only 53 per cent of illegal file sharing downloads (28 million) would become legitimate purchases on which VAT would be chargeable, and it also indicates what average retail price would attach to each of these different types of purchase.¹⁴ The details are as follows.

- 18 per cent (9.4 million) become cinema visits at an average of £5.07 per visit
- 15 per cent (7.8 million) become DVD rentals at £3.11 per rental
- 9 per cent (4.7 million) become purchases of new-release DVDs at £12.21 per DVD
- 7 per cent (3.6 million) become purchases of catalogue DVDs at £6.46 per DVD
- 2 per cent (1.0 million) become TV pay-per-view purchases at £3.00 per purchase
- 2 per cent (1.0 million) become legitimate downloads at £14.00 per download.

5.24 The total revenue calculated from these numbers is £170 million and the VAT fraction on that (at 7/47) amounts to £25 million.¹⁵

Income tax

5.25 We calculated above a gross employment increase of 895 jobs. At this stage we do not know what average earnings are sector by sector, but we assume that, overall, the incremental jobs achieved are remunerated at slightly above the national average wage of £25,000. The UK Film Council Statistical Yearbook 2008 includes a table (Table 19.10) of the income distribution of those working in the feature film sector. The average of these incomes amounts to approximately £27,500 and we used that as a proxy for average salaries in the other sectors considered here. Individual tax liabilities vary greatly, of course, but we assume for the sake of simplicity that the average tax allowance is £5,000, giving average taxable income of £22,500, and that income tax at 22 per cent is payable on that. This amounts to £4,950 per person, and 895 jobs at that tax contribution produce additional income tax of £4.4 million.

¹⁴ According to Ipsos, the remaining 47 per cent of illegal file-shares are replaced by other forms of viewing that are free to the viewer and therefore do not attract VAT. Some 17 per cent would not be replaced at all, i.e. those viewers would find something else altogether to do.

¹⁵ We are aware that the VAT rate will drop to 15 per cent on December 1st 2008 but will revert to 17.5 per cent on January 1st 2010. Since this study is intended to be longer-term in its perspective, we have used the 17.5 per cent rate throughout. Tax and NI changes are also due to take place, but not until 2011, so for these too we use current rates.

National Insurance contributions

5.26 These are paid by employers and employees. Employers pay at 12.8 per cent of employee income, i.e. £3,520 per person per annum on an average of £27,500. Employees pay 11 per cent on earnings above £90 per week (£4,680 per annum) up to earnings of £770 per week (£40,040 per annum) so employees on £27,500 per annum would pay 11 per cent of £27,500 minus £4,680, which amounts to £2,510. The Government would thus receive £3,520 plus £2,510 per additional job per annum, which amounts to £5.4 million.

Summary of tax effects

5.27 The total increased tax revenue to Government is thus £2.1 million of corporation tax, plus £25 million of VAT, plus £4.4 million of income tax plus £5.4 million of National Insurance contributions. The total is £36.9 million.

Music

Revenue effects of reducing music piracy

5.28 Because we did not have for music an equivalent to the Ipsos survey, we had to aggregate information from a variety of sources, principally the British Phonographic Industry (BPI) Yearbooks, among which the 2006 edition uses a TNS survey, and the EMR survey already referred to.

5.29 EMR reported that 29 per cent of respondents in its survey had file-shared unauthorised music, while the TNS survey reported in the BPI Yearbook 2006 found that 15 per cent of respondents had downloaded music from an illegal source.

5.30 In order not to exaggerate the estimated effects of reducing piracy, we chose to take TNS' more conservative finding of 15 per cent and apply that to the population.¹⁶ Since TNS' survey was confined to 12-74 year olds, we subtract the population aged under 12 and over 74 as at 2005 before extrapolating to the remaining population.¹⁷ Official population data from the Office for National Statistics records that the 12-74 inclusive population in the UK in 2005 was approximately 48 million. If 15 per cent of 48 million were engaged in some form of piracy, this would equate to 7 million people.

