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Joost Poort

Empirical Evidence for Policy in Telecommunication, Copyright & Broadcasting

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Contents

Abstract

This dissertation contains nine articles with an empirical focus in copyright, telecommunication, and broadcasting. These articles address different research questions and employ a variety of methodological approaches. They all share an economic foundation and the aim to contribute to evidence based policymaking in the field of information law.

Topics covered range from the welfare effects of illegal downloading, to those of public television; from the effectiveness of blocking access to The Pirate Bay to stop consumers from illegal downloading, to the effect of adequate legal online services on illegal downloading; from fixed price regulation for e-books, to text and video relay services to enable the hearing impaired to use telephony services; from the valuation of commercial radio licenses, to setting renewal fees for telecommunication spectrum based on an auction.

Using these nine articles as case studies, the role and impact of economic evidence for policymaking in the field of information law is investigated. It is concluded that this role is positive rather than normative: legal or social norms maintain the upper hand as guiding principles for policy, more than the economic goal of welfare maximization. However, this does not by any means render economic analysis useless. Increasingly, politicians, judges and stakeholders require economic analysis and economic evidence to make informed decisions about new policy measures, to make optimal decisions within existing legal boundaries and to fathom the consequences of proposed legal interventions. Without empirical evidence they may simply assume the effects of a policy measure as an article of faith.

Samenvatting

Dit proefschrift bevat negen artikelen met een empirische inslag op het gebied van het auteursrecht, telecommunicatie, radio en televisie. Deze artikelen adresseren uiteenlopende onderzoeksvragen met verschillende onderzoeksmethodes. Ze delen een economische grondslag en het oogmerk een bijdrage te leveren aan op feiten gebaseerd – '*evidence based*' – beleid in het informatierecht.

De onderwerpen lopen uiteen van de welvaartseffecten van illegaal downloaden, tot die van de publieke omroep; van de effectiviteit van het afsluiten van de toegang tot *The Pirate Bay* om consumenten ervan te weerhouden illegaal te downloaden, tot het effect van adequate legale online diensten op dat downloaden; van een vaste prijs voor e-boeken, tot tekst- en videobemiddelingsdiensten om mensen met een auditieve beperking in staat te stellen te telefoneren; van de waardering van commerciële radiovergunningen, tot het vaststellen van verlengingsvergoedingen voor telecommunicatiespectrum op basis van een veiling.

Door deze negen artikelen te gebruiken als casestudies, is de rol en invloed van economisch bewijsmateriaal voor de beleidsontwikkeling in het informatierecht onderzocht. Geconcludeerd wordt dat deze rol veeleer positief dan normatief is: meer dan het economische doel van welvaartsmaximalisatie, voeren wettelijke en maatschappelijke normen de boventoon als beginselen voor beleid. Maar dit maakt economische analyse allerminst overbodig. Steeds vaker hebben politici, rechters en belanghebbenden economische analyse en economisch bewijsmateriaal nodig om geïnformeerde beslissingen te nemen over nieuwe beleidsmaatregelen, om optimale beslissingen te nemen binnen bestaande juridische kaders en om de gevolgen van voorgestelde maatregelen te doorgronden. Zonder empirisch bewijsmateriaal zouden zij de effecten van een beleidsmaatregel simpelweg als geloofsartikel kunnen veronderstellen.

1 Introduction

The legal and economic disciplines are distinct in terms of methodology and scientific approach. In large measure this stems from different objectives. Economics is a positive science, while law is essentially normative. Yet the mixture of the two is appealing and exciting and gives way to a completely new discipline.

(Harrison & Theeuwes, 2008, p. xxi)

1. Overarching research question

There is no unanimously accepted definition of economics. In a discussion of the definition of economics over the ages, Backhouse & Medema (2009) state that "perhaps the most common currently accepted definition" is that by Lionel Robbins: "Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses." (Robbins, 1932, p. 16).[1]

This definition suggests that economics is a *descriptive* or *positive* science, which studies how humans *do* behave facing scarcity, rather than a *prescriptive* or *normative* science, which studies how they *should* behave.[2] Likewise, the field of 'law and economics', described by Ogus (2004, p. 384) as "the application of economic methodology to predict the impact of law and legal institutions on behaviour", is a positive endeavour. The quote from Harrison and Theeuwes above, in which they contrast economics with law, also stresses the fact that economics is a positive science.

Or is it? A few pages further on, Harrison and Theeuwes write: "Economics is about allocating scarce resources, whereas law seems to be about resolving disputes in ways that are fair and just." (Harrison & Theeuwes, 2008, p. 3). In

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[1] Note that Robbins's definition has been criticized both for being too narrow and for being too broad. Other definitions typically focus on wealth, decision-making, or rationality. Probably the most pragmatic definition is attributed to Jacob Viner in the 1930s: "Economics is what economists do" (Backhouse & Medema, 2009).

[2] Apart from the way in which the dichotomy positive-normative is used here, the economic practice may be considered normative by some when it puts a monetary value on non-economic goods such as heritage, privacy, or even a human life. Yet, in economics such values are typically derived from the choices people make when buying a house in a monumental district, when using free but privacy-intrusive apps on their smartphone, or when accepting a dangerous job. However technocratic or even cynical this may seem, it is ultimately a positive, descriptive endeavour. Only when the outcome of such valuations is used to decide what ought to happen – e.g. not to supply a medicine which is more costly than the human life it saves or the time it buys – does the analysis become normative as the concept is used here.

this allocation of scarce resources, *efficiency* is a central concept. Some allocations are better than others in fulfilling our virtually unlimited desires. Economists use the concept of *Pareto efficiency*[3] to describe a situation in which no alternative allocation of resources will make one or more individuals better off in terms of their welfare or utility, while making no one worse off. Accordingly, a *Pareto improvement* is a change in the allocation of resources which brings it closer to *Pareto efficiency*, and a *potential Pareto improvement* is a change which *could* lead to a Pareto improvement if the winners were to compensate the losers. Such a change is also referred to as *Kaldor-Hicks efficient*.[4] It is easy to see that Kaldor-Hicks efficiency is a much less strict criterion than Pareto efficiency: is does not require the actual compensation of those who stand to lose. It may seem a small step to apply these efficiency concepts normatively: Is it not almost implied by the words 'better off' that this is something that individuals and policymakers *should* strive for? Indeed, in welfare economics efficiency or wealth maximization may be considered to be a goal for decisions or policies and a criterion to evaluate them by. Richard Posner is famous for developing this normative position on wealth maximization and for giving the field of law and economics a normative agenda (Ogus, 2004). By linking wealth maximization to consent, he argues that the former is a 'moral principle' (Posner, 1981, pp. 69, 88-103): in a free market without 'third party effects', agents would consent to any wealth maximizing transaction. However, as Posner argues, this ethical justification of wealth maximization is limited by distributional issues (Posner, 1980, pp. 499-500).

Although the normative position on wealth maximization advocated by Posner has been criticized by many, particularly legal scholars (e.g. Dworkin, 1980; Schmalbeck, 1983) for various reasons (see Mackaay, 2000, pp. 77-80 for a discussion), it has been very influential. In their publication *De Calculus van het publieke belang*, which has had much influence on policymaking in the Netherlands over the last decade, the economists Teulings, Bovenberg & van Dalen (2003, pp. 10-14) argue along similar lines that ultimately, there are only two goals for public policymaking: efficiency and distributional issues. Ideally, these should be decided on independently. A few years earlier, the Dutch Scientific Council of Government Policy had identified five separate principles for good governance: *democratic legitimation, equality before the law*, *legal certainty, effectiveness* and *efficiency* (WRR, 2000, pp. 27-

[3] This concept is named after the Italian economist Vilfredo Pareto (1848-1923).
[4] This concept is named after the British economists Nicolas Kaldor (1908-1986) and John Hicks (1904-1989).

28). In response, Teulings *et al*. (2003, pp. 10-11), argue that effectiveness is not fundamentally distinct from efficiency, while they consider the first three principles to be procedural criteria, which are not goals in themselves but means to achieve the public interests of efficiency and an acceptable distribution of welfare.

Thus, the normative approach to welfare economics has only one ultimate criterion to evaluate a project or policy by, namely efficiency. Meanwhile it recognizes that distributional issues can be a legitimate reason to deviate from the policy which is the most efficient in terms of aggregate welfare. Economics cannot reveal which distribution of welfare is fair, but it can assess the welfare implications of a proposed policy and of redistribution measures. This normative approach to economics has two important implications. First, a free market becomes the default for market design, since perfect markets, which do not suffer from so-called 'market failures', will lead to Pareto efficient outcomes. Following this approach, only market failures or redistribution can justify government interference with free markets. Second, it paves the way for cost-benefit analysis of policy measures and public investment. In this type of analysis, all positive and negative effects of a project are identified, measured, and expressed in monetary terms to enable a comparison of the net effect on social welfare.

In contrast, legal scholars do not have a single criterion to evaluate a policy or change in legislation by. Legal principles, as they are for instance codified in Europe in the *European Convention on Human Rights* and the *Charter of Fundamental Rights of the European Union*, or nationally in constitutions and lower legislation, are manifold and thereby not seldom need balancing. For instance, there is a notorious tension between the right to security (Article 6 of the Charter) and the right to respect for private and family life (Article 7) and the right to protection of personal data (Article 8). And every now and then, the right to freedom of expression may conflict with the prohibition of discrimination (Article 21) or even the protection of human dignity (Article 1). In such cases, legal scholarship entails the balancing of these rights or principles (e.g., see Barendt, 2005, pp. 244-245). Likewise, the field of information law involves the balancing of the underlying basic legal principles of intellectual property, freedom of expression, and privacy (IViR, 2012).

The debate on whether welfare economics is a positive or a normative science is rather old (e.g., see Hennipman, 1992). How can the normative 'monotheistic' position on welfare economics be reconciled with the positive

view on economics expressed in the quote from Harrison and Theeuwes above? In practice, it can be both and economists may take intermediate positions. For instance, economics can study human behaviour or the effects or effectiveness of a policy in a strictly positive way, much like the definitions of 'economics' and 'law and economics' by Robbins and Ogus. Based on this, however, economists may provide policy recommendations derived from a normative welfare economic framework. Or they may offer more humble recommendations, conditional on the society's preferences for, or weights of non-economic goods. The latter role is expressed eloquently by Posner in relation to the Exxon Valdez oil spill in 1989: "If the government and the taxpayer and the voter all know – thanks to cost-benefit analysis – that a project under consideration will save 16 sea otters at a cost of $1 million apiece, and the government goes ahead, I would have no basis for criticism' (Posner, 2000, pp. 1157-58).

The next nine chapters of this dissertation present nine economic articles with an empirical focus in the fields of copyright, telecommunication, and broadcasting. As will be sketched in the next section, the underlying industries have experienced disruptive technological and institutional changes since the 1980s. These changes raised numerous new questions for policymakers and the industries themselves, many of which are economic questions or questions that can be addressed with an economic toolset. The nine articles in this dissertation address different research questions and employ a variety of methodological approaches, yet they all share an economic foundation and the aim to contribute to policymaking based on empirical economic evidence.

After these nine chapters, the concluding chapter investigates the role and impact these articles and the underlying policy reports have had on policymaking and court rulings. Is this a normative role, in the sense that based on economic research recommendations are made in relation to what should happen to enhance economic efficiency or social welfare? Or is it a positive role, and if so, what exactly is this role? To the extent that such a conclusion can be based on a limited and diverse sample of cases, it will be argued that in the fields of copyright, telecommunication, and broadcasting, economic analysis hardly ever lives up to the normative ambitions some economists may have. Instead, legal or social norms maintain the upper hand as guiding principles in the cases studied here, and the fields covered are subject to all sorts of government involvement for reasons other than market failure or redistribution.

Yet this does by no means render economic analysis useless in the field of information law. On the contrary: increasingly, policymakers and lawyers require economic analysis and economic evidence to make an informed decision about new policy measures, to make optimal decisions within existing legal boundaries and to fathom the consequences of proposed legal interventions. More so than in the past, it will be argued, are economic analysis and economic evidence requested *and* weighted in these decisions, even though such evidence is not seldom disputed and countered by seemingly opposing evidence. In some cases, the mere fact that economic evidence is collected in the policymaking process can be considered a relevant development which contrasts with the past. Not distorting market competition has become the general default for law and policymaking by EU Member States, as codified in the *Treaty on the Functioning of the European Union.* In a positive role, economics appears to be increasingly successful and inevitable, more so than in a normative role.

2. Institutional and technological change

Up until the last two decades of the 20th century, telecommunications, broadcasting, and copyright have been fairly immune to economic thinking. In the Netherlands, as in most other Western countries, telephony services were provided by bureaucratic, mostly state owned, monopolies that lacked competitive pressures. Likewise, television and radio broadcasts were exclusively provided by publicly financed organisations that were either centralized, or organized by region or by political or religious conviction. Publishers of recorded music, books, and films thrived in a time when copyright, the exclusive *right* to copy works, coincided largely with the exclusive *ability* to make such copies in a satisfactory way.

Telecommunications

Starting in the 1980s, a series of disruptive changes took place. Politically, these are often marked by the premiership of Margaret Thatcher in the United Kingdom (1979-1990) and the simultaneous presidency of Ronald Reagan in the United States (1981-1989), who became soul mates in their efforts to reduce the size and role of government. In his Inaugural Address on 20 January 1981, Ronald Reagan spoke his famous words “government is not the solution to our problem; government is the problem” and during his presidency, many industries were liberalised and privatised. Likewise, Margaret Thatcher reduced the size of the British public sector by more than 50 percent (Feigenbaum et. al. 1999, pp. 115-122) and one of the landmark privatisations in the United Kingdom was that of British Telecom in 1984. A simultaneous development of great significance for the telecommunications

industry in the United States was the breaking up the AT&T monopoly in 1984, which introduced competition for long distance telephony and seven independent regional phone companies, called 'Baby Bells' (Kearney, 1999).

Most EU countries followed the United States and the United Kingdom in the 1990s. A series of directives regulated the gradual liberalisation of telecommunications services and infrastructure in the European Union. This process was completed by the so-called "Full competition in Telecommunication Market Directive" (1996/19/EC), which for most Member States had to be implemented by 1-1-1998. In several countries, splitting up integrated state-owned companies which provided post, telecommunications, and sometimes also banking services, preceded privatization and liberalisation.

For Margaret Thatcher, as for Ronald Reagan, privatization was a matter of conviction rather than the outcome of profound thinking about the pros and cons of public versus private ownership. In her memoirs, Thatcher wrote "in some cases it was a choice between having the ideal circumstances for privatization, which might take years to achieve, and going for a sale within a particular politically determined timescale, the second was the preferable option." (Thatcher, 1993, p. 677).

Apart from political drivers, there are also technological drivers for institutional change in the telecommunications industry. The rise of mobile telephony from the late 1980s weakened the case for a natural monopoly, while technological developments increased the possibility to 'unbundle' infrastructure from services and long-distance networks from local loops. The emergence of the Internet in the 1990s was another disruptive force. It revolutionized communications networks, first as a novel and exciting service on these networks and later as an enabler of convergence of networks and services. This enhanced competition between coaxial cable networks that were traditionally only used for broadcasting television and radio, twisted-paid copper networks that exclusively provided fixed telephony and mobile networks. These developments resulted in an explosive growth of the telecommunications industries. Between 1980 and 2011, the revenues in the OECD telecommunication industry grew at a compound annual growth rate (CAGR) of 7.5%, while investment grew at 4.3% and the total number of access paths at 6.8% per year (OECD, 2013).

These institutional and technological developments raised a whole new set of economic questions. Which parts of the telecommunications

infrastructure and which services are natural monopolies? And how can these be separated from parts that can be supplied competitively? How can the remaining private monopolies be regulated? How can incentives for investment and innovation be reconciled with incentives for cost efficiency and low prices? How can competitive entry be stimulated in those parts of the industry where competition seems viable? How can scarce spectrum for mobile communication be best allocated to competing mobile network operators? How can the accessibility of telecommunication services be safeguarded for consumers in sparsely populated regions, with low incomes or with disabilities? And how can this be reconciled with a competitive market structure? It was primarily after the privatisation of the telecommunication industry and its exposure to competitive pressures that such questions about regulation, the role of government, and the public interests to be safeguarded, were asked.

Broadcasting

Large-scale commercialization in the broadcasting industry took off around the same time as it did in the telecommunication industry, spurred on by the "Television without Frontiers Directive" (89/552/EEC), which entered into force in October 1991. This Directive aimed to ensure the free movement of television broadcasting services within the EU, while preserving public interests such as cultural diversity, consumer protection, and the protection of minors. Since 1989, the number of television channels in Europe exploded from 47 national channels to more than 3,346 mostly commercial channels in 2008 (ACT, 2009).

Just like the privatisation and liberalisation in the telecommunication industry, the boom of commercial television and radio raised a new set of policy questions with an economic angle. Once commercial radio and television started competing with public service broadcasting (PSB)[5], questions about the social and cultural objectives of PSB became more prominent: why are some radio and television channels financed with public money, while others have to earn all their income through advertising or other market-based revenue sources? What consequences should this have for programming restrictions? What sources of income are acceptable for commercial and public channels and to what extent can advertising interfere with the content of programmes? How can economic incentives for PSB be reconciled with the social and cultural objectives? As in telecommunications,

[5] Brown (1996) notes that non-commercial broadcasting is referred to as *public broadcasting* in North America and *Public Service Broadcasting* (PSB) in Europe and Australia.

issues about spectrum allocation – against a background of cultural or social objectives – also arose.

Copyright

The Internet, together with the development of cheap digital technology for copying and producing content, also revolutionized the industries that rely on copyright: the music, film and video industry, and the book publishing industry. Within these industries, disintermediation and user generated content have been key developments. The introduction of cheap technology for producing content combined with the possibility to reach an audience directly on the Internet enables established writers, singer-songwriters, and even documentary makers to do away with studios and publishers, the traditional intermediaries in the copyright industries. Likewise, aspirant writers and performers can bypass traditional selection mechanisms in the industry and have their shot at a potentially worldwide audience through their own websites, social networks or platforms such as YouTube and Flickr. In doing so, they have to compete for attention with amateurs who have no ambition to become professional and just want to share their creations and receive attention.

From the outside, mass copyright infringement through unauthorised file sharing initiated a decrease of revenues from recorded media. This topic is so controversial that even statistics on revenue trends are often disputed (e.g. see Degusta, 2011; Masnick & Ho, 2012, 2013). Market definition is an important driver for such disputes: does it, for instance, make sense to consider the market for recorded music in isolation? Or should one look at the wider revenues for the music industry, including revenue streams from live performances, advertising and texting to vote for candidates in talent shows on television? Or should one take an even broader perspective and look at the entire media or entertainment market? Notwithstanding all disputes over the correct statistics and the subtleties of establishing causality, it is largely undisputed that 1999, the year that the launch of Napster initiated an era of large scale file sharing, was a turning point for revenues from global recorded music sales. Between 1999 and 2010, real revenues from physical and digital recorded music sales are claimed to have declined by 68% in the United States and 54.5% in the rest of the world (Liebowitz, 2013, p. 266). North American real video revenues (exclusive of box office) continued to grow until 2004, then levelled off and declined between 2005 and 2010 (Liebowitz, 2013, p. 265).

Whether – and if so to what extent – file sharing caused this decline in legal sales, has been a hotly debated topic since the turn of the century. In a review of the empirical literature, Smith & Telang (2012) conclude that "the vast majority of the literature […] finds evidence that piracy harms media sales." However, this effect is generally found to be much smaller than a one-to-one displacement of sales by illegal copies and also smaller than the loss of revenues from recorded music and video that the industry has experienced since the late 1990s (Liebowitz, 2013, p. 267). Apart from any sales displacement, digitisation and the option to download or stream from illegal sources emancipated consumers. Like the English Rock band Queen, the public want it all, and they want it now, and if they cannot acquire it from legal sources at the time, format, and price they desire, a substantial amount of people will turn to illegal sources for instant gratification or lose interest altogether.

The industry was thus confronted with economic puzzles it is still struggling to solve: What is the best strategy to deal with unauthorised distribution of copyrighted content on the Internet? To suffer it and focus on legal online models? Or to take arms against a sea of infringers, platforms or intermediaries, and by opposing try to end them? To prevent copying by using technological protection measures? Or to use softer forms of so-called social DRM, which does not preclude copying but helps to identify the original buyers of content? Apart from these questions that are primarily relevant for the copyright industries, a more socially relevant question is what kind of copyright enforcement is effective and acceptably in balance with freedom of expression and privacy. Another question relevant from a societal and cultural perspective is what digitisation and file sharing did to the production and consumption of music, films, series, games and books. It is often argued that the loss of revenues from recorded media and printed books decreases the possibility to invest in new talents and products. It seems only logical that if the revenues from copyrighted works decrease, the incentives to invest in the production of works should fall. Others, however, emphasise that the cost of production and of reaching the public have dropped and new platforms have been developed for supply and demand to meet. The net effect, they argue, is that despite losses for some players in the market, the wider entertainment industries are booming (Masnick & Ho, 2012, 2013).

3. Methodology

The next nine chapters of this dissertation present a series of economic articles that fit into the trends briefly outlined above. All of these are

multidisciplinary and have an empirical approach. They share the objective to contribute to policymaking by providing or analysing empirical economic evidence[6], in concord with the plea by Mackaay (2000, p. 94) that: "Lawyer-economists should only presume to offer policy advice to minister to the ills of society as the discipline acquires solid empirical bearings. (…) The crucial point is for the discipline to engage in empirical work capable of disproving false tenets. Only in this way can we hope to discover what is indisputable in law and economics, and make its message last." At the same time, they are firmly linked with the national and international legal framework, which imposes regulation for economic, cultural, and social reasons. Seven of these chapters have been published (or accepted for publication) in interdisciplinary peer reviewed academic journals. These articles have been included 'as is' and have not been revised for this dissertation. The other two have been submitted to such journals. All nine are linked to policy reports that have, in most cases, been commissioned or co-financed by the Dutch government and in some cases by private companies or PSB associations. The research presented was carried out independently from the interests of these commissioning parties and in line with academic standards.[7]

The role that these underlying policy reports, and in some instances the journal articles themselves, have played in policymaking, court rulings, public debate, and academic debate is assessed in the last chapter of this dissertation. This is done as follows:

- First, the research question of the policy report and the positioning of this research as outlined in the call for proposals are reviewed. In most cases, these are also outlined in the introduction of the report itself. Analysis of the research question and positioning of the study provides information about the role that was envisaged *ex-ante*, before the research was carried out.
- This can be compared to the ex-post role, which is analysed by studying the impact on policy documents, parliamentary proceedings, and court rulings. Relevant questions for this analysis are whether the report was sent to Dutch Parliament or mentioned in letters to Parliament or policy papers, to what extent the conclusions and recommendations in the

[6] As such, they can be contrasted with qualitative economic argumentation, and with economic modelling aimed at capturing economic mechanisms in abstract mathematical models that serve to make the effect of specific assumptions explicit or make forecasts that may be tested empirically in future.

[7] Such standards are for instance laid out in "The Netherlands Code of Conduct for Scientific Practice" (VSNU, 2014). For the papers in this dissertation, details about the underlying policy reports and their commissioning are discussed in the analysis of their role and impact in Chapter 11. See also the acknowledgements in the individual chapters.

report have been adopted and implemented, and whether the report played a role in court rulings.

- The role in the public debate is assessed concisely by looking at references to the policy report or the journal article in national and international online media and blogs, as well as public responses that have, in some instances, been made by stakeholders or lobbying groups. In addition, references are searched using the *LexisNexis Academic* database.[8] Given the diversity of such sources, language issues, and the implicit form that references often take, however, this analysis does not claim or aim to be comprehensive. Rather it aims to reveal striking differences between the impacts of the various case studies on public debate.

In cases that had a suitable counterpart in the past, the role of the policy reports in the case studies on policymaking or court rulings is compared to the role of economic evidence on these earlier and comparable policymaking or rulings.

4. Methodology of case studies and structure

Despite their common ground in being empirical, the articles in this dissertation present a wide variation in methodology and have different levels of abstraction. The methodology used is explicated in each individual chapter and in this sample, it is not found to have any bearing on the role and impact of the studies themselves.

Nevertheless, the research methodology and level of abstraction of the individual papers has been used as the primary criterion to organize the case studies in this dissertation. In addition, logical or chronological connections in terms of subject matter have been taken into account. On the axis of abstraction level, the methodology used can be roughly distinguished into *fact-finding*, the use of *primary data*, and analysis of *secondary data*.

Fact-finding is arguably the least abstract empirical approach and is the primary source for information in the underlying policy reports of *Chapter 2: Universal services and disabled people* and *Chapter 3: Digital fixation: The law and economics of a fixed e-book price*. Using this research method, the

[8] On LexisNexis: "LexisNexis aggregates information from over 36,000 international news and business sources, as well as thousands of business-relevant web sites, blogs and forums. Our content portfolio ranges from newspapers to trade magazines, from company databases to market reports, with literally millions of new documents added to our database every single day. With archives dating back up to 35 years, we provide results that paint the whole picture, rather than just the most recent headlines. See: http://www.lexisnexis.nl/english/about-us/about-us.page."

research question is addressed by gathering specific qualitative and quantitative information through document study or interviews, which is then analysed economically.

Chapters 4-7 make use of surveys to collect so-called primary quantitative data about the actual or intended behaviour, characteristics or opinions of respondents. These data are analysed using various techniques, ranging from simply reporting percentages or means, to fairly abstract econometric regression models to reveal the interactions between variables or to find patterns in the opinions or behaviour of respondents. This approach is used in *Chapter 4: Legal, Economic and Cultural Aspects of File sharing*, which combines legal and economic analysis, literature study, and the outcomes of a consumer survey to assess the effects of unauthorised file sharing on music, films, and games. *Chapter 5: Elvis is returning to the building: Understanding a Decline in Unauthorized File Sharing* is also based on a representative consumer survey, and combines the outcomes with some key results from the previous survey to conclude that in the Netherlands, unauthorised file sharing for music has declined between 2008 and 2012, while it has increased for films and series. *Chapter 6: Baywatch: Two approaches to measure the effects of blocking access to The Pirate Bay* combines survey data from the aforementioned 2012 survey with a second survey later that year. It assesses the effect of a specific intervention on the file sharing behaviour of the Dutch population: In 2012, Dutch ISPs were summoned by court to block their subscribers' access to The Pirate Bay. This article combines an analysis of survey results with another primary dataset resulting from direct measurement, acquired through BitTorrent Monitoring. *Chapter 7: Perspectives of creators and performers on the digital era* is also based on a survey and deals with many of the same issues addressed in Chapter 4-6, but from the perspective of creators and performers. Survey data are analysed using econometric models, as well as the rather abstract data analysis techniques of factor analysis in combination with cluster analysis.

A third empirical approach is the analysis of secondary data. Secondary data analysis can either be the re-analysis of data, using new techniques to address the original research question, or the use of existing data to answer new research questions (e.g. Glass, 1976). In three case studies in this dissertation, secondary data analysis of the latter kind was performed. The secondary data used in Chapters 8-10 derive partly from public data sources, which are openly available to anyone, and partly from confidential sources. *Chapter 8: Valuing Commercial Radio Licenses* analyses confidential financial

data from national and regional commercial radio operators using panel data models, in order to calculate fees for licence renewal that aim to ensure optimal allocation of spectrum on the one hand, and to avoid providing state aid on the other. *Chapter 9: Setting licence fees for renewing telecommunication spectrum based on an auction* is a second paper on setting licence renewal fees, this time for telecommunication licences. Again, it uses panel data analysis of financial data – gathered from public sources in this case. *Chapter 10: Measuring the welfare effects of public television* also makes use of secondary data, which is partly public and partly confidential. A dataset containing viewership, quality rating, and various other variables of all broadcasts on Dutch television in the evenings of the first nine months of 2011 is analysed in an explorative study, which aims to develop an objective measure for the welfare effect of public broadcasting.

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2 Universal service and disabled people

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Abstract
The EU regulatory framework enacted 25 May 2011 has the objective to provide functionally equal access to telecommunication services for disabled persons. What are the rules, who are the target groups, and what obstacles do they face when using various telecommunication services? And what arrangements do exist in a selected group of six EU Member States to remove these obstacles? Recommendations include the introduction of a more market-oriented approach, where appropriate, independent of specific networks.

Keywords
Universal service, disabled people, relay services, European regulation

1. Introduction

The revised European Framework for the Communications Sector enacted 25 May 2011 shows a substantial shift in the thinking about universal service obligations. The framework requires Member States to take specific measures for disabled end-users, which is a substantial break with the past where regulation was not mandatory but mainly indicative ("Member States can regulate…"). Also, Member States are now obliged to give national regulatory authorities the power to regulate issues that relate to disabled people. The biggest drive behind improvement of the regulatory framework for disabled people is the principle of equality. Disabled end-users should have access to communications infrastructure and services as any other users and they should be able to make use of services in a non-discriminatory way (aiming at full inclusion).[9] The new provisions impose obligations on service providers regarding access, information needs and the availability of adequate terminal equipment. Examples are the provision of relay services, functional Internet access and special tariff schemes.

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[9] These principles and arguments can be found in paragraphs 8, 9, 12, 13, 36 and 41 of the Preamble of the "Citizens' Rights" Directive (2009).

Very little research has been done in this field although the impact of the new framework may be substantial. Both a delineation of disabled end-users and an assessment of the services they should have access to is lacking. Nevertheless it concerns a substantial and growing group in (the information) society. Figures presented in this paper suggest that, depending on the criteria used, this group constitutes 5-15% of the entire population.

This contribution aims at filling this gap. It sets out by reviewing and analysing the European Framework concerning universal service regulation, focussing on the position of disabled end-users. Subsequently, the specific obstacles faced by end-users with specific disabilities are analysed. After that, an overview is presented of specific regulation and services that are currently in place in six EU Member States to remove these obstacles. Finally, some conclusions and recommendations are presented.

2. Universal service regulation

2.1. Introduction

Universal service obligations are a known concept in the telecommunication industry (Bohlin & Teppayayon, 2009). Before the liberalization and privatization of the existing monopolies, universal service regulation had already gained ground as a result of new technological developments. At the end of this stage, universal service regulation in several European countries also comprised the provision of mobile telephony, which was at the time offered in the form of a monopoly. Gradually, liberalization of the telecommunication markets reduced the extent of universal service regulation. An important reason for this was the fear that too broad a universal service would benefit incumbents and that the impediments for entrants would be too big if they were either subjected to service obligations or were obliged to make overly high (financial) contributions to universal service obligations.

The essence of classical universal service regulation still consists of voice telephony. This must be offered to everyone on a non-discriminatory basis, at an affordable price and at a certain level of quality. Following on from this, facilities such as subscriber information services, (electronic) telephone directories and the existence of public payphones are also covered by universal service obligations. So far, the main orientation of universal service obligations in telecommunications has been financial and geographical: they

guaranteed accessibility of services at an affordable price in any region of a country, to avoid that only high density areas are covered.[10] Provisions for special groups – such as disabled persons who are the subject of this study – are in general only discussed marginally.

Universal service regulation is mainly framed within a European context by European directives. That is why in the following paragraphs it is first defined how the position of disabled persons was regulated within the rules before 25 May 2011, in particular in the previous versions of the *Framework Directive* and the *Universal Service Directive* of 2002.[11] Next a description is given of the relevant provisions that have been introduced in the adapted regulatory framework for the telecommunication industry, which had to be implemented by the EU Member States by 25 May 2011.[12]

2.2. European framework

2.2.1. Framework Directive

In the original *Framework Directive* several general principles have been laid down with respect to the position of disabled persons. They can be found specifically in Article 8 of the Directive which sets out the objectives for national regulatory authorities. They have to promote inter alia within the framework of competition that disabled users derive maximum benefit in terms of choice, price and quality. In the preamble it is further specified that network operators and producers of terminal equipment should be incited to facilitate access to electronic communication services for disabled users by means of cooperation. Further paragraph 4 of Article 8 comprises a general recommendation for national regulatory authorities to address the needs of specific social groups, in particular disabled users.

2.2.2. Universal Service Directive

The provisions of the original *Universal Service Directive* in general cover all end-users including disabled persons. In this section the provisions which specifically regard disabled users are discussed. Thus Article 6(1) provides that it should be possible to impose measures concerning access to public pay telephones for disabled persons. Article 7(1) provides that the Member States – where necessary – take special measures for disabled end-users. These measures should aim at giving disabled persons affordable access to public telephone services, including emergency and directory enquiry

[10] See: Poort, Groot, Kok, de Graaf, Hof (2005) for a theoretical framework on different types of accessibility.
[11] Framework Directive (2002) and Universal Service Directive (2002).
[12] For further background info: BEREC (2011) and Ofcom (2011).

services and telephone directories. Access should be equivalent to the access of other end-users. In the second paragraph of Article 7 it is stated that Member States may, in the light of national conditions, take measures to ensure that disabled end-users can choose between the various service providers which are available to the majority of end-users.

In the preamble of the Directive (recital 13) it is further specified how Article 7 should be read. The special measures which Member States have to take in order to guarantee access at an affordable price to speech telephony, emergency services, directory enquiry services and telephone directories for disabled persons are described indicatively. They may concern "making available accessible public telephones, public text telephones or equivalent measures for deaf or speech-impaired people, providing services such as directory enquiry services or equivalent measures free of charge for blind or partially sighted people, and providing itemised bills in alternative format on request for blind or partially sighted people. Specific measures may also need to be taken to enable disabled users and users with special social needs to access emergency services (112) and to give them a similar possibility to choose between different operators or service providers as other consumers (recital 13)". The preamble next states that there are no standards for the quality of universal service for disabled persons (contrary to general standards that do exist). These standards should be developed; specifically, the preamble states that "[p]erformance standards and relevant parameters should be developed for disabled users and are provided for in Article 11 of this Directive (recital 13)". Article 11 of the Directive indeed gives a special ground for regulating standards/quality criteria, but leaves it up to the Member States to decide whether they do so or not, and subjects this to the question whether relevant parameters have been developed, or not ("National regulatory authorities may specify, inter alia, additional quality of service standards, where relevant parameters have been developed, to assess the performance of undertakings in the provision of services to disabled end-users and disabled consumers" (Article 11, para 2)). National regulatory authorities should be enabled to require that data regarding the level at which the quality of the service is met, are published if and as soon as such standards and parameters have been developed. Further the preamble states that the universal service provider is not allowed to take measures which prevent users from benefiting fully from services which are provided by various operators or providers of services, in combination with its own services that are offered as part of universal service.

As to the option stated in the second paragraph of Article 7 to take measures in respect of freedom of choice no further clarification is given in recital 13 of the preamble.

Finally, Annex 4 of the Directive lays down that elements can be included in the calculation of costs associated with providing the universal service, which can only be provided at a loss or under conditions that fall outside normal commercial standards. The provision of specific services or equipment for disabled persons is specifically listed as such an element.

2.2.3. Evaluation Universal service obligation

The previous version of the *Universal Service Directive* has undergone two evaluations, the results of which can be found in two communications of the European Commission of 2006 and 2008.[13] In the communication of 2006 the position of the representatives of disabled persons is mentioned. They alleged that extension of universal service to mobile communication would be required because many disabled persons experience serious problems accessing and using mobile services. These representatives also stressed the need for further harmonization of measures, but there were also organizations which saw the risk of overregulation and therefore preferred other initiatives like designing services for consumers which are also suitable for users with special needs. All in all, the European Commission did not see any reasons to impose stricter universal service obligations. This is also the conclusion of the evaluation of 2008, in which the European Commission states inter alia that there is no longer the need to bring mobile communication under the universal service obligation, because it has meanwhile become generally accessible and affordable. The costs of mobile telephony for a small user are even lower than the cost of a landline connection. As to broadband the European Commission finds that this is not open to a universal service qualification because the majority of the population does not yet have such a connection. However, the European Commission expects such a majority to exist in the near future. The communication rather widely discusses what is called 'universal service in a changed environment' and illustrates some future perspectives. This involves inter alia broadband availability for everyone and equality in access. Regarding disabled people, the question is raised how to guarantee access and user-friendliness of electronic communication services for vulnerable

[13] Communication Universal Service (2006) and Communication Universal Service (2008).

persons (such as disabled and elderly persons) to allow them to use such services like the majority of users do.

2.2.4. Analysis: No specific obligations

Summarizing, it can be concluded that before the revision the European framework did not have any strict obligations. Only where necessary should Member States take special measures in order to ensure equal access for disabled end-users. This implies broad discretionary powers of the Member State, despite the fact that the preamble uses a more binding phrasing ("Member States should take suitable measures…").