5.31 We know from the Ipsos survey that 45 per cent of those who bought counterfeit CDs would have bought the original if counterfeits had not been available. We have no evidence to suggest that consumers' switching behaviour in relation to file-sharing would be any different, so we assume that 45 per cent would switch to legitimate downloads or

¹⁶ The TNS survey seems to us more representative of the population and it is more closely focused on piracy.

¹⁷ Whilst it is plausible that children under 12 engage in file sharing, it is equally plausible that older people do not. For the sake of simplicity we have assumed that each group roughly cancels the other out.

other forms of purchase. This implies around 3 million people in the UK who would switch to legitimate purchases if file-sharing were not available.

- 5.32 In order to calculate an annual gain to the music industry from the elimination of unauthorised downloading, we need (a) the average number of tracks downloaded per person annually; and (b) the average price of a legitimate track purchase.
- 5.33 The TNS survey reported a distribution for the number of tracks file-shared in the month before the survey.¹⁸ The weighted average suggests that the average person surveyed downloaded 12 unauthorised tracks per month, which translates to 144 tracks per year.
- 5.34 On this basis the complete elimination of P2P file sharing would result in 430 million extra tracks sold per year (144 times 3 million). At an average price per track of £0.99, this implies an estimated annual revenue gain of £425 million from the complete elimination of unauthorised file sharing of music.¹⁹
- 5.35 However, this could be an over-estimate. It seems to us likely that at least some, and possibly many, of the 45 per cent of consumers that switch to legitimate downloads would reduce the number of tracks they buy. If we hypothesise (say) 100 tracks rather than 144, the annual gain to the industry from the elimination of file-sharing would be £297 million.
- 5.36 We therefore used the figure of £297 million as input to the I-O Tables already referred to. As with film and TV, we categorised the music industry as a part of the wholesale and retail trade sector.
- 5.37 The I-O Tables show that indirect effects within the wholesale and retail trade and other sectors of the economy bring the total effects of an elimination of illegal P2P file sharing of unauthorised music content to £512 million – an additional £215 million.
- 5.38 As with film and TV we next factor in the multiplier effect. Multiplying the £512 million by the standard multiplier factor of 1.1 implies a total gain to the UK economy of £562 million – again, almost double the starting point.

Employment effects

- 5.39 According to the I-O Tables, an additional £512 million of revenue in the economy generates a gross total (as previously explained) of 3,745 new jobs, with almost 1,900 jobs arising in the wholesale and retail trade sector.

¹⁸ BPI Statistical Handbook 2006

¹⁹ £0.99 is the standard price of downloading a track from iTunes, which we understand has a 70 per cent market share in legal downloads.

Summary of revenue and employment effects

- 5.40 To summarise then, we estimate that the complete elimination of illegal P2P file-sharing of music content (namely tracks) will produce revenue benefits to the music industry of £297 million per annum, benefits to the wider economy of £562 million per annum, and an employment increase (gross) of 3,745 jobs.
- 5.41 We emphasise that, as with all impact assessments based on the I-O tables, the results presented here are approximate.

Tax effects

- 5.42 We now calculate the tax effects in the same way as we did for films and TV.

Corporation tax

- 5.43 We base our Corporation Tax estimate on the assumption that £297 million revenue would produce a net taxable profit increase of 10 per cent – say £30 million. With an average 30 per cent rate of tax, the additional revenue accruing to the government equates to £9 million.

VAT

- 5.44 In order to calculate additional VAT, we need to start with the volume of tracks that would be purchased legally following the elimination of this form of piracy. We assumed earlier that the 3 million people who switch to downloading legitimately would purchase an average of 100 tracks per year, such that the increase in volumes purchased would be 300 million. With an assumed price, inclusive of VAT, of £0.99, the VAT included in each unit is £0.147. Multiplying by the number of new sales by 14.7p per unit gives an additional £44 million in VAT revenues.