2.3. Revised European framework

2.3.1. Introduction

As regards universal service, in the route which resulted in the review of the existing framework, suggestions were made for amendments to the provisions relating to the position of disabled persons. Several of them are in line with the outcome of a study of the implementation of the *Universal Service Directive* concerning disabled people. All this is described in a working paper of the European Commission.[14] It appears from this document that the implementation of the provisions concerning disabled people presents a high degree of variety. Specifically the report recommends to impose stricter rules concerning disabled people within the context of the review of the regulatory framework.

2.3.2. Main lines of the review

The amendments, laid down in two directives,[15] show that there is more focus on the specific position of disabled persons. Furthermore there is a distinct shift in emphasis. To illustrate this, the elements of the revised European Framework can be classified in three categories. First, there are measures which Member States have to take in order to make services accessible and affordable for disabled end-users. These binding obligations form the core of the revised regulatory framework. Second, the framework contains provisions which commit Member States to create a legal basis for the provision of rules on several specific topics. Third, there are provisions which give Member States the option to take certain specified measures.

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[14] Inclusive Communications Group (2006).

[15] "Better Regulation" Directive (2009) and "Citizens' Rights" Directive (2009). Commission of the European Union (2010) contains consolidated versions of the new Framework and Universal Service Directives.

The problems encountered by disabled persons are discussed with more emphasis in the revised directives, as can be seen from the fact that both the *Framework Directive* and the *Universal Service Directive* specifically refer to disabled persons in the initiatory articles.

2.3.3. Binding obligations

Article 7 of the *Universal Service Directive* falls within the first category. This article has been made stricter, because in the first paragraph the words '*where necessary*' have been deleted from the sentence concerning the measures to be taken by the Member States for disabled end-users. Thus, Member States are obliged to take special measures in order to ensure that disabled persons have affordable access to fixed telephone services, including emergency services, directory enquiry services and directories. Access should be equal to the services for other end-users, which is expressed in the first full sentence of Article 7(1). Member States should also ensure that disabled end-users are able to call emergency services (Article 26).

2.3.4. Obligations to make additional regulation possible

Member States should empower the national regulatory authorities (NRAs) to take certain measures when needed. This goes inter alia for providing information. Article 21 creates the basis for imposing obligations to inform disabled subscribers regularly and in detail about products and services intended for them. Furthermore, Article 22(1) provides that providers can be required to communicate similar, adequate and current information for the sake of end-users about the quality of their services, including equal access for disabled end-users.

Under a new Article 23bis, national regulatory authorities shall have powers to impose rules on providers to ensure that disabled end-users get access and choices similar to the majority of end-users. It should also be possible to take specific measures to promote accessibility of terminal equipment with services and functions necessary for disabled end-users.

Finally, Article 33 can be mentioned in which Member States are ordered to ensure that national regulatory authorities take due account of the views of end-users including also disabled end-users. To that end a consulting mechanism should be set up.

2.3.5. Options

Within the revised framework several topics are mentioned which Member States can regulate concerning disabled persons.

In Article 7(1) it is laid down that national regulatory authorities can be obliged by the Member States to assess inter alia the extent and form of specific measures for disabled end-users.

The second paragraph of Article 7 seems unaltered, but is not quite so: Member States can take measures – in the light of national conditions – to ensure that disabled end-users can also benefit from the choice between undertakings and providers of services which are available to the majority of end-users. The new phrasing '*take advantage of*' instead of the old '*choose*' stresses the equalization of disabled and other end-users.

As to emergency services, measures can be taken which aim at guaranteeing that relevant technical standards and specifications are respected (Article 26(4)). To ensure effective implementation of 112 services – including access for disabled end-users who travel in other Member States – the European Commission may take enforcement measures (Article 26(7)).

Finally the *Authorisation Directive*[16] can be mentioned which empowers national regulatory authorities to attach specific conditions to general authorizations to ensure that the spectrum is also accessible to disabled users.

3. Analysis of target groups and obstacles

The revised European Framework obliges Member States to take measures to guarantee disabled end-users functionally equivalent and affordable access to fixed telephone services, including emergency services, directory enquiry services and directories. However, neither a definition of disabled end-users is provided, nor of the necessary arrangements to meet their needs to guarantee equal access.

This section first distinguishes the major groups of disabled end-users that face obstacles accessing telecommunication services. Next, the obstacles they experience accessing telecommunication services are analysed. Although this assessment is largely based on Dutch figures and a series of interviews with Dutch representatives of these groups, the problems experienced stem from

[16] Authorisation Directive (2002). This directive has been modified by the "Better Regulation" Directive (2009). Relevant article in Annex, point A8.

general disabilities in combination with international telecommunications technology. Hence, the outcomes of this assessment are believed to be internationally valid.

3.1. End-user groups

In an official communication on eAccessibility, the European Commission estimated people with disabilities to constitute about 15% of the EU population (Commission of the European Communities, 2005). However, this figure does not differentiate between different kinds of disability or severity.

For the purpose of this paper, four main types of disabilities are distinguished in line with general literature on disabilities (e.g. Klerk, 2007): visual, auditory, cognitive and motor. Estimates of the size of these groups in relation to the general population differ substantially, depending on the severity of the disability included. Klerk (2007) provides estimates for the Netherlands as listed in Table 1. These figures are based on people who do *not* live in institutions and excludes people whose disability is characterized as light.

Table 1 – Percentage of Dutch population with disabilities

	% of population	% of those severely disabled
Visual	3%	20%
Auditory	2%	44%
Motor	9%	30%
Cognitive	1%	52%

For visual, auditory and motor disabilities, there is a strong correlation with age, which is also one of the main drivers of overlap between (light or moderate) disabilities. Thus the elderly turn out to be a specific target group for accessibility measures, as a combination of often light disabilities is prevalent in a large proportion of this group. Overlap between severe disabilities is less common, in particular outside institutions.[17] All in all, the proportion of the population that is believed to be affected by the revised European Framework can be expected to exceed 10%. If only severely disabled end-users are counted, this would amount to about 5% of the population.[18]

[17] In total deaf-blind people in the Netherlands amount to about 0.2% of the population.

[18] Fragmented data from other contries show similar figures. For example, recent material of the French Telecommunications regulator mentions that 5.5 million people have problems with mobile telephony due to a handicap (ARCEP, 2010). This amounts to approximately 8.5% of the entire population. Likewise, the

3.2. Obstacles vis-à-vis telecommunications services

Based on interviews with representatives of stakeholders as well as document study, an assessment was made of the obstacles that these groups encounter when using the ordinary telephony services, and the adaptations or additional services required. In this assessment, the following services that are covered by the general universal service obligations are taken as a starting point: fixed telephony, emergency services, directory enquiry services and directories. In addition, mobile telephony and Internet access are considered, as the introduction of a universal service obligation for these is presently being considered in several countries.

In this assessment, it is critical to distinguish the accessibility of the service itself, from the content or information provided by this service. Content does not fall under the revised European Framework. A second distinction that needs to be made is that between physical and financial accessibility. Physical inaccessibility refers to a situation when a disabled person cannot use a certain telecommunication service without adaptations. Financial inaccessibility may arise when disabled persons are faced with substantially higher costs for the use of a telecommunication service. This may be a consequence of the fact that disabled users need more time to use a service. Obstacles may also arise from a combination of physical and financial inaccessibility, when specific equipment or services that are used have substatially higher costs.

The issue of financial inaccessibility is aggrevated by the fact that people with disabilities have lower average incomes, as their disabilities also negatively affect their earning capabilities. In 2003, the average gross annual income of people with a physical disability in the Netherlands was almost 40 percent lower than that of people with no disabilities (Klerk, 2007; p. 98).

3.2.1. Visually disabled

People with a visual disability have traditionally had little problems using fixed telefony. Modern handsets, however, tend to have more complex menu structures and displays. The continued existence of simple handsets is important for this group.

Mobile telephony is more problematic for this group: navigating menus and operating touchscreens without speech software is highly problematic. Such

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number of users of Swedish video relay services relative to the population (0.03%) is equal to the share of the Dutch population for whom sign language is the first language (Akker & Poort, 2009).

software is only supported by relatively expensive handsets, thus creating a potential *financial* accessibility problem.

The same holds for directory enquiry services. People with a visual disability have trouble using printed directories; they have to rely on directory inquiry services which are generally paid for services.

Accessing the Internet is considered to be a growing problem for the visually disabled. Although speech software can in theory be used to navigate the Internet, Internet sites increasingly use plugins and formats that thwart the use of such software.

Accessing emergency services (112) presents no obstacles.

3.2.2. Auditorily disabled

The use of fixed telephony has traditionally been problematic both for hearing impaired and for speech impaired people. However, text telehony and text relay services have been developed in several countries to counter this problem. More recently, video relay services have been introduced in some countries (see section 4.2). Also, text telephony and relay services can be offered on mobile phones.

Furthermore, the accessibility of emergency services may pose problems. Emergency services need to be accessible either by relay service, or by other means of communications such as text telephony, fax or SMS.

No specific accessibility problems exist vis-à-vis the Internet and directory services (printed and online).

3.2.3. Motor disabled

People with moderate or severe motor disabilities tend to have problems operating modern handsets for fixed and mobile telephony. The continued existence of easy-to-operate handsets is important for this group.

For people with very severe motor disabilities, speech operated telecommunication facilities can be required. Also, these people may benefit from personal equipment to alert emergency services directly (e.g. by pressing a single button).

In addition, the motor disabled tend to have difficulties using printed telephony directories, thus increasing their use of directory enquiry services

(as with people with a visual disability). This may raise the costs involved and thus cause financial accessibility issues.

3.2.4. Cognitively disabled

As for motor and visually disabled people, the existence of easy-to-operate mobile and fixed handsets is important for people with cognitive disabilities. Also the use of directories, directory enquiry services and particularly the Internet may pose problems for this group. The use of intermediaries can improve this.

The main adaptations in equipment and services that according to the present research are required by these groups are summarized in Table 2.

Table 2 – Main adaptations required for disabled end-users using telecommunication services

	Visual	Auditory	Motor	Cognitive
Fixed telephony	Simple handsets required	Text telephony, text relay or video relay services	Simple handsets required, additional equipment	Simple handsets required
Mobile telephony	Simple handsets or spoken menus	Text telephony, text relay or video relay services	Simple handsets required, additional equipment	No specific issues
Emergency services	No specific issues	Accessible by text telephone, fax, SMS, or relay service	Simple handsets required, additional equipment	No specific issues
Directory enquiry services and directories	Dependence on (expensive) directory inquiry services	No specific issues	Dependence on (expensive) directory enquiry services	Dependence on (expensive) directory enquiry services
Internet	Speech software	No specific issues	Additional equipment and/or interfaces	No specific issues

4. Situation in selected Member States

4.1. Introduction

In order to establish the impact of regulation on universal service and disabled people, a comparative study was made of the situation prior to the implementation of the revised European Framework in six EU Member States: Belgium, Germany, France, United Kingdom, Sweden and the

Netherlands.[19] In line with the preceding sections, the comparison includes the services that are currently part of to the universal service regulation in the EU, or are considered te be so in the future: fixed telephony, emergency services, other services (mobile telephony, directory enquiry services and Internet access), financial accessibility and obligations that can be dealt with by the regulatory authorities (information to the public, promotion of adequate terminal equipment and freedom of choice).

4.2. Fixed telephony

In five out of six studied countries relay services were provided for hearing-impaired and speech-impaired persons on a national scale. In France, relay services were being developed. Three different relay services are offered: text telephony, video telephony, and a help service. A help service for speech-impaired persons and cognitive disabled persons is only provided in Sweden. Users can make arrangements with the operator about the support they need, e.g. taking notes during the conversation which are sent to the user after the call, or giving reminders during the conversation.

Table 3 lists availability in hours a day (h.d.) of relay services. Including France, four out of six countries provide text mediation service 24/7. However, this high service level should be considered in light of the fact that in the first three of these countries text relay services also mediate in calls from hearing-impaired persons to emergency services. In Belgium and Germany, where the service is not available the entire day, as well is in the Netherlands, the emergency services can be reached by fax or SMS (see section 4.3).

With the exception of France, a text relay service was available in all countries in this benchmark groep prior to the implementation of the New Framework. In Belgium, the service is only accessible through the Internet. In the other countries the service can also be used with a landline or mobile text phone. In countries where video telephony is presently provided, this service is only accessible through the Internet. In the United Kingdom, the text relay service operates through direct connections: the user himself calls the desired number whereat the relay service is switched on afterwards. This increases the speed by which hearing- and speech-impaired persons can

[19] These countries were chosen because they are neighbouring countries (Belgium, Germany, United Kingdom) or countries with an interesting situation as far as the topic is concerned (France, Sweden). Information was gathered from April to July 2009, using document and internet research, as well as e-mail and telephone communication with regulators, government departments and service providers in these countries. Where relevant, this information has been updated using BEREC (2011).

reach a desired number. Sweden is presently experimenting with direct connections.

Table 3 – Relay services in selected countries

Countries	Text	Video	Initiation by hearing person	Cost for users
Belgium	10 h.d.	No	No	Free
Germany	15 h.d.	15 h.d.	Yes	€ 0.14 and € 0.28[a]
France[b]	24 h.d.	24 h.d.	Yes	Free
United Kingdom	24 h.d., Direct Call	No	Yes	Free
Sweden	24 h.d.	12 h.d.	Yes	Free
Netherlands	24 h.d.	No	Yes	€ 0.10 and € 0.50[c]

[a] The user pays € 0.14 per minute for text mediation services and € 0.28 for video mediation services.
[b] By July 2009, the services were not yet available on a national scale in France. Data are based on the intended availability.
[c] Use of the Teleplus service costs € 0.10 a minute from the landline and € 0.50 a minute from mobile text phone

4.2.1. Restrictions on use of the service

Belgium is the only country with a restriction on use of the relay services. The service is only intended to arrange practical and social matters. Calls with commercial purposes can be refused or terminated. In the other countries the services are also explicitly aimed at facilitating equal access to telecommunication in the workplace.[20]

4.2.2. Financing of the services

There are several ways of financing the services. This applies both to the development of services and the use of services. Table 4 lists how this is arranged in the countries studied.

In the Netherlands and the United Kingdon, the relay services are funded and operated by the former incumbent, KPN and BT respectively. However, proposed new regulation for the Netherlands aims at financing by providers of telecommunication networks according to their turnover.

[20] In Germany, workplace use of video relay is available only on weekdays from 8 am to 5 pm.; charges for workplace users are different from private users (Ofcom, 2011).

Table 4 – Financing of relay services in selected countries

Countries	Financing of development	Financing of use
Belgium	Government	Government
Germany	Telecom provider DTAG	Combination of government grants, contributions by the industry and user charges
France	Providers, users, private parties	Not yet known
United Kingdom	Service was developed in the 1980s by RNID[a] and is currently operated by BT	BT
Sweden	Government	Government
Netherlands	KPN	KPN

[a]RNID is UK's largest charity supporting deaf people, currently known is Action on Hearing Loss (OFCOM, 2011)

4.3. Emergency services

Emergency services can be used by hearing- and speech-impaired persons in the studied countries through relay services, by SMS and fax. Table 5 lists the options in the six countries. Use of a mediation service can only be fully effective, if the service is available 24/7. Use of direct connections increases the speed by which emergency services can be reached.

In several countries studied, the use of SMS for reaching the emergency services is possible locally, but nowhere has it been set up nationally. Supply reliability is still an impediment in all the countries. Fax is used in three of the studied countries to reach the emergency services. In Germany and France standard forms are used for this.

Table 5 – Accessibility of emergency services in selected countries

Countries	Text	Video	SMS	Fax
Belgium	10 h.d.	No	Locally	Yes
Germany	No	No	Pilot projects	Some 'Länder'
France	Future	Future	Locally	Yes
United Kingdom	Direct Call 24/7	No	Regions	No
Sweden	experiments with Direct Call 24/7	Yes + experiments with Direct Call	Experiments	No
Netherlands	Direct access with text phone	No	No	No

4.4. Other services

In table 6 a list is given of the measures relating to other services. In three of the six studied countries visually impaired persons have free access to directory services. In Belgium the service provider is of the opinion that visually impaired persons are already compensated by the overall social tariff (see section 4.5). Only in France, measures are taken in addition to the relay services to render mobile telephony more accessible to impaired persons. Upon the government's initiative, telecom providers in France consult interest groups in order to develop suitable mobile phones. In Sweden an accessible Internet forum is offered to deaf-blind persons.

Table 6 – Regulation of directory services, mobile telephony and Internet for disabled users in selected countries

Countries	Directory services visual impairment	Directory services hearing impairment	Mobile telephony	Internet
Belgium	€ 1.12 per minute	€ 1.12 per minute + mediation service	No regulation	No regulation
Germany	No regulation	Mediation service	No regulation	No regulation
France	Free access	No regulation	Consultation target-group	No regulation
United Kingdom	Free access	Mediation service	No regulation	No regulation
Sweden	Free access	Mediation service	No regulation	Internet service deaf-blind persons
Netherlands	Directory service: number information service at low rate	Mediation service	Compensation aids in social security insurance for hearing handicap	Compensation aids in social security insurance for visual and motor impairment

4.5. Financial accessibility

Financial accessibility of telecommunication for disabled people is implemented in two different ways. First, there is the option of providing a social tariff. Thus the costs of subscription and/or calls for disabled users are reduced. In the United Kingdom another way of financial compensation has been chosen. Since calls through the relay services take longer, the telecom providers are obliged to give a discount of 60% on the costs of calls. This discount is also given if a hearing person initiates the call. In addition to the costs of subscription and the costs of using services, countries often provide

specific equipment through social security or health insurance arrangements. Such arrangements fall outside the direct reach of telecommunication regulation and hence fall outside the scope of the present paper.

Table 7 – Financial regulation of subscriptions and calls for disabled end-users in selected countries

Countries	Social tariff	Relay service discount	Social tariff/discount arranged by law
Belgium	Nominal discounts, financed by industry	No	Yes
Germany	Yes	No, additional costs	No
France	Yes	No	Yes
United Kingdom	No	Yes	Yes
Sweden	No	No	n.a.
Netherlands	No	No	No

4.6. Obligations to make additional regulation possible

4.6.1. Information

In France, telecom providers are obliged to send invoices which are understandable for the target-group. This means that visually impaired users must be informed in Braille if they request so. Telecom providers are also required to report annually about the progress made in the accessibility of telephony for disabled persons. In Belgium, an annual evaluation is held with the users of the text relay service. In the other countries studied, no specific measures were found with respect to an obligation to inform disabled persons.

4.6.2. Terminal equipment

No specific measures were found in most of the countries studied with respect to the availability of terminal equipment. Only in France, providers are required to consult the users for the development of suitable phone sets.

4.6.3. Freedom of choice

In all studied countries the service is separate from phone subscriptions, and freedom of choice of users is not restricted either. However, in none of the countries a choice can be made among several providers of relay services. In several countries, the service is provided by the former monopolist.

5. Conclusions and recommendations

The revised EU regulatory framework has the objective to provide functionally equal access to telecommunication services for disabled persons. The proportion of the population affected by it is expected to exceed 10%, but the actual use of arrangements for disabled people will strongly depend on their attractiveness in terms of user charges, availability and user friendliness. The previous section shows that prior to the implementation of the revised framework, most of the studied Member States were already addressing the needs of disabled persons in several ways. Here, conclusions are drawn and recommendations are made for policymaking and regulation.

Bottlenecks in accessibility of telecommunication services which are considered substantial to such an extent that they impede functionally equal access for groups of disabled persons, should be further remedied. A condition to this is that there should not be enough reason to trust that the bottleneck will be solved by the market without any regulation. Market failure can be a reason for this, as well as the relatively small market for services and equipment tailored to the needs of disabled end-users. The smaller the number of end-users in need of a specific service, the less likely it is that the fixed costs of setting up or operating the service can be recovered from commercial user charges without creating financial inaccessibility. Substantial additional costs which disabled persons have to bear to be able to communicate in a functionally equal manner, should also be remedied.

Terminal equiment can often be obtained from the global market, in particular if international standards such as the Internet Protocol (IP) or ITU-standards are complied with. Economies of scale in relay services, however, are limited to language areas and/or national borders. This implies that the social costs of providing such services will be relatively higher in smaller Member States. Only the most populous EU Member States may be able to achieve competition between providers of relay services, as is the case in the United States.

Nevertheless there is a degree of subjectivity in the above: when is a bottleneck substantial to such an extent that it should be remedied? What additional costs are so high that an arrangement should be made? And for what combination of restrictions can equal access reasonably be imposed? Inter alia the country comparison, but also user surveys provide holds for this.

Next to the question of what should be regulated, there is the question of how to realise it: who should provide a service? In what manner? How should the service be financed? Upon answering these questions, solutions should be looked for which are *market-conform* as much as possible and enhance *competition* and *innovation*.

Freedom of choice, both for terminal equipment and service providers is a key-notion in this and it is recommended that more emphasis is given to this aspect. Freedom of choice of users incites providers to compete and thus aspire to innovation and cost reduction. This implies that freedom of choice for terminal equipment is to be guaranteed where possible to make sure that global economies of scale are benefitted from. Moreover, phone sets are developed on the global market which are not specifically intended for disabled persons, but are nevertheless suitable for them. Thus freedom of choice helps disabled persons to benefit from innovation and competition on the world market and to participate in general telecommunications wherever possible.

If – given the extent of the market for a service or product – competition *on* the market is not feasible, competition *for* the market by means of tenders is often second best. Furthermore it is important that when a service is a natural monopoly for lack of market volume or scale benefits, it is separated as much as possible from services or products where there is competition. This prevents users from needlessly loosing their freedom of choice for services and products which are offered competitively and thus also missing out on the advantages of competition. For the monopolistic part of the service there should be supervision to prevent abuse of the dominant position.

Adapted services and terminal equipment should function *independently of networks*. Relay services should for instance be accessible (dialable) from any network under equal conditions. This may also imply that use of these services should be charged directly through the party which provides the relay service and not through the network operator to prevent the latter from acquiring an undesirable dominant position.

Finally, upon implementation a distinction should be made between bottlenecks which are specific to the studied telecommunication services on the one hand, and accessibility problems which also apply to other markets, on the other hand. Think for instance of readability of invoices of telecom providers and accessibility of their sites: although all this can be arranged

through specific telecommunication regulation, it concerns problems which are in fact of a general nature and ask for more general solutions. On this point the European framework is not sufficiently distinctive and the amended directive includes elements which can be characterized as generic rather than sector specific.

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3 Digital fixation: The law and economics of a fixed e-book price

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Abstract
Fifteen countries in the OECD, ten of which EU members, have adopted regulation for fixing the price of printed books. At least eight of these have extended such regulation to e-books. This paper investigates the economic arguments and legal context concerning a fixed price for e-books and deals with the question of how the economic arguments for and against RPM for e-books should be weighted in the light of the evidence. It concludes that while the evidence in defence of a fixed price for printed books is slim at best, the case for a fixed price for e-books is weaker still while the legal acceptability within EU law is disputable. Against this background, introducing a fixed price for e-books is ill-advised.

Keywords
Retail price maintenance, Fixed book price, e-books, agency pricing

1. Introduction

In many Western countries, books have been subject to price fixing, or in more general terms retail price maintenance (RPM), since as early as 1829 (IPA, 2014). Usually, RPM originated from agreements between publishers and booksellers, containing sanctions for booksellers who would sell below the prescribed price. Over the years, such agreements have been replaced by legislation in many countries. Laws or agreements concerning fixed book prices are often motivated from the observation that 'books are different' from other products and deserve special treatment. In 1962, the Restrictive Trade Practices Court in the United Kingdom accepted the argument that without fixed prices there would be fewer and less well-equipped bookshops, more expensive books and fewer titles published (Dearnley & Feather, 2002). Other countries usually motivated price fixing legislation along similar lines.

With the advent of e-books, countries with a fixed price for print are faced with the question of whether or not to extend existing legislation to e-books: do the same cultural policy arguments and legal considerations apply? Conversely, they could consider repealing RPM laws for printed books in the light of these developments. An extra angle was added to this debate by the rise and fall of agency pricing for e-books between 2010 and 2013: in response to Amazon's aggressive pricing strategy to gain market share, the six largest publishing multinationals in co-operation with Apple adopted the 'agency model', in which the retailer receives a percentage of the retail price set by the publisher. Publishers feared low prices would erode consumers' perception of the value of books, cannibalise print sales and lead to a downward pressure on wholesale prices. Amazon resisted the agency model initially, but yielded after a few months. Thus, agency pricing operated without sector-specific legislation and echoed the price fixing arrangements for printed books of the distant past, with the notable difference that it was introduced unilaterally by publishers against a dominant retailer rather than in agreement with booksellers. After antitrust investigations by the European Commission and the US Department of Justice, agency pricing was abandoned (De los Santos & Wildenbeest, 2014; European Commission, 2013).

This paper investigates the economic arguments and legal context concerning a fixed price for e-books and deals with the question how the economic arguments for and against RPM for e-books should be weighted in the light of the evidence. While there is a large literature on RPM and a substantial number of studies on fixed prices for printed books, an analysis of fixed prices for e-books is lacking. This paper is aimed at filling this gap. To this end, Section 2 reviews the general economic analysis of RPM and the evidence supporting it. Section 3 gives an overview of the current situation concerning fixed prices for printed books and e-books within the OECD. Since the policy motivations and economic arguments concerning a fixed price for print and e-books are largely generic and interact, Section 3 also discusses the arguments commonly used for fixed printed book prices and the evidence supporting these arguments. Section 4 analyses their applicability to e-books and briefly discusses the acceptability of a fixed price for e-books under EU law. Section 5 concludes that while the evidence in defence of a fixed price for printed books is slim at best, the case for a fixed price for e-books is weaker still while the legal acceptability within EU law is disputable in many respects.

2. The economics of retail price maintenance

Judging from the historical use of retail price maintenance, books do not seem to be so different after all. Mathewson & Winter (1998, p. 59) observe that "RPM is the most important vertical restraint in terms of both the frequency of use and the number of legal cases generated." It was used in a wide range of markets such as clothing, jewellery, sports equipment, electronic appliances and cars, and estimates of the percentage of retail sales under RPM range from 4-10% in the US in the 1950s, to 25% or more in the UK and Canada in the 1960s.

2.1. Manufacturer's perspective

Unless specified differently, RPM is used in this paper to refer to the implementation of a fixed price in the consumer market, which does not allow for any upward or downward deviations. Alternatively, some authors use the term 'minimum RPM' for price floors and 'maximum RPM' for price ceilings. In general, price floors and price ceilings will have very different effects on the market outcome. Economic analysis of RPM usually starts with the observation that in a perfectly competitive market, one would not expect any manufacturer to prefer RPM: demand for a product is usually higher if prices are lower, and price competition in the retail market normally leads to lower prices and thereby increases sales. Price competition in the retail market therefore increases a manufacturer's profit as long as it does not affect wholesale prices.

Telser (1960) describes two main motivations for manufacturers to adopt RPM, the 'service argument' and the 'cartel argument'. The cartel argument explains why a group of manufacturers may adopt fixed retail prices. If a cartel of manufacturers aims at raising wholesale prices above the competitive level, it will be tempting for any member of the cartel to lower his price secretly and increase output. RPM is a relatively efficient way to monitor compliance to the cartel agreement.[21]

A second anti-competitive argument is related to foreclosure, where profit margins for retailers ensured by RPM serve to convince retailers not to supply a competitor's products (see Lafontaine & Slade (2008) for a discussion).

For the service argument, one needs to assume that the quantity sold at the retail level increases with the level of service or sales effort offered. The

[21] See Jullien & Rey (2000) for a formal model of RPM used to support collusion between manufacturers.

detrimental effect that retail price competition could have in such cases is most easily understood in relation to free-riding: without RPM, consumers can shop around for service and afterwards buy the product at the store that offers the lowest price and the lowest service. This enables discounters to free-ride on the service delivered by others. As a consequence, high-service retailers are forced to reduce their service levels as well in order to prevent losing market share. RPM encourages retailers to compete on the level of service provided, and if the sensitivity of demand to service is substantial with respect to the sensitivity to price, RPM may lead to higher prices, service levels, sales and profits. Telser argues that this service argument can only apply to "branded products that are unfamiliar to the mass of consumers" (Telser, 1960, p. 95).[22] Obviously, free-riding by discounters on the service provided by high-service stores is potentially aggravated by Internet sales.

An additional motivation for RPM in case both manufacturing and retail are highly concentrated, is the issue of 'double marginalisation' or 'double mark-up' (Spengler, 1950). If the manufacturer and the retailer both set profit-maximising prices without co-ordination, the resulting retail price will be higher than it would be if there was one vertically integrated monopolist. As a result, both the manufacturer and the retailer have lower profits, whereas consumer surplus is also reduced. In such a case, co-ordination to set retail prices at a monopoly level is welfare-enhancing for manufacturers, retailers and consumer. However, price floors are not needed to solve the double marginalisation problem; the use of price ceilings suffices. An alternative solution would be to set the wholesale price at the marginal cost level and charge retailers a fixed franchise fee.

Mathewson & Winter (1998) observe that RPM occurs for many products that do not seem to be prone to free-riding on high service levels, such as clothing, books, candy et cetera, which are likely to have high search costs compared to the differences in price across retailers. They extend the service argument to include the effect of RPM on the number of outlets for a product, which may increase demand as well, and review several more subtle mechanisms suggested by various authors, in which RPM may be efficient even without any free-riding on service. Such mechanisms are related to

[22] As alternatives to RPM, Telser (1960) discusses the option to have retailers charge consumers for sales services; to have manufacturers pay retailers up-front for providing services; to charge high-service retailers a lower wholesale price; or to deny supply to low-service retailers. However, all of these options face substantial information and monitoring problems. Service levels provided to consumers or trans-shipments between retailers need to be monitored for example.

differences in taste between consumers, high service as a signal of product quality or luxuriousness (Marvel & McCafferty, 1984), and the effect of RPM on inventory. The latter is studied in Deneckere, Marvel & Peck (1996, 1997) in a model of a situation with demand uncertainty in which discounters minimise their inventory to reduce costs. RPM can then support larger inventories and sales and may or may not increase consumer welfare. Other modelling approaches such as Rey & Tirole (1986), Rey & Vergé (2004), Schulz (2006), Foros, Kind, & Shaffer (2007) reveal that, depending on differences in the structure of the market and of demand, almost any outcome is possible: RPM may or may not lead to higher prices and service levels, and may or may not be in the interest of the manufacturer and of social welfare as a whole. Such diverging results lead Schulz to observe that it is "very difficult for a competition authority to assess the efficiency impact of RPM" (Schulz, 2006, p. 4).

2.2. Retailer's perspective

An additional motivation for retailers to implement RPM is also anti-competitive. RPM can be an effective tool for a cartel of retailers to co-ordinate their prices. Given a fixed wholesale price (which would result from effective competition between manufacturers), this enables them to increase their profits by keeping retail prices artificially high. A related effect of RPM initiated by a cartel of retailers is that it delays entry by discounters: it makes it less attractive for them to enter because they can gain market share less quickly. Once discounters gain relevance and market share, RPM becomes less attractive for a manufacturer (Mathewson & Winter, 1998).

Another situation in which retailers profit most from RPM is when manufacturers compete for scarce shelf space for retailers (Shaffer, 1991). Through RPM, manufacturers can commit to a large profit margin for retailers, which can convince them to dedicate shelf space to the product.

2.3. Empirical evidence

In theoretical models, almost any outcome of RPM on welfare is possible, depending on subtle characteristics of market structure and demand. Therefore, looking at the evidence is the obvious thing to do. Overstreet (1983) gives an extensive review of economic arguments concerning RPM and empirical studies evaluating its effects that existed at the time. He notes that in the greater part of the empirical work the effect of RPM on product prices was studied, and in most cases, a price increase was observed. However, this observation alone cannot distinguish between efficient and anti-competitive uses of RPM, since a combined increase of prices and

service levels, inventory or outlets, may increase total demand and enhance consumer surplus and total welfare. Studies of the effects on the quantities sold, on the other hand, are scarce and inconclusive.

All in all, Overstreet concludes that RPM has been used in both efficient and anti-competitive ways and that it is "extremely unlikely that any single hypothesis for RPM would be able to explain all uses of the practice either in general or in those particular markets where the practice might become prevalent" (Overstreet, 1983, p. 163). Hence, a strict standard of per se illegality is inappropriate and a rule of reason approach is more in line with economic theory and with the evidence.

Ippolito (1991) reviews all RPM cases reported in the US between 1975 and 1982 and concludes that collusion is the primary explanation in less than 15% of the cases. Service-enhancing and sales-enhancing theories are a more plausible explanation in most cases. Likewise, Mathewson & Winter (1998, p. 82) observe that there is little evidence to distinguish the various candidate explanations for RPM in practice but that "the available evidence tends to support principal-agency interpretations". A similar conclusion is drawn in reviews of empirical papers on vertical restraints (of which RPM is a subset) by Cooper et al. (2005) and by Lafontaine & Slade (2008). Thus, the evidence suggests using a case-by-case rule of reason approach to RPM, instead of illegality per se.[23]

Kretschmer (2014) develops criteria to tell pro-competitive and anti-competitive use of RPM apart, solely based on the available empirical evidence. He discusses screening criteria for presumptive legality or illegality proposed by other authors. These are typically related to a high market share/market power of the manufacturer, a high adoption rate or RPM in the market, and dealer initiation – all of which are considered indicators for anti-competitive use of RPM. The use of RPM by new firms to launch new products or to enter the market, in particular if such products benefit from a high level of sales service, is often considered acceptable, as is an output increase as a result of RPM. However, the use of such criteria could lead to false positives or false negatives, i.e. the rejection of instances of pro-competitive RPM or the acceptance of anti-competitive instances. Moreover, Kretschmer notes that the relevance of dealer initiation is not backed by

[23] In line with this, the US Supreme Court adopted a 'rule of reason' approach in the Leegin Decision, in which judges have to distinguish "between restraints with anticompetitive effect that are harmful to the consumer and those with procompetitive effect that are in the consumer's best interest" (Leegin Decision, 2007). Up until that time, RPM had been per se illegal in the US with only a few acceptable defences.

empirical evidence. Instead, he proposes a sequential investigation rule, based on questions concerning the concentration in the manufacturing market and the market share of the individual manufacturer applying RPM, the adoption rate of RPM, dealer concentration and product complexity. Depending on the answers to these questions, RPM is most likely to be pro-competitive or anti-competitive.

3. Fixed printed book prices: practice, motivations and evidence

3.1. Fixed book prices in the OECD

In the bulk of the literature on RPM cited in the previous section, its application in the book market is ignored. Schulz (2005), however, stresses the remarkable situation that in Germany RPM has been mandatory in the book trade since 2002, while it is forbidden per se for all other sectors. This situation is not unlike that in many other countries. Presently, 15 OECD countries have regulation for fixing the price of printed books (see Table 1), in most cases mandated by legislation as competition policy would no longer allow for a business agreement to fix book prices (OECD, 2012). The fixed price typically lasts between 18 and 24 months, but in Slovenia this period is only six months while in Norway it lasts until the 30th of April of the year after publication (i.e. between 4 and 16 months). In the Netherlands, publishers can adapt the fixed price every six months, and the fixed-price law does not apply to schoolbooks. Most countries with a fixed book price allow limited discounts for the general public, at book fairs or for schools and libraries (IPA, 2014).

Ten of the countries with a fixed book price in Table 1 are EU members, despite the fact that, as pointed out above, RPM is a hard-core restriction under the Block Exemption Regulation. The European Commission does not favour fixed book price laws, but accepts them as long as they do not hinder cross-border trade between member states (European Commission, 2002). Fixed book prices are by no means a remnant of the past: some of these countries have introduced such legislation only recently. Slovenia, for instance, introduced a fixed book price law only in 2014, Israel in 2013, while in Poland, the Polish Chamber of Books has drafted a bill only recently and is currently lobbying to have it adopted. Quebec (Canada), Hungary and Denmark have recently had discussions on whether a fixed price for books should be (re)introduced (IPA, 2014). At the same time, other countries have repealed existing price fixing agreements, often prompted by the development of competition policy: Sweden, Finland and Australia in the

1970s, the UK and Ireland in 1995, Switzerland in 1999 and Hungary in 2007 (OECD, 2012; IPA, 2014).

At least eight of the OECD countries with a fixed price for printed books currently have a fixed price for e-books as well (see Table 1). Italy, Japan, the Netherlands and Portugal chose not to extend RPM regulation to e-books. No country is known to have RPM regulation for e-books but not for print.