Income tax

- 5.45 Our earlier calculations estimated an average net employment increase of 3,745 jobs gross. Although around half of these will be in the music industry, the rest will arise across other sectors. Therefore, as for film and TV, we use an assumed average wage of £27,500 for our calculations.
- 5.46 For simplicity's sake we assume that each of these 3,745 employees has a taxable income of £22,500 (i.e. £27,500 less a personal tax allowance of £5,000, as used before) and that tax is paid at 22 per cent. This amounts to £4,950 per person, and 3,745 jobs at that tax contribution produce additional income tax of £18.5 million.

National insurance contributions

- 5.47 Employers pay at 12.8 per cent of employee income, i.e. £3,520 per person per annum. Employees pay 11 per cent on earnings £4,680 per annum up to earnings of £40,040 per annum so employees on £27,500 per annum would pay 11 per cent on £27,500 minus

£4,680 so £2,510. The Government would thus receive total NI contributions of £6,030 per job which amounts to a total of £22.6 million per annum.

Summary of tax effects

5.48 Our tax calculations indicate total increased tax revenues to the Government of £94 million, derived from £9 million of corporation tax, £44 million of VAT, £18.5 million of income tax, and £22.6 million of National Insurance contributions.

Software

5.49 As we pointed out in Section 4 of this report, our primary information source relating to software piracy (i.e. that published by BSA based on research by IDC) does not follow the same format, or provide equivalent content, to that which we were able to use for film and TV.

Revenue effects

5.50 The BSA/IDC 2007 Global Piracy Study records a UK rate of 27 per cent for software copyright theft (that is to say, from all forms of “piracy”), which it calculates as equivalent to an industry revenue loss of US\$1.837 billion. The sterling equivalent of this dollar figure has, of course, fluctuated greatly since IDC carried out its research. At that time of the research the sterling figure would have been almost exactly £1 billion, and that is the figure we use for our own calculations.²⁰

5.51 However, IDC assumes a far more modest rate of reduction in UK software copyright theft than the 75 per cent we were asked to assume for film and TV. Rather, IDC assumes an even annual reduction in the UK piracy rate from 27 per cent to 17 per cent over the five years 2007 to 2011. This is effectively a reduction of 37 per cent, not 75 per cent – and a gradual, not an instant reduction. We do not know from the reports why IDC chose this figure, but, because it is quite modest in context, we are happy to take it as realistic.

5.52 In our calculations we therefore take 37 per cent of £1 billion, i.e. £370 million, as input to the I-O Tables.

5.53 An additional revenue of £370 million produces a whole-economy revenue impact of £638 million, i.e. an additional £268 million. To the figure of £638 million we must add an allowance for induced effects of 10 per cent, making a total of £702 million.

5.54 The I-O Tables calculate a gross employment impact of 4,665 jobs. We have already explained why we have not explicitly applied the re-absorption factor here.

²⁰ The value of sterling against the dollar has fallen sharply since the IDC research, and at a current notional rate of \$1.45 = £1, the figure of \$1.837 billion would now be £1.27 billion. It seems to us likely that, for a UK study, IDC would have started with sterling estimates and then converted them to dollars, rather than the other way round.

- 5.55 However, because the IDC studies do not break down the different forms of piracy applied to software, these estimated employment gains probably do not represent the benefit only of reducing P2P file sharing (the sole method we were asked to consider). It seems to us unlikely, for technical reasons²¹, that streaming will be relevant to pirating software, and (therefore) that the commonest forms of piracy applied will be (a) file sharing by downloading and (b) the sharing of CD-ROMs among friends and relatives. That said, we have no information as to the mix of (a) and (b).
- 5.56 We found one reference by Symantec, the anti-virus software producer, to the effect that P2P file sharing, and the swapping of CD-ROMs might account for equal proportions of piracy of its software in the US, but it did not seem to us that we could simply transpose that assessment across to all software piracy in the UK.²² It must nevertheless follow that confining the calculations to electronic P2P file sharing would produce a smaller number of new jobs than the 4,665 calculated above.

Summary of revenue and employment effects

- 5.57 If the UK revenue losses from software copyright theft are currently running at approximately £1 billion, then, on the assumed reduction of 37 per cent, the benefits would be an overall revenue gain of some £700 million to the UK economy, and a gross increase of 4,665 jobs.

Tax effects

- 5.58 If the revenue recovery of £370 million produced a 10 per cent increase in taxable profits to the UK industry (the same percentage that we used for films, TV and music) the UK government would gain roughly 30 per cent of £37 million in Corporation Tax, i.e. £11 million.
- 5.59 If the 4,665 jobs were remunerated at the same average rate as for the film, TV and music sectors, the increased income tax accruing to the UK government would be £23.1 million, and the increased NI contributions by employers and employees combined would be £28.1 million.
- 5.60 We cannot attempt complete detailed VAT calculations from IDC's study because we are not told how many software units, at what average price, would result. However, we can estimate, in very round terms, that if increased revenue in the music sector produced increased VAT of £44 million, the increased VAT arising from the software sector could be £44 million multiplied by 370/297, i.e. roughly £55 million.

²¹ We assume that consumers who pirate software want to save it on their PCs for repeat use, in which case streaming has no merit.
²² See the New York Times, January 19th 2004:
<http://query.nytimes.com/gst/fullpage.html?res=9C03E5DB1439F93AA25752C0A9629C8B63>

Summary of tax effects

- 5.61 We estimate – tentatively – that the combined tax benefits could amount to £11 million of Corporation Tax, £23.1 million of income tax, £28.1 million of NI contributions, and £55 million of VAT, making a total of £117.2 million.

6 IMPACTS OF REDUCING ILLEGAL P2P FILE-SHARING BY 75 PER CENT

- 6.1 This section adjusts the calculations carried out in Section 5 solely to allow for a reduction of 75 per cent in (not the complete elimination of) illegal P2P file-sharing in films, TV and music. The calculations in relation to software are entirely unchanged.

Film and TV

Revenue and employment effects

- 6.2 The additional revenue available to the industry as calculated in Section 5 (i.e. for the complete elimination of illegal P2P file-sharing) is £71 million, and 75 per cent of that is £53 million.
- 6.3 The I-O Tables tell us that the economic effect of adding £53 million of revenue to the industry is £91 million, i.e. an additional £38 million.
- 6.4 We must add “induced effects”, and a normal figure of 1.1 is again used. Ten per cent of £91 million is £9 million so the total economic impact comes to £100 million.
- 6.5 For an additional £53 million of revenue in the Wholesale and Retail Trade sector, the I-O Tables indicate a gross increase of 335 jobs in that sector, and for the whole economy a gross increase of 668 jobs (including the 335). The comments we made in Section 5 about the adjustment from gross to net employment impacts need to be read across to this Section too.
- 6.6 In summary, then, we estimate that a 75 per cent reduction in the piracy of film and TV material by P2P file sharing will produce revenue benefits to the industry of £53 million per annum, benefits to the wider economy of £100 million per annum, and a gross employment increase of 668 jobs.

Tax effects

Corporation tax

- 6.7 In relation to corporation tax, our assumption is (as before) that the additional £53 million revenue calculated above produces a net taxable profit increase of £5.3 million. In very round terms, corporation tax at 30 per cent on £5.3 million is £1.8 million.

VAT

- 6.8 In relation to VAT, our starting point is the 52 million film downloads (presumably all attributable to P2P file sharing) that Ipsos calculates from its survey. If such downloading is reduced by the assumed figure of 75 per cent (giving 39 million), then 39 million unlawful downloads would in theory become legitimate purchases of one sort or another.

- 6.9 If we use the same price assumptions for legitimate purchases as in Section 5, the total incremental revenue earned amounts to £128 million and the VAT fraction on that (at 7/47) amounts to £19 million.

Income tax

- 6.10 We calculated above a net employment increase of 668 jobs. At £4,950 per person (as in Section 5), 668 jobs produce additional income tax payments to government of £3.3 million.

National Insurance contributions

- 6.11 At £6,030 per job, i.e. the contributions of employers and employees combined, 668 jobs produce additional contributions of £4.2 million.