Table 1 – Fixed prices for printed books and e-books in OECD countries per 1 January 2015

RPM for printed books	RPM for e-books?	No RPM for books
Austria	Yes	Australia
France	Yes	Belgium
Germany	Yes	Canada
Greece	Yes	Czech Republic
Korea	Yes	Denmark
Norway	Yes	Estonia
Slovenia	Yes	Finland
Spain	Yes	Hungary
Italy	No	Iceland
Japan	No	Ireland
Netherlands	No	New Zealand
Portugal	No	Poland
Luxembourg	N/A	Slovak Republic
Mexico	N/A	Sweden
Israel	N/A	Switzerland
		Turkey
		United Kingdom
		United States

Sources: No information available for Chile. Compiled based on IPA (2014), OECD (2012), Kurschus, S. (2015), http://www.buchmesse.de/en/international/book_markets/, http://www.boekenvak.be/sites/default/files/EBF_surveyfixedfreeprices_112010.pdf.

3.2. Motivations and evidence for fixed book prices

RPM for printed books is not the primary focus of this paper. However, a discussion of the cultural and economic arguments for it and of the available empirical evidence is an inevitable steppingstone for an analysis of a fixed price for e-books. After all, these arguments are largely generic and fixed prices for print and e-books are likely to interact: whether or not to extend RPM to e-books may affect the policy objectives for printed books.

3.2.1. Policy motivations for fixed book prices

There is a variety of cultural reasons to opt for fixed prices for books, often related to improving the production, availability and consumption of quality books and promoting readership (OECD, 2012, note 82). For instance, the Net Book Agreement in the UK was motivated by the argument that without

price fixing there would be fewer and less well-equipped bookshops, more expensive books and fewer titles published (Dearnley & Feather, 2002). Similarly, the explanatory memorandum to the proposal for the Dutch RPM Books Act, expressed the aim of creating conditions for a broad and diverse supply of books in the long term, available through a geographically wide network of bookstores with a broad collection in stock (*Kamerstukken II* 2002/03, 28 652, nr 3, p. 1). However, Canoy, van Ours & van der Ploeg (2006) observe that governments do not want to tie themselves down to quantitative targets for introducing a fixed price in terms of the desired number of books published or the number of bookstores.

Proponents of fixed book prices fear that price competition between booksellers would drive smaller, independent, specialist or niche booksellers out of business, to the benefit of large chains, discounters and supermarkets that focus on bestsellers only. This would force other booksellers and publishers also to focus on bestsellers, leading to a reduction in the variety of books published and on stock in bookstores as well as reduced accessibility of books, in particular in remote areas. A fixed price, it is argued, enables publishers and booksellers to cross-subsidise low-selling but culturally important titles with the profits made on bestsellers. Moreover, a guaranteed profit margin can convince booksellers to stock books that have an uncertain sales potential.

Arguments against a fixed retail price for books mostly originate from general competition policy: RPM is believed to reduce or even eliminate competition between booksellers, leading to artificially high retail prices and supra-normal profits in the industry at the expense of consumers. In addition, fixed book prices may be opposed for equity reasons, since to the extent that cross-subsidies between titles occur, they may very well cause a cross-subsidy from low-income bestseller readers to high-income readers of specialist books (e.g. see Canoy, van Ours & van der Ploeg, 2006).

3.2.2. Economic analysis

For an economic analysis of a fixed book price, it is useful to outline the characteristics of the book market briefly. The production of books traditionally comes with high fixed costs and low marginal costs, which entails economies of scale when publishing a single title and economies of scope when publishing a portfolio of titles. Combined with the reputation publishers can build, this naturally brings about concentration in the book publishing industry. Another feature of books – or any cultural product – which stimulates concentration is the fact that some authors and books

become very popular and others fail, while success is very hard to predict in advance. Caves (2000) coined this as the 'nobody knows principle'. It can be countered by pooling risks in larger portfolios. Digital printing technologies, however, have reduced the economies of scale in the production of printed copies substantially. This increased the viability of small print runs, small publishers and even self-publishing, but economies of scale will remain in the production of the content itself, much like for any copyrighted product. All in all, the market structure typically consists of a handful of large publishers, some of which are international players, and a fringe of many small independent publishers that are often less commercially motivated (Wikström & Johansson, 2013). Globally, the turnover in the book publishing industry is in the order of US$150 billion (Wischenbart, 2014). There are six internationally dominant conglomerates, three to four hundred medium-sized publishers and over 80 thousand small or self-publishers. The top-fifty publishers together have 80% market share (OECD, 2012).

Different books are imperfect substitutes even if sometimes they are close substitutes. Normally, this leads to monopolistic competition, which may cause too little or too much variety (Canoy, van Ours & van der Ploeg, 2006). Another characteristic of books is the relatively short commercial life cycle. For the Netherlands it was concluded that around 2010, an average book generates more than half of its turnover in the first year after publication and about three quarters in the first two years (Poort et al., 2012, p. 33). This implies that the typical duration of mandatory price fixing discussed in the previous section more or less equals the commercial life of a new title.

At the retail level, economies of scale may stem from the 'love for variety'. Consumers entering a bookstore for a certain book, may walk out with an alternative book or with several books that match their interests. An opposite force, driving the optimum scale of retailers down, is the highly skewed distribution of turnover in the book market.[24] To the extent that it is predicable which books will sell well by the time they reach bookstores, this implies that despite consumers' love for variety, the marginal revenues of extra square feet of store space will often quickly drop below their marginal costs or the marginal revenues of a coffee corner or of selling stationary. Nevertheless, in many countries there are large chains of physical booksellers with a substantial market share, such as Fnac in France,

[24] In the Netherlands in 2010, 13% of all available titles generated 90% of turnover, and the average turnover from titles with revenues exceeding €1,000 was over 50 times the average turnover from titles that generated less than €1,000 (Poort et al., 2012, p. 32).

Feltrinelli in Italy, Waterstones in the UK and Barnes and Noble in the US (Canoy, van Ours & van der Ploeg, 2006).

To what extent do the economic mechanisms underlying RPM apply to the book publishing industry? Note that the policy motivations for fixed book prices are largely consistent with the anti-competitive retailer cartel argument. Fixed book prices are supposed to help small, independent – and possibly inefficient – bookstores to survive and to keep discounters and supermarkets away from gaining market share rapidly. Fixed book prices are also supposed to generate higher profits, which retailers may re-invest in stocking low-selling but culturally important titles. Thus, the anti-competitive effect of a fixed price is motivated by the culturally desirable effect it may have on the survival and geographical spread of smaller bookstores and on its presumed effect on the diversity of books stocked by retailers. At the publisher level, the effect of fixed prices is also implicitly expected to be anti-competitive: publishers are expected to be able to cross-subsidise culturally important publications that have uncertain commercial prospects, with additional profits they make on bestsellers, thanks to the fixed price.

However, it is not certain if the higher profits that bookstores and publishers are supposed to re-invest, occur in the first place. Wholesale prices are not fixed, and it depends on these prices whether retailers have a high profit margin or not. In theory, publishers may help small, independent booksellers survive by offering them a lower wholesale price than large chains, discounters or Internet stores – they could also do this without RPM – but this runs counter to the logic that larger retailers have more buying power to negotiate low wholesale prices or even to include a most-favoured-nation-clause in their agreement which precludes this. With or without RPM, small booksellers may be driven out of business. Similar question marks can be placed by the assumption that RPM raises profits for publishers which they can use to cross-subsidise low-selling publications. RPM is not a sufficient condition for softening the monopolistic competition between publishers. Nevertheless, it may facilitate tacit or explicit collusion with respect to the retail prices each publisher fixes for their own publications.

But even if RPM enables publishers to collude and increase their profits, there is no guarantee it will cause them to invest in a wider variety of books than they would have done otherwise. With or without a fixed price, the 'nobody knows principle' dictates publishers to invest in a wide portfolio of titles, many of which will fail. Ringstad (2004) argues that there is no

indication that publishers knowingly invest in loss-making titles. They may temporarily subsidise books by authors of whom they have higher expectations for the future, or publications that do not sell well but improve their image. But this is business as usual. The point that cross-subsidies are not guaranteed is also stressed by Appelman (2003) and Canoy, van Ours & van der Ploeg (2006) and extends to bookstores as well. Instead, the opportunities for extra profits may as well cause inefficiencies at publishers and bookstores and will be the most beneficial for booksellers with a limited number of books in stock.

An additional anti-competitive argument mentioned in the previous section is foreclosure. This argument does not apply in the book market, as booksellers generally have no exclusivity deals with publishers. Deals are made about a more prominent placement of books in the shop-window or in the store – e.g. on tables instead of on the shelf – but such deals do not qualify as foreclosure.

What about the pro-competitive motivations for RPM? The service argument in combination with free-riding, as it was originally made by Telser (1960), has been criticised for being unlikely for products with search costs that are high compared to possible differences in retail price. This criticism certainly applies to books (Schulz, 2006). Moreover, as Canoy, van Ours & van der Ploeg (2006) stress, the opportunity costs of the time spent on consuming a book usually outweigh the price, which implies a relatively low price elasticity.

The applicability of the more general version of the service argument to books is also questionable. Books are no complex products, even if finding the right book may be difficult. Nor do books seem to benefit from a luxury image upheld by high prices and fancy stores. Advice by a well-informed, passionate bookseller may certainly increase sales, but the costs of providing such services do not seem to be so high that they require a profit margin guaranteed by price fixing. Besides, it can be disputed if the low-cost service provided by an algorithm in an Internet store pointing out books that might be of interest does not beat the passionate bookseller and the romantic serendipity of browsing bookshelves.

The related argument made by Deneckere, Marvel & Peck (1996, 1997) that RPM can be used to mitigate the negative effect of demand uncertainly on inventory, could potentially be valid. However, the book trade has already produced an alternative solution to this by return policies which allow

booksellers to return unsold copies. Insofar as a fixed book price increases the number and geographical spread of bookstores, this may increase demand, particularly since a substantial share of books is bought on impulse or as a gift. For such purchases, availability is likely to prompt demand. However, the weight of this argument is likely to have decreased with the advent of large Internet bookstores that offer a near infinite variety and next-day delivery.

Lastly, it was already mentioned that a price ceiling would suffice – rather than a fixed retail price or a price floor – to remedy the double mark-up problem. The situation in the UK after the Net Book Agreement resembles this, as most publishers print a recommended retail price on the back cover, which in practice serves as a price ceiling.

It can be concluded that anti-competitive arguments are the most obvious motivation for fixed book prices. This conclusion also matches the outcome of the empirically based sequential investigation rule developed by Kretschmer (2014), when assuming a fairly high concentration rate of the publishing market and a high adoption rate of RPM. It is also in line with the common – albeit empirically unsupported – critical appraisal of dealer initiation of any RPM scheme.[25] This anti-competitive nature of a fixed book price is paired with noble intentions about what should be done with the ensuing profits. There is, however, no guarantee that such surpluses are indeed created, and if they occur, that they will be re-invested in line with the policy objectives.

3.2.3. Empirical evidence

The empirical evidence about the effects of a fixed book price is limited. As was discussed in Section 2.3, the welfare effects of RPM are generally hard to determine, since indicators such as a price increase have ambiguous consequences. But even partial evidence – e.g. the effect of a fixed book price on title production, average price levels, the number of bookstores, and readership – is scarce. An important reason for this are the very large differences in book production and reading behaviour between countries (Canoy, van Ours & van der Ploeg, 2006), which may depend on factors such as the language area, cultural differences, income levels and cultural policy other than RPM. This implies that the effect of a fixed book price can hardly be tested in a cross-sectional country comparison. Nor can the effect of an

[25] Dearley & Feather (2002) note that "the initial impetus for RPM came from booksellers, not publishers". Likewise, booksellers are the most fervent supporters of the fixed book price in the Netherlands (E.g. KVB, 2014).

unchanged policy be determined by monitoring developments over time in a single country. The best if not the only way to find empirical evidence about the effect of a fixed book price, is studying the effect of policy changes in country case studies or by using a panel dataset of countries over time. Ideally, this panel dataset contains countries that introduced or repealed a fixed book price over the measurement period. If not, conclusions may be based on diverging developments between countries with and countries without a fixed book price.

Canoy, van Ours & van der Ploeg (2006) perform this kind of panel study, using data for 20 countries in the years 1975-1999. They explain the annual number of new titles relative to the population of each country by developments in GDP per capita, education levels and whether or not countries have a fixed book price. A fixed book price appears to have no effect. In a second model for only seven countries in the years 1990-1999, a negative effect of a fixed price on title production is found when allowing for country-specific random effects. This outcome is purely determined by the suspension of the Net Book Agreement (NBA) in the UK in 1995.

While the NBA was suspended voluntarily by the end of 1995, it was officially struck down by the Restrictive Practices Court in 1997. This decision was motivated by the material changes in the production costs and the length of production runs in printing as well as by structural changes in retailing, i.e. the emergence of large chains of retailers. By this time, the Publishers Association had decided it could no longer defend it (Utton, 2000). Dearnley & Feather (2002) study the changes in the British book trade since 1995. They find indications for a decrease in the number of independent bookstores but a relative increase in the retail space devoted to books. Like Canoy, van Ours & van der Ploeg (2006), they see no indications for a decrease in the number of published titles. A sharp increase in the *recommended* retail price of books was observed shortly after suspension of the NBA, but the aim of this was to give booksellers room for discounting. They conclude that "there is little compelling evidence that the abrogation of RPM in 1995 intrinsically harmed the UK bookselling trade."

Ringstad (2004) discusses a study by Fishwick (2001) in which similar conclusions are reached. Bestsellers are concluded to have gained from discounting while non-mass-market books have become more expensive. This implies that in general, high-income customers ended up paying more while low-income groups pay less and buy more. Title production has increased after a brief dip in 1997. Fishwick (2008), however, studies retail

price developments since 1995 in more detail and concludes that book prices have in fact increased more than general inflation in the years 1996-2007, when correcting for changes in the mix of books purchased. During the same period, book prices in Germany and France appear to have increased less. Fishwick explains this remarkable outcome by pointing at an increase of the recommended retail price set by publishers, to compensate for much bigger discounts given to powerful retailers.

Løyland & Ringstad (2012) and Ringstad (2004) contrast this outcome with price and sales developments in Finland, Sweden, Norway and Denmark, which do not reveal any correlation with fixed book prices at all. In addition, Løyland & Ringstad (2012) study the effects of the partial liberalisation of the Norwegian fixed book price system in 2005, which reduced the duration of the fixed price, allows for a maximum discount of 12.5% in all sales channels during that period (instead of a maximum discount of 25% exclusively for book clubs before), and repealed the exclusive right for bookstores to sell schoolbooks. The authors conclude that prices are slightly lower than they would have been without the partial liberalisation, even though this effect is short-term and is concentrated on bestsellers. Bookstores in rural areas experience a negative impact of losing their exclusive right to sell schoolbooks. The number of titles published appears to be slightly higher, particularly in crime and entertainment literature.

4. Fixed prices for e-books

E-books, or electronic books, have existed since the 1970s, but have only gained economic relevance after the launch of e-readers and tablet computers from 2006 onwards (OECD, 2012). Currently, e-books are most popular for fiction. Although systematic, internationally comparable data for the e-book market are unavailable, it is safe to say that the current adoption of e-books differs substantially between countries. In the US, turnover from e-books amounted to about 19% of industry revenues in 2013, and although this market share was 50% or more in some segments and for some publishers and retailers, total e-book revenues stagnated in 2013 and in the first half of 2014. The UK came in second, with a market share for e-books of 15%, followed at some distance by countries such as Denmark (5%), the Netherlands (4.7%), Germany (3.9%), and Spain (3-5%). France (1.5-2.3%) and Sweden (1%) are lagging behind. Overall, e-books account for only 3% of book sales in Europe (Wischenbart, 2014). In particular for Sweden, the low penetration of e-books is surprising when compared to the adoption of digital music services and the Internet penetration in general. These figures underscore the fact that the speed of e-book adoption is not only determined

by demand characteristics, but also by availability and pricing. In several countries, publishers have been hesitant to publish e-books, fearing that unauthorised file sharing would erode their revenues much like it had eroded those in the music and audio-visual industries.

However, the figures above also underscore the fact that policymakers can no longer ignore e-books, in particular since e-book market shares are considerably higher when expressed in terms of the number of copies sold. With the advent of e-books, countries with a fixed price for printed books are faced with the question of whether to extend existing legislation to e-books: do the same cultural policy arguments and legal considerations apply? They could also consider repealing RPM laws for printed books in the light of these developments, but there have not been any indications for such developments so far. Eight countries in the OECD extended fixed book price regulation to e-books (see Table 1). On the other hand, Italy, Japan, the Netherlands and Portugal decided to leave the price of e-books free, whereas the price of printed books is still subject to RPM. No OECD country opted for the mirror image of this situation – free prices for print and fixed prices for e-books – even though the agency model could be seen as a publisher-initiated version of this.

4.1. Economic analysis

There are several relevant differences between the market for printed books and the market for e-books. First, a consumer needs a complementary device for reading an e-book. E-readers or tablet computers are most commonly used for this purpose, but e-books can also be read on computers or smartphones. Different devices use different file types for e-books and with these file types come consumer lock-in and compatibility issues: Amazon has developed apps for reading e-books in its proprietary AZW format on iOS and Android devices, but Amazon's Kindle e-readers cannot read e-books in the common ePub format (OECD, 2012). Several conversion tools are available on the Internet, which limit the switching costs for consumers who want to use different devices or buy e-books from different platforms. Nevertheless, retail concentration is much higher for e-books than for print. In the US for instance, Amazon was initially responsible for more than 90% of all e-book sales. By the end of 2013, Amazon's market share was still around 65% (De los Santos & Wildenbeest, 2014).

From a consumer perspective, e-books have advantages as well as disadvantages in comparison to printed books (Poort et al., 2012, pp. 54-61). Portability of a large number of books is an important advantage, in

particular when the user is travelling or for reference purposes. Ease of purchase – combined with instant delivery – is another advantage. Other features of e-books are primarily of interest for non-fiction books: searchability, the possibility of including external links and multimedia extensions, and of providing updates as well as the option to buy individual chapters of a book, which is useful for travel guides for instance. Disadvantages of e-books in comparison to printed books are reduced oversight when browsing through a book, reduced ease of lending books to friends and the fact that e-readers on the beach or at the poolside are more vulnerable to theft and damage.

Section 3.2 concluded that the anti-competitive argument for RPM – to raise profits for publishers and retailers – is the most likely motivation for fixed book prices. These profits are commonly justified by the aim of maintaining a geographically wide network of well-stocked bookstores and a wide variety of books published, but it is uncertain to what extent such profits occur and are indeed re-invested. For e-books, all retailer-related arguments lose their direct relevance. The Internet provides access to any e-bookstore anywhere, so there can be no public interest associated with a geographically dense network of e-bookstores.

Moreover, given the fact that retailers do not have to keep costly stocks of e-books or rent expensive floor space to shelve them, there are no cost-related impediments for any e-bookstore to offer the full collection of e-books, once they have developed an adequate infrastructure to sell them. In many countries (e.g. the Netherlands, Flanders and a number of Scandinavian countries), booksellers have created a joint electronic platform for selling e-books, in some cases joining forces with publishers. Individual specialist shops and larger chains of booksellers are trying to develop the local market for e-books together to achieve the kind of scale needed to compete with companies such as Google, Apple and Amazon. Thus, cross-subsidisation between titles at the retailer level and the preservation of a geographically wide network of bookstores are irrelevant for e-books. Along with this, pro-competitive arguments for RMP related to inventory (Deneckere, Marvel & Peck, 1996; 1997) and shelf space (Shaffer, 1991) lose relevance insofar as they have ever had any in relation to books. Nor does the argument that the proximity of bookstores could increase the sales of books bought on impulse or as a gift apply to e-books.

The argument could yet be made that a fixed price for e-books helps a wide network of bookstores for print to survive in a market which is gradually

shifting to e-books. Thanks to a fixed e-book price, they may acquire their share in this market as well, which helps them to survive for print. Note, however, that this requires a new kind of cross-subsidisation: from e-books to print. Again, it is most uncertain if the according profits on e-books will be made and if a cross-subsidy will really occur. Moreover, with the increasing adoption of e-books and the ubiquitous availability of e-bookstores 24/7, the justification for government intervention to safeguard a geographically wide network of well-stocked bookstores also loses strength. A fixed e-book price will not contribute to the accessibility of books but may only marginally and temporarily improve the geographical spread of bookstores by stalling the adoption speed of e-books in general and offering bookstores slightly better chances to acquire a share of the e-book market.

From the perspective of publishers, pro-competitive arguments related to sales services, retailer inventory and shelf space apply even less than for printed books, and double marginalisation problems can be solved differently. Hence, publishers' motivations for fixed e-book prices are also anti-competitive in the sense that they are geared towards raising their profits, at the expense of retailers or consumers, rather than towards total welfare. As has already been stated, this conclusion also matches the outcome of the empirically based sequential investigation rule developed by Kretschmer (2014), when a fairly high concentration rate of the publishing market and a high adoption rate of RPM are assumed. In the US, agency pricing was indeed used to raise retail prices significantly: when the agency model was adopted, prices for bestsellers rose by more than 40%, which motivated the Department of Justice to file a lawsuit. De los Santos & Wildenbeest (2014) find that after agency pricing was abandoned again, e-book prices for the relevant titles decreased by 18% at Amazon and by 8% at Barnes & Noble. Again, one can hope but not be certain that any additional profits resulting from fixed prices are used to cross-subsidise commercially less attractive titles, and so far no sound evidence has been found to base this hope on. Shareholders, for one, would rather receive such profits in the shape of dividend payments.

Obviously, publishers can have an interest in a diverse and fragmented retail market, in which there is little buying power. It strengthens their bargaining position, and fixed prices can contribute to this. However, a single publisher taking the RPM route does not add much, which can explain why publishers coordinated the introduction of agency pricing in 2010. A diverse and fragmented retail market serves like a collective good that benefits all publishers and to which they all contribute by observing RPM. In some cases,

individual publishers might be better off if *everyone else* observes RPM, but they will not – for example, when marketing a long awaited sequel to a bestseller.

Against this background, one should bear in mind that there are many more opportunities for publishers to sidestep RPM legislation for e-books than for print. First, publishers can decide to lend or stream e-books next to selling them, for instance in access-based subscription models like Spotify. For e-books, commercial lending is more likely to be a viable business model than for print. As noted, most books are only in high demand for a year or two, but this is no obstacle for e-lending. Second, they can enhance e-books with external sources, sound or video. With such additions, they normally no longer fall under the legal definition of an e-book, since a clear demarcation between e-books and other electronic services would become tricky or even impossible as soon as such functionalities become more sophisticated. Third, schoolbooks, academic books and other non-fiction may be sold per chapter and updates may be sold at lower costs, which also creates a puzzle for RPM legislation. Given these options, a publisher can decide for himself whether or not to have specific titles fall entirely under the fixed price regimen. Since it would be detrimental to innovation for legislators to forbid such practices, complying with RPM legislation for e-books would basically become optional for publishers and in particular for bestsellers, they may decide not to.

4.2. Legal context[26]

As with printed books, European law does not rule out legislation for fixed e-book prices in principle. That said, price fixing laws will be subject to stricter review in the case of e-books, in part owing to their nature: e-books are a service, whereas paper books are a good. Introducing a fixed price presents even more of a legal challenge when the free movement of services is at stake. Whereas there is some room for the imposition of restrictions on the trade of *goods* in the domestic market, even if supplied from abroad (i.e. in the case of not allowed forms of circumvention), a similar restriction on *services* would give rise to significantly bigger problems.

This issue was the main focus of the debate in France, when it introduced a fixed price for e-books. Under the French Act, suppliers who have their corporate seat in France are required to charge a fixed price for books, so anyone offering books for sale to buyers in France must apply the fixed price. This means that suppliers established outside of France (e.g. Amazon) are

[26] For a more extensive legal analysis, see Section 2.2 in Poort et al. (2012).

also bound to charge fixed prices. It is this extraterritorial criterion – no exception being made for EU/EEA countries – that makes the proposal vulnerable. In this particular case the European Commission started an investigation (as became clear from the French Parliamentary documents), but this did not result in a formal procedure.

The question therefore remains as to whether a far-reaching restriction like RPM for e-books is compatible with European law: whereas standard case law offers the possibility of counteracting classic evasion of the law (selling from abroad with the sole purpose of sidestepping national regulations), generic supply, which includes supplying domestic markets, should remain possible. Similar restrictions on the provision of services have proven to be untenable. Stricter national rules would put such international suppliers at a competitive advantage compared with players that focus exclusively on the national market. Should these suppliers face a situation where publishers refuse to supply them (in an effort to enforce domestic price fixing indirectly, if applicable), this would quickly meet with objections arising from national and/or European competition law, based in part on the requirement of proportionality.

To the extent that agency pricing *could* offer a possible alternative in the digital arena, this model may not operate outside the limits of competition law, by which RPM is a hard-core restriction in the EU under the Block Exemption Regulation. Price setting by the manufacturer (principal) is accepted in agency agreements, however, as the agent does not become the owner of the good (European Commission, 2010, Art. 47). A defining criterion for such agency relation is that the agent bears no financial or commercial risk to the contract concluded or negotiated, but even if these criteria are met, an agency relation may not be used to facilitate collusion (European Commission, 2010, Art. 12-21). In 2011, the European Commission formally opened antitrust proceedings against the publishers who had adopted agency pricing, resulting in a settlement to abandon agency pricing.

5. Conclusion

While economists have increasingly accepted pro-competitive motivations for RPM since the 1980s, the motivations for fixed price legislation for books remain predominantly anti-competitive. Nevertheless, fifteen countries in the OECD currently have regulation for fixing the price of printed books, and at least eight of these have extended such regulation to e-books. Pro-competitive motivations do not seem to apply, and fixed book prices are

willingly accepted by legislators to soften competition between retailers. This is typically justified by beneficial effects the ensuing profits are believed to have on the preservation of a geographically dense network of well-stocked bookstores and a diverse supply of titles. There is, however, no guarantee that such surpluses are indeed created and if they occur, that they are re-invested in line with the policy objectives. The empirical evidence in defence of a fixed price *for printed books* is slim at best and there is no clear indication of any favourable effect of fixed price regimens on title production or the number of bookstores. The most promising way to find more conclusive empirical evidence about the effect of a fixed printed book price is studying a panel dataset which contains countries that introduced or repealed a fixed book price over the measurement period.

Focused on e-books, the economic analysis showed that the case for fixed prices is weaker still. Combined with the legal concerns that can be raised under EU law, this makes a fixed price for e-books ill-advised. For e-books, all retailer-related arguments lose their direct relevance: cross-subsidisation between titles at the retailer level and the preservation of a geographically wide network of bookstores are irrelevant to e-books. The argument could yet be made that a fixed price for e-books helps a wide network of bookstores for printed books to survive, but this argument requires a new kind of cross-subsidisation, from e-books to print. Again, it is most uncertain if the according profits on e-books will be made and if a cross-subsidy will really occur. A fixed e-book price will not contribute to the accessibility of books but may only marginally and temporarily improve the geographical spread of bookstores by stalling the adoption speed of e-books in general. Pro-competitive arguments for retail price maintenance related to sales services, retailer inventory and shelf space apply even less for e-books than for print.

From the perspective of publishers, motivations for fixed e-book prices are also anti-competitive: they are geared towards raising their profits, at the expense of retailers or consumers, rather than towards total welfare. One can only hope but not be certain that any additional profits resulting from fixed prices are used to cross-subsidise commercially less attractive titles, and so far no sound evidence has been presented to base this hope on. The most compelling argument for a fixed price for e-books is related to its contribution to a diverse and fragmented retail market, in which there is little buying power. One may call this the anti-Amazon argument. However, it seems to be an oxymoron to allow publishers to fix retail prices in order to improve competition. Instead, general competition law should be used to

prevent Amazon from abusing a dominant position as an e-book retailer. As regards the other policy objectives legislators may pursue with fixed book prices, such as to increase the production of works of literature and the accessibility of books in less urbanized regions, instruments such as authors grants or subsidies for digitising the back catalogue seem, more effective, more efficient and legally less controversial.

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4 Legal, economic and cultural aspects of file sharing

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Abstract
This contribution seeks to identify the short and long-term economic and cultural effects of file sharing on music, films and games, while taking into account the legal context and policy developments. The short-term implications examined concern direct costs and benefits to society, whereas the long-term impact concerns changes in the industry's business models as well as in cultural diversity and the accessibility of content. It observes that the proliferation of digital distribution networks combined with the availability of digital technology among consumers has broken the entertainment industries' control over the access to their products. Only part of the decline in music sales can be attributed to file sharing. Despite the losses for the music industry, the increased accessibillity of culture renders the overall welfare effects of file sharing robustly positive. As a consequence the entertainment industries, particularly the music industry, have to explore new models to sustain their business.

Keywords
File sharing, downloading/uploading, entertainment industry, cultural analysis, economic analysis, legal and policy analysis.

1. Introduction

The introduction of digital technology in the media sector has far-reaching consequences for the role of media in society and the position of companies and institutions that have become the main providers of information and entertainment content. One of the many issues concerns the (unauthorised) distribution of entertainment products, mainly music, but also audio-visual products and games, through the Internet. The growing phenomenon of file

[27] This paper was presented at the 25th EURO CPR Conference (Brussels, 28-30 March 2010). The content of this paper is largely based on the study 'Ups and Downs. Economic and cultural effects of file sharing on music, film and games', HUYGEN *et al.*, 2009.

sharing has been accompanied by a number of controversies on its implications for the rights holders (creators, performing artists and producers), its legal status and its wider economic and cultural implications. File sharing is the catch-all term for uploading and downloading, and encompasses a range of technologies.

Specifically in the United States and to a lesser extent in Europe the content industries have taken action in cases where they assumed that citizens violated the rights of authors, artists and producers and have organised extensive lobbies, successfully mobilising politicians to plea to make file sharing by individual citizens a violation of the law. Apart from the fact that those who fight file sharing claim that rights are violated, they state that cultural diversity will suffer and opportunities for new talent will dry up together with the industry's revenues.

The French Hadopi law drew attention from all over the continent while the court cases against the Swedish Pirate Bay made waves globally and led to the establishment of a political party called The Pirate Party that made it into the European Parliament. Those who oppose the anti-file sharing legislation claim that file sharing is the consequence of the industry's failure and argue that the industry should tap into new value-creating opportunities. They see opportunities to achieve cultural, social and economic value by new means.

The research reported here seeks to identify the short- and long-term economic and cultural effects of file sharing on music, films and games. The short-term implications examined concern direct costs and benefits to society. The long-term impact concerns changes in the industry's business models as well as in cultural diversity and the accessibility of content.

Conclusions are based on three analyses. Characteristics of and trends in the entertainment industry, its context and its business model are analysed using a broad range of existing information, from previous research to a number of consultations with industries' professionals. The legal/policy framework and the specific issues concerning copyright and file sharing are dealt with as part of a review of trends in the regulatory framework, nationally and within Europe. A representative survey of Dutch Internet users examines the practice of file sharing and the underlying reasons and motives. The results are compared with those from similar studies, to validate its outcomes and to estimate wider implications of the study's results. Hence, the conclusions presented are believed to have wider validity then solely for the Netherlands, since similar circumstances apply in other

countries. The entertainment industries examined operate globally and the contextual legal framework is European.

2. Entertainment industry: music, film and games

The markets for film-, games- and music both in the Netherlands and abroad show different developments. Turnover from recorded music sales fell by around 30 % between 2004 and 2009 internationally. Despite their enormous growth of 940% in the same period, paid-for downloads have not been able to match this decline (IFPI 2010). The market for films is growing in some areas – DVD sales and cinema visits – but declining in others, e.g. DVD rentals. The games market is enjoying exuberant growth – at the console end of the market (both hardware and content), that is, as PC games have stopped moving. In the Netherlands, these diverging trends add up to a relatively stable turnover in the overall entertainment industry.

Operating in the experience market, the film, games and music industries leverage access to information and cultural products through authors' rights and neighbouring rights, with products that are primarily symbolic in nature. The business of the core companies in these sectors is based on the controlled access to the products created, in this case films, games and music recordings. Copyrights give them control over the use and marketing of their products, for which they may charge consumers. In many cases these companies are also producers of the content provided, employing creative personnel or making contractual arrangements with creators and performers who license the exploitation rights of their creations to publishing companies on an exclusive basis, either in film, music or gaming and in case of cross media production, to all of them.

A key feature of the entertainment industries is their specific combination of high fixed initial costs and relatively low variable costs, which translates into economies of scale. In addition, consumers are only able to establish the value of music, film and games through getting to know them, which makes them so-called experience goods. What is more, consumption of entertainment products is typically non-rival, i.e. use by one consumer does not necessarily affect another's enjoyment of them – especially if these products are available in digital format.

With information and communication being crucial features of these industries, trends in information and communication technologies have a decisive influence on the sector – digitisation being a current case in point. In fact, the games industry itself is a product of the digital revolution. File

sharing, a by-product of digitisation and the central focus of this study, has major implications for the music, film and games industries.

3. Regulatory context

The regulatory context of file sharing in most European countries is based on traditional copyright related concepts, but increasingly is an issue of national and international attention.

3.1. Downloading and private copying

Within the meaning of copyright law, the downloading of copyrighted digital content constitutes a reproduction (copying). Every form of downloading (from P2P networks or a website, on a mobile phone, etc.) basically involves making a copy. In general, the prior consent of the right holder is required for making a copy of protected content. Whether or not content is offered in exchange for payment is not in itself an indication of whether the content concerned is offered with the consent of the right holder.

However, consent is not always required to download content. This applies to content that is not (or is no longer) copyrighted, such as material whose protection has expired (sound recordings more than 50 years' old, works of authors who have been dead for more than 70 years, etc.). Nor is consent required for downloading content that is not eligible for protection (facts, formulas and creations lacking their own original character). Likewise, 'torrent' files, which specify the name, size and location of a file, do not enjoy copyright protection.

Downloading can be lawful even without prior consent if one of the copyright exceptions is applicable. The most relevant exception for the purposes of the present study is the exception for private use. This means that consumers may download content from P2P networks, websites and social networks (Hyves, MySpace, etc.) even without the consent of the right holder. Both non-economic and economic arguments have been advanced for this private use exception. Non-economic arguments include protection of the user's privacy, promotion of participation in cultural and intellectual life, personal development and encouragement of creativity and freedom of expression. Economic arguments are the high costs and practical difficulties that would make it impracticable to enforce a prohibition on making copies for private use. Another consideration mentioned in the context of the private use exception is the need to strike a balance between, on the one hand, the aims of copyright (i.e. encouraging creativity, innovation and wider distribution) and the cost/benefit ratio (limiting the possibility for third

parties to use existing creations) and, on the other, encouraging authors and producers. An additional condition for making digital copies for private use is that a fair levy is paid. These types of levies can be linked to blank tapes/cd's/dvd's/harddisks and/or recording devices.

However, countries may also choose not to allow certain types of private copying or limit the scope. For example, the private copying of games is often not allowed (or restricted to copies for the use and study of the program for the purpose of the work concerned or for making a backup copy), nor is breaking the protection schemes of DVD's. Private copying might be limited to short parts of the work. More importantly, many countries have chosen not to allow private copying from an 'illegal source'. A source is considered to be illegal if the copied content is distributed without the consent of the copyright holder or if the downloaded file has been produced without the consent of the copyright holder. Arguments against such a requirement are that it is generally difficult for users to determine whether or not a source is legal and that such a requirement would be difficult to enforce and could adversely affect the amount of the payment owed to the right holder for private copies.

3.2. Enforcement instruments and procedures

A distinction can be made between civil and criminal instruments and procedures in relation to the enforcement of copyright and action taken in this connection to prevent unlawful acts. The civil law rules for copyright enforcement are partly of a specific nature (e.g. the rules in copyright acts) and partly of a general nature (including tort law). Copyright can be enforced against anyone committing an infringement. Various instruments are available, including an injunction backed by a penalty for non-compliance (also in the case of imminent infringements), damages, surrender of profits, attachment, destruction of infringing content and means of production, claim for ownership of such content or means of production, recall of infringing products from the trade, and demands for personal information (name and address etc.) of infringers from the intermediaries (such as Internet Service Providers). Provisions on surrender of profits and attachment focus specifically on infringers who act in a commercial or professional capacity. When imposing enforcement measures the courts must weigh the interests of the defendant (such as privacy and freedom of expression) against those of the right holder.

As regards means of enforcement under criminal law, it should be noted that an individual user who infringes copyright (e.g. by uploading without

authorization) may be guilty of an indictable offence if he acted with intent. Not every instance of unauthorised uploading is committed with intent. Intent may be doubted, for example, in the above situations where users make use of P2P or BitTorrent software. Conditional intent may be held to exist in certain circumstances, namely where users "knowingly expose themselves to the far from negligible chance ...". Users might possibly be presumed to realize that using P2P software can also result in the distribution of copyrighted content. The level of actual awareness is therefore a relevant element. Other aspects that have to be taken into account are questions such as proving that the publication was actually committed by the suspect or the question whether or not the offence is committed in a commercial or professional capacity. Finally, it should be noted that criminal law in general serves as an ultimate remedy, which is applied mainly where the public interest is affected by the infringement.