Summary of tax effects

- 6.12 The increased tax revenue to Government is thus £1.8 million of corporation tax, £19 million of VAT, £3.3 million of income tax and £4.2 million of National Insurance contributions. The total is £28.3 million.

Music

Revenue and employment effects

- 6.13 As in Section 5, we hypothesise that users would legitimately purchase 100 tracks per annum and on that basis the industry revenue gain from a 75 per cent reduction in illegal P2P file-sharing would be £223 million.
- 6.14 The I-O Tables show that indirect effects within the wholesale and retail trade and other sectors of the economy bring the total effects of a 75 per cent reduction in file sharing of unauthorised music content to £384 million – an additional £161 million.
- 6.15 Multiplying the £384 million by the standard multiplier factor of 1.1 to estimate the induced effects implies a total gain to the UK economy of £420 million.
- 6.16 According to the I-O Tables, an additional £384 million of revenue in the economy generates a gross total of roughly 2,800 new jobs, with 1,400 jobs arising in the wholesale and retail trade sector.
- 6.17 To summarise, we estimate that a 75 per cent reduction in the illegal file-sharing of music content (namely tracks) by P2P file sharing will produce revenue benefits to the music industry of £223 million per annum, benefits to the wider economy of £420 million per annum, and a gross employment increase of 2,800 jobs.

Tax effects

- 6.18 We now calculate the tax effects in the same way as for films and TV.

Corporation tax

- 6.19 We assume that £223 million revenue would produce a net taxable profit increase of 10 per cent – £22.3 million. With an average 30 per cent rate of tax, the additional revenue accruing to the government equates to £6.7 million.

VAT

- 6.20 We assumed earlier that the 3 million people who switch to downloading legitimately would purchase an average of 100 tracks per year, such that the increase in volumes purchased would be 300 million. With an assumed price, inclusive of VAT, of £0.99, the VAT implicit in each unit is £0.147. Multiplying by the number of new sales by 14.7p per unit gives an additional £44 million in VAT revenues.

Income tax

- 6.21 The I-O table suggest a gross employment increase of 2,800 jobs. As for film and TV, we use an assumed average wage of £27,500 for our calculations.
- 6.22 For simplicity's sake we assume, as before, that each one of these 2,800 gives rise to an income tax contribution of £4,950 per person, and 2,800 jobs at that tax contribution produce additional income tax of £13.9 million.

National insurance contributions

- 6.23 NI contributions amount to £6,030 per job per annum which for 2,800 jobs makes an incremental revenue to government of £17 million.
- 6.24 Our calculations thus indicate total increased tax revenues to the Government of £81.6 million, derived from £6.7 million of corporation tax, £44 million of VAT, £13.9 million of income tax, and £17 million of National Insurance contributions.

Software

- 6.25 As already explained, we do not adjust the results of the BSA/IDC study in this section of our report. The study assumes a reduction from 27 per cent to 17 per cent in the UK software piracy rate, taking all forms of piracy (not just illegal P2P file-sharing) into account.
- 6.26 To recap briefly, the revenue effects are estimated at £702 million per annum, with the creation of an additional 4,665 jobs at the gross level.
- 6.27 The total tax effects are estimated at £117 million per annum.

7 AGGREGATED IMPACTS

7.1 Table 7.1 shows the aggregated impacts arising from the elimination of P2P file-sharing in films, TV and music, and of an average reduction from 27 per cent to 17 per cent across all forms of software piracy.

Table 7.1: Summary of impacts of the complete elimination of illegal P2P file-sharing

	Direct Revenue Increase (£m)	Whole Economy Revenue Increase (£m)	Gross Employment Increase (jobs)	Tax Revenue Increase (£m)
Films and TV	71	135	895	37
Music	297	562	3,745	94
Software	370	702	4,665	117
Total	738	1,399	9,305	248

7.2 Table 7.2 shows the impacts of reductions of 75 per cent in the illegal P2P file-sharing of film, TV and music. In software the same average reduction as in Table 7.1 is used (i.e. from 27 per cent to 17 per cent across all forms of piracy).