3.3. Policy developments

The introduction of a special law in France - intended to criminalize downloading by individual users - generated a lot of discussion throughout Europe.[28] The law, known as the 'Loi Hadopi', provides the possibility to cut off Internet access because of copyright infringements (after two previous warnings). The original version of the law received substantial criticism and was turned down by the French constitutional court. It didn't provide enough legal guarantees, more in particular it would have allowed cutting off Internet user without a judicial procedure. In the final version, the intervention of a judge is obligatory. Nonetheless, it remains to be seen whether such type of legislation is enforceable in practice. It will require substantial resources (police, courts) and will incriminate a large part of the population. Also, the risk of file sharing going underground (by using encryption) or moving to alternatives (usenet) is mentioned. Some European countries are discussing whether they should introduce regulation that matches the French one. Other countries take a more cautious approach by taking a broader perspective.

The position of file sharing has been heavily debated during the Review of the European communication framework. The European Parliament rejected proposals for stricter rules on copyright infringements. Finally a compromise

[28] This website provides a good overview on both the French proposal and the review of the European telecommunications package: http://www.laquadrature.net. The website also provides info on the Anti-Counterfeiting Trade Agreement (ACTA)-negotiations. Measures against file sharing are discussed as part of the agreement.

was concluded. Article 1, sub 3 of the Universal Service Directive now reads as follows:

"This Directive neither mandates nor prohibits conditions, imposed by providers of publicly available electronic communications and services, limiting end-users' access to, and/or use of, services and applications, where allowed under national law and in conformity with Community law, but lays down an obligation to provide information regarding such conditions. National measures regarding end-users' access to, or use of, services and applications through electronic communications networks shall respect the fundamental rights and freedoms of natural persons, including in relation to privacy and due process, as defined in Article 6 of the European Convention for the Protection of Human Rights and Fundamental Freedoms."[29]

This text clearly aims at a more balanced approach although it doesn't entirely exclude the French solution. The issue remains a priority on the European agenda and is subject of further consultation.[30]

4. Economics of file sharing

Worldwide, sales of recorded music have been in decline for several years, while file sharing is growing rapidly. Is this a mere correlation, or is it safe to say that there is a causal relation? Although a widely debated phenomenon, reliable numbers on the incidence and economics of file sharing are relatively sparse, particularly for films and games. A survey held in the Netherlands as part of the research underlying this article aimed at filling this gap in order to estimate short-term welfare effects of file sharing.

4.1. Downloaders and downloads

Downloading from unauthorised sources is a widespread and growing global phenomenon. IFPI (2010) states that in 2009, the proportion of file sharers was around 21% of the Internet users in the top five European markets. In a French survey, 38% of the Internet users admitted to having downloaded music from torrent sites, while about 28% downloaded in the last year (*Rapport au Ministre de la Culture et de la Communication*, 2010). Figures for the United States, where lawsuits against individual file sharers have drawn

[29] Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws, Publ L337 d.d. 18/12/2009. (Article 1, sub 3, universal service directive).

[30] See for example the recent Public consultation on "Content Online": http://ec.europa.eu/avpolicy/other_actions/content_online

considerable media attention, are similar: in December 2007, 37% of the Internet users admitted to having downloaded music; 27% downloaded video files (PEW, 2009). File sharing figures tend to be higher in countries with higher broadband penetration and much higher among young people. For instance, a survey in the UK showed that 63% of young respondents download music (University of Hertfordshire, 2008). In the United States, 58% of the age bracket from 18 to 29 years downloaded music (PEW, 2009). File sharing of films and games is less common, but is rapidly catching up as residential bandwidth increases. Whereas estimates of the volume of unauthorised download traffic vary strongly, it is clear that it accounts for many billions of files per year worldwide and makes up a substantial share of international Internet traffic.

4.2. A Dutch survey on downloading music, films and games

To gain a better understanding of consumers' file sharing activity and its impact on the entertainment industries, a representative survey of a sample of the Dutch population was conducted in April 2008. A total 1,464 respondents completed questions about music (98% of the sample), 1405 about films (94%) and 778 about games (53%).

4.3. Size and Scope

Free downloading or file sharing is a very common phenomenon across all socio-demographic groups of the Dutch population. 44% of the Dutch Internet population over the age of 15 that had Internet access, admit to file sharing on one or more occasions in the previous 12 months, which works out at around 4.7 million people. Music is the most downloaded entertainment product: 40% of those who have Internet access do so. Note that this figure is remarkably in tune with figures in France and the United States. Films (13%) and games (9%) follow at some distance. File sharers are predominantly young (15-24 years), male, particularly when it comes to films and games.

A notable finding is that a large number of file sharers are unable to say what method or technology they use for downloading, e.g. P2P, Usenet, newsgroups, FTP address. Most file sharers said they only engaged in downloading and did not upload. This would seem improbable as most P2P programs upload automatically. It seems likely that many file sharers are unaware that they are uploading. A mere one in twenty file sharers admit to adding new uploads themselves.

Buying and file sharing turn out to go hand in hand. Music sharers are as likely to buy music as other people: 68% of file sharers also purchase music. File sharers buy as much music as non-file sharers. However, file sharers spend more money on merchandise and go to concerts significantly more frequently.

As for films, file sharers turn out to buy significantly more DVDs than non-file sharers. On average, file sharers and non-file sharers go to the cinema equally often.

Game sharers also buy games, and significantly more frequently too: 67% of file sharers are buyers as well. And if they buy, they buy significantly more games than non-file sharers. These results are summarized in Table 1.

Among file sharers, 63% of music downloaders might yet buy the music they first got for free online. Their main reasons for buying are loving the music – a key motive for over 80% – or wishing to support the artist (over 50%). Owning the CD sleeve and booklet are mentioned by a third of eventual buyers, as well as the higher quality of the CD. Forty-eight per cent of film sharers will buy a previously downloaded film at a later date, citing such reasons as liking it a lot or wanting the extra features the DVD offers. Between 50% and 60% download to discover new genres and directors/actors. 63% of game sharers report sometimes buying a previously downloaded game at a later date. Their main reasons include thinking it a really good game. Wanting to own the original box and game were also frequently mentioned.

Table 1 – Differences in purchasing behaviour between file sharers and non-file sharers

	Music	Films	Games
Buyers in the past 12 months: Yes/No	No difference	No difference	File sharers buy more often (61% vs 57%)
If a buyer in previous 12 months: number	No difference	File sharers buy more (12.0 vs 8.0 films)	File sharers buy more (4.2 vs 2.7 games)
Related products	File sharers visit concerts more often and buy more merchandise	No difference in cinema visits	No difference in buying merchandise

All in all, these figures show that there is no sharp divide between file sharers and others in their buying behaviour. On the contrary, when it comes to attending concerts, and expenses on DVDs and games, file sharers are the industry's largest customers. Note that no causal relationship is implied

here. Aficionados of music, games or films will typically buy more, get into related products more but also download more.

4.4. Price

In order to estimate the turnover that the music industry may be missing out on due to file sharing, the survey asked file sharers what they would consider a reasonable price for a CD, film or game they would really like to own, and how likely they would be to purchase it for this price. Please note that this is more than what they would be willing to pay on average for the products they are downloading. Figure 1 reveals what percentage of file sharers consider reasonable prices. Three-quarters of music sharers are willing to pay at least €8 for a CD (see also Table 2). The average 'reasonable price' for music is higher than for DVDs, which turns out to be €5.

Figure 1 – What music sharers find a reasonable price for a much-wanted CD

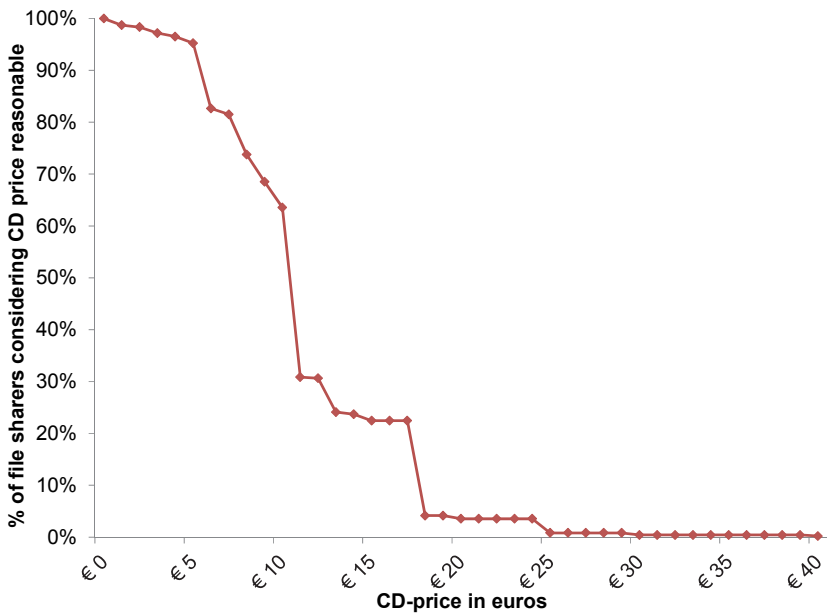


Table 2 – Reasonable price according to file sharers

	Music	Films	Games
75 percentile	€8	€5	€7
Median	€9	€9	€19
Top quartile	€12	€11	€24

4.5. Causal mechanisms how file sharing may relate to sales

The effect of file sharing on sales is ambiguous. Research on this issue results in descriptions of mechanisms through which file sharing either results in an increase or, conversely, in a decrease in digital media sales, or in having no impact on sales whatsoever. These various potential mechanisms are summarized in Table 3. The most prominent positive effect is the sampling effect: consumers are introduced to new music and this creates new demand. When downloading serves consumers whose demand is driven by a lack of purchasing power, the effect on sales is neutral. File sharing has a negative impact on buying when it replaces paid-for consumption.

Table 3 – Possible effects of file sharing on the purchase of CDs, films, games and related products

Positive	+	File sharing introduces consumers to music, films and games (and to artists and genres), thus creating demand. This is known as the sampling effect (SHAPIRO & VARIAN, 1999; LIEBOWITZ, 2006).
	+	File sharing allows consumers to pool their demand, resulting in increased demand. (*)
	+	File sharing enhances willingness to pay and demand for concerts and related products (complementary demand).
	+	File sharing enhances the popularity of products, boosting demand driven by a lack of purchasing power (network effect). (**)
Neutral	o	File sharing meets the demand of consumers who are not, or not sufficiently, willing to pay and subsequently are not served by the manufacturer.
	o	File sharing meets a demand for products that are not offered by manufacturers (e.g. film files for iPods).
Negative	-	File sharing substitutes for the purchase of music, DVDs or games or cinema visits (substitution).
	-	File sharing results in the deferred purchase of music, DVDs or games, at a lower price than the price at launch.
	-	Sampling results in sales displacement as a result of fewer bad buys. (***)

(*) This applies in particular to the exchange of media with friends rather than to the anonymous exchange through P2P networks.

(**) This applies in particular to the use of software for which network effects are clear. A (modest) network effect may also be found for lifestyle products such as music, films and games. Unauthorised use can also, under certain circumstances, have a positive effect on profits and investments without network effects as it can weaken competition between products (JAIN, 2008).

(***) ROB & WALDFOGEL (2006) show that on average people's appreciation of music is lower after it has been bought or downloaded than prior to the purchase.

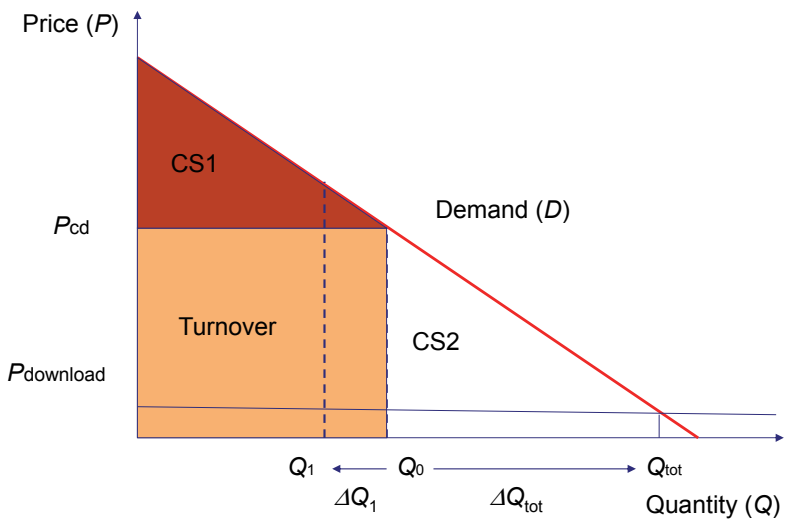
Given the different possible effects above, it may not come as a surprise that the findings of empirical studies into the causal or other relationships between downloading and buying music vary widely, ranging from positive to neutral to negative. There does not appear to be a clear relationship between the decline in sales and file sharing. The effect on revenue from

concerts and merchandise is unknown. The state of play in the film industry has hardly been investigated to date, but available findings suggest a negative relationship. In the games industry download volumes are low and its implications largely unknown.

4.6. Short term welfare effects of downloading music

The main conclusion that can be drawn from the above is that not every file downloaded does result in one less CD, DVD or game sold. The degree of substitution is difficult to determine. Below we seek to describe the scope of file sharing and its short-term effects. The analytical framework used in this analysis is a welfare-theoretical approach, similar to the one in ROB & WALDFOGEL (2006). They apply it to calculate the welfare gains and losses for the music industry based on the observed relationship between downloading and purchasing music.

Figure 2 – Media demand and wealth effects of file sharing



The premises of this approach are illustrated in Figure 2, where the diagonal line represents the demand (D) for CDs in relation to price. In a situation without file sharing activity, a Q_0 number of CDs will be sold at price P_{cd}, resulting in a turnover of $P_{cd} \times Q_0$ (the lightly shaded rectangle 'TURNOVER'). Given the high fixed costs and the low marginal costs that are so characteristic of the entertainment industry, in this particular case the gains for the publisher or the producer – the producer surplus – roughly equal

turnover.[31] Consumers may also benefit in that some would have been prepared to pay a higher price for a CD than they actually paid. Taken together, these amounts constitute the consumer surplus, represented by the darkly shaded triangle (CS1) in the graph. The creation of welfare in the economy is defined as the consumer surplus plus the producer surplus.

Now assume that consumers have the opportunity of downloading the product. The horizontal line P_{download} represents the costs (in terms of effort and time) of file sharing. Far more consumers (Q_{tot}) are interested in the music at this lower price and consumption increases by ΔQ_{tot} because consumers who initially were not prepared to pay the higher price now buy the product (Table 3, effect 5). At the same time, however, some of the consumers who used to buy the CD may now download the music, resulting in a reduction in demand for the CD by ΔQ_1 (substitution: Table 3, effect 7). In this example this would amount to a total of $\Delta Q_1 + \Delta Q_{\text{tot}}$ consumers downloading the music, resulting in turn in lost revenues for producers (in this case this is equated with a lower producer surplus) of $\Delta Q_1 \times P_{\text{cd}}$. This welfare is not lost but goes directly into the pockets of consumers who choose to download rather than to buy, thus creating additional consumer surplus. Even more consumer surplus is created and represented in the graph as the triangle between demand D, the initial vertical line Q_0 and the download costs P_{download}. This is a new surplus compared with the initial situation and constitutes welfare gains to society.

In summary, we saw that this stylised static analysis substitution resulted in a redistribution of welfare (producer surplus becoming consumer surplus) without a net effect. Meeting demand that has insufficient willingness to pay the market price creates welfare gains for society. The positive impact of file sharing on sales, mainly attributable to sampling, mitigates the degree of substitution.[32] If the sampling effect or other positive effects were to dominate, demand would even increase on balance and both the consumer and the producer surplus would rise.

The above effects can be quantified using:

- the number of downloads of music, films and games ($\Delta Q_1 + \Delta Q_{\text{tot}}$)

[31] To be more precise: the marginal costs are low, but the fixed recording costs (or costs of developing a game) have already been incurred and are 'sunk' In order to determine the absolute producer surplus, the fixed costs need to be subtracted from total revenues. The current approach suffices for an estimation of relative differences.

[32] ROB & WALDFOGEL's estimate the transfer amounted to $25 per student in the period 1999-2003. The welfare gains for society stood at $70 per student, almost three times the transfer.

- the number of file sharers who would buy music if downloading were not possible (ΔQ_1)
- file sharers' (average) valuations or willingness to pay

Based on a compilation of various sources, estimates for the Dutch market have been put at 1.5-2 billion music tracks downloaded (ΔQ_1 + ΔQ_{tot}) per year. This amount to 7.5 downloads for each track sold in the Netherlands, or 300 to 400 tracks (20 to 25 albums) downloaded per year for each of the 4.7 million music downloaders mentioned above. The market value for all these downloads amounts to the same volume in euros, but may not be equated with lost revenues.

The next step is to determine the extent of substitution. Based on the number of downloads given above, a substitution ratio of 20%, as used by Rob and Waldfogel, would seem unrealistically high as this would imply that 300-400 million fewer tracks are sold as a result of file sharing, which is equivalent to one-and-a-half to twice the downturn in sales reported for the Dutch music industry since 1999. Taking PEITZ & WAELBROEK's (2004) estimate as an upper limit, namely that a 20% decline in total sales may be attributed to file sharing, which is still relatively high, this would result in lost revenues of at most €100 million in the Netherlands. This in turn is equivalent to a *substitution ratio of at most 5-7%*, or one track less sold for every 15 to 20 downloads.

The third step is to determine the value of downloads that do not result in substitution: the additional consumer surplus. As shown in Figure 2, the welfare gains would be more or less equal to half the retail value of the downloads. ROB & WALDFOGEL (2006) found that on average, students' valuation of downloaded music was one-third to half lower than that for purchased music.

The additional consumer surplus can be estimated using data about file sharers' willingness to pay. These data were collected in the consumer survey and were depicted in Figure 1. The area under the curve in Figure 1 is equal to the weighted average 'reasonable price' given by the file sharers, namely €10.67 for a CD. Multiplying this reasonable price by the 69% of respondents who said they would 'probably' or 'most probably' buy the CD for this price, puts the average actual willingness to pay for a much-wanted downloaded CD at €7.36. This is 40% lower than the average price of a CD sold in 2007 (€12.31) and is well in line with the 33-50% lower valuation

found by Rob and Waldfogel and the estimate of half the price that can be derived from Figure 2.[33]

Figure 1 also shows that about one quarter of file sharers felt that a price that was higher than the average retail price of €12.31 would still be reasonable. Again, adjusting this for the likelihood that consumers will actually buy the CD for that price, means that roughly 17% of all file sharers would be willing to buy the CD for the retail price if downloading were not possible. This percentage is slightly lower than the 20% found by Rob and Waldfogel, but much higher than the 5-7% derived from the estimates made by PEITZ & WAELBROECK. An important difference, however, is that this substitution ratio does not relate to all downloads, but to highly valued downloads only.[34]

In order to calculate the additional consumer surplus, one cannot simply multiply the willingness to pay for *highly valued music* by the total download volume of 1.5 to 2 billion tracks a year. Much-wanted downloads tend to be the downloads that file sharers keep. Young consumers keep the equivalent of an average of 8-16 months of downloaded material on their computers or players (University of Hertfordshire, 2008). For people under the age of 25 this amounts to about 1000 MP3s. Using the average willingness to pay 60% of the retail price, this collection represents an additional consumer surplus of around €600. For the 25-plus age bracket, the average download collection totalled 200 MP3s per person, which is equivalent to a surplus of around €120. Downloaded music files for all music sharers taken together represent a value of €1-1.5 billion.

This value has been built up over a period of several years, in some cases even from as early as the launch of Napster in 1999. The *consumer surplus* created by music sharing in the Netherlands would then amount to an estimated minimum of *€200 million per year*. Based on the above assumptions, this is a conservative estimate (collections have been estimated to have been built up over a long period of time, namely an average of 5 to 8 years, and the surplus for deleted downloads has been set at zero). At most half this amount is generated at the expense of the producer surplus and therefore constitutes a transfer of welfare. The remainder constitutes welfare gains.

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[33] Figure 1 shows at which price maximum turnover from downloading would be achieved - namely €10. Demand drops steeply at higher prices (such as the current average of €12.31).

[34] Note also that this is only one side of the coin – namely substitution. A positive contribution of the sampling effect could explain why actual impact on turnover is lower.

Needless to say, these calculations are necessarily based on assumptions and contain many uncertainties. Many of the underlying data are not precisely known. That said, it is clear that the direction and magnitude of the amounts calculated are plausible. An annual surplus of €200 million for 1.5 to 2 billion downloaded tracks gives an average value of 10-13 cents per track, about one-eighth to one-tenth of the cost of tracks (€0.99) on iTunes and other sites.

The consumer survey referred to earlier showed that not all music genres are equally popular among file sharers. Whereas classical music is downloaded relatively infrequently, file sharing of genres such as soul/urban, experimental, rock, dance and pop is all the more frequent. This is in line with the fact that the younger age brackets are fervent file sharers.[35] Sales of these popular youth genres are therefore likely to be more heavily impacted by file sharing. That said, the consumer survey also revealed that experimental and avant-garde music are frequently downloaded even though few respondents actually stated a preference for these genres. In this light it is worth taking a closer look at BLACKBURN's (2004) findings, which showed that while popular music artists are negatively impacted by file sharing, lesser known artists benefit. In principle, this development favourably affects the diversity of supply, yet a decline in income from popular artists can put pressure on investments in talent development.

5. Conclusions and recommendations

The entertainment industry is experiencing the effects of file sharing. The proliferation of digital distribution networks combined with the availability of digital technology among consumers has actually broken the entertainment industries' control over the access to their products. Turnover in the recorded music industry is in decline, but only part of this decline can be attributed to file sharing. Conversely, only a small fraction of the content exchanged through file sharing networks comes at the expense of industry turnover. This renders the overall welfare effects of file sharing robustly positive.

Actually the fear of all of this happening, prevented the music industry from providing the consumers, ready to consume music online, with downloads. For a considerable amount of time, the industry remained unable to stem the

[35] Note that according to the NVPI, the market share of classical CD sales has dropped from a stable 10% up until 2002, to 5% in 2005. This underlines once again that the relationship between the drop in CD sales and file sharing is an ambiguous one.

tide of unlicensed music file sharing with their conservative strategy of abstaining from innovation, promoting legal measures against supposed offences and digital rights management. This strategy resulted in the current backlash, providing space for a new entrant establishing a major brand in the online music business: Apple's iTunes. Reinvention of the business model looks like the only way out for the traditional players in the music industry. The music economy appears to be facing a shift in spending away from recordings to concert tickets and, to a lesser degree, merchandise. The advance of so called 360-degree artist contracts is a step towards greater diversification of sources of income and underlines the clear connection that exists between various revenue sources in different music markets: recordings, live music and merchandise. Interestingly, recent research for Sweden indicates that total revenues from recorded music, live concerts and collecting societies remained roughly stable between 2000 and 2008 (JOHANSSON & LARSSON, 2009).

Yet, the film industry is feeling the file sharing pain less than is the music business, but this looks about to change as broadband is rolled out further. The 'digitally native' games industry would seem better positioned to respond to the impact of file sharing, although some segments of the market, particularly the one for PC games, witnesses effects similar to the music industry. The entertainment industry should step outside the box of the traditional value chain and venture into a host of other markets through the creation of value networks. A strategy that focuses solely on lawsuits and digital rights management (DRM) is not the best response, in particular as it remains to be seen whether a fully authorised, paid-for downloading market would generate sufficient revenues to stay in business. Even in a hypothetical future without file sharing, a hybrid business model would appear to be the solution.

The survey held among Dutch Internet users has shown that file sharing is here to stay and that people who download are at the same time important customers of the entertainment industry. The point of no return has been reached and it is highly unlikely that the industry will be able to turn the tide. What is more, there is no guarantee that a situation will ever arise in which a majority of digital downloads will come from an authorised source. Whatever the future brings, the time that will pass between now and a 'clean' future is too long for the industry to sit back and wait, without making an effort to innovate. And so the entertainment industry will have to work actively towards innovation on all fronts. New models worth developing, for example, are those that seek to achieve commercial diversification or that

match supply and end-user needs more closely. In such a context, criminalizing large parts of the population makes no sense. Enforcement should focus on large scale and/or commercial upload activities.

In terms of actual cultural diversity and accessibility there are at the moment no signs of impoverishment or the raising of significant barriers. Although the evidence is merely anecdotic, it turns out that online media provide a number of new avenues for creators and producers to reach their intended audiences, without significant gatekeepers preventing them from doing so. It is up to government, as part of its cultural policy and its policy to strengthen the country's innovative power and competitive edge, to consider identifying the promotion of innovation in the entertainment industry as a key priority. Introducing new protective measures does not seem the right way to go.

Monitoring and research

This is one of the first studies to focus on the broader implications for society of file sharing of various forms of content. As this is an industry in flux, developments need to be monitored on an ongoing basis. An important question in this respect is whether file sharing is likely to have a major impact on the DVD market in the foreseeable future. It also remains to be seen how the games market will develop in light of the growing broadband penetration in consumers' homes. Another uncertain factor is which business models will work best in the music industry. Will the delivery of official downloads be the most appropriate response to declining sales, or are more radical changes needed? Nor do we know what shape the growing availability of broadband Internet access and the further development of bandwidth will take and what the effect will be in other sectors in the entertainment industry.

This study has also shown that information about certain major sectors of the industries researched here, such as the live music sector, is in short supply. It is often claimed – this report being no exception – that live concerts are growing at the expense of CD sales. The Swedish example mentioned earlier seems to confirm this claim, but internationally much remains uncertain about the magnitude of the assumed growth and the degree to which it could make up the loss in CD sales.

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5 Elvis is returning to the building: Understanding a decline in unauthorized file sharing

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Abstract
A set of representative consumer surveys shows that in the Netherlands unauthorized file sharing of music has declined substantially between 2008 and 2012. It decreased slightly for games, but almost doubled for films and TV series. Overall, file sharing dropped from 38% to 27% of the population. The empirical evidence presented supports the hypothesis that adequate legal services for downloading and streaming music helped to reduce file sharing, while a lack of good digital audio-visual services made consumers turn to illegal alternatives.

Keywords
Online media markets; business models; file sharing; downloading; copyright enforcement; legal digital services.

1. Introduction

There is ongoing debate in media and politics about the relationship between file sharing and the development of legal digital content services.[36] Proponents of anti-piracy legislation and strong copyright enforcement claim that legal digital services, either paid-for or advertisement-sponsored free services, will never fully succeed as long as people engage in file sharing.[37] On the other hand, opponents and sceptics tend to argue that a lack of adequate legal digital services is an important cause of file sharing. They assert that bringing the legal offer up to the mark is a more effective strategy to reduce file sharing than the legal pursuit of those who engage in it or facilitate it (e.g. Tassi, 2012).

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[36] The term 'file sharing' is used henceforth for the online exchange of copyright-protected material without the consent of the copyright holder, also referred to as 'unauthorized file sharing', 'illegal file sharing', 'online piracy' et cetera.

[37] Content industries traditionally point at file sharing in order to explain the decline in recorded media sales since the turn of the century, e.g. MPAA (2011).

Currently, there is a substantial difference between the availability (and uptake) of online services for music and for audio-visual content in the Netherlands as well as most other Western countries. Legal services to download music, such as iTunes, have been around since the beginning of the century. Streaming music services, such as Spotify, Google Play and Deezer, are relatively younger. They offer an easy to use 'celestial jukebox' at a flat monthly rate of typically € 5~10. Apart from such major brands that cater for mainstream consumers, there are also niche players for specific genres, e.g. Beatport for the electronic music genre. Although territorial fragmentation of copyright and neighbouring rights makes it costly and complicated to roll out pan-European – let alone global – music services, several firms have succeeded in doing so. There is general consensus that there are various digital music services that meet the critical consumer requirements: complete and up-to-date title/album catalogues, user-friendly file types and software (lack of restrictive Digital Rights Management, or DRM) and affordably priced, in some cases even free of charge (i.e. 'freemium' ad-sponsored services such as Spotify Free, MOG FreePlay and Rdio Free). In other words, digital music offerings appear to have reached a phase of maturity. In the Netherlands, this was marked in 2013 by a first year of turnover growth for the music industry since 12 years (+1.1%), thanks to a 113.5% growth for digital streaming. Turnover from physical album sales declined by 19.2% and even digital downloads declined by 5.5% (NVPI, 2014).

Meanwhile, the market for audio-visual services is still in decline. Despite a 22.9% growth for online video services, the market reported a 10.9% overall decline in 2013. The perception is that the legal supply of audio-visual content lags behind the music industry. The industry's strategy of deliberately postponing digital availability of films and series by sequential distribution windows, which often results in titles being digitally available from illegal sources way ahead of legal services, as well as the trouble of clearing rights, are important determinants of a fragmented, incomplete and dated supply of digital titles (Bangma, 2011; Engelfriet, 2009). However, this may change when online video services are rolled out that meet the demands of consumers in terms of repertoire, timeliness, quality and price. Netflix has proven an enormous success in the United States, and the experiences since it set foot in the Netherlands in September 2013 have been promising (Trouw, 2014), despite its catalogue that has been limited thus far (De Volkskrant, 2013). There is clearly a high demand for digital video services. In 2012, 80% of consumer spending on video rental in the Netherlands concerned digital formats (IVF, 2013, p. 74) and the only segment of the

audio-visual market that grew in 2013 was that of digital video-on-demand (VoD) services.

This paper investigates the development of file sharing in the Netherlands between 2008 and 2012 and its relationship with the perceived supply and adequacy of legal sources for content. To this end, three representative consumer surveys have been conducted, which enables a comparison of the development of file sharing over the past few years between music, audio-visual content (films and series), games and books. Also, a comparison is made between four distribution channels: 1) purchasing *physical formats* in an offline or online store, 2) *paid-for* downloading or streaming from a *legal source*, 3) *free or add-sponsored* downloading or streaming from a *legal source*, and 4) downloading or streaming from an *illegal source*. Building on these surveys, the following questions are addressed:

1. How have file sharing and legal media consumption developed over time, at an individual level and within the general population?
2. How do these developments differ between content types?
3. What is the link between these developments and the perceived adequacy of legal services?

The rest of this paper is structured as follows: Section 2 gives a brief overview of the literature on the interaction between file sharing and legal media consumption and on various strategies to reduce file sharing. Section 3 describes the surveys used for data collection. Section 4 analyses the results of these surveys with respect to the research questions. Section 5 concludes.

2. Literature

The effect of file sharing on legal media sales has been studied extensively over the past ten years, albeit to no general consensus. In theory, file sharing can have opposing effects on legal sales and the sales of related products and services. Van Eijk, Poort and Rutten (2010) distinguish nine different interactions. Perhaps the most obvious, and certainly the one that is stressed most by copyright holders, is substitution: file sharing may substitute for the online or offline purchase of recorded music, films or series, books, games or for cinema visits. Opposing this is the so-called sampling effect: file sharing may introduce consumers to works, artists and genres increasing their demand for these works or other works by the same artists or in the same genre. Another positive effect may be an increased demand for related products or services, such as concerts or merchandise (e.g. Dewenter,

Haucap, & Wenzel, 2012; Mortimer, Nosko, & Sorensen, 2012). Neutral effects with respect to sales occur when file sharing meets demand of consumers with insufficient willingness to pay, or who have demand for a work (or a work in a specific technical quality or file type) that is not on offer.

This variety of different and opposing interactions is one of the reasons why the effect of file sharing on sales is hard to determine empirically. Early contributions in this field focus on the music industry – e.g. Peitz & Waelbroeck (2004), Rob & Waldfogel (2006), and Zentner (2006), Liebowitz (2006), Oberholzer-Gee & Strumpf (2007). A smaller number of studies deal with the effect for movies – e.g. Bounie, Bourreau, & Waelbroeck (2006), Hennig-Thurau, Henning, & Sattler (2007), and Rob & Waldfogel (2007). In literature reviews (e.g. Smith & Telang, 2012; Handke, 2012); Watson, Zizzo & Flemming, 2014), it is observed that there are hardly any studies concerning other markets such as games, books and software. Smith & Telang (2012) conclude that "the vast majority of the literature [...] finds evidence that piracy harms media sales." Note, however, that this evidence generally suggests a much smaller effect than a one-to-one displacement of sales by illegal copies. The effect is also substantially smaller than the loss of revenues from recorded music that the industry has experienced since the late 1990s.[38]

Over the years, the entertainment industry pursued a variety of strategies to combat unauthorized file sharing. One is to put a lock on their own supply: the use of Digital Rights Management (DRM) technology to prevent users from sharing legally acquired content. For the music industry this strategy proved to be counterproductive and was abandoned (Sinha, Machado, & Sellman, 2010; Vernik, Purohit, & Desai, 2011) while for audio-visual products, e-books and games the use of DRM is still common. A more controversial strategy involves the pollution or poisoning of file sharing networks with useless decoys (Christin, Weigend, & Chuang, 2005).

Legal actions are another strategy. These can be distinguished in actions against individual file sharers, i.e. the demand side of the illegal market, and actions against the supply side, i.e. platforms that accommodate

[38] Moreover, some studies find indications that more popular musicians and albums (Blackburn, 2004; Mortimer et al., 2012) and blockbuster movies (Peukert, Claussen, & Kretschmer, 2013) suffer more from the substitution effect, while less well-known productions may even benefit as the opposing sampling effect prevails. However, some studies find an opposite effect (Bhattacharjee, Gopal, Lertwachara, Marsden, & Telang, 2007; Hammond, 2013). Thus, the effect of file sharing may vary between works or genres.

unauthorized file sharing. For a discussion of the literature on the effects of such interventions, see Poort *et al*. (2014), who find no impact of blocking access to The Pirate Bay (a popular website for file sharing trackers) on the percentage of the Dutch population downloading from illegal sources. All in all, legal actions tend to have only a short-term effect on file sharing. That is, until illegal supply and demand have found other platforms to meet.

Another strategy is to offer adequate legal digital alternatives. Although it is often claimed that online services, such as iTunes, Spotify and Netflix, can help to combat file sharing,[39] empirical academic literature on this matter is scarce. In a theoretical paper, Thomes (2013) concludes that a free, ad-sponsored music streaming service can be effective against file sharing, given a certain level of copyright enforcement. A theoretical paper by Halmenschlager and Waelbroeck (2014) concludes that the freemium model can help fight piracy without a need for stricter enforcement, as long restrictions on the free version are limited. Danaher *et al*. (2010) study the effect of the removal of NBC content from the iTunes Store in December 2007 and its restoration in September 2008 on BitTorrent file sharing and DVD sales on Amazon. They associate the removal with an 11.4% increase in BitTorrent file sharing of NBC content. This amounts to about 48 thousand downloads, which is roughly twice the digital sales of NBC content in the iTunes store prior to removal. No significant effects on DVD sales were found, nor on file sharing levels after the content was restored. Similarly, Danaher *et al*. (2014, forthcoming) find a decline in piracy levels after ABC started streaming their television content at Hulu.com in July 2009.

Two papers by Aguiar and Martens (2013) and Nguyen, Dejean & Moreau (2013) are also of interest. Aguiar and Martens study the effect of free streaming music services on legal downloads and find a small but significant positive effect, which suggests these legal channels are complements rather than substitutes. Nguyen *et al*. study the effect of free streaming services on CD purchases and live music attendance. They find no effect on the former and a positive effect on the latter.

This paper adds to this literature in various ways. Use is made of three representative surveys, covering both music, films/series, games and books, and four different consumption channels are distinguished. This allows for a comparison across content types and channels, and for studying developments over time. With the use of respondents' rating of these

[39] For a partisan but well-documented report on the effect of Spotify along these lines, see Page (2013).

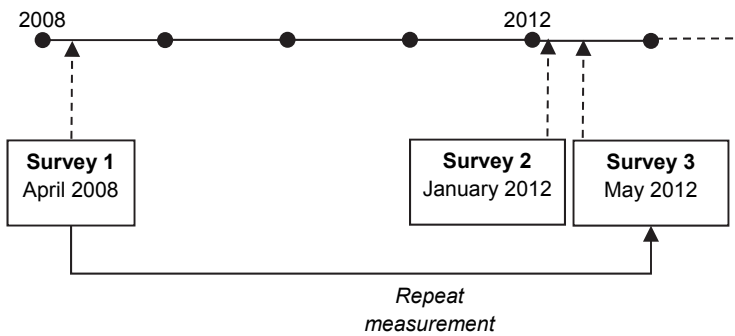
channels on title availability, price and technical quality, the link between these developments and the perceived adequacy of legal offers can be studied.