Table 7.2: Summary of impacts of a 75 per cent reduction

	Direct Revenue Increase (£m)	Whole Economy Revenue Increase (£m)	Gross Employment Increase (jobs)	Tax Revenue Increase (£m)
Films and TV	53	100	668	28
Music	223	420	2,800	82
Software	370	702	4,665	117
Total	646	1,222	8,133	227

7.3 We emphasise again that, for reasons given earlier, the employment increases shown are gross, before the application of a re-absorption factor.

7.4 It should also be noted that the impacts in each of the three sectors are derived from different sources, each of which used different methods. The aggregation is therefore to be regarded as no more than a reasonable approximation of the total effects.

The impact on employment of growth in recovered revenue

7.5 We were asked finally to assess the gross employment impacts of a 7 per cent annual increase over three years in the incremental revenues to film and TV and to music (not to software because the BSA/IDC study which we use for the software segment is incorporated intact).

Aggregated impacts

- 7.6 At a compound increase of 7 per cent, the incremental revenue to film and TV becomes £87 million after three years (£71 million times 1.07^3). The employment impact of this additional £87 million is 1,096 jobs gross.
- 7.7 At a compound increase of the same 7 per cent per annum, the incremental revenue to music becomes £364 million (£297 million times 1.07^3). The employment impact of this additional £364 million is 4,587 jobs gross.
- 7.8 Assuming that the software employment impact remained constant at 4,665, the total of jobs added after three years of growth at 7 per cent per annum would thus be 10,348 gross.

APPENDIX 1: INPUT-OUTPUT TABLES

In this Appendix we set out first the Input-Output Tables in their raw state, i.e. with no revenue entry in any of the sectors listed.

Table A1.1 below lists the sectors that the I-O Tables use.

Table A1.1 Direct Impact

	Output (mils. £)
Agriculture	0.00
Mining and quarrying	0.00
Manufacturing	0.00
Electricity, gas and water supply	0.00
Construction	0.00
Wholesale & retail trade	0.00
Transport and communication	0.00
Financial intermediation	0.00
Public administration	0.00
Education, health and social work	0.00
Other services	0.00

Table A1.2, on the next page, shows the coefficients that are applied to one or more starting figures entered in Table A1.1. These coefficients are used to calculate an output (in revenue terms) in each of the sectors, and the details and totals are then set out in Table A1.3. Because we have no entry in Table A1.1, Table A1.3 would be blank, so we have not included it.

Note that table A1.2 is entitled “The Leontif Inverse Table”. The title refers to Professor Wassily Leontif of Harvard University, a Nobel Laureate who is credited with originating Input-Output Tables.

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Appendix 1: Input-output tables

Table A1.2: Leontif Inverse Table (Type I)

Product	Product group										
	1 Agriculture [1-3]	2 Mining and quarrying [4-7]	3 Manufac- turing [8-84]	4 Electricity, Gas and water supply [85-87]	5 Construc- tion [88]	6 Wholesale and retail trade [89-92]	7 Transport and com- munication [93-99]	8 Financial intermed- iation [100-114]	9 Public adminis- tration [115]	10 Education, health and social work [116-118]	11 Other services [119-123]
Agriculture	1.138	0.005	0.051	0.004	0.011	0.016	0.006	0.004	0.005	0.007	0.007
Mining and quarrying	0.009	1.061	0.028	0.211	0.018	0.008	0.008	0.005	0.006	0.005	0.005
Manufacturing	0.302	0.125	1.355	0.110	0.280	0.173	0.125	0.087	0.120	0.103	0.120
Electricity, gas and water supply	0.026	0.024	0.037	1.462	0.020	0.020	0.018	0.012	0.019	0.017	0.014
Construction	0.021	0.068	0.014	0.028	1.341	0.019	0.018	0.046	0.072	0.010	0.017
Wholesale & retail trade	0.091	0.030	0.085	0.031	0.055	1.052	0.046	0.029	0.030	0.027	0.033
Transport and communication	0.053	0.063	0.073	0.039	0.059	0.163	1.244	0.102	0.061	0.049	0.079
Financial intermediation	0.161	0.195	0.185	0.160	0.275	0.251	0.237	1.304	0.153	0.112	0.245
Public administration	0.002	0.002	0.001	0.001	0.002	0.002	0.003	0.007	1.001	0.001	0.002
Education, health and social work	0.013	0.003	0.007	0.006	0.007	0.008	0.011	0.013	0.025	1.055	0.021
Other services	0.019	0.007	0.013	0.007	0.008	0.011	0.013	0.015	0.019	0.015	1.139
Total	1.836	1.584	1.849	2.060	2.075	1.724	1.729	1.624	1.511	1.400	1.681

Table A1.4 sets out the employment coefficients. The revenue figure input to table A1.1 is multiplied by these coefficients to produce an employment calculation.

Table A1.4: Employment coefficients

Sector	Turnover (£mil)	Employment ('000)	Empl. per mil turnover
Agriculture, hunting and forestry	3,054	73	23.90
Fishing	976	12	12.30
Mining and quarrying	30,902	70	2.27
Manufacturing	447,178	3,534	7.90
Electricity, gas and water supply	47,651	122	2.56
Construction	152,403	1,323	8.68
Wholesale & retail trade	822,221	4,941	6.01
Hotels and restaurants	54,469	1,881	34.53
Transport, storage and communication	189,722	1,600	8.43
Real estate, renting and business activities	293,824	4,371	14.88
Education	17,116	3,163	184.80
Health and social work	18,533	998	53.85
Other community, social and personal service industries	102,131	1,347	13.19
Average employee per mil turnover	2,180,180	23,435	10.75

Table A1.5 then shows the calculated revenue and employment impacts. Because we have a zero entry in Table A1.1, the results are all zero.

Table A1.5: Output and Employment Effects

	Output (£mil)	Employment
Agriculture	0.000	0
Mining and quarrying	0.000	0
Manufacturing	0.000	0
Electricity, gas and water supply	0.000	0
Construction	0.000	0
Wholesale & retail trade	0.000	0
Transport and communication	0.000	0
Financial intermediation	0.000	
Public administration	0.000	
Education, health and social work	0.000	
Other services	0.000	
	0.000	0
Output that no emp effects are computed for	0.000	
Employment effect for these based on avg.		0
Total	0.000	0

We now show Tables A1.1 and A1.5 for each of the categories of pirated material that our report covers, and for films, TV and music the 100 per cent and 75 per cent reduction scenarios.

Film and TV

The 100 per cent scenario

Here we use a revenue input of £71 million, as explained in paragraph 5.7.

Table A1.1 Direct Impact

	Output (mils. £)	
Agriculture	0.00	
Mining and quarrying	0.00	
Manufacturing	0.00	
Electricity, gas and water supply	0.00	
Construction	0.00	
Wholesale & retail trade	71.00	from para. 5.7
Transport and communication	0.00	
Financial intermediation	0.00	
Public administration	0.00	
Education, health and social work	0.00	
Other services	0.00	

Table A1.5: Output and Employment Effects

	Output (£mil)	Employment
Agriculture	1.144	27
Mining and quarrying	0.571	1
Manufacturing	12.307	97
Electricity, gas and water supply	1.450	4
Construction	1.342	12
Wholesale & retail trade	74.707	449
Transport and communication	11.563	98
Financial intermediation	17.854	
Public administration	0.119	
Education, health and social work	0.584	
Other services	0.747	
	103.084	688
Output that no emp effects are computed for	19.304	
Employment effect for these based on avg.		207
Total	122.387	895

The 75 per cent scenario

Here we use a revenue input of £53 million, as explained in paragraph 6.2.