3. Method

3.1. Survey Design

This paper combines the results of three online surveys on media consumption that were held among Dutch consumers in 2008 and 2012 (see Figure 1). All surveys cover the online and offline consumption of music, films and games, while the last two surveys also cover TV series and books.

Figure 1 – Timeline media consumption surveys



Survey 1 was conducted by Synovate in 2008 in a sample representative of the Dutch Internet using population aged 15 years and older. Surveys 2 and 3 were conducted in 2012 in the CentERpanel, an online household panel representative of the entire Dutch population aged 16 years and older.[40] Demographic and other background variables are available for all panel members.

The questionnaires kept close to day-to-day language so as to achieve a true and accurate picture of consumers' activities and motives. The term 'file sharing', for instance, was avoided in Dutch in favour of 'downloading', which in pre-testing the 2008 survey proved to have the right connotations for

[40] In the CentERpanel, households can only participate on invitation, based on random sampling from Dutch address registers (probability sample). Households without Internet access receive necessary support from CentERdata, resulting in a highly representative panel, both observed and unobserved characteristics. For representativeness figures, see: http://www.centerdata.nl/en/about-centerdata/what-we-do/data-collection/centerpanel/centerpanel-representativity-figures-may.

Dutch consumers.[41] Examples of content types and acquisition channels and explanations for technical terms (e.g. for 'streaming' and 'on-demand services') were provided to ensure the correct framing of questions.

Special care was taken to prevent social desirability bias. First of all, in the introduction to the questionnaire it was emphasized that the anonymity of the information was guaranteed at all times. Next, the surveys were not introduced as being about file sharing or online piracy but more generally as being about media consumption. Emotionally charged concepts, such as 'piracy', 'infringement' and 'theft', were not used.

3.2. Response Characteristics

A total of 1,500 people fully completed the first questionnaire. The second and third surveys had 2,031 and 2,009 respondents respectively. Measurements in the CentERpanel are treated as independent cross-sections in order to keep the information of one-time participants.

The three samples are highly comparable in terms of age distribution, gender, educational level and income. As file sharing behaviour differs among age and other demographic characteristics, Table 1, Figure 2 and Figure 3 (and accompanying text) have been weighted to arrive at a representative picture of the Dutch population.[42] No weights have been used in the subsequent data analysis.

3.3. Analysis

The statistical analysis presented in this paper draws mainly on the third survey. The first survey contains a subset of questions similar to the third and is used to study some key developments over a four-year time span, which for this topic one could venture to call 'long-term developments'. The second survey primarily serves the purpose of learning which features are most crucial for choosing the channel to consume a certain type of content.

For questions about media consumption through various channels and for various content types ordered scales were used for the last consumption for this content type and channel. These scales ranged from 'less than a week

[41] Many consumers are unaware of the techniques they use for downloading and of the legal status of their actions. This is why the questionnaires preferred phrasing questions to match consumer perceptions over using legally correct terminology (e.g. 'unlawful distribution').

[42] This concerns weighting on socio-demographic characteristics, such as age and gender, to translate sample outcomes for the entire Dutch population. Moreover, in 2008, a considerable part of the Dutch population (around 13%) did not yet have Internet access. Therefore, the survey findings of 2008 were extrapolated to the entire Dutch population using Internet adoption statistics from the International Telecommunication Union (ITU). See also footnote 45.

ago', to 'never' in seven steps.[43] For questions about the perceived audio/video quality, availability and pricing of various channels and content types ordered 5-point scales were used ranging from 'very bad' to 'very good' (or 'very low' to 'very high' in case of prices).

4. Results

4.1. Development of Digital Media Consumption over time

The surveys offer two ways to assess how the consumption of legal and illegal digital media has developed over time: at an individual level (i.e. self-reported change in download behaviour per 2012) and at a population level (i.e. comparison between 2008 and 2012 measurement).

Self-Reported Development

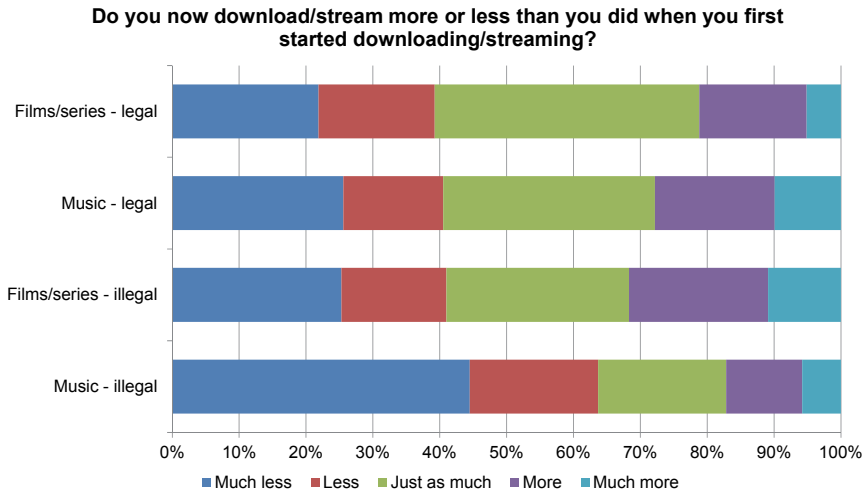
When assessing their own digital content consumption over time, the group that reports downloading less than when it first started downloading from illegal sources is larger than the group that said it downloaded more (Figure 2). This applies to both legal and illegal sources and to both music and films & series, which tallies with the phenomenon that media consumption decreases with age. In fact, the econometric models in Table 6 and Table 7 confirm this phenomenon.

Nevertheless, there is a sharp contrast between music and films & series: about two-thirds of music downloaders state they download or stream less or much less from illegal sources now than they used to do, against 40% from legal sources. Conversely, the group that downloads more music from illegal sources is considerably smaller than the group that downloads more from legal sources: 17% and 28% respectively. The opposite is the case for films and series. The group that now downloads and streams less is about the same for both legal and illegal sources: 39% and 41% respectively. However, the group that consumes more from illegal sources is considerably larger than for legal sources (32% versus 21%).

These individual developments suggest opposing trends for music and films or series: for music a shift is taking place in favour of legal sources, as music consumption from illegal sources is declining faster and legal consumption is increasing faster. On the other hand, the use of illegal sources to acquire films and series is increasing for a larger group than the use of legal sources.

[43] Intermediate steps were: 'more than a week ago, but less than a month'; 'between 1 and 3 months ago'; 'between 3 and 6 months ago'; 'between 6 and 12 months ago'; and 'more than a year ago'.

Figure 2 – Self-reported development of legal and illegal download behaviour



Comparison between 2008 and 2012 measurements

A comparison of the findings of Survey 3 for 2012 with Survey 1 in 2008 confirms these opposing trends. Figure 3 shows that the overall percentage of file sharers declined sharply: from 38.3% of the population in 2008 to 27.2% in 2012 (Pearson-$\chi 2$= 52.1; p=0.000; df=1), even though the 2012 measurement included TV series and e-books, which the 2008 measurement did not. File sharing declined significantly for music, while it increased significantly for audio-visual material: from 34.8% to 21.7% (Pearson-$\chi 2$= 79.3; p=0.000; df=1) and from 11.2% to 18.3% respectively (Pearson-$\chi 2$= 36.3; p=0.000; df=1).[44] There is also a slight but significant decrease for games: from 8.2% in 2008 to 6.0% in 2012 (Pearson-$\chi 2$= 6.5; p=0.011; df=1).[45]

[44] The difference cannot be explained by the fact that the 2012 measurement also includes downloading of TV-series, as it is highly unlikely that almost 40% (7.1%/18.3%) of the people who downloaded audio-visual material from illegal sources in the past year downloaded *only* TV content. This is confirmed by a new survey in January 2014, which was focused exclusively on film and revealed a further increase of the percentage of file sharers to 21.5% of the Dutch population aged 16 years and older (Leenheer & Poort, 2014).

[45] Data for 2008 was representative for the Internet using population and has been extrapolated to the entire population by making use of the fact that people who do not use the Internet, do not download from illegal sources either. According to the International Telecommunication Union (ITU), 87.42% of the Dutch population aged 16-74 had used the Internet in the last 12 months in 2008 (http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, accessed 24 March 2014).

Understanding the opposing trends for music and films/series

This paper aims to explain these opposing developments for music and films/series. General copyright enforcement measures can be ruled out as an explanation, since these would affect the sharing of music and audio-visual content alike. Moreover, Poort *et al*. (2014) conclude that the most significant change in enforcement which took place in the Netherlands in this time span, court rulings which ordered Internet service providers to block access to The Pirate Bay, had no impact on the percentage of the population downloading from illegal sources.

Second, an increased uptake and speed of residential broadband connections could explain the observed increase in sharing film and series but would fail to explain the decrease in sharing music. Furthermore, the Dutch broadband market was already relatively mature in 2008: the number of fixed broadband subscriptions increased by a relatively small amount, from 35.1 per 100 inhabitants during the first survey to 39.4 during the third.[46] This small additional broadband uptake by relatively late adopters (or in Roger's (2010) terminology: 'laggards') is an unlikely explanation for a substantial increase in file sharing for films and series.

Third, diverging price developments do not provide a satisfactory explanation. Between 2008 and 2012, the average price of a physical music album decreased by 4%, but the average price of a DVD also decreased by 2%. The average price paid for digital albums decreased, but that for digital singles increased. On the assumption that an average album has ten tracks, the overall average price paid for a digital music track hardly changed (-1%).[47] Price developments for digital audio-visual services and music streaming are unknown, but most of the services that are available now, did not exist in 2008.

This introduces the fourth candidate for explaining the opposing trends for music and audio-visual contents: the adequacy of legal online offers. Analysis of the consumption of music and audio-visual material from legal and illegal sources through the lens of the perceived adequacy of these channels, later in this article, provides strong support for this explanation.

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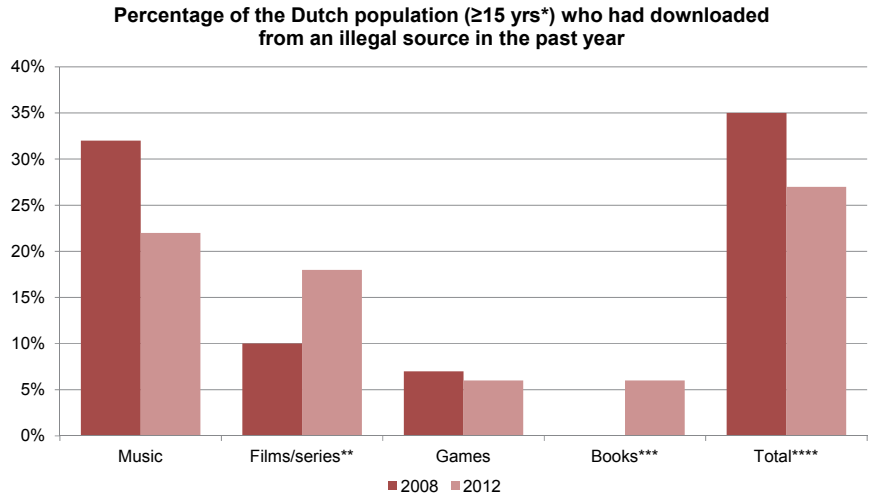
[46] Penetrations 2008Q2 and 2012Q2 according to http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm, accessed: 31 January 2014. To compare: the OECD average was 20.4 and 25.8 respectively per 100 inhabitants. The percentage of the Dutch population with Internet access increased from 87% in 2008 to 93% in 2012.

[47] NVPI market information 2008-2012, http://www.nvpi.nl/marktinformatie, accessed: 25 March 2014.

Figure 3 – Overall, unauthorized file sharing decreased, despite an increase for films and series



* 16 years and older in 2012 measurement; ** Excluding series in 2008; *** Not measured in 2008; **** Excluding series and books in 2008.

4.2. Analysis

In the analysis of the consumption of music and audio-visual material, four acquisition channels are distinguished which may be substitutes or complements:

1. buying *physical formats* (CD, DVD, Blu-ray, etc.) in an offline or online store;
2. *paid-for* downloading or streaming from a *legal source*;
3. *free* downloading or streaming from a *legal source*;
4. downloading or streaming from an *illegal source*.

A comparison of the use of these four channels in the past year and in the past week is provided in Table 1. In line with the time trends above, the relative position of paid-for downloading and streaming from legal sources is the least favourable for films and series. Measured over the past year, paid-for downloading and streaming is the least popular channel for both music and audio-visual material, but the gap between this channel and illegal sources is considerably wider for films and series, both in relative (percentage) and absolute (percentage points) terms. For games and books, illegal sources are the least popular channel.

The second half of Table 1 reveals information about the behaviour of the most fervent consumers by displaying content consumption in the last week. In this group, downloading and streaming music, films and series from illegal sources comes in second after free legal sources. In this group, acquiring films and series from illegal sources is just as common as for music.

Table 1 – Downloading, streaming and purchasing per content type (N = 2,009)

	Purchased offline and online store (1)	Downloading & streaming from a legal source		Downloading & streaming from an illegal source (4)	All channels (1 to 4)	Total legal (1 to 3)
		Paid-for (2)	Free (3)			
Past year						
Music	40.0%	17.1%	36.5%	21.7%	63.0%	60.8%
Films & series	44.8%	11.8%	25.3%	18.3%	59.4%	57.2%
Games	19.7%	8.8%	14.6%	6.3%	28.7%	27.7%
Books	69.0%	7.8%	9.2%	6.3%	70.9%	70.5%
Past week						
Music	3.1%	3.7%	14.4%	6.3%	20.5%	18.4%
Films & series	3.8%	1.5%	8.7%	6.2%	16.1%	13.1%
Games	1.7%	1.3%	3.2%	1.0%	5.7%	5.2%
Books	9.8%	0.7%	0.9%	0.9%	11.2%	10.8%

At an individual level, the frequency of use of all four channels is strongly correlated, both within and between content types. Nearly all correlation coefficients in Table 2 are positive and significant ($p < 0.01$), which indicates that aficionados of music make more frequent use of all four channels. The same goes for aficionados of films and series. Within a content type, correlation is particularly high between the use of free online services (3) and illegal sources (4), which suggests a segmentation between consumers with and consumers without willingness to pay. Correlation coefficients are lower between the purchase of physical formats and consumption from all three online sources.

Interest in music and interest in audio-visual material are positively correlated, and a preference for a specific consumption channel stands out: respondents who have bought a CD more recently, are much more likely to have bought a DVD or Blu-ray more recently, and the same holds for legal

and illegal online acquisition.[48] A similar pattern occurs when adding books and games, although between these and music or audio-visual fewer correlation coefficients are significant.

Table 2 – Significant and strong correlation between frequency of use of distribution channels (Spearman's rho)

	Music				Films & Series		
	(1)	(2)	(3)	(4)	(1)	(2)	(3)
Music							
Paid-for d/s from legal source (2)	**0.17** (0.00)						
Free d/s from legal source (3)	**0.15** (0.00)	**0.43** (0.00)					
d/s from illegal source (4)	*0.05* (0.01)	**0.36** (0.00)	**0.58** (0.00)				
Films & series							
Purchased offline and online store (1)	**0.43** (0.00)	**0.20** (0.00)	**0.26** (0.00)	**0.14** (0.00)			
Paid-for d/s from legal source (2)	**0.06** (0.01)	**0.33** (0.00)	**0.25** (0.00)	**0.22** (0.00)	**0.17** (0.00)		
Free d/s from legal source (3)	**0.08** (0.00)	**0.27** (0.00)	**0.52** (0.00)	**0.40** (0.00)	**0.21** (0.00)	**0.35** (0.00)	
d/s from illegal source (4)	0.01 (0.54)	**0.29** (0.00)	**0.46** (0.00)	**0.68** (0.00)	**0.14** (0.00)	**0.30** (0.00)	**0.56** (0.00)

Bold correlation coefficients $p < 0.01$; correlation coefficients in italics $p < 0.05$.

4.3. Ratings on factors which determine the choice of acquisition channel

In Survey 2 (January 2012), respondents were asked about the factors that influence their choice between acquisition channels. Title availability and price came up as the most decisive factors by far, followed by (technical) sound and/or video quality (Table 3).

[48] Note that these correlations are partly explained by underlying socio-demographic variables, in particular age.

Table 3 – Mean scores and rank (1-4) of factor importance (scale from 0 to 100)

	Music (N=748)	A/V content (N=667)	Games (N=157)	Books (N=972)
Title availability	16 (1)	19 (1)	18 (2)	28 (1)
Price	15 (2)	18 (2)	19 (1)	20 (2)
Technical quality	14 (3)	12 (3)	12 (3)	
Ease of obtainment	9	10 (4)	8	9 (3)
Free of viruses and malware	9 (4)	8	10 (4)	4
Safety of payments	7	7	6	9 (4)
Privacy and security	6	6	4	4
Payment options	4	3	4	5
Certainty of content legality	4	4	3	3
Interoperability	5	3	2	2
Future accessibility	3	3	3	2
Other	2	2	1	4

Based on these outcomes, respondents were asked in Survey 3 to rate each acquisition channel for music and films/series on title availability, technical quality and price. In the first two rows of Table 4, the mean ratings for all respondents are presented. Significant differences between music and films/series per channel (paired samples t test) are marked with ** ($p < 0.01$) or * ($p < 0.05$). Several observations can be made:

- Comparing between music and film/video:
  - All consumption channels for music score significantly higher on availability than their counterparts for films/series.
  - Online films and series (2) are considered more expensive than online music.
  - The technical quality of free legal (3) and illegal online music (4) is rated significantly higher than their counterparts for films and series.
- Comparing between legal and illegal channels:
  - Physical formats (1) score significantly better on availability than illegal sources (4) for both music and films/series. Paid-for online music (2) also scores better than illegal sources on availability. For films/series this difference in the availability ratings is not significant (t=1.48; p=0.14). Title availability of free legal sources for music and films/series (3) is considered worse than that of illegal sources (4).
  - For both music and films/series, the technical quality of all legal channels is considered significantly better than that of illegal sources.

The last two rows in Table 4 give the mean ratings for respondents who ever file-shared music and films/series, respectively. In case file sharing behaviour significantly correlates with respondents' ratings, means have

been marked in bold (p < 0.01) or italics (p < 0.05). These rows reveal that people who ever downloaded or streamed from illegal sources consider the price of physical formats (1) and paid-for online services (2) significantly higher. As can be expected, they also give significantly higher marks to the availability and technical quality of the illegal supply. Interestingly, more frequent file sharers appreciate the technical quality of legal online music (2 and 3) and of DVDs/Blu-rays (1) more, which could indicate the presence of the previously mentioned music and films/series aficionados in this group.

What is both striking and alarming, is that respondents who ever downloaded films or series from illegal sources, rate the availability of paid-for legal online channels for such content significantly lower than the average respondent. In fact, they rate it lower than the availability from illegal sources (*t*=-2.35; p=0.02). In other words: those who ever downloaded films or series think that the availability from illegal sources is better than from legal digital sources. For music, these channels have equivalent scores in terms of availability.

Table 4 – Mean scores of channels for acquiring music and films/series respectively on availability, quality and price

	Availability				Technical quality				Price	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)
All respondents										
Music	4.22**	3.97**	3.68**	3.77**	4.43	3.89	3.65**	3.50**	3.84	3.55*
Films/series	4.15**	3.81**	3.47**	3.69**	4.46	3.88	3.54**	3.40**	3.91	3.73*
Respondents who ever file shared…										
Music	**4.11**	3.96	3.68	**3.95**	4.45	*3.98*	**3.80**	**3.69**	**4.07**	**3.73**
Films/series	*4.09*	**3.67**	3.40	**3.89**	**4.56**	3.90	3.60	**3.64**	**4.16**	**3.91**

Mean values excluding answer category 'Don't know'. Significant differences between music and films/series (paired samples t test) for the sample of all respondents are marked with ** (p < 0.01) or * (p < 0.05). Significant differences with respect to the variable for the last music or films/series downloaded or streamed from an illegal source (F test) are marked in bold (p < 0.01) or italics (p < 0.05).

Table 5 – Mean scores for users of channels on availability, quality and price

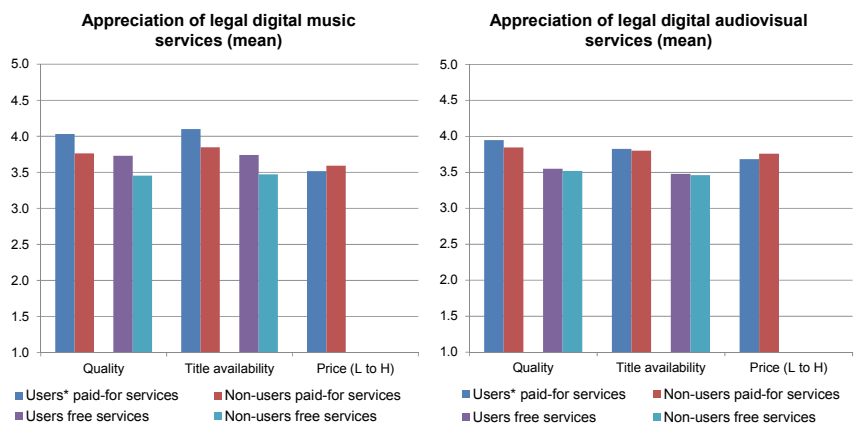
	Availability				Technical quality				Price	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)
All respondents										
Music	4.23**	4.10**	3.74**	3.95*	4.43	4.03	3.73**	3.69*	3.84	3.52
Films/series	4.15**	3.82**	3.48**	3.89*	4.46	3.95	3.55**	3.64*	3.90	3.68
Respondents who ever file shared…										
Music	**4.11**	4.02	*3.69*	3.95	4.46	4.03	**3.80**	3.69	**4.06**	**3.63**
Films/series	*4.10*	3.71	3.42	3.89	**4.57**	3.92	3.59	3.64	**4.15**	*3.76*

Note that causality could run both ways here: people who appreciate a channel more, may use it more frequently and use other channels less. Alternatively, appreciation could be the *result* of using a channel (an 'acquired taste'). The latter can be tested by restricting the sample to respondents who ever used each specific channel. Thus, all respondents had the chance to acquire a taste for the channel they rate. Table 5 gives the results, following the same structure as Table 4. In general, the quality and availability ratings for online legal music services are somewhat higher within the group that ever experienced it. Most differences between Table 4 and Table 5 are small, however, and most significance levels are unaffected. This indicates that these ratings are predominantly exogenous, i.e. ratings primarily influence frequency of use rather than the other way around.

Figure 4 zooms in on paid-for and free legal online services, again with a distinction between respondents who ever used the respective service and those who did not.[49] Two lessons can be drawn from this:

- Paid-for online services receive higher scores for title availability and technical quality than free legal services ($p < 0.05$ in all cases). This holds for both music and films/series.
- Users of legal online music services give them higher scores than non-users, while there is no such difference for online audio-visual services.

Figure 4 – Users of legal digital services like them better



* *Users* are defined as those people who have ever consumed the service.

[49] Note that defining users as people who have consumed the service in the previous year gives a virtually identical picture.

Modelling

To gain a more comprehensive understanding of the use of the four channels for acquiring music and audio-visual content in relation to the rating of these channels – on title availability, technical quality and price – models have been estimated for the last use of each channel. Since this last use is an ordinal variable, ranging from 'never' (lowest) to 'less than a week ago' (highest), ordered logit models have been used. Explanatory variables in each model are:

- Age cohort;
- Gender (1 = male; 2 = female);
- Urbanization (ranging from 1: not urbanized to 5: very highly urbanized);
- Net monthly household income bracket;
- Educational attainment;
- The rating of price, availability and quality of each channel for the content type in the dependent variable.

Based on the insights from the correlation matrix in Table 2, a second model was estimated for each channel, including the last use of the same channel for alternative content types. For instance, the second model for downloading music from illegal sources also includes the last video and e-book download from illegal sources. These variables all have highly significant positive coefficients and serve as a proxy for channel preference, regardless of content type. To prevent a substantial loss in the number of observations, which would also imply a biased restriction of the dataset on heavy content users, the option 'I do not know' for ratings on price, title availability and technical quality has been re-coded to 'neither good nor bad'. Note that these variables are assumed to be exogenous in these models, in line with the observations from Table 4 and Table 5 (i.e. ratings influence frequency of use and not vice versa).

Music

The results for the last music acquisition per channel are presented in Table 6. The coefficients for the demographic variables are mostly straightforward and are not discussed here in detail. One effect is noteworthy, however: Urbanization has a positive coefficient in the first model for purchasing CDs, which may stem from the fact that CD stores are located in more urbanized areas. The fact that this coefficient drops and becomes insignificant in the second model, suggests that the absence of media stores in rural regions affects DVD or book acquisition similarly.

The first model for *CD acquisition* indicates that people who value the sound quality of CDs more highly are more frequent CD buyers, while the more satisfied people are with the quality of illegal supply, the less often they buy CDs. Both coefficients are no longer significant when correcting for channel preference, which indicates that these effects are not specific for music and are similar for other content types. Correlations with title availability of CDs and through illegal sources are more specific and robust: people who think more highly of CD availability buy CDs more frequently, and the higher people mark the availability through illegal sources, the less often they buy CDs. This all indicates that CD purchase and downloads or streams from illegal sources are to some extent substitutes (in line with the majority of the literature on the effects of file sharing on physical sales), while no indication is found for (strong) substitution effects between physical formats and legal online channels (in line with Nguyen *et al.*, 2013). Price ratings have no significant effect either.

This substitution effect between CDs and downloads from *illegal sources* is mirrored in the rightmost models. Dissatisfaction with the technical quality of legal supply appears to be no driver for the use of illegal sources, but the insufficient availability of CDs is. A positive and significant coefficient for the perceived price of legal digital supply also indicates substitution from this channel to illegal channels. Note that this model has the highest explanatory power (pseudo R^2 = 0.21~0.28).

In the models for *paid-for downloading and streaming*, the rating of CD quality has a robustly negative coefficient. Since there are no significant price coefficients, this indicates a segmentation in the market – between those who are satisfied with the quality of downloads and streams and those who prefer CD quality – rather than substitution.

The frequency of *free downloading and streaming from legal sources* correlates positively with the quality rating for CDs and paid-for online sources, suggesting free legal sources are used for sampling and are complements to paid for sources rather than substitutes. On the other hand, a negative sign for CD availability as well as a positive correlation with a higher perceived CD price in the first model and with paid-for online channel in both models suggest substitution. Negative coefficients for the quality of illegal supply indicate substitution as well.

Films and series

Table 7 presents the results for the last acquisition of films or series. The first two models for purchasing *DVDs and Blu-ray disks* only give robustly positive coefficients for the quality and availability of this same channel. The other coefficients are not significant.

The models for *paid-for downloading and streaming* give a rather similar pattern. In addition, this channel is used more often by people who think less highly of the technical quality of DVD/Blu-ray or who rate the price of DVDs/Blu-rays higher. This indicates substitution from physical formats to paid-for downloads and streams.

The third set of models shows that people who give higher rates to the technical quality of *free legal sources* for films and series use them more often. A negative sign for the availability of DVDs/Blu-rays in one of the models, as well as a robustly positive sign of the price rating for paid-for downloads and streams, suggests substitution from these channels. The positive coefficient for the availability of illegal sources suggests that for films and series, free legal and illegal sources are complements rather than substitutes.

Just as for music, the models for the last acquisition from *illegal sources* have the highest explanatory power (pseudo R^2 = 0.22~0.33). Quality ratings for the three legal channels have no effect, indicating that dissatisfaction with the quality of legal supply is no issue. However, people who rate the availability of DVDs/Blu-rays lower and people who consider the price of legal downloads and streams to be higher, download significantly more often from illegal sources.

Table 6 – Models for the last music acquisition

	Purchased offline and online store (1)				Paid-for d/s from legal source (2)				Free d/s from legal source (3)				D/S from illegal source (4)			
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Age	**-0.13**	0.03	-0.04	0.04	**-0.27**	0.04	**-0.25**	0.04	**-0.48**	0.04	**-0.43**	0.04	**-0.45**	0.04	**-0.36**	0.04
Gender	-0.13	0.10	**-0.28**	0.10	**-0.61**	0.12	**-0.56**	0.12	**-0.95**	0.11	**-0.76**	0.11	**-0.90**	0.12	**-0.71**	0.13
Urbanization	*0.08*	0.04	0.04	0.04	0.05	0.04	0.04	0.04	*0.09*	0.04	0.07	0.04	0.05	0.04	0.01	0.04
Income	0.09	0.05	0.04	0.05	0.07	0.06	0.04	0.07	-0.07	0.05	-0.06	0.05	*-0.15*	0.06	*-0.15*	0.06
Education	**0.10**	0.03	0.03	0.03	-0.05	0.04	-0.07	0.04	0.01	0.03	-0.01	0.03	-0.06	0.04	-0.07	0.04
Quality(1)	*0.19*	0.08	0.06	0.08	**-0.28**	0.10	**-0.26**	0.10	*0.19*	0.08	*0.20*	0.09	-0.05	0.10	0.00	0.10
Quality(2)	-0.01	0.10	-0.09	0.11	**0.97**	0.12	**0.86**	0.12	*0.24*	0.10	0.18	0.10	0.07	0.12	0.11	0.12
Quality(3)	-0.08	0.11	-0.05	0.11	-0.23	0.13	-0.22	0.13	**0.49**	0.11	**0.42**	0.11	*0.30*	0.13	0.23	0.13
Quality(4)	**-0.30**	0.11	-0.18	0.11	-0.19	0.12	-0.14	0.12	*-0.26*	0.11	**-0.30**	0.11	**0.68**	0.12	*0.26*	0.12
Availability(1)	**0.33**	0.07	**0.31**	0.07	0.00	0.08	0.04	0.09	**-0.30**	0.07	**-0.20**	0.07	**-0.34**	0.08	**-0.35**	0.09
Availability(2)	0.17	0.10	0.12	0.10	**0.66**	0.10	**0.61**	0.11	*0.19*	0.10	0.14	0.10	0.18	0.11	0.19	0.11
Availability(3)	-0.12	0.10	-0.11	0.10	-0.10	0.10	-0.12	0.10	**0.32**	0.10	**0.32**	0.10	*-0.25*	0.10	-0.04	0.11
Availability(4)	**-0.27**	0.10	*-0.23*	0.10	-0.09	0.11	-0.06	0.11	0.16	0.10	0.06	0.10	**0.86**	0.11	**0.44**	0.11
Price(1)	-0.08	0.07	-0.10	0.07	0.16	0.09	0.14	0.09	*0.17*	0.07	0.08	0.08	0.16	0.09	0.14	0.09
Price(2)	0.11	0.09	0.02	0.09	0.03	0.10	0.00	0.10	**0.33**	0.09	**0.26**	0.09	**0.58**	0.10	**0.38**	0.10
Films/series(1)			**0.40**	0.03							**0.32**	0.03				
Films/series(2)							**0.28**	0.04								
Films/series(3)											**0.32**	0.03				
Films/series(4)															**0.58**	0.04
Books(1)			**0.23**	0.03							**0.17**	0.04				
Books(2)							**0.33**	0.05								
Books(3)											**0.17**	0.04				
Books(4)															**0.24**	0.05
N	1849		1849		1849		1849		1849		1849		1849		1849	
Pseudo R^2	0.028		0.086		0.108		0.139		0.131		0.166		0.211		0.282	

Ordered logit estimation (Quadratic hill climbing). Bold coefficients $p < 0.01$; coefficients in italics $p < 0.05$.

Table 7 – Models for the last acquisition of films or series

	Purchased offline and online store (1)				Paid-for d/s from legal source (2)				Free d/s from legal source (3)				D/S from illegal source (4)			
	Coef.	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Age	**-0.15**	0.03	**-0.14**	0.04	**-0.19**	0.05	**-0.14**	0.05	**-0.32**	0.04	**-0.17**	0.04	**-0.50**	0.05	**-0.34**	0.06
Gender	0.17	0.10	0.11	0.10	**-0.48**	0.14	**-0.46**	0.15	**-0.80**	0.12	**-0.59**	0.13	**-1.07**	0.15	**-0.76**	0.16
Urbanization	0.05	0.04	0.00	0.04	0.10	0.05	0.07	0.05	0.04	0.04	0.00	0.04	0.09	0.05	*0.12*	0.06
Income	0.00	0.05	-0.06	0.05	0.08	0.08	0.04	0.08	-0.08	0.06	-0.12	0.07	-0.05	0.08	-0.06	0.08
Education	*0.08*	0.03	0.01	0.03	-0.02	0.04	-0.03	0.05	0.03	0.04	0.00	0.04	-0.06	0.05	-0.02	0.05
Quality(1)	**0.45**	0.08	**0.37**	0.08	**-0.38**	0.11	**-0.33**	0.12	0.11	0.09	-0.04	0.10	0.09	0.11	0.03	0.12
Quality(2)	-0.14	0.12	-0.10	0.12	**0.68**	0.15	**0.58**	0.15	0.16	0.13	0.03	0.13	0.26	0.14	0.26	0.15
Quality(3)	-0.08	0.13	0.01	0.13	0.12	0.15	0.15	0.16	*0.33*	0.14	*0.27*	0.14	-0.13	0.15	-0.10	0.16
Quality(4)	-0.15	0.11	-0.16	0.12	-0.16	0.14	-0.17	0.14	-0.11	0.12	-0.05	0.12	**1.09**	0.14	**0.72**	0.14
Availability(1)	**0.30**	0.08	**0.23**	0.08	-0.10	0.11	-0.14	0.11	*-0.22*	0.09	-0.16	0.09	*-0.26*	0.11	*-0.26*	0.11
Availability(2)	-0.01	0.11	0.01	0.12	*0.32*	0.14	*0.33*	0.14	0.00	0.12	0.11	0.13	-0.24	0.14	-0.16	0.15
Availability(3)	-0.07	0.12	-0.07	0.12	-0.14	0.14	-0.13	0.14	0.11	0.12	0.08	0.12	-0.26	0.14	-0.16	0.15
Availability(4)	-0.20	0.10	-0.14	0.11	0.24	0.13	0.19	0.13	**0.33**	0.11	*0.24*	0.11	**0.85**	0.12	**0.47**	0.13
Price(1)	-0.01	0.08	0.03	0.08	*0.22*	0.11	0.18	0.11	0.14	0.09	0.06	0.09	0.19	0.11	0.18	0.12
Price(2)	0.09	0.11	0.09	0.11	0.05	0.13	0.00	0.13	**0.48**	0.11	**0.30**	0.11	**0.69**	0.12	**0.35**	0.13
Music(1)			**0.43**	0.03												
Music(2)							**0.26**	0.04								
Music(3)											**0.36**	0.03				
Music(4)															**0.67**	0.04
Books(1)			**0.19**	0.03												
Books(2)							0.08	0.06								
Books(3)											**0.23**	0.04				
Books(4)															**0.25**	0.06
N	1575		1575		1575		1575		1575		1575		1575		1575	
Pseudo R^2	0.032		0.083		0.062		0.086		0.082		0.143		0.222		0.331	

Ordered logit estimation (Quadratic hill climbing). Bold coefficients $p < 0.01$; coefficients in italics $p < 0.05$.

5. Conclusions and discussion

Based on three representative surveys among the Dutch population aged 15 years and up, this paper has shown that in the Netherlands downloading and streaming from illegal sources has declined between 2008 and 2012. The music industry can pride itself on this decline: file sharing music declined from 35% of the population to 22%. For films and series, it increased from 11% to 18% over this time span. This cross-sectional trend corroborates with individual, self-reported downloading behaviour over time. The latter also reveals that a gradual shift is taking place for music in favour of legal digital sources. The opposite is the case for films and series, which leads to the observation that Elvis is returning to the building, while Bond is still on the way out.

General copyright enforcement measures and an increased uptake and speed of residential broadband connections can be ruled out as satisfactory explanations for these opposing trends. They would not explain diverging trends for music and video and are unlikely to have had much effect on file sharing at all. Neither can price developments for physical formats or music downloads explain these developments.

From the evidence presented in this paper, it is concluded that the opposing trends for file sharing music and audio-visual content can be explained by differences in the adequacy of legal online offers. To this end an assessment was made of respondents' satisfaction with four channels by which they can acquire content – physical formats, paid-for downloading/streaming from legal sources, free downloading/streaming from legal sources and downloading/streaming from illegal sources – in terms of title availability, price and technical quality. Legal online music services are considered more adequate than legal online audio-visual services: they score better on title availability and price, which are the two most crucial drivers for the choice between acquisition channels. This implies a better perceived price/quality ratio for legal music offers. Free online music services are also considered to have a better technical quality than free online video, while theoretical papers have already shown that free online services can be effective against file sharing.

The good news for the content industries is that physical formats and paid-for online channels are on average considered to have better availability and technical quality than illegal sources. However, those who ever downloaded films or series from illegal sources think that the availability from these sources is in fact better than from legal digital sources. For music, these

channels have equivalent scores in terms of availability. Alternatively, users of legal digital music services rate these higher on quality and title availability than non-users do, while for film and video this difference is negligible.

Ordered logit models to explain the last time respondents used each specific channel also underline the general importance of technical quality, title availability and price. People who rate a specific channel better generally use this channel more often. These models also give evidence for substitution as well as complementarity between the three legal channels. Downloading content from illegal sources turns out to be significantly driven by a lower satisfaction with the availability of physical formats and by a higher price perception of paid-for downloads and streams. Dissatisfaction with the technical quality of legal supply seems to be no bottleneck.

What implications can be drawn from this for media managers and policymakers? Legal online offers that are superior to illegal sources can regain consumers for legal consumption and even make them turn their back to illegal sources. In particular, the recent development and fast uptake of streaming music services seems most relevant for a decline in file sharing. Now, the audio-visual industries should make haste to provide legal online services that meet the standard set by music services in terms of repertoire, price and technical quality: illegal sources such as *PopcornTime* should not be able to provide a better user experience than legal digital services.

To reduce file sharing, the pricing of legal online services turns out to be a crucial instrument: the price perception of legal online services has a robust effect on file sharing for both music and audio-visual content. Also, the availability and technical quality of content from illegal sources directly relates to file sharing, but for the industry these turn out to be hard to influence.

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6 Baywatch: Two approaches to measure the effects of blocking access to The Pirate Bay

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Abstract
In the fight against unauthorised sharing of copyright protected material, Dutch Internet Service Providers have been summoned by courts to block their subscribers' access to The Pirate Bay and related sites. This paper studies the effectiveness of this approach towards online copyright enforcement, using both a consumer survey and a newly developed non-infringing technology for BitTorrent monitoring. While a small group of respondents download less from illegal sources or claim to have stopped doing so, no impact is found on the percentage of the Dutch population downloading from illegal sources. Slight changes are found on the distribution of Dutch peers, but these seem related to the awareness raised by blocking rather than the blocking itself.

Keywords
Unauthorised file sharing; Piracy; p2p; BitTorrent monitoring; Blocking access; The Pirate Bay; Online copyright enforcement.

1. Introduction

In early 2012, Dutch rights holders claimed two potentially important legal victories in their fight against unauthorised sharing of copyright protected material on the Internet, also known as online piracy. As from February 2012, two large Internet Service Providers (ISPs) were ordered by the Court of The Hague (2012a), a lower Dutch court, to block access to The Pirate Bay (TPB) website and a list of subdomains and mirror sites. In a second ruling in May 2012, the same court ordered four other Dutch ISPs to block access to TPB within ten days (Court of The Hague, 2012b). Both rulings combined imply that more than 90% of Dutch Internet subscribers cannot access TPB directly through their ISP. Both rulings are currently under appeal from the ISPs. They are part of a manifold of legal actions against TPB in Sweden, Germany and other countries. According to the Dutch court, TPB is currently

the world's largest index site for BitTorrent files and as such an important platform for online piracy. Other legal efforts to take down this site have failed so far. The court considered blocking access to TPB for all subscribers of these ISPs proportional, as an estimated 90% to 95% of the material offered via this site is illegal while legally offered material can also be obtained through other sites. If this situation were to change, withdrawal of the ruling could be ordered (Court of The Hague, 2012a, 4.27-4.29).

The effectiveness of the requested measures was an important issue in both lawsuits. Rights holders' representatives presented evidence from Italy and Denmark that blocking access to TPB had significantly reduced its number of unique visitors, despite the claim by the defendants that the intervention is easily circumvented, for instance by making use of *virtual hosting* or an anonymous web proxy provider (Court of The Hague, 2012a, 4.34-4.36). From an economic perspective, however, the relevant question is not whether blocking access to TPB decreased the number of visitors to this website, but what the effect is on online copyright infringement as a whole.

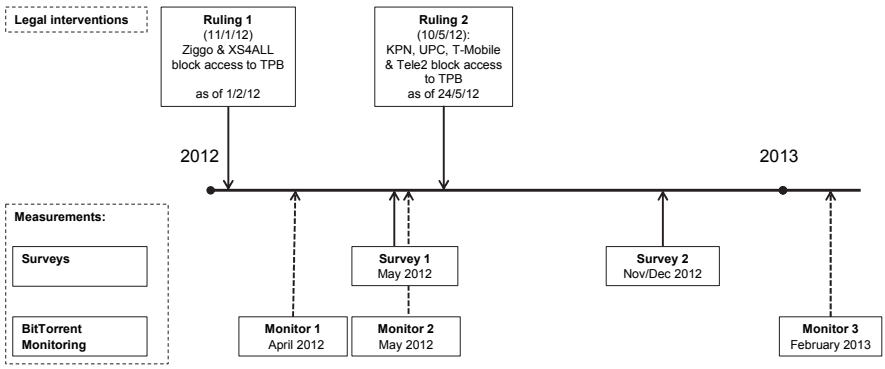
Blocking access to TPB may affect unauthorised file sharing through various mechanisms. First, the mere announcement of the intervention may discourage downloading because of anticipation or awareness that file sharing is not appreciated by rights holders[50] and may deprive authors from their income (*awareness effect*). Second, after the actual blocking has become effective, illegal content may become less attractive, because it is more difficult to find. This raises transaction costs, which may have an instant negative *blocking effect* on file sharing. After these immediate effects, two opposing mid- or long-term effects could occur: On the one hand, consumers may be triggered by the intervention to use legal alternatives and continue using them (*conversion effect*), on the other hand, they may learn how to circumvent the blocking, and new illegal sources may be launched, causing file sharing to increase again (*relapse effect*).

This paper assesses the effects of blocking access to TPB on unauthorised file sharing and the use of legal channels, using two empirical approaches next to each other: 1) Consumer surveys among representative consumer samples (two measurements) and 2) BitTorrent monitoring on selections of torrents (three measurements). BitTorrent monitoring concerns an innovative data collection technique that directly measures BitTorrent participation by

[50] In the Netherlands, downloading from illegal sources is allowed under the private copying exception, but uploading is illegal. By default BitTorrent clients download as well as upload content.

monitoring the distribution of peers for a sample of torrent files, without participating in the file sharing. The first consumer survey and BitTorrent Monitoring took place three months after the first ruling; the second monitoring after four months. The second survey took place six months after the second ruling and ten months after the first. Finally, the second monitoring took place approximately one year after the first ruling (see Figure 1).

Figure 1 – Timeline of legal interventions and measurements



Both methods combined lead to the conclusion that while a small group of respondents downloads less from illegal sources or has stopped doing so altogether and a significant but small effect is found on the distribution of Dutch peers, there is no impact on the percentage of the Dutch population downloading from illegal sources. As such, this paper contributes to the literature on the effectiveness of online copyright enforcement. Moreover, it provides a novel and non-infringing technology for BitTorrent monitoring.

The rest of this paper is structured as follows. A short technical introduction to the BitTorrent file sharing mechanism, and an overview of the emerging literature on copyright enforcement and on BitTorrent monitoring are provided in Section 2. The design and results of the consumer surveys are presented in Section 3, and BitTorrent monitoring in Section 4. The conclusions are summarised in Section 5.

2. Background and literature

2.1. The BitTorrent file sharing mechanism

The BitTorrent protocol is a peer-to-peer protocol in which peers cooperate in distributing content over the Internet. A *peer* is a program running on a

computing node that participates in downloading and uploading content. This content is divided into *blocks* of data, which are exchanged between peers and together form the complete content. A *swarm* is a set of peers sharing a single set of files, a *torrent file*. This torrent file describes the relevant metadata of the content being distributed to support the BitTorrent protocol.

Trackers are used to bootstrap and accelerate BitTorrent swarms; they participate in swarms by keeping track of all participants and provide a peer with information on other peers in the swarm. A peer can discover other peers through *peer exchange*, that is sharing known peers with connected peers.

The initial version of the BitTorrent protocol (Cohen, 2008) used torrent files to describe content. Later versions have added another layer of distribution by storing the BitTorrent files in a *Distributed Hash Table* (DHT) storage network created by all global peers. A so-called *magnet link* can then be used to address content in this DHT network, which provides the contents of a torrent file, and several participating peers. The main advantage of magnet links is that they remove the need for a central node, the tracker, but often magnet links also contain pointers to trackers to improve the peer discovery process.

2.2. Effectiveness of measures against unauthorised file sharing

Since early this century, a substantial empirical literature emerged on the effects of unauthorised file sharing on the sales of entertainment products. Early contributions focused on the music industry, later some studies appeared on movies. In their literature review, Smith and Telang (2012) conclude that a large majority of these studies find a negative effect of unauthorised file sharing on sales.

Over the years, the entertainment industry has pursued a variety of strategies to combat unauthorised file sharing. Some concern their own supply, for instance the use of Digital Rights Management (DRM) technology to prevent users from sharing legally acquired content. For the music industry this strategy proved to be counterproductive and was abandoned (Sinha, Machado & Sellman, 2010; Vernik, Purohit & Desai, 2011), while for audio-visual products, e-books and games the use of DRM is still common. Another strategy is to offer legal digital alternatives. Danaher, Dhanasobhon, Smith, and Telang (2010) study the effect of the removal of NBC content from the iTunes store in December 2007 and its restoration in September

2008, on BitTorrent piracy and DVD sales on Amazon. They associate the removal with an 11.4% increase in piracy of this content, twice the legal digital sales prior to removal. After the content was restored, no significant effects on DVD sales were found, nor on piracy levels. A more controversial strategy involves the pollution or poisoning of illegal file sharing networks with useless decoys (Christin, Weigend & Chuang, 2005).

Blocking access to TPB, the object of this study, stands in a tradition of *legal* actions against file sharing. These can be distinguished in action against individual file sharers, the demand-side of the illegal market, and actions against the supply-side, platforms that accommodate unauthorised file sharing.

2.2.1. Legal action against individual file sharers

In June 2003, the Recording Industry Association of America (RIAA) initiated a series of lawsuits against individual file sharers. Bhattacharjee, Gopal, Lertwachara, and Marsden (2006) tracked the online file sharing behaviour of over 2000 individuals. They found that in reaction to these lawsuits, the majority of substantial file sharers decreased the number of files shared typically by 90% and small time file sharers typically to a third. However, the individuals who continued unauthorised file sharing increased their activity again after a court ruling that made it harder for the RIAA to request the names of file sharers from ISPs. Furthermore, the authors note that individuals may have gone off the radar, using more covert file sharing technologies.

Adermon and Liang (2011) study the effects of the implementation of the Intellectual Property Rights Enforcement Directive (IPRED) in Sweden on music and movie sales. This European directive, implemented on 1 April 2009, substantially increased the risk of being caught and prosecuted for online file sharing. The authors have found an 18% drop in Internet traffic during the six months following the implementation. Using difference-in-difference analysis with Finland and Norway as controls, they conclude that the implementation led to an increase in the sale of physical music by 27% and digital music by 48%. No significant effects were found on cinema visits or DVD sales. On the other hand, it was also shown in the study that "the reform effects more or less disappeared after six months except for digital music sales" – the aforementioned *relapse effect*. They also report the outcome of two consumer surveys on file sharing. In 2009, 23% of the respondents stated they had stopped using file sharing sites as a result of the new legislation, 37% used file sharing sites less (N = 429). In 2010, 52%

stated they used file sharing sites less for downloading music than the year before (*N* = 1060). From this group who reported to download less than the year before, 56% mentioned Spotify as the reason for this, while 34% mentioned the IPRED, and 25% "better legal services".

Danaher, Smith, Telang, and Chen (2012) study the effect of the French HADOPI legislation on digital sales in the iTunes store. Under this "three strikes" legislation, implemented in October 2009, infringers caught first receive a warning. When caught again, they get a second warning, and after this, suspension of their Internet connection may be ordered. Using a difference-in-difference approach comparing French data with other countries, the authors have found a positive effect on song and album sales at iTunes of 22.5% and 25% respectively (*conversion effect*). However, it is impossible to disentangle the effects of the actual legislation and the education campaigns accompanying the introduction of HADOPI (*awareness effect*). Most of the effect seems to have arisen before the (amended) legislation was finally accepted by the Constitutional Council and diminished since then.

2.2.2. Legal action against platforms that accommodate file sharing

A different strategy is directed towards platforms that accommodate file sharing, the supply side of the illegal market. Blocking access to TPB stands in this tradition. An early victory of right holders against this supply side was the shutdown of Napster in July 2001. However, Napster was soon succeeded by alternative platforms such as KaZaA and BitTorrent clients that decentralise the file sharing process. The bootstrapping of the process occurs at sites such as TPB. An alternative technology is provided by cyberlockers (or *one-click hosters*), cloud services where individuals can store copyright protected content anonymously for others to download.

In January 2012, Megaupload, the most popular cyberlocker, was shut down. Danaher and Smith (2013) study the effects of this natural experiment on unauthorised file sharing and legal online movie rentals and purchases. They analyse cross-country variation in the use of Megaupload before and the change in legal sales after the shutdown. No relation is found between the penetration of Megaupload and the digital sales *prior* to the shutdown. However, a significant positive relationship is found between this penetration and the sales change *after* the shutdown (*blocking effect*). For each additional 1% of pre-shutdown penetration, the post-shutdown sales increased by an extra 2.5-3.8%. The absence of a relation between Megaupload penetration and digital sales prior to shutdown suggests that

the effect of the shutdown is temporary and lasts until consumers have found their ways to alternative suppliers of illegal video content. Peukert, Claussen, and Kretschmer (2013) also study the effect of the Megaupload shutdown and have found a negative effect of the shutdown on box office revenues for smaller and mid-range movies. Apparently, only large blockbusters benefit from the shutdown of Megaupload, whereas smaller movies may benefit more from file sharing through word-of-mouth in social networks.

Lauinger *et al*. (2013) also study the effect of legal actions against cyberlockers, such as removing certain content. They have found that such actions are a nuisance to the users of cyberlockers but that their effect on overall availability of content and on file sharing activity is limited. They conclude that cyberlockers "are probably most vulnerable to antipiracy measures targeted at removing external sources of revenue. Indexing sites may be less affected, especially those that are less driven by (and reliant on) monetary gain" (Lauinger *et al*., 2013, p. 12).

In sum, this review of the literature shows that legal actions against file sharers and platforms for unauthorised file sharing often have immediate effects (*awareness* and *blocking effects*) which disappear after typically six months, as illegal supply and demand find other places to meet (*relapse effect*). This is congruent with the conclusion drawn by Cammaerts, Mansell, and Meng (2013), that "[t]argeting individual internet users is not likely to reverse the trend toward an online sharing culture." Subsequently, they stress the importance of independent evidence for copyright policy. This study on the effect of blocking access to TPB at several points in time during the first year after the intervention adds to this literature and body of evidence.

2.3. BitTorrent monitoring

There is a large body of research on monitoring BitTorrent and other peer-to-peer networks. Many studies are focused on detecting monitors and escaping detection from these monitors. Piatek, Kohno, and Krishnamurthy (2008) describe a reverse-engineering approach to BitTorrent monitoring by copyright holders attempting to identify infringing users. They have found that this monitoring has become more systematic, yet not conclusive. In their experiments, they are able to inject false information, which is then served with complaints about copyright infringement. Furthermore, blacklists used by the BitTorrent community at the time were not effective in identifying these monitors.

Toro and Chothia (2009) wrote a BitTorrent monitor for examining the behaviour of peers participating in swarms. This can then be used to classify peers heuristically, so that suspicious peers showing deviant behaviour can be identified and thus be avoided.

Bauer, Mccoy, Grunwald, and Sicker (2009) note that passive monitors often produce false positives, and that active monitoring of a BitTorrent swarm is much more effective. They have created a tool, BitStalker, which probes participating peers, exchanges a block of data and then requests a peer exchange. This allows for monitoring a BitTorrent swarm in a way that is robust against trackers providing false data and also verifies whether peers are actively participating. Jünemann, Andelfinger, Dinger, and Hartenstein (2010) and Wolchok and Halderman (2010) monitor the Distributed Hash Table (DHT) storage network. The BitMON tool created by Jünemann *et al*. monitor the participants in the DHT network, and allows tracking their behaviour and the stability of the DHT network. Wolchok and Halderman instead crawl the DHT to discover the stored torrent files but also identify peers downloading these files. This is an indirect way of identifying BitTorrent participants.

Hoßfeld *et al*. (2010) use the test bed distributed by PlanetLab to monitor BitTorrent swarms, with the objective of identifying how much the performance can be improved by adjusting the BitTorrent distribution protocol by leveraging distance in the network in forming the overlay network. They show that it is possible for most swarms to identify almost all of the participating IP addresses.

Kryczka, Cuevas, Guerrero, Azcorra, and Cuevas (2011) classify many different BitTorrent monitoring techniques: Portal, tracker and peer crawling, but also a custom client/plugin. They identify the possibilities of these techniques and identify a custom client/plugin as the best method for gathering information about peers. Chothia, Cova, Novakovic, and Toro (2013) classify monitoring techniques as direct and indirect, equivalent to the active and passive techniques mentioned earlier. They observe that both techniques are used to identify infringing peers.

3. Consumer survey

To study the effects of blocking access to TPB, two surveys were held among representative samples of the Dutch population aged 16 years and older. Combining both surveys yields a multi-period measurement of reactions to

blocking access expected among individuals, and of their (self-reported) reaction after three, six and ten months (see Figure 1).

3.1. Sample and response

Both surveys were conducted in the CentERpanel, a representative online household panel. In contrast to most commercial panels, CentERpanel is not an access panel: households can only participate on invitation. The CentERpanel recruits participants with the argument that they support scientific and societal research without commercial purposes. Household selection is done through random sampling from Dutch address registers (probability sample), households without Internet access receive necessary devices and support from CentERdata. As such the panel is highly representative on both observed and unobserved characteristics.[51] The panel aims to keep participants attached on a permanent basis (since 1990), but some panel attrition renders periodic panel recruitment necessary. In fact, recruitments occurred between both survey measurements, during which a wave of new participants were recruited and inactive members were dropped.

A total of 2009 people fully completed the first questionnaire, yielding a response rate of 64.4% (3118 members had been invited). The second questionnaire revealed a response of 2422, a response rate of 78.4%. 1692 panel members (54.3% of the first sample) participated in both surveys. The measurements are treated as two independent cross-sections in order to keep the information of one-time participants. The first sample consists of 55% men, 38% have a college degree, 40% live in a highly urbanised area. For the second sample the percentages are 53% men, 41% with a college degree, and 38% live in a highly urbanised area. As file sharing differs strongly among age groups and young age groups are somewhat under-represented, all data were weighted by age on seven different age groups.

3.2. Results

3.2.1. Market developments

The first measurement reveals that 27.8% of Dutch consumers purchased music in a physical format (CD, LP) in the preceding six months (Table 1). For 63.1% buying physical music formats was longer than six months ago, whereas 9.1% never did so. Overall, 51.7% obtained music from a legal

[51] For representativeness figures, see: http://www.centerdata.nl/en/about-centerdata/what-we-do/data-collection/centerpanel/centerpanel-representativity-figures-may.

source in the preceding half year: In a physical format (27.8%), as paid download or streaming (14.2%), and/or as free download or streaming from a legal source (33.2%). Finally, 18.3% downloaded music from an illegal source such as TPB in the preceding six months.

Table 1 – Purchasing, downloading and streaming music

Last time	Physical format (CD/LP) (1)	Downloading & streaming from a legal source		Downloading & streaming from an illegal source (4)	All channels (1 to 4)	Total legal (1 to 3)
		Paid (2)	Free (3)			
May 2012 (*N*=2009)						
Past 6 months	27.8%	14.2%	33.2%	18.3%	53.6%	51.7%
6-12 months	12.2%	2.9%	3.3%	3.4%	9.4%	9.0%
> a year ago	50.9%	11.7%	11.6%	12.4%	30.6%	32.5%
Never	9.1%	71.2%	51.9%	65.9%	6.4%	6.7%
November-December 2012 (*N*=2422)						
Past 6 months	30.4%	14.8%	31.5%	18.2%	55.3%	53.3%
6-12 months	12.3%	3.5%	4.2%	3.5%	9.8%	9.7%
> a year ago	49.7%	12.6%	14.0%	13.7%	29.0%	30.9%
Never	7.7%	69.0%	50.4%	64.6%	5.9%	6.1%
Comparison between measurements:						
χ^2	11.8*	6.9	21.1*	4.0	4.7	5.7
(*p*-value)	(0.01)	(0.07)	(<0.001)	(0.26)	(0.20)	(0.13)

* Significant change between measurements ($p<0.05$)

The second measurement shows that purchasing music in physical formats increased slightly ($\chi 2=11.8$; $p=0.01$; $df=3$) to 30.4% in the preceding six months. This increase is unlikely to be caused by the blocking of TPB, given the fact that acquiring music from illegal sources remained constant ($\chi 2=4.0$; $p=0.26$; $df=3$). Paid downloading remained stable as well ($p>0.05$), whereas free downloading and streaming from a legal source decreased somewhat ($\chi 2=21.1$; $p<0.001$; $df=3$).

Data on downloading and streaming for music, films & series, books, and games is provided in Table 2. Downloading music from an illegal source is most common, closely followed by downloading films & series. The majority of Dutch consumers has never downloaded any of the content types from an illegal source (58.7% in the second measurement). Whereas downloading music was practically equal between both measurements (($\chi^2=4.0$; $p=0.26$; $df=3$), downloading films & series, games and books increased somewhat (ps<0.0).

Table 2 – Downloading & streaming from illegal sources

	Music	Films & series	Books	Games	Total
		May 2012 (*N*=2009)			
Past 6 months	18.3%	16.8%	5.1%	4.4%	24.0%
6-12 months	3.4%	1.5%	1.2%	1.9%	3.2%
> a year ago	12.4%	5.6%	2.3%	7.1%	12.0%
Never	65.9%	76.0%	91.4%	86.7%	60.8%
		November-December 2012 (*N*=2422)			
Past 6 months	18.2%	17.8%	8.5%	6.4%	24.5%
6-12 months	3.5%	2.1%	1.7%	1.7%	3.4%
> a year ago	13.7%	8.2%	3.2%	8.7%	13.4%
Never	64.6%	72.0%	86.6%	83.2%	58.7%
Comparison between measurements:					
χ^2	4.0	41.6*	74.6*	34.7*	6.3
(*p*-value)	(0.26)	(<0.001)	(<0.001)	(<0.001)	(0.10)

* Significant change between measurements ($p<0.05$)

3.2.2. The effects of blocking access to The Pirate Bay

The self-reports of behavioural changes in reaction to blocking access to TPB by the two sets of ISPs are described in Table 3.[52] During the first measurement, subscribers to UPC, KPN, Tele2 and T-Mobile were not confronted with the blocking yet and were asked about their expected reaction. More than half of the downloaders (56.1%) expected to keep their downloading rate unchanged; 28.8% expected to decrease their downloading, either by downloading less (21.7%) or by quitting completely (7.1%); 15.2% expected to download more.

After the blocking had become effective, consumers were asked about the actual impact of the blocking. The reported behaviour three months after the blocking differed significantly from the expected change reported before the blocking (χ^2=12.1; $p=0.007$; df=3): The percentage of downloaders that did not change their downloading behaviour was higher (71.4%) than initially expected (56.1%). The percentage that stopped downloading was slightly higher than initially expected (8.0% versus 7.1%), but the share of customers that downloaded less was substantially lower (14.9% vs. 21.7%). On the other hand, fewer consumers increased downloading (5.7%) than they previously expected (15.2%).

[52] Because the focus is on the developments in these subsamples, unweighted observations of those who were downloaders at the time of the blocking are used.

Table 3 – Reaction or expected reaction to blocking access to The Pirate Bay of customers downloading from illegal sources at the time of blocking (two measurements, split sample)

	UPC, KPN, Tele2 & T-Mobile (expected reaction, *t* = 0)*	Ziggo & XS4ALL (reaction *t* = 3)**	UPC, KPN, Tele2 & T-Mobile (reaction *t* = 6)*	Ziggo & XS4ALL (reaction *t* = 10)**
Stop	7.1%	8.0%	9.2%	8.4%
Less	21.7%	14.9%	14.5%	15.3%
Just as much	56.1%	71.4%	70.2%	71.8%
More	15.2%	5.7%	6.1%	4.6%
N	198	262	228	131
Comparison with previous measurement:				
χ^2		12.1	0.6	0.7
(*p*-value)		(0.05)	(0.91)	(0.87)

* Part of 1st measurement; ** Part of 2nd measurement

There is no significant difference between the reported reaction three and six months after the blocking (χ^2=0.6; p=0.91; df=3), nor between six and ten months after the blocking (χ^2=0.7; p=0.87; df=3). Thus, an immediate effect of the blocking is found that is smaller than the expected effect prior to the blocking, and this effect does not change within this time span. It is important to realise that the majority of customers was not affected by the blocking, simply because they were no downloaders at the time of the blocking. Overall, 4-6% of all consumers have decreased their downloading.[53]

Table 4 – Downloading & streaming from illegal sources per blocking situation (two measurements, split sample)

	UPC, KPN, Tele2 & T-Mobile		Ziggo & XS4ALL	
	No blocking, *t*=0	Blocking, *t*=6	Blocking, *t*=3	Blocking, *t*=10
Past 6 months	**15.7%**	**18.4%**	**22.5%**	**25.2%**
< week	6.0%	8.1%	7.8%	11.3%
Week-month	3.7%	4.2%	6.8%	4.1%
1-3 months	3.7%	3.4%	6.0%	5.4%
3-6 months	2.3%	2.7%	1.9%	4.4%
6-12 months	2.8%	3.3%	3.0%	3.5%
> a year ago	9.5%	12.0%	13.2%	15.1%
Never	72.1%	66.4%	61.3%	56.3%
χ^2	43.6		942.8	
(*p*-value)	<0.001		<0.001	

[53] Approximately 25% of consumers downloaded from illegal sources in the preceding six months, of which 20-25% decreased downloading in reaction to the blocking.

Downloading from illegal sources has not decreased since the interventions. This is confirmed in Table 4. In fact, both for UPC, KPN, Tele2 & T-Mobile (χ^2=43.6; p<0.001; df=6) and for Ziggo and XS4all (χ^2=942.8 ; p<0.001; df=6) the percentage of consumers downloading in the preceding six months increased. For the former it increased from 15.7% just before the blocking to 18.4% six months after. For the latter it increased from 22.5% three months to 25.2% ten months after the intervention. For both sets of ISPs, the percentage of customers downloading very recently (preceding week or month) also increased. Thus, though a small share of downloaders reports a decrease in their downloading activities after the blocking, this effect is not reflected in the overall numbers. A likely explanation is that there are also new consumers who have started downloading from illegal sources, since the percentage of consumers that has never downloaded decreased over the measurements.

4. BitTorrent monitoring

4.1. Monitoring tools used and torrent samples

The initial monitoring (April and May 2012) (Van der Ham *et al*., 2012) started as an ad hoc way to chart effects of the first blocking, by Ziggo and XS4ALL, in order to come up with measurements shortly after this intervention (see Figure 1). A programmable interface of the popular Transmission client was used. By means of a script, a torrent magnet link was added programmatically, and then every minute the list of peers the client was interacting with was requested and stored. The default limit of peers to interact with was raised to 1024 (the maximum allowed) to record as many peers as possible. This methodology recorded activity on several magnet links at different times during a few days.

The above method of recording peers yielded a list of IP addresses for each of the torrents. To convert this list to usable information, first the Team Cymru IP-to-ASN mapping service (http://www.team-cymru.org/Services/ip-to-asn.html) was used to record which ISP the IP address came from. This service has combined all the IP address registrations from the Internet Registries. Unfortunately, the country data from these registries is not always accurate. Many ISPs also have IP subnets registered as EU. To pin down the location further, the MaxMind Free GeoIP database was used (http://www.maxmind.com/en/country). In cases of conflicting results, the latter was preferred.

In April 2012, 59 Dutch spoken or subtitled torrents were selected, which yielded a total of 12,942 Dutch peers. In May 2012, 19 Dutch spoken or subtitled torrents were selected which yielded 2566 Dutch peers.

The monitor described above is an active client, from which data are exported. The methodology provides a valid insight into the BitTorrent activity but could be improved on its effectiveness to record peer activity. Therefore, a new monitor was designed from scratch for the third measurement using Python and the libtorrent library. This library (http://www.rasterbar.com/products/libtorrent/) implements the BitTorrent protocol and is used in many popular BitTorrent clients. The new monitor uses the library to appear as an active client but is configured such that it does not download or upload any content. The monitor joins the torrent swarm and records activity, it requests a new set of peers from the tracker as often as allowed and records all these IP addresses. The monitor does not exhibit any suspicious behaviour as defined by Toro and Chothia (2009), because it only monitors a maximum of ten torrent swarms simultaneously and behaves like a regular client.

The above monitor is a stand-alone process, which submits all its recorded peers to a database server, where they are stored and processed. Each peer record contains the IP address, the torrent it was recorded in, and the time it was recorded. During February 2013, the server and three monitors ran at different locations on the Internet and recorded activity in ten torrent swarms over a period of two weeks. After analysing the records with the Team Cymru IP-to-ASN mapping and MaxMind GeoIP database, 98,807 Dutch peers were obtained from ten Dutch spoken or subtitled torrents. As such, the new monitor proved to be much more effective than the former one.

4.2. Results

The Dutch peers were attributed to a total of 133 ISPs (108 of which recorded less than 50 peers over all measurements combined). While the court rulings primarily affect only six ISPs, these account for over 90% of Dutch residential broadband subscribers and of all Dutch peers recorded. Table 5 presents the percentage of Dutch peers for each ISP of interest for the three consecutive measurements. Although differences in the distributions of peers are statistically significant, changes are small, which implies limited effects of the intervention on BitTorrent file sharing. The percentage of peers associated with the ISPs affected by the *first ruling* increased by 3.5%-point between April and May 2012 while the percentage

affected with the *second ruling* decreased by 1.8%-point. The changes were statistically significant (χ^2=15.7; p<0.001; df=2). Since the second ruling was not yet enacted by that time, this increase cannot be the result of the aforementioned *blocking effect*. It is more likely the result of an *awareness effect* on subscribers of the ISPs affected by the second ruling or of a *relapse effect* for subscribers of Ziggo.

Between May 2012 and February 2013, the percentage of peers affected by the first ruling decreased, albeit not back to the April 2012 level, while the percentage of peers affected by the second ruling decreased only slightly (χ^2=1075.8; p<0.001; df=2). The latter indicates that the actual *blocking effect* adds little to the earlier *awareness effect*.

Table 5 – Distribution of peers amongst ISPs affected by the 1st or 2nd ruling

ISP	April 2012	May 2012	February 2013
Total Dutch peers	12942	2566	98807
Ruling 1: blocking since 1-2-2012	*29.7%*	*33.2%*	*31.7%*
Ziggo	27.6%	31.5%	29.3%
XS4ALL	2.1%	1.7%	2.4%
Ruling 2: blocking since 24-5-2012	*63.9%*	*61.1%*	*60.3%*
KPN	29.2%	25.9%	30.3%
UPC	21.8%	23.9%	19.1%
Tele2	7.2%	6.3%	5.9%
T-Mobile	5.7%	5.0%	5.0%
Other Dutch ISPs	*6.4%*	*5.7%*	*8.1%*
Comparison with previous measurement:			
χ^2 (df=2)		15.7	1075.8
(p-value)		(<0.001)	(<0.001)
Total peers ISPs of interest	12118	2420	90852
% of all Dutch peers	93.6%	94.3%	91.9%
Total residential broadband subscriptions (million)	6.47	6.48	6.61
Market shares:			
Ziggo	26.3%	26.4%	26.6%
XS4ALL	3.7%	3.7%	3.5%
KPN	37.0%	37.0%	37.4%
UPC	15.3%	15.3%	15.6%
Tele2	6.6%	6.6%	5.9%
T-Mobile	4.4%	4.3%	4.1%
File sharing propensity IPSs Ruling 1	0.99	1.11	1.05
File sharing propensity IPSs Ruling 2	1.01	0.97	0.96

Figures on market shares for residential broadband based on linear interpolation of Albrecht (2013). For consistency, all figures for KPN include 1.8% market share estimate of fibre subsidiaries taken over in Q4 2012.

The status of the remaining smaller ISPs after the second ruling complicates this analysis. Some have also blocked access to TPB at some point even though the rulings do not explicitly apply to them: they may want to avoid prosecution. Moreover, the awareness effect may also occur for the subscribers of these ISPs. Hence, this group cannot be seen as a completely *untreated* control group. This can be resolved by only comparing the ISPs addressed in either ruling and gives similar results.

Finally, changes in ISPs' market share for residential broadband between the three measurements could influence the outcomes. To control for such market dynamics, the second half of Table 5 give the relevant residential broadband market shares as well as total market size. Combining this with the distribution of Dutch peers, a metric can be developed for the file sharing propensity of subscribers per ISP as: share of total peers / share in broadband market. For the entire market, this propensity is 1 by definition, but it differs between ISP according to the socio-demographic composition of their client base. Changes over the short time frame studied are most likely related to the court rulings. For the ISPs in ruling 1, the pattern for this metric is identical to that for the percentage of Dutch peers. For the ISP in ruling 2, the decrease between the last two measurements is negligible, despite the blocking that was ordered in between. This suggests that the *awareness effect* dominates any *blocking effect*.

5. Conclusions and recommendations

Following rulings from a Dutch court, the major Dutch Internet Service Providers have blocked access to The Pirate Bay (TPB) since February/May 2012, and more than 85% of Dutch Internet subscribers can no longer (directly) access this popular website facilitating the unauthorised exchange of copyright protected material. This study contributes to the emerging literature on the effectiveness of online copyright enforcement by measuring the effects of these interventions on downloading from illegal sources, possibly in favour of legal channels. Two complementary empirical methods (yielding five measurements) for assessing the effects of this intervention on downloading from illegal sources are presented in the paper. No strong indications are found for any structural effects.

Two consecutive consumer surveys provide insight into consumers' reactions to the intervention after three, six and ten months, as well as the reaction they expect shortly before blocking. The intervention can only affect consumers who download or intend to download from illegal sources, 27-

28% over the past year. For this segment of the population, it is found that a large majority (70-72%) is non-responsive to blocking access to TPB. This is significantly more than consumers expect prior to the blocking. About half of those who report a response to the intervention state they download less, while a third state they stopped downloading altogether. The rest claim to download more as a result of the intervention.

This would suggest a small negative *blocking effect* of the intervention on the percentage of the population downloading from illegal sources. However, no such effect is found. Instead, the percentage downloading films & series, games and books from illegal sources in the preceding six months increased between May and November/December 2012, while downloading music from illegal sources remained constant. This implies that any behavioural change in response to blocking access to TPB has had no lasting net impact on the overall number of downloaders from illegal sources, as new consumers have started downloading from illegal sources and people learn to circumvent the blocking while new illegal sources may be launched, causing file sharing to increase again (*relapse effect*).

These findings are corroborated by the second, complementary method presented: BitTorrent monitoring. BitTorrent monitoring measures observed rather than reported behaviour, but with the short-coming that it cannot observe consumers circumventing the blocking by downloading via VPN connections or from newsgroups and cyberlockers. BitTorrent monitoring reveals only small changes in the distribution of Dutch peers over the different ISPs for the three measurements, which implies very limited effects of the intervention on BitTorrent file sharing.

For the small changes observed, it is not fully possible to disentangle the different and opposing effects of the *blocking* itself, *awareness* of the intervention, *conversion* to legal alternatives induced by the blocking, and a *relapse* as a result of circumvention or the launch of new file sharing platforms. The fact that consumers report a significantly smaller response to the intervention than they expect in advance, indicates that the *awareness effect* wears off quickly. Furthermore, the increase between the two surveys of the percentage of ISP subscribers admitting to having downloaded from illegal sources in the preceding period indicate a *relapse effect*: After a small initial *awareness* or *blocking effect*, the market moves back towards the earlier equilibrium, with no or only very small structural effects.