Table A1.1 Direct Impact

	Output (mils. £)	
Agriculture	0.00	
Mining and quarrying	0.00	
Manufacturing	0.00	
Electricity, gas and water supply	0.00	
Construction	0.00	
Wholesale & retail trade	53.00	from para. 6.2
Transport and communication	0.00	
Financial intermediation	0.00	
Public administration	0.00	
Education, health and social work	0.00	
Other services	0.00	

Table A1.5: Output and Employment Effects

	Output (£mil)	Employment
Agriculture	0.854	20
Mining and quarrying	0.426	1
Manufacturing	9.187	73
Electricity, gas and water supply	1.082	3
Construction	1.002	9
Wholesale & retail trade	55.767	335
Transport and communication	8.632	73
Financial intermediation	13.328	
Public administration	0.089	
Education, health and social work	0.436	
Other services	0.558	
	76.950	513
Output that no emp effects are computed for	14.410	
Employment effect for these based on avg.		155
Total	91.360	668

Music

The 100 per cent scenario

Here we use a revenue input of £297 million, as explained in paragraph 5.35.

Table A1.1 Direct Impact

	Output (mils. £)	
Agriculture	0.00	
Mining and quarrying	0.00	
Manufacturing	0.00	
Electricity, gas and water supply	0.00	
Construction	0.00	
Wholesale & retail trade	297.00	from para. 5.35
Transport and communication	0.00	
Financial intermediation	0.00	
Public administration	0.00	
Education, health and social work	0.00	
Other services	0.00	

Table A1.5: Output and Employment Effects

	Output (£mil)	Employment
Agriculture	4.785	114
Mining and quarrying	2.387	5
Manufacturing	51.481	407
Electricity, gas and water supply	6.066	16
Construction	5.613	49
Wholesale & retail trade	312.506	1,878
Transport and communication	48.370	408
Financial intermediation	74.686	
Public administration	0.497	
Education, health and social work	2.443	
Other services	3.125	
	431.208	2,877
Output that no emp effects are computed for	80.750	
Employment effect for these based on avg.		868
Total	511.959	3,745

The 75 per cent scenario

Here we use a revenue input of £223 million, as explained in paragraph 6.13.

Table A1.1 Direct Impact

	Output (mils. £)	
Agriculture	0.00	
Mining and quarrying	0.00	
Manufacturing	0.00	
Electricity, gas and water supply	0.00	
Construction	0.00	
Wholesale & retail trade	223.00	from para. 6.13
Transport and communication	0.00	
Financial intermediation	0.00	
Public administration	0.00	
Education, health and social work	0.00	
Other services	0.00	

Table A1.5: Output and Employment Effects

	Output (£mil)	Employment
Agriculture	3.593	86
Mining and quarrying	1.793	4
Manufacturing	38.654	305
Electricity, gas and water supply	4.554	12
Construction	4.214	37
Wholesale & retail trade	234.643	1,410
Transport and communication	36.318	306
Financial intermediation	56.077	
Public administration	0.373	
Education, health and social work	1.834	
Other services	2.346	
	323.769	2,160
Output that no emp effects are computed for	60.631	
Employment effect for these based on avg.		652
Total	384.400	2,812

Software

Note: only one scenario used

The revenue input of £370 million is explained in paragraphs 5.50 to 5.52.

Table A1.1 Direct Impact

	Output (mils. £)	
Agriculture	0.00	
Mining and quarrying	0.00	
Manufacturing	0.00	
Electricity, gas and water supply	0.00	
Construction	0.00	
Wholesale & retail trade	370.00	from paras. 5.50-5.52
Transport and communication	0.00	
Financial intermediation	0.00	
Public administration	0.00	
Education, health and social work	0.00	
Other services	0.00	

Table A1.5: Output and Employment Effects

	Output (£mil)	Employment
Agriculture	5.962	142
Mining and quarrying	2.974	7
Manufacturing	64.135	507
Electricity, gas and water supply	7.556	19
Construction	6.992	61
Wholesale & retail trade	389.317	2,340
Transport and communication	60.259	508
Financial intermediation	93.043	
Public administration	0.619	
Education, health and social work	3.043	
Other services	3.893	
	537.196	3,584
Output that no emp effects are computed for	100.598	
Employment effect for these based on avg.		1,081
Total	637.794	4,665