These results are in line with a tendency found in the literature that any effects of legal action against file sharing often fade out after a period of typically six months, as the initial *awareness effect* wears off and illegal supply and demand find other places to meet. Probably, the required ICT knowledge to circumvent the blocking is no more advanced than the knowledge required to download from illegal sources. Hence, targeting individual file sharers and blocking access to file sharing platforms seem relatively ineffective to reduce unauthorised file sharing, while such measures bear a risk of alienating customers from the content industries and giving them incentives to adopt covert technologies such as dark nets, IP-spoofing and VPN. These interventions also threaten the transparency of the Internet, effectively introducing censorship. In France, such considerations as well as the costs of enforcement have led the government to temper the HADOPI-sanctions (see Cammaerts, Mansell, and Meng (2013) for a brief discussion).

Since there are no indications for structural effects of the interventions, it is unlikely that the increased use of legal channels and decrease in file sharing observed for music over a longer time span of four years (Poort & Leenheer, 2012) can be attributed to the intervention (*conversion effect*). If that were the case, a similar pattern would be expected for films and series, and books, while the opposite is found. A more likely explanation is the development of successful and comprehensive legal business models for downloading and streaming music. Therefore, policymakers and the content industry had best focus on removing any legal or practical obstacles for comprehensive and attractive legal online models, not only for music but also for films, series and books, instead of combating unauthorised file sharing. Researchers could support this by studying the dynamics between the adequacy of legal supply and file sharing.

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7 Perspectives of creators and performers on the digital era

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Abstract
In this contribution, a nearly comprehensive survey among creators and performers in media, arts and entertainment in the Netherlands is presented. It concerns the implications of digital reproduction and distribution for the creative professions as perceived by those working in it. Based on regressions and cluster analysis of the survey data, an analysis is provided of income developments and perceived threats and opportunities of digitisation, as well as an exploration of the underlying socio-economic and professional factors. Many creators and performers perceive digitisation primarily as a threat. Although age is a relevant explanatory factor for the opinions regarding digitisation, the notion of a generation gap is shown to be an oversimplification. Other relevant dimensions include income development, education level, and the way digitisation has affected respondents' discipline.

Keywords
Survey, Creators, Performers, Digitisation, Copyright, Cluster analysis.

1. Introduction

On 22 April 2010, YouTube removed several parodies of the famous bunker scene in the film Der Untergang after the producer, Constantin Films, filed a complaint about copyright infringement. However, the director, Oliver Hirschbiegel, responded that these parodies were a compliment for him and had actually amused him. Along with other anecdotic evidence, such as the experiment of the band Radiohead who posted their album In Rainbows on their website for a voluntary payment, and Lady Gaga stating that she has no problem with people downloading her music, this news item suggests that creators and performers are more lenient towards copyright issues in the digital era than most producers and publishers. In contrast, Madonna and Scorpions guitarist Rudolf Schenker have been very critical about file

sharing, which suggest that not all popular artists take a lenient position towards copyright infringement. Could this be a generational issue or are there other factors at play here?

Digitisation, a term used in this article as shorthand for digital production, reproduction and the distribution of works through free or paid download or streaming services, websites and social media, contains both threats and opportunities for creators and performing artists. On the one hand, it enables them to reach their audience or clients without intermediation. They can bypass traditional media companies and create 'buzz' through social networks which can be capitalised in live performances or assignments. On the other hand, digitisation implies a loss of control over the distribution of and payment for their work as a consequence of unauthorised file sharing (commonly referred to as 'piracy'). Despite the many commentaries on the changes in the cultural and media landscape caused by digitisation, a systematic analysis of the perspectives of creators and performers on these matters is lacking.

This article is aimed at filling this gap. The positions of creators and performers on copyright in the digital environment and their perception of the implications of digitisation for their profession are investigated. A broad scope is chosen for the study, investigating individuals working in the nucleus of the creative process in those domains and sectors in which copyright is a crucial part of the business model, both for creators and performers, and for institutions and corporations active in the exploitation of those rights. These corporate players remain unaddressed in this study, since the implications of digitisation for them have been addressed frequently. What the creators and performers focussed on in this study have in common is their role as an initial source of creative input, but they are expected to differ in their perceptions of the consequences of digitisation. The specific development phase of the creative sector they work in, the nature of the works in their professions (for instance the written word, music or audio-visual) as well as the mediation of their creative output to their main audiences (directly face-to-face or through electronic media) are expected to lead to different perceptions and opinions. Therefore, a wide range of creators and performers is addressed, from photographers to journalists and from translators to video artists.

Combining several survey questions, an index of opportunities and threats of digitisation as perceived by different professions is created. Although respondents' socio-economic characteristics and their profession can to

some extent explain their position on these indices, these characteristics do not provide any insight into the underlying variance between individual respondents, nor do they explain the coherence in the responses to the various questions. For this purpose, cluster analysis is used to distinguish seven response profiles encompassing eight key variables indicating respondents' positions towards digitisation, copyright and their future within the domain of cultural production. Respondents within a cluster hold relatively homogenous opinions. Demographic characteristics and the professions that are under- or overrepresented in these groups are informative as to which characteristics explain respondents' attitudes. They show that besides generation the way creators perceive their role and position in the digital age is influenced by education, income development and creative discipline.

2. Background

Digitisation brings new opportunities and challenges for creators and performers, centred around disintermediation, new players, and unauthorised distribution and re-use. Disintermediation involves the disruption of the traditional vertical set-up in which media institutions were in charge of producing and distributing content, and changing it into a more horizontal paradigm allowing creators and performers to operate independently. Many now reach their audience directly through social media. They can communicate with their clients over the Internet and sell their work without intermediaries, making them less dependent and providing them with a stronger bargaining position towards producers and publishers. On the other hand, professional creators and performers face competition from debutants and amateurs who use social media and online distribution to bypass the traditional selection mechanisms and quality filters.

Simultaneously, companies that are new to the media industries manifest themselves as information providers and publishers: Apple and Google have developed into media institutions, providing access to information and cultural products.

Digitisation also spurred the unauthorised distribution of creative works: never before has it been so easy for creators and performers to reach an almost worldwide audience, yet never before has it been so easy for their audience to obtain content without paying for it. Within certain creative disciplines, free digital distribution of content may be part of a business

model in which it serves as promotion for live performances. In other disciplines, however, no such alternative sources of income exist.

The balance of these opportunities and threats and the future structure of the entertainment industry has so far remained undecided. Notably, the effect of file sharing on sales is a much debated issue in the academic literature. A majority of authors find a negative effect of file sharing on sales, but others find little or no effect and occasionally even a positive effect (see Smith and Telang (2012) for a literature review). Moreover, even with negative effects on sales, short-term welfare effects are likely to be positive, while the dynamic effects on creative production need not be negative either (Van Eijk *et al*., 2010). A study on the evolution of the quality of recorded music over time indicated it has increased rather than decreased since the launch of Napster in 1999 (Waldfogel, 2012). Underlying the debate to what extent performers and creators experience harm from file sharing, is a more ideological debate as to whether copyright enforcement should be stricter or more lenient in the face of massive unauthorised file sharing.

In comparison to the rather extensive literature on the effects of file sharing on media sales, studies on the perspectives of creators and performers on the impact of digitisation are scarce. Most of the research on artists' labour markets originates from the time before digital reproduction and distribution were widely adopted (see Towse (2001) for an extensive discussion). Madden (2004) performed a survey amongst self-declared artists and musicians. It turned out that both groups were using the Internet more than the general public was. In particular musicians used the Internet to reach their audience and as a source of inspiration. Musicians with lower income stated more often that the Internet increases their opportunities to reach their audience. At the time of Madden's survey, most artists were still hardly affected by digital developments, yet they were largely in favour of using technologies for copyright protection (DRM). Especially successful musicians were concerned that file sharing would harm them. Of the surveyed musicians, 83% provided free samples of their work online. Nevertheless, two thirds of both artists in general and musicians agreed that copyright holders should have complete control over the use of their work.

Kretschmer and Hardwick (2007) surveyed professional writers in the United Kingdom and Germany about their income. They found that in both countries authors' incomes have decreased since 2000. Authors earn considerably less than typical wages in other professions, a conclusion also found in earlier work on artists' earnings (Towse, 2001; Chapter 3). Authors

in the UK earned 64% of the net median wage, while German authors earned only 42%. This is in line with Frey's (1997, 1999) assertion that the supply in artist labour markets depends on both intrinsic and extrinsic motivations and rewards. As Caves (2000: 4) put it: "…on average [they] earn lower pecuniary incomes than their general ability, skill and education would otherwise warrant."

Equally typical for artists' labour markets is the skewed income distribution, which implies that average income statistics are of relatively little value to understand the artists' economic position: the winner takes all. This is, however, mitigated by incomes outside creative professions. Only one out of five writers earned their total income as a writer. As Kretschmer and Hardwick (2007) coined it, most authors lead 'portfolio lives'.

Kretschmer *et al*. (2011) conducted a similar study among visual creators in the United Kingdom in 2010 and found a comparable pattern of lower wages, portfolio lives and a more skewed distribution than in other sectors. The peak of income was found to be in the age bracket of 35-44, which is in line with other studies on artists' income development with age (Towse, 2001; Chapter 3) but in contrast to the typical labour market pattern that income peaks close to the retirement age.

Apart from income, Kretschmer *et al*. (2011) surveyed respondents on terms of contracts and bargaining power. The results are mixed: photographers generally feel that their bargaining power has decreased, while visual artists and designers see improvement. Illustrators occupy a middle position. A speculative explanation for these differences is that through the general availability of good-quality digital cameras and editing software, professional photographers face more competition from amateurs than other visual artists do.

3. Method

3.1. Survey design

In this study, an online questionnaire was used among creators and performing artists in the Netherlands. It includes 54 closed questions/statements and was conducted in October-November 2010. Statements were presented using 5-point Likert scales, ranging from 'strongly agree' to 'strongly disagree', plus a sixth scale item for 'don't know' (De Pelsmacker and Kenhove, 2006).

Apart from questions about the socio-economic and professional background of respondents, the main themes in the questionnaire were:

- Digital developments and preferences concerning online exploitation;
- Contracts and bargaining position vis-à-vis producers and publishers;
- File sharing, remixing, copyright enforcement and digital rights management (DRM);
- The role and performance of collecting societies (also known as copyright collectives).

3.2. Targeting individual rights holders

Five major collecting societies and seven professional associations invited their members to participate by sending them an e-mail with some background information about the survey, a hyperlink and a unique username and password to log in to the survey.[54] As nearly all of these organisations chose to handle the e-mailing themselves for privacy reasons, it was impossible to merge mailing lists and delete double entries (i.e. people included in more than one mailing list). To be able to estimate the actual number of creators and performers addressed, respondents were asked how many invitations they had received.

A total of 32,000 members of collecting societies and professional associations were invited to partake in the survey.[55] Respondents reported having received 1.4 e-mails about the survey on average. Correcting for this overlap, an estimated maximum of 23,500 individuals was invited.[56]

3.3. Response characteristics

A total of 6,054 people responded to the invitation: a gross response rate of 25.8%. Several filters were applied to convert this response into a valid sample. First of all, people who are not or no longer active as a creator or performer (e.g. retired performers and creators, or successors) and people who spend less than 12 hours a week on creative activities and have no intention of increasing this, were excluded from the sample. Furthermore, several people quit after seeing the introduction screen, which is most probably the result of receiving a second or third invitation to the

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[54] Two professional associations chose to propagate the survey by means of a press release or newsletter. Their members had to apply for a username and password themselves. This option was also offered to non-affiliated creators and performers. In order to reach them, announcements were posted on blogs, including a hyperlink to a website where they could apply for participation.

[55] Including the self-applicants discussed in footnote 54.

[56] This is likely to be an overestimation, since the number of e-mail bounces is unknown for four sending organizations. Moreover, some respondents may have received an additional invitation *after* they responded.

questionnaire. Checks were then performed to ensure that the number of duplicate respondents (an analysis of double IP addresses) and deliberately inaccurate respondents (an analysis of case-wise data variance) was minimised.

A net sample of 4,645 respondents resulted, of which 3,935 completed the survey. 710 people partly completed the survey and 210 people were presented a short version of the questionnaire as they neither now nor in the future expect their creative work to be digitally distributed. Considering that a respondent on average spent over 27 minutes filling out the questionnaire (excluding partly completed surveys, short versions of the questionnaire and extreme values), this response is very satisfactory.

Respondents were asked to tick their creative activities within 19 occupations. In case they ticked more than one activity, they were asked to indicate their primary activity. The self-proclaimed primary activities of creators and performers are listed in Table 1.[57] Most respondents are male (69%) and the mean age in the sample is 49 years, with occupation means ranging from 44 to 56 years old. Most (80%) have been active in their discipline for more than 10 years, and half for more than 20 years.

Table 1 – Primary activity

Occupational group	% of sample	*N*
Performing musician	21%	993
Photographer	13%	595
Composer/lyricist	12%	555
Visual artist	10%	451
Designer	9%	419
Actor	6%	289
Illustrator/cartoonist	6%	286
Author	6%	285
Director	5%	225
Singer-songwriter	4%	186
Translator	2%	105
Journalist	2%	79
Screenwriter/scriptwriter	2%	73
Video artist	1%	31
Other disciplines	2%	73
Total	100%	4,645

[57] Only 15 occupational groups are listed in Table 1, as comedians (N=15), choreographers (N=5), dancers (N=5) and game developers (N=4) have been added to the group of 'other disciplines'.

3.4. Representativeness

Too little is known about the demographic characteristics of Dutch creators and performers to allow for an extensive analysis of the representativeness of the response. Statistics Netherlands (CBS) published a study on Dutch artists (Jenje-Heijdel and Ter Haar, 2007), but the aggregated manner in which statistics are presented, entails that artist categories are 'contaminated' by the inclusion of occupations that were not part of our study, such as urban planners and landscape architects. Only two aggregated groups can serve as benchmarks: (1) Dance, Theatre & Music, and (2) Visual Arts, Language & Miscellaneous.

Compared with Jenje-Heijdel and Ter Haar (2007), our sample has an underrepresentation of age groups younger than 34 and by consequence an overrepresentation of age groups older than 54. This age bias is reflected in other studies in which the same mailing lists were used (IJdens *et al*., 2009; Von Der Fuhr *et al*., 2010; Brouwer and Zijderveld, 2003). The difference in age distribution also affects age-related characteristics such as years of experience, household position and income and can be explained by the fact that the relevance of copyright and neighbouring rights increases with age. As creators and performers build up their oeuvre, a larger part of their income is derived from royalty payments from collecting societies and publishers. This also explains why a comparison with the age distribution of the mailing lists used in this study does not indicate a systematic age difference.

There may be a slight survival bias in our sample as compared to the entire population of creators and performing artists. However, it does not impair the valid analysis of the various topics in this study. The number of young respondents is sufficiently large (over 500 respondents are younger than 35). Moreover, possible age effects are isolated by means of multivariate techniques.

3.5. Analysis

In the next section, the current and expected future earnings of creators and performers are assessed. Next, questions relating to the perceived opportunities and threats of digitisation are combined into two indices, and the factors influencing the position of respondents and professional groups on these indices are analysed.

Subsequently, cluster analysis is used to shed some light on the patterns of answers given by respondents. A cluster is a homogenous group of

respondents in terms of their answers to survey questions. Profiles of respondents of different clusters are, on the other hand, heterogeneous. The result elucidates the diversity of opinions among creators and performers, illustrating the social and cultural differences between groups (or 'clusters') of respondents, their different views on copyright, neighbouring rights, collecting societies, and digitisation. These clusters were obtained by means of two related multivariate techniques: factor analysis and cluster analysis.

Cluster analysis is a technique that identifies groups of respondents with similar response patterns. Given the wide array of questions, the number of questions on which cluster analysis was performed (i.e. the cluster variables) was first reduced by means of factor analysis – a technique that identifies groups of correlated questions.

Factor analysis was applied through a total of 54 questions seen by all 4,435 respondents who were presented the complete questionnaire. In order to assign each survey participant to a cluster, it was necessary to determine factor scores for all respondents. Missing values were therefore imputed an Expectation Maximisation (EM) algorithm (SAS Institute Inc., 2004: 2536).[58] The resulting factor scores were then used as variables in the cluster analysis, following a two-stage approach of hierarchical and non-hierarchical techniques (Burns and Burns, 2008; Norušis, 2010; Punj and Stewart, 1983). First, hierarchical cluster analysis (Ward's Method) was performed in order to find an indication of the 'optimal' number of clusters in the data. These were then tested using non-hierarchical (K-means) cluster analysis with the centroids – the average score of a cluster on a cluster variable – of the hierarchical cluster analysis as initial cluster centres. Prior to cluster analysis, cases were randomised and disposed of outliers[59] because K-means cluster analysis is sensitive to case order and outliers (Norušis, 2010).

Initial factor analysis with all 54 Likert statements produced a 12-factor solution, which was then judged on validity and statistical qualities. Validity in this context relates to interpretability of the factor: Do all items in the factor make sense? Are item scores highly correlated with occupation? Et cetera. The statistical qualities of an item are its standard deviation,

[58] Since the factor analysis was performed on Likert data, which is prone to contain a relatively large amount of error variance, Common Factor Analysis (CFA) was preferred over Principal Components Analysis (PCA), as the former does not distribute error variance among factors (Hair et al., 1998). We opted for Principal Axis Factoring (PAF), since ordinal data rarely have a normal distribution, and oblique rotation, as the resulting factors are expected to be correlated (Fabrigar et al., 1999).

[59] Outliers are cluster variable scores of 1.5 interquartile range (IQR) below the first quartile or 1.5 IQR above the third quartile.

communality, factor loading and measure of sampling adequacy (MSA). Additionally, the Kaiser-Meyer-Olkin (KMO) Measure and the Bartlett's Test of Sphericity of each factor solution were taken into account (Hair *et al.*, 1998).

After these various tests concerning validity and statistical quality, 14 of the 54 Likert statements were dropped as a result of a relative lack of variation between respondents, and an 8-factor solution resulted. These eight factors and the number of statements in each factor are listed in the first column of Table 2.[60]

Regression factor scores were subsequently used for clustering. As a rule of thumb clustering is stopped when the coefficients in Ward's Method for hierarchical cluster analysis increase steeply, as this indicates that two inconsistent groups are being merged and a heterogeneous group results. In our analysis, Ward's Method indicated that there are at least four homogeneous groups of respondents. This procedure was repeated using random selections of 50% of the respondents, in order to test the reliability of this outcome (Norušis, 2010: 375). These split-sample analyses show primary inflection points between five and seven clusters.

Hierarchical cluster analysis thus suggests solutions of four to seven clusters. Next, non-hierarchical (K-means) cluster analysis was performed and respondent assignments in both approaches were compared. A small overlap indicates that hierarchical cluster analysis may be overly restrictive.[61] There is significant switching between both clustering techniques from four to six clusters. This stabilises in the 7-cluster-solution, which is also the most intuitive of all solutions and was therefore adopted.

Almost all differences between factor scores are significant at the 1% level, indicating that each cluster has a distinct opinion profile.[62] Demographic profiles, on the other hand, are less clear-cut as clustering was based on opinions and not on socio-economic variables. Nevertheless, various demographic characteristics differ significantly between clusters (see Section 4.3).

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[60] The factors' Cronbach's Alpha values, a metric expressing internal consistency, are 0.6 or higher and therefore acceptable for explorative measurement scales (Hair et al., 1998).
[61] In non-hierarchical cluster analysis, respondents can switch from the initial cluster to which they were attributed using hierarchical cluster analysis, to the cluster they actually have most in common with.
[62] Differences were tested using Tukey's HSD, a One-Way ANOVA post hoc test.

4. Results

The outcomes of the survey are presented in this section. First, the income position of artists and performers is discussed, as well as their perceptions about the effect of digitisation on their earnings. Next, a 2-dimensional 'opportunities-and-threats space' is constructed, in which several survey questions are combined. The effect of respondents' socio-economic characteristics and profession on their position in this space is discussed. Subsequently, cluster analysis is used to identify groups of artists and performers with similar attitudes towards digitisation, revealing heterogeneity within professions.

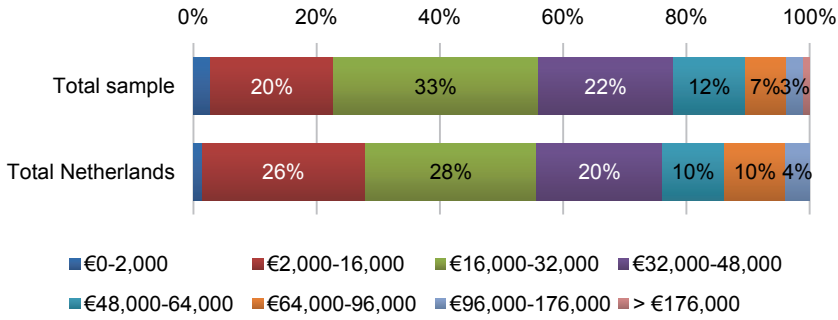
4.1. Income distribution and sources of income

In concordance with Kretschmer and Hardwick (2007) and Kretschmer *et al*. (2011), many creators and performers are found to lead 'portfolio lives': they supplement their income outside their creative profession. Over the entire sample, such earnings amounted to 17.4%. The most common income bracket for creators and performers is €16,000 to €32,000 in 2009 (Figure 1). This includes all sources of income, both within and outside the creative discipline.

In addition to the income distribution of the sample, the same is plotted for the entire Dutch working population in Figure 1. The two are very similar, unlike the results of earlier research on creative income distribution (Kretschmer and Hardwick, 2007; Kretschmer *et al*., 2011; Towse, 2001). This is probably a consequence of the aforementioned earnings outside respondents' creative discipline.

The distribution over sources of income is shown in Figure 2. Designers and illustrators/cartoonists on average earn around 90% of their income within their creative discipline. Authors, composers/lyricists, illustrators, translators and singer-songwriters rely most heavily on royalties from their operators and payments from collecting societies. Over the entire sample, these comprise less than 10% of the artists' income.

Figure 1 – Total gross annual income 2009 (N=3,377)*



*Excluding respondents who did not know or did not want to disclose their gross annual income.

Figure 2 – Distribution of income within creative discipline

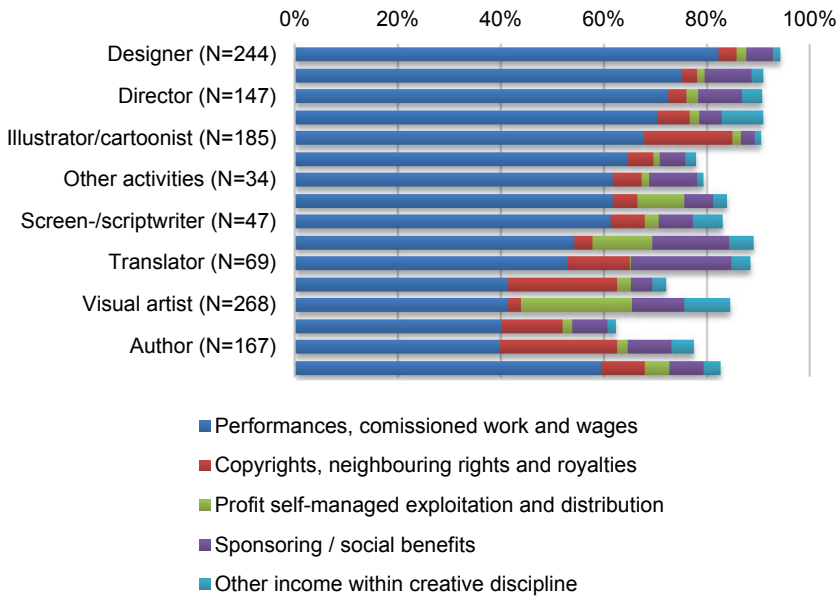


Figure 3 – Past income development in relation to financial harm from file sharing

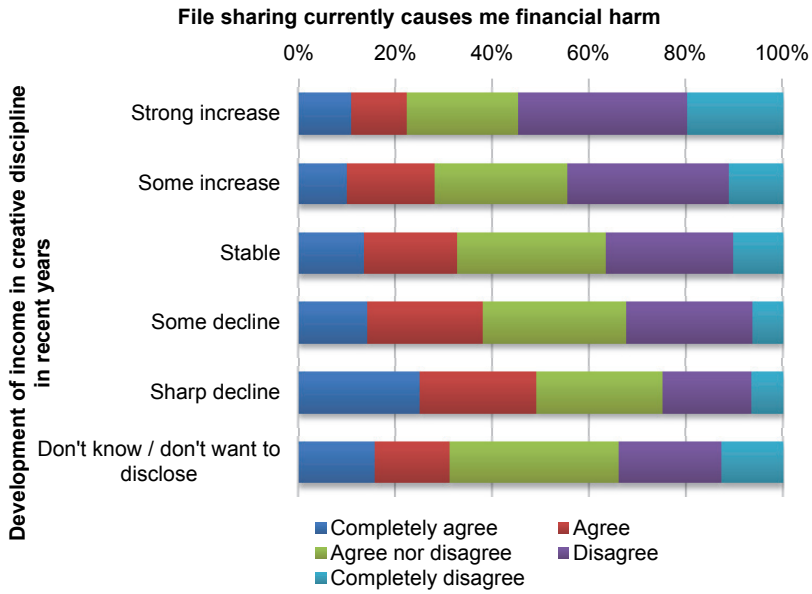
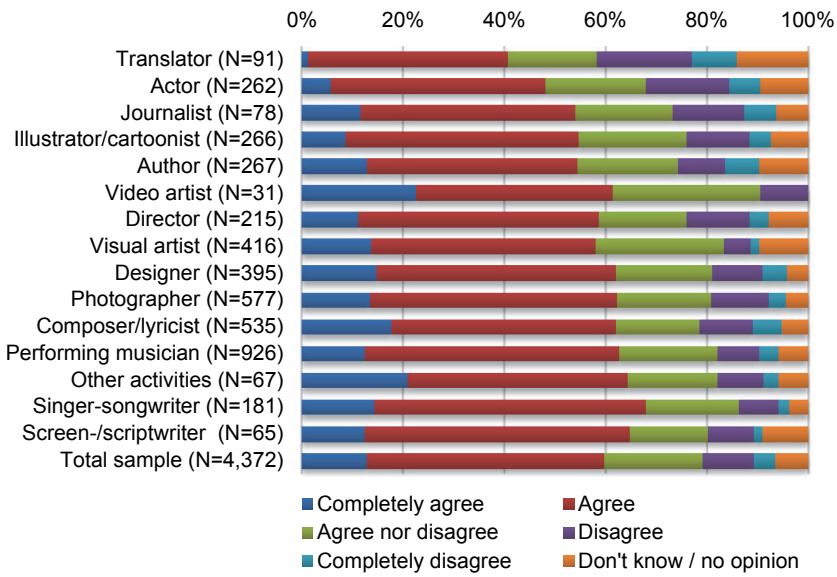


Figure 4 – 'I expect more earning opportunities as a consequence of digitisation'



Past income development and expected future income development in relation to file sharing and digitisation are displayed in Figure 3 and Figure 4. While there is a striking correlation between respondents' past income development and their perception of the effect of file sharing on their income (Figure 3), a majority is optimistic about the future (Figure 4). Note that the writing professions (translators, journalists, authors) are least optimistic.

4.2. Opportunities and threats of digitisation

Past and future income development can be understood in relation to (perceived) threats and opportunities that digitisation entails, and vice versa. The survey contains various questions that relate to these perceived threats and opportunities of digitisation in general and file sharing & remixing in particular. For a comprehensive assessment of perceived threats and opportunities, relevant survey questions were combined into two indices: one for opportunities and one for threats, since creators and performers may or may not experience both simultaneously.

The 'opportunities index' is the unweighted conditional mean of eight statements, standardised to obtain deviations from the sample mean.[63] The 'threats index' is composed of the four statements. The statements in both indices are outlined in Table 2. In general, 73% of respondents see digital distribution and exploitation as an opportunity while only 28% see them as a threat. Respondents are also fairly positive about the effect of digital distribution and exploitation on earning opportunities and opportunities to reach an audience. On the threats index, file sharing and remixing are generally looked upon critically.

The average position of occupations on these combined indices is plotted in Figure 5, with sphere size indicating the share of each occupation in the total sample. This expresses the average stance within each occupation towards digital developments, without controlling for respondent characteristics. There is an obvious correlation between both indices, as creators who see more opportunities are likely to see fewer threats.

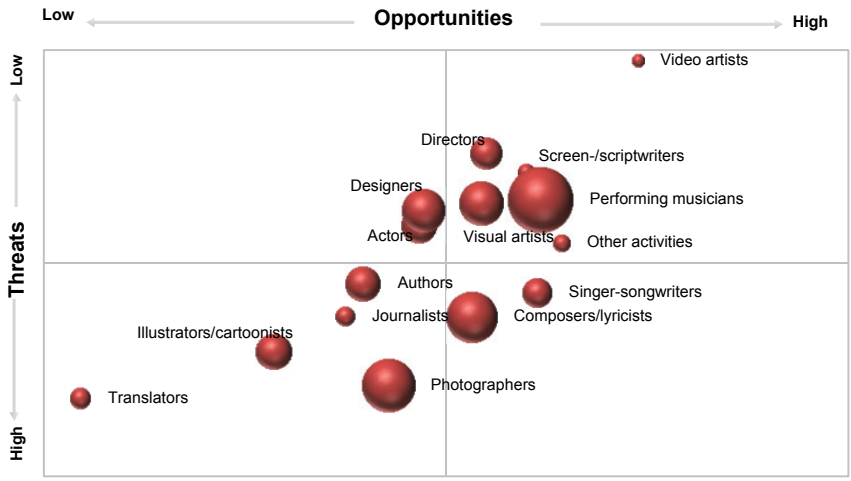
[63] Missing values and the answer category 'do not know/no opinion' were excluded for the indices.

Table 2 – Statements for the opportunities and threats indices

	Strongly Agree	Agree	Agree nor disagree	Disagree	Strongly disagree
Opportunities index					
Digital distribution and exploitation are an opportunity for me	22%*	54%	17%	5%	2%
As a consequence of digital distribution and exploitation:					
I presently have more earning opportunities	12%	32%	27%	19%	9%
I expect to have more earning opportunities in the future	14%	50%	21%	11%	4%
my producer/publisher has more earning opportunities	14%	46%	25%	10%	4%
my opportunities to reach an audience have increased	30%	55%	9%	4%	2%
File sharing increases the familiarity with my work	13%	49%	22%	11%	5%
File sharing increases my earning opportunities	4%	10%	30%	36%	21%
File sharing will increase my earning opportunities in the future	5%	18%	36%	26%	16%
Threats index					
Digital distribution and exploitation are threats to me	7%	24%	23%	32%	14%
Presently, file sharing harms me financially	15%	20%	29%	27%	10%
I expect that file sharing will harm me financially in the future	18%	37%	25%	14%	6%
Remixing of my work without my explicit permission is a threat to my income	21%	28%	24%	18%	8%

*All percentages recalculated to total 100% after excluding 'Don't know/no opinion'.

Figure 5 – Opportunities and threats index per occupational group



Translators turn out to be the most traditional of all groups, perceiving high threat and low opportunity. Video artists are their opposites. Taking into account their high exposure to digitisation (in particular unauthorised file sharing), performing musicians occupy a notable position in this chart: low on threat and high on opportunity. The other music-related professions, composers and singer-songwriters, perceive comparable opportunities, but their sense of threat is above average and therefore considerably higher than that of performing musicians. The position of photographers is also noteworthy: their perception of opportunities is equal to that of authors, actors and designers, but they feel much more threatened (almost as much as translators).

A perception of threats and opportunities of an occupational group is partially explained by the group's underlying demographics. For instance, a group that is averagely young, may be more optimistic than an older group. Also, an individual's earnings may influence their perception about threats and opportunities. To understand the socio-economic drivers of respondents' positions on the threats and opportunities indices, four Ordinary Least Squares (OLS) regressions were performed.

The regression models which explain the opportunity and threat indices by demographic variables are presented in Table 3:[64] for each index, the top

[64] A higher score on the opportunities index equates to a respondent perceiving more opportunities; a higher score on the threats index corresponds to a respondent perceiving more threats.

model includes occupation as an exogenous variable (i.e. the explanatory power of demographics, corrected for occupation), and the bottom model does not.

The OLS models including occupation dummies show that age is an important 'driver' of anxiety about digital developments (older respondents see more threats) but not of perceived opportunities, and that female artists perceive more threats. Income turns out not to be a determinant of opportunity and threat perceptions but rather the share of income derived from royalties from collecting societies and the recent income development: artists who depend more on copyright and neighbouring rights for their income, see significantly fewer opportunities and more threats. The same holds for those who saw their creative income decline in recent years. People working more hours in their creative discipline sense more threats and fewer opportunities of digitisation. Finally, a higher education level correlates with artists feeling less threatened by digital developments.

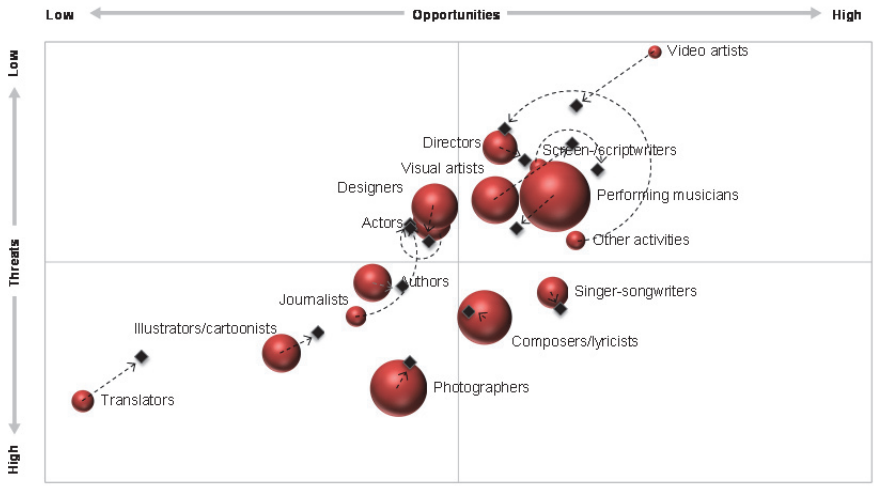
The models without occupation dummies serve two purposes: (1) as a robustness check of the explanatory power of demographics (which shows that all correlations that are significant at 99% or more remain so) (2) to assess the stance of occupational groups vis-à-vis digitisation, corrected for its underlying demographics. To do the latter, the residuals of the OLS model without occupation dummies (Figure 6) are confronted with the original, 'uncorrected' two-dimensional graph (Figure 5). An arrow connects the original position of each profession (the red spheres) with its position corrected for underlying demographics (the black diamonds). Notable shifts are those of journalists – the only group that switches quadrants (from threatened above average to threatened below average) – and those of visual artists, translators, video artists and the rest group 'other activities'. The opinions of these groups turn out to be highly 'coloured' by their demographic composition.

Table 3 – Regression models opportunities and threats index

	Dependent		variable:	Dependent		variable:
N	1,634			1,620		
F	7.1			14.63		
Prob > F	0.000			0.000		
R^2	0.096			0.180		
Adj R^2	0.082			0.168		
	Coef.	*S.E.*	*P*	*Coef.*	*S.E.*	*P value*
Author*	-0.387	0.125	**0.002**	0.458	0.119	**0.000**
Translator*	-0.980	0.185	**0.000**	0.664	0.176	**0.000**
Journalist*	-0.351	0.184	0.056	0.280	0.175	0.109
Screen-/scriptwriter*	0.040	0.182	0.826	0.133	0.175	0.449
Actor*	-0.330	0.128	*0.010*	0.288	0.122	*0.019*
Director*	-0.095	0.135	0.478	0.086	0.128	0.500
Singer-songwriter*	0.016	0.156	0.917	0.541	0.148	**0.000**
Performing musician*	-0.084	0.104	0.419	0.285	0.099	**0.004**
Composer/lyricist*	-0.194	0.121	0.111	0.588	0.116	**0.000**
Photographer*	-0.357	0.106	**0.001**	0.698	0.101	**0.000**
Video artist*	0.045	0.283	0.874	-	0.269	0.790
Illustrator/cartoonist*	-0.563	0.123	**0.000**	0.610	0.118	**0.000**
Designer*	-0.319	0.116	**0.006**	0.322	0.110	**0.004**
Other activities*	-0.132	0.237	0.578	-	0.231	0.987
Current working hours per week	-0.081	0.030	**0.007**	0.082	0.029	**0.005**
Preferred working hours per week	0.011	0.042	0.795	0.086	0.040	*0.030*
Age	-0.005	0.003	0.106	0.019	0.003	**0.000**
Gender* (Male=0; Female=1)	-0.102	0.058	0.079	0.192	0.055	**0.001**
Education	0.015	0.023	0.525	-	0.022	**0.002**
Experience in profession	0.011	0.024	0.636	-	0.023	0.431
Financial role in household	-0.013	0.036	0.722	0.004	0.034	0.906
Gross year income 2009	-0.013	0.020	0.523	0.010	0.019	0.601
% Income from collecting societies	-0.009	0.002	**0.000**	0.010	0.002	**0.000**
Recent income development (-/+)	0.129	0.022	**0.000**	-	0.021	**0.000**
[Constant]	0.252	0.285	0.377	-	0.273	**0.000**
N	1,634			1,620		
F	9.95			24.24		
Prob > F	0.000			0.000		
R^2	0.058			0.131		
Adj R^2	0.052			0.126		
	Coef.	S.E.	P	Coef.	S.E.	P value
Current working hours per week	-0.112	0.029	**0.000**	0.086	0.028	**0.002**
Preferred working hours per week	0.034	0.042	0.411	0.063	0.040	0.115
Age	-0.008	0.003	**0.005**	0.019	0.003	**0.000**
Gender* (Male=0; Female=1)	-0.151	0.057	**0.008**	0.166	0.054	**0.002**
Education	0.002	0.023	0.921	-	0.022	**0.000**
Experience in profession	0.042	0.023	0.065	-	0.022	*0.031*
Financial role in household	-0.022	0.036	0.551	0.006	0.035	0.874
Gross year income 2009	-0.021	0.020	0.294	0.023	0.019	0.225
% Income from collecting societies	-0.010	0.002	**0.000**	0.014	0.002	**0.000**
Recent income development (-/+)	0.128	0.022	**0.000**	-	0.021	**0.000**
[Constant]	0.118	0.250	0.637	-	0.241	*0.024*

* Dummy variables (excluded occupational group dummy: Visual artists)

Figure 6 – Opportunities and threats stance is partially explained by demographics



4.3. Patterns and diversity: cluster analysis

In Figure 5 and Figure 6, the underlying heterogeneity of opinions within each occupation is disregarded. Also, the relationship between the various themes in the questionnaire are not explored in the previous section, other than the opportunities-and-threats indices. Although occupation often has a significant impact on perceived opportunities and threats (see the dummy coefficients in Table 3), there are other determinants. Cluster analysis was used to create groups that are relatively homogeneous in their answers yet differ significantly from the other groups.

As set out in Section 3.5, it is not possible to determine the number of clusters solely on statistical grounds: hierarchical cluster analysis suggests cluster solutions between four and seven clusters. The optimal number has been reached when an additional cluster would not be sufficiently different from the other clusters. Based on an analysis of the number of respondents changing clusters when adding one, as well as the interpretability of the factor scores within clusters, a 7-cluster solution is adopted and presented in Table 4.

Table 4 – Clusters and their position on factors and demographic variables

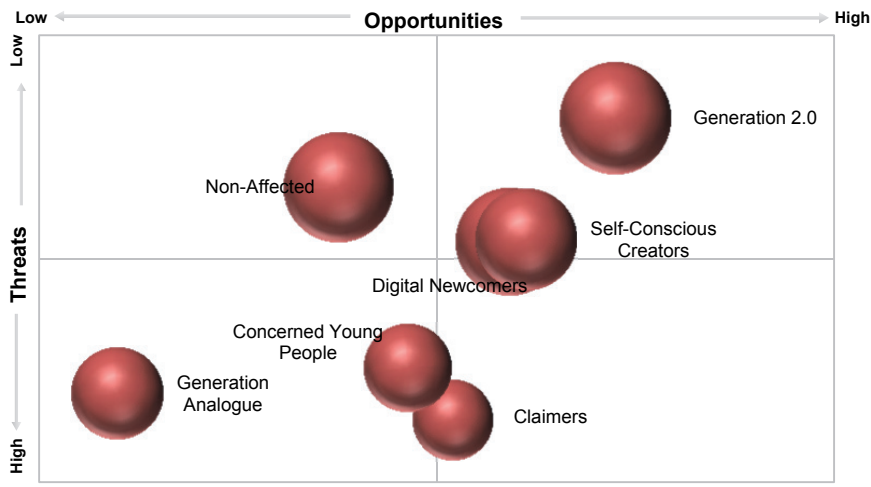
Cluster	Generation 2.0	Generation Analogue	Non-Affected	Claimers	Concerned Young People	Digital Newcomers	Self-Conscious Creators
% of sample	18%	12%	18%	9%	11%	17%	15%
N (total = 4,435)	788	533	797	410	488	758	661
Factor description (items in factor)	**Position on factors**						
Satisfaction with collecting society (8)	- -	+	-	+++	- -	+	+
Opportunities of digital distribution (7)	++	- - -	- -	++	0	+	+
Threats of file sharing (5)	- -	++	- -	++	++	+	-
Strength of bargaining position (2)	+	-	+	-	- -	-	++
Use of social media (4)	++	- -	-	+	+	- -	+
Appreciation of remixing and sampling (4)	+++	- -	+	- -	-	+	-
Opportunities of file sharing (3)	++	- - -	-	-	-	+	-
Need for empowerment (7)	0	+	- -	++	+	-	+
	Demographic and income position						
Current working hours	-	+	0	+	0	-	+
Desired working hours	0	0	-	0	+	-	+
Age	- -	+	+	+	-	+	0
Education	+	0	0	-	0	0	0
Working experience	-	+	0	+	-	+	-
Contribution to household income	0	0	0	+	0	0	0
Current income	-	0	0	0	0	0	0
% Income from royalties	-	+	-	+	0	0	-
Recent income development	+	-	0	-	-	-	+

Key to symbols: '+' or '-' mean cluster scores significantly different from sample mean ($p<0.05$) while: +++/--- means $|Z|>= 1$; ++/-- means $0,5<=|Z|<1$; and +/- means $0 <|Z|<0.5$.

The names for the clusters have been chosen on the basis of the opinion patterns within each cluster, with occasional reference to age patterns that were found in some clusters. In the top half of Table 4, the relative position of each cluster on the factors is summarised, while the positions on demographic and income variables are summarised in the bottom half. The

differences in opinions turn out to be much more outstanding than the demographic differences. This should not be surprising, as no demographic variables were used in the clustering. Nonetheless, all demographic differences referred to in the description of clusters below are significant as defined in Table 4. The clusters on the indices for opportunities and threats are plotted in Figure 7 as was done for occupational groups in Figure 5 and Figure 6. Which groups of creators and performers are overrepresented or underrepresented in each cluster is shown in Table 5.

Figure 7 – Opportunities and threats index per cluster



Generation 2.0

Generation 2.0 sees many opportunities in digital developments, file sharing and remixing and hardly feels threatened by these developments. Its members use social media intensively. They are much more critical than other groups about collecting societies; a relatively large proportion of this group (20%) is not associated with a collecting society.

Generation 2.0 members are predominantly male, relatively young and work fewer hours as creators or performers than the average respondent. They earn less and derive a relatively large share of their income from activities outside their creative profession. Nevertheless, their income has increased over the past few years. Generation 2.0 members characteristically rely on performing fees for their income rather than on royalties from collecting societies.

The music industry – singer-songwriters, composers and musicians – are overrepresented in this group. This is remarkable, since the music industry was profoundly changed by digitisation, dramatically affecting those working in it.

Table 5 – Occupational profile clusters

Cluster	Overrepresented professions*	Underrepresented professions*
Generation 2.0	Singer-songwriters Performing musicians Composers	**Translators** **Illustrators/cartoonists** Authors Actors Photographers
Generation Analogue	**Translators** **Illustrators/cartoonists** Authors Journalists Photographers	Screen-/scriptwriters Directors Singer-songwriters Performing musicians Visual artists
Non-Affected	Directors Visual artists Designers	Authors Singer-songwriters Composers Illustrators/cartoonists
Claimers	**Photographers** **Illustrators/cartoonists** Authors	**Screen-/scriptwriters** Actors Directors Performing musicians Designers
Concerned Young People	**Journalists** Singer-songwriters Composers	**Translators** **Visual artists** Screen-/scriptwriters Illustrators/cartoonists Designers
Digital Newcomers	**Authors** Screen-/scriptwriters Actors Directors	**Photographers** Journalists Designers
Self-Conscious Creators	**Illustrators/cartoonists** **Designers** Photographers Visual artists	**Translators** **Actors** Directors Performing musicians Composers

*Overrepresentation and underrepresentation of a profession in a cluster are defined as a representation of at least 25% more and 25% less respectively than the sample average. Bold face professions are overrepresented or underrepresented by at least 50%.

Generation Analogue

Generation Analogue is the antipode of Generation 2.0 (see also Figure 7). Its members see no opportunities but many threats in digitisation and file

sharing and do not approve of remixing. They are more positive about collecting societies than other groups and favour measures to improve their bargaining position. Of all clusters, they make the least use of social media.

Generation Analogue members are older than the average respondent and work many hours. They derive a large share of their income from royalties from collecting societies and have experienced a negative income development over the past few years.

Translators, cartoonists/illustrators and to a lesser extent authors, journalists and photographers are overrepresented in this group, while the music industry, directors, writers and visual artists are underrepresented.

Non-Affected

A third cluster that stands out in Figure 7 is called the Non-Affected: they score relatively low on both the opportunities and the threats index. Digital developments have little impact on these creators and performers. They feel no need for empowerment and are critical about collecting societies. They do not mind remixing of their work. Visual artists, designers and directors[65] make up a relatively large part of this group, whereas authors, singer-songwriters, composers and illustrators are underrepresented.

In demographic and economic terms, this group is quite average: their income, income development and working hours do not differ from the sample mean. Their age is older than average, however, and unlike most respondents, they would like to work fewer hours. They derive a relatively small share of their income from rights and royalties.

Claimers

Claimers in turn are in many ways the opposites of the Non-Affected. This relatively small but distinct group sees many opportunities in digital developments but sees an equally large threat in unauthorised file sharing. Claimers see no opportunities in file sharing and disapprove of remixing. They endorse stricter measures against file sharing and measures to improve their bargaining position vis-à-vis publishers and clients. Claimers are very satisfied with their collecting societies.

They are often responsible for a substantial part of the household income, but their earnings have decreased over the past few years. On average they

[65] Stage directors (as opposed to movie directors) comprise over 80% of the group of directors, which explains this group is overrepresented amongst the Non-Affected.

are older than all other groups (80% of this group is older than 45 years), work more hours and are less highly educated.

Within this group, illustrators, photographers and authors are overrepresented. More than the average respondent, they depend on copyright for their income, but their work can be shared relatively easily over the Internet, with or without their consent. This explains why the Internet is both an opportunity and a threat to them. Musicians are underrepresented amongst the Claimers. Musicians, who have already experienced the consequences of digitisation and had to find new ways to deal with it, are underrepresented amongst the Claimers.

Concerned Young People

On the opportunities and threats indices, the Concerned Young People resemble the Claimers. They see serious threats in file sharing, do not appreciate remixing of their work and are concerned about their bargaining position. In other respects, however, they are more like Generation 2.0 members: they are relatively young, make active use of social media and have professional backgrounds that are similar to those of Generation 2.0 members. Also, they are relatively unsatisfied with collecting societies. Their income has decreased in recent years, and they would like to work more. They have less education than Generation 2.0 members.

Digital Newcomers

The last two groups, Digital Newcomers and Self-Conscious Creators, score similarly on the opportunities and threats indices. On other criteria, they are very different. Digital Newcomers see opportunities in digitisation and file sharing but also experience threats and make very little use of social media. They are fairly satisfied with the collecting societies and perceive their bargaining position as rather weak. On the other hand, they appreciate remixing more than other groups do and feel no need for empowerment.

The overrepresented professions in this group (screenwriters, actors, directors and authors) predominantly work in sectors that have yet to experience the opportunities and consequences of digitisation.

They earn their creative income relatively often with (temporary) jobs or contracts. Digital Newcomers are relatively old, work fewer hours than average and would prefer to work even less. Their income has declined over the past few years.

Self-Conscious Creators

Self-Conscious Creators perceive digitisation as an opportunity but also feel threatened by file sharing and have a negative view of remixing. They work many hours and would prefer to work even more. Their income development is comparatively positive. Self-Conscious Creators earn their income mainly by commercialising their own work instead of from copyright or royalties. This is a typical feature of the various professions that are overrepresented in this group: photographers, visual artists, cartoonists/illustrators, and designers. Self-Conscious Creators frequently use new media and are optimistic about their own bargaining position. Nevertheless, they support measures to improve this position further and are fairly satisfied with their collecting society.

5. Conclusion

Creators and performers hold on to more traditional opinions than often suggested. Unauthorised file sharing is primarily seen as a threat, and tougher enforcement is supported by a majority of them. Remixing is also perceived negatively. The use of DRM is endorsed by a significant share in order to keep control over copyrighted work. Finally, despite the criticism they receive in the media, collecting societies are generally approved of.

Beneath this general, fairly traditional approach towards copyright, our analysis reveals a relatively diverse and multifaceted picture. Some creators and performers see the opportunities created by digital technologies to gain more control over the distribution and exploitation of their works. They seek a more independent position from producers and publishers, and digitisation provides opportunities to achieve this.

Age is clearly an important driver of this underlying diversity, but simply pointing towards a generation gap is an oversimplification. Perceived opportunities of digitisation are surprisingly stable over the different age brackets. On the other hand, the perception of threats tends to increase with age. On the financial axis, current income was not found to determine the threats and opportunities that performers and creators perceive. Instead, a negative income development over the past few years and a large share of income from collecting societies induces a high score on the threats index and a low score on the opportunities index.

Another finding is the impact of profession. Translators are an interesting example. They combine perceived high threats and low opportunities as a result of digitisation. For them, more self-control over their work as a result

of digital distribution is not an option, because they do not produce works that can be exploited independently from traditional parties such as publishers. At the other extreme are video-artists whose work is predominantly financed through public subsidies. They do not expect digital technology to harm them financially. On the contrary, they see the Internet as an inspirational environment to experiment.

Creators and performers composing, recording and performing music all see many opportunities. Yet, composers and lyricists see more threats than the average respondent does, while performing musicians score relatively low on threats. The music industry and those working in it have weathered the digital storm and are now coming back in shape, facing the future in a modest optimistic fashion. Meanwhile, photographers, journalists and authors are still on the gloomy side seeing more threats than the average creator or performer does and scoring modestly on opportunities. Their home base, the print media, is still in flux. This warrants the conclusion that the digital transition phase of a sector influences the perspective of creators and performers working there. For those parts of the creative industries that still have to experience the full impact of digitisation, the fear factor leads to fairly pessimistic views, boiling down to a fear to lose income, combined with a traditional attitude towards copyright and neighbouring rights and a rather strict view on rights protection implying strong DRM measures to be taken.

The perspectives on copyright and digitisation of creators and performers have been summarised in seven clusters. Plotted against two axes of perceived threats and opportunities of digitisation, the dominant position of these clusters is on the diagonal from high threats and low opportunities to the contrary (see Figure 7). Generation Analogue takes the gloomiest position. Members of this on average older group work relatively many hours, make little use of social media for their work and derive a large part of their income from copyright royalties, which explains their adherence to collecting societies and their firm stance on support of the present copyright system. At the other end of the spectrum, we find Generation 2.0, a relatively young group of people who (as of yet) work fewer hours in their creative profession than Generation Analogue members and consequently earn a larger share of their income outside their creative discipline. They see many opportunities in digitisation and not many threats, make intensive use of social media and are critical about collecting societies. Interesting outliers from the diagonal in Figure 7 are the Concerned Young People and Claimers. They combine a relatively high score on threats and an average score on opportunities. They have expectations concerning the digital possibilities but

are hesitant because they see their position threatened. Another outlier are the Non-Affected. They do not see too many possibilities but also hardly experience any threats. Digital developments hardly seem to touch them.

These findings show that the position of creators and performers is the result of a specific interplay of variables, combining creative professions, age, income development and dependence on income from copyright royalties. They result in different positions vis-à-vis the future of copyright in the digital domain. Apart from the fact that they point to relevant coherent and identifiable groups, their positions connote a specific ideological stance towards copyright in the digital age.

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8 Valuing commercial radio licenses

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Abstract
Within the EU Regulatory Framework, licensees for commercial radio broadcasting may be charged a fee to ensure optimal allocation of scarce resources but not to maximize public revenues. While radio licence renewal occurs in many EU countries, an objective, model-based approach for setting licence fees has not been used so far. In this paper, it is described how such a fee can be determined for the purpose of licence renewal or extension. National and regional Dutch FM licences were valued, taking into account that simulcast broadcasting of digital and analogue radio is obligatory upon extension.

Licences are valued using Discounted Cash Flow Methodology, whereby the cash flows of an averagely efficient entrant are taken as the benchmark for valuation of each individual licence. Cash flows during the licence period 2011-2017 are forecast based on Generalized Least Squares (GLS) regressions, using financial variables of Dutch radio stations for the years 2004-2008. Separately, bottom-up cost and investment models are used to calculate analogue and digital distribution costs. This results in a value per licence, based on objective licence characteristics, which can be used to set licence fees if administrative renewal or extension is opted for instead of a new auction or beauty contest.

Keywords
Radio, Licence Value, Renewal, Extension, Net Present Value (NPV), Digital Audio Broadcast (DAB).

JEL Classification
D45 - Rationing; Licensing; D46 - Value Theory; L82 - Entertainment; Media

1. Introduction

Commercial radio stations in developed countries commonly operate under a licence for a fixed period. Once this licence expires, policymakers can either

opt for an open allocation procedure using an auction or a beauty contest, or for an extension or renewal of the current licences. If the latter is chosen, setting the financial terms is an important issue. These terms should promote efficient use of scarce radio spectrum and avoid state aid to incumbents, while maximization of public revenues by rent extraction beyond allocation purposes should be avoided.

In the Netherlands, licences for national and regional commercial FM radio broadcasting (hereafter: 'licences') were assigned by means of a beauty contest in 2003, with the licence period ending in September 2011. In June 2009, the Dutch government announced plans for extension of the licences. Cornerstone of the extension is the ambition to stimulate the development and uptake of digital radio broadcasting. Based on the assumption that this is best accomplished by the incumbents, analogue licences are extended conditional on investments in, and simulcast broadcasting of, digital radio (Tweede Kamer 2008-2009). Incumbents that want to extend their licence have to pay a one-off licence fee, covering both a six-year extension of the current licence as well as access to the digital radio spectrum.

In this paper, it is described how such a one-off licence fee can be calculated, based on an objective assessment of the value of the spectrum for an averagely efficient entrant.[66] As incumbents have made specific investments to operate a licence and have an installed base of listeners, they can be expected to have a higher valuation of the spectrum than an entrant. The value of the spectrum for an averagely efficient entrant would be the second highest bid and therefore the expected price that the incumbents would have to pay for renewing their licence in case a (second bid) auction were held.[67]

This paper is organized as follows. In Section 2, the legal framework is discussed that is relevant for setting the financial terms for licence renewal or licence extension. In relation to this framework, several methods are discussed for determining the value of commercial radio spectrum, and it is concluded that value is best calculated by means of a Discounted Cash Flow exercise. This means that all cash flows that can be generated with a licence during the licence period must be forecast. It is argued that an averagely efficient entrant should be the starting point for this calculation. Section 3

[66] This paper is based on research the authors conducted together with TNO Informatie- en communicatietechnologie and Prof. Paul Rutten, commissioned by the Dutch Ministry of Economic Affairs (Poort et al. 2010) and (Poort et al. 2011).

[67] Using an alternative auction design, for instance a first price sealed bid auction, the price for incumbents is expected to be higher as a result of winner's curse and uncertainty about the entrant's exact bid.

covers the methodology and data used to assess values. Cash flow forecasts are based on Generalized Least Squares (GLS) regressions and bottom-up investment and cost models for distribution-related variables. In Section 4, each of the cash flow items is discussed in more detail and the resulting models for forecasting are described. The cash flows relating to digital radio are described separately in Section 5, in view of their specific role in the Dutch reassignment procedure. In Section 6, the final steps towards calculation of the licence values are described, after which Section 7 is concluded with policy implications.

2. Legal and economic framework

2.1. Legal framework

Renewal of licences for commercial radio broadcasting is not a new phenomenon but has already taken place elsewhere in Europe in several ways. Where appropriate, the renewal was regulated via an amended legislative framework, for instance, by adjusting the existing licences, testing against previous eligibility criteria or by interlinking with investment in digital radio.

Renewal of frequency licences also occurs outside the commercial radio market. A recent example is the renewal of GSM 900 licences in the Netherlands. The licences of the two mobile providers KPN and Vodafone have been renewed for a limited period of time, so that the licence duration coincides with the duration of other mobile licences (the so-called DCS 1800 licences). Both parties have to pay a renewal fee (Poort *et al*. 2006).

The regulatory context of the renewal of licences for frequency use has been defined in both a European and a national framework. The Framework Directive (2002/21/EC) and the Authorization Directive (2002/20/EC) provide the primary regulatory context at a European level. From a national perspective, licence renewal has been laid down in the Telecommunications Act and the Frequency Decree.

Framework Directive and Authorization Directive

The general principles with respect to frequency distribution have been laid down in the European Framework Directive and are further addressed in the Authorization Directive. This directive does not include any specific provisions with regard to licence renewal. Yet, there are some general criteria that may be considered applicable to licence renewal as well, especially when it comes to both imposing fees and procedural guarantees.

In principle, two types of fees are allowed: fees for administrative costs and fees for the purpose of encouraging the optimum use of frequencies. The first category is beyond the scope of discussion here. As to the second category, it should be underlined that a fee in the form of a special duty – in particular in the context of a renewal – will only be permitted if it is intended to encourage the optimum use of frequencies. Revenue maximization is contrary to this. The issue is further underlined by other considerations in the preamble of the directive (especially consideration 32 of the preamble of the Authorization Directive[68]). Fees are not to hamper the development of innovative services and competition in the market. As a matter of fact, this condition implies for instance that there should be sufficient room to invest in digital radio (particularly if this is a condition that is linked with renewal, such as roll-out obligations). If a requested fee is a one-off fee and could be regarded as a comparison-based fee or a competition-based selection procedure, possible appropriate payment schemes are to ensure that in practice this will not lead to selection based on criteria that have nothing to do with the objective of achieving an optimum use of radio frequencies. As will be discussed below, the approach presented in this paper guarantees optimum use of frequencies by taking the value for an entrant as a benchmark.

In the preamble of the Authorization Directive, it is further stated that the European Commission can publish benchmark studies on a regular basis about best practices with respect to the assignment of radio frequencies. Such a benchmark is not available with respect to the distribution of broadcasting frequencies.

The Authorization Directive (consideration 33 of the preamble) also provides a framework with respect to the question if amendments can be made to 'rights, conditions, procedures, charges and fees' relating to licences. Such amendments should be justified objectively. All interested parties that should have the possibility of stating their views, must be informed about these amendments timely and in the proper way.

State aid

At a European level, there are no specific rules or guidelines for renewing frequency licences. Consequently, general criteria should be used to find out

[68] 'Where, in the case of competitive or comparative selection procedures, fees for rights of use for radio frequencies consist entirely or partly of a one-off amount, payment arrangements should ensure that such fees do not in practice lead to selection on the basis of criteria unrelated to the objective of ensuring optimal use of radio frequencies.'

if (improper) state aid is provided for a renewal. These criteria can be largely derived from Article 107 of the EC Treaty and case law of the Court of Justice.

Before answering the question as to whether or not state aid is permissible, it should first be determined if renewal fees may in fact be qualified as state aid. In the context of this paper, a valuation methodology for licence renewal is proposed which is aimed at preventing any form of state aid. The fee requested for renewal has been calculated in a way that is in conformity with the market, with due observance of the criteria as set forth in the Framework Directive/Authorization Directive. It is therefore stated that, given the method chosen, state aid is not involved in the valuation of the intended renewals.

Telecommunications Act

Renewal of frequency licences on the basis of further regulations is provided for in Chapter 3 of the Dutch Telecommunications Act. This further regulation can be found in the so-called Frequency Decree. Renewal is possible if a general social, cultural or economic interest is involved.

Accuracy

The Framework Directive/Authorization Directive, the Dutch Communications Act and previous experience in granting or renewal of licences indicate that it is important that the valuation of frequency licences is performed with the utmost care.

The valuation should be suitable to the intended government objectives that allow renewal as an instrument (Article 9 Frequency Decree), for instance. In the presented valuation model, this has been achieved by including the costs of the innovation (especially the costs for distribution of digital radio). In addition the valuation should stimulate the optimum use of frequencies. This is reflected in the valuation model, where the optimum use of the available frequency space rather than revenue maximization is the starting point.

In addition, a careful procedure was used for choosing the valuation model and for calculating licence values. An extensive study was conducted, taking the technically and legally relevant aspects into account. The market parties involved have been consulted extensively before a model was prepared based on generally acknowledged economic parameters. Next, the market parties were consulted about this model again. The researchers evaluated the comments on their merits and processed them in a well-founded way. Additional feedback was provided through the formal public consultation

process based on the Telecommunications Act, which generated additional input for the optimization of the model.

Finally, a valuation methodology is used, which to a large extent corresponds with the methodology used earlier for the renewal of the GSM 900 licences in the mobile telecommunication sector. It was the subject of a legal dispute and was brought before the court. The court concluded that the question of what could be a fee in conformity with the market, had been studied carefully and in a comprehensively documented way.

2.2. Economic framework

Despite the fact that a model-based valuation of licence renewal fees is concluded to be in line with the European Regulatory Framework in Section 2.1, there are no previous examples of such an approach. In a study covering several European countries AnalysysMason and Hogan&Hartson (2009) conclude that in Europe radio broadcasting licences are usually awarded by means of a beauty contest or, less frequently, an auction. For renewal, a competitive procedure such as an auction or a beauty contest is often organized if there is sufficient market interest. If too few parties are interested, the licence is offered to the incumbent for renewal or extension. The incumbent is sometimes charged a fee that is fixed or based on its turnover, but objective economic value is no driver for fee determination.

Ofcom's methodology used in 2006 and 2010 to determine the financial terms for the UK's three national licences, is most congruent with such a value-based approach. The terms set by Ofcom were aimed at reflecting the value to a (fictional) bidder, which was assumed to equal 'the net value of the rights and obligations associated with the licence' (Ofcom 2006, 2010b, 2010a).

This suggests the use of an objective valuation model. However, possibly due to the small number of licences to be valued, Ofcom does not translate this economic starting point into an objective model-based approach. The value of each licence is based directly on the costs and revenues for the incumbent, adjusting for the costs of entry. By doing so, the idiosyncratic efficiency or inefficiency of each incumbent determines the licence value: licensees with high advertising revenues are penalized for their success and end up paying more.

Apart from the UK, other European countries have either not experienced renewal or have preferred to rely on the market to determine prices; they have thus not valued licences based on economic principles.

Economic theory offers – in broad terms – three possible ways to assess the economic value of an asset: based on cost, market or cash flow. The cost approach is most suitable for assets which can be reproduced, with value being determined on the basis of costs involved in producing the asset. As broadcasting licences are unique assets, which cannot be reproduced, this is not a viable approach. The market approach is suitable for assets being traded on an 'active market', i.e. markets with homogeneous assets, readily available sellers and buyers, and publicly available prices. In this case, the market price is a good proxy for economic value. As broadcasting licences are not traded on an 'active market', this approach does not seem suitable either. Historic financial bids for licences could provide an alternative starting point. These historic market prices should be corrected for changes in market conditions, advertising behaviour and cost structures over time, which might prove difficult. But even then, historic prices are not a solid proxy for objective valuation of spectrum. Bids in an auction or beauty contest do not necessarily reflect the value of the licence at that time but first and foremost the value attributed to the licence by the bidding party. This value will be affected by elements such as the design of the beauty contest or auction and the number of bidding parties. Another issue is the 'winner's curse', which refers to the risk that – depending on the chosen bid method – the party overestimating the value of the asset will win, resulting in an upward price bias. The outcomes for the unrestricted lots in the 2003 beauty contest in the Netherlands illustrate this: despite relatively small differences in demographical coverage, the financial bids for these lots ranged from €32.8 to €80.4 million. Hence, historic prices are rejected here as an alternative starting point.

The cash flow approach values an asset based on the discounted future cash flows that can be obtained with the asset. Free cash flows are discounted on the basis of a discount factor reflecting the required return on invested capital. It is best suited for unique assets that are not traded on a(n active) market, such as commercial radio licences: an economic agent interested in buying a commercial radio licence would logically value the licence based on what he could earn with it. The cash flow approach – also called Discounted Cash Flow (DCF) in valuation literature – is therefore best used for valuing radio frequency licences.

Discounted cash flow methodology

As part of the DCF methodology, all cash flows resulting from the licence during the licence period must be determined – that is: all financial flows resulting in actual cash-in or cash-out. In simple and generic terms this

means that the net result after taxes should be corrected for depreciation (which is a cost, impacting net result and thus taxes, but not a real cash-out), after which investments (cash-out) are subtracted and divestments (cash-in) are added. The cash flow schedule used in our analysis is presented in Table 1, where all cash flows for a radio station in a given year during the licence period are illustrated. Note that the costs of digital broadcasting are treated differently.

Table 1 – Cash flow schedule (station x, year t)

1	Net advertising income		
2	Non-advertising income		
3	***Total income***	**=**	***(1)+(2)***
4	Distribution costs – analogue		
5	Costs Telecom Agency		
6	Wages		
7	Other non-distribution operational costs		
8	Other non-distribution costs		
9	Depreciation distribution assets – analogue		
10	Depreciation distribution assets – digital		
11	Depreciation non-distribution assets		
12	***Total costs***	**=**	***(4)+(5)+…+(11)***
13	***Net result***	**=**	***(3)-/-(12)***
14	Taxes (-/-)		
15	***Net result after taxes***	**=**	***(13)-/-(14)***
16	Depreciation (+)		
17	***Gross Cash flow***	**=**	***(15)+(16)***
18	Investments/divestments distribution assets – analogue		
19	Investments/divestments distribution assets – digital		
20	Investments/divestments non-distribution assets		
21	***Gross investments***	**=**	***(18)+(19)+(20)***[a]
22	***Net cash flow***	**=**	***(17)-/-(21)***

[a] Divestments are treated as negative investments.

Valuation benchmark: an averagely efficient entrant

It was postulated earlier that the value of the spectrum for an *averagely efficient entrant* would be the expected price that the incumbents would have to pay for renewing their licence in case an auction were held. Here, 'entrant' refers to a new licensee; the entrant can be both a start-up, a newcomer in the radio business or a company already owning another radio licence.[69] The cash flows – and hence the value – for an entrant are modelled based on historic cash flows of the incumbents, accounting for objective differences between licensees and for the evolution of an entrant's costs and revenues in

[69] In the Netherlands, a company can acquire a maximum of two national radio licenses, provided one has format restrictions and the other is unrestricted. Combining regional licences is also allowed, within restrictions concerning the total demographic coverage.

time. By taking the historic cash flows of incumbents having at least survived up and until 2010, and including a variable for 'number of years active', the model forecasts the cash flows for an averagely efficient entrant, given objective licence characteristics.

Taking an entrant as a starting point for the valuation guarantees concordance with the legal framework, as was argued in Section 2.1. Charging a fee to incumbents equal to the value for an averagely efficient entrant implies that the incumbents, if they agree to pay this price, value the licence at least at the level of the maximum cash flows an entrant could generate with it. Therefore, the licence could not be put to a more efficient use if it were to be operated by an entrant instead of an incumbent. Put differently, the opportunity costs for an incumbent of operating the licence itself instead of selling it to an entrant are equal to the cash flows an averagely efficient entrant could earn with it – implying this is the price the incumbent could earn by selling its licence in an efficient market.

Moreover, the value for an averagely efficient entrant would also be the outcome of a hypothetical auction, without a winner's curse, as the resulting price would be determined by the runner-up, and this would most likely be an averagely efficient entrant. The incumbent can be expected to value the licence more and to be willing to pay a higher price, as he has already sunk costs in an installed base of listeners and in broadcasting equipment. An entrant still has to make these investments. Finally, taking an entrant as a starting point prevents penalizing successful incumbents by charging them what an efficient entrant *could earn* rather than what incumbents *actually earn* based on their success.

3. Research methodology and data handling

As argued in Section 2.2, the value of a licence for an averagely efficient entrant is equal to the present value of all cash flows that can be generated during the licence period. In our analysis, it is assumed that the averagely efficient entrant is as efficient as the market average, after accounting for the fact that net cash flows will be relatively low during the first years in view of the build-up of market share. To predict cash flows during the licence period, historic data of all the radio stations in the Netherlands have been analysed: econometric models for expected revenues and costs have been developed, based on exogenous licence characteristics. By including the 'years active' as an explanatory variable, the build-up of market share in a mature market is explicitly accounted for. Subsequently, a forward looking cash flow model was built for a hypothetical entrant.

All commercial FM radio stations active in the Netherlands by November 2009 were asked for details on specific cost, income and investment variables. For regional stations, data were gathered for the financial years 2006, 2007 and 2008. For national stations, data for two additional years were used (2004 and 2005), since the years from 2006 onwards were expected to be insufficiently representative for the first years of an entrant operating a national unrestricted licence.

This resulted in a robust dataset on cash flows for five financial years (2004-2008), which was corrected for inconsistencies and exceptional cash flows that were out of scope of 'normal radio activities'. In order to guarantee correct understanding and interpretation of the data, interviews were held with various radio companies, sector representatives and business experts. Finally, the licensees were consulted during the research process on the methodology and the underlying assumptions.

The variables in the resulting dataset are all expressed in 2008 prices and analysed as panel datasets in econometric regression models. A model is prepared for each of the cash flow variables in Table 1. More specifically, the method of Generalized Least Squares (GLS) with random effects is used to estimate the relevant variables in a log-linear regression model. Panel robust (sandwich) standard errors are used, correcting for serial correlation and heteroscedasticity.

All explanatory variables that were used to predict cash flows are objective, licence-specific variables, which facilitates determining an objective value for each individual licence that is independent of the specific performance and business model of the current holder of a licence. The explanatory variables, some of which are further explained below, are described in Table 2. The final model for each cash flow variable includes those explanatory variables that result in the highest predictive power.

Separate from the above methodology, distribution costs have been forecast based on bottom-up cost and investment models. This was done for all variables related to distribution, i.e. those cash flows that relate to the technicalities of broadcasting like (operation of) broadcasting antennas.[70]

[70] These calculations were carried out by TNO Informatie- en communicatietechnologie (Poort et al. 2010, chapter 5).

Table 2 – Explanatory variables

Variable	Abbreviation	Explanation
Demographic reach FM – national[a]	RCH-N	Demographic reach in the Netherlands of a national licence as a percentage of the Dutch population
Demographic reach FM – local[a]	RCH-L	Demographic reach in the Netherlands of a non-national licence as a percentage of the Dutch population
Dummy National licence	DNAT	Dummy value is '1' if the licence refers to a national licence and '0' if not
Number of sites	SIT	Number of broadcasting sites used to operate the licence, based on specifications by Telecom Agency.[b] This will affect distribution costs but may also be a proxy for the demographic comprehensiveness of the region served
Dummy Format Restriction – Non-recent (Golden Oldies)	DFR-OLD	Dummy value is '1' if radio content should apply to a minimum percentage of 'non-recent music' and '0' if not *Dummy refers to licence A2*
Dummy Format Restriction – News	DFR-NWS	Dummy value is '1' if radio format should apply to a minimum percentage of 'news' and '0' if not *Dummy refers to licence A4*
Dummy Format Restriction – Recent	DFR-NEW	Dummy value is '1' if radio format should apply to a minimum percentage of 'recent music' and '0' if not *Dummy refers to licence A5*
Dummy Format Restriction – Dutch/European	DFR-NL	Dummy value is '1' if radio format should apply to a minimum percentage of 'Dutch music' and '0' if not *Dummy refers to licence A9*
Competition level within demographic reach	CMP	Variable reflecting the average number of commercial radio stations within the demographic reach of a licence
Number of years active	YRS	The number of years the radio station is active in the Dutch radio market
Number of stations in cluster	CLUS	The number of radio stations that is active within a cluster
Total revenues[c]	REVTOT	Total revenues, consisting of net advertising income and other revenues, net of rebates

[a] These two variables are separated in order to determine whether the relation between advertising income and demographic reach, for example, is identical for national and non-national licences. This might be expected, because business experts claim that these licence types service different markets.

[b] Telecom Agency ('Agentschap Telecom') is part of the Dutch Ministry of Economic Affairs and deals with technical aspects of ether frequencies.

[c] This variable is not licence-specific but was only used to predict working capital, which can be expected to have a logical relation with total revenues.

In the general modelling approach, several complicating elements have to be taken into account:

- Licences apply to ether only: the data used refer to the entire operational activities of a radio station, including non-ether broadcasting through cable networks and the Internet. The value calculated based on these data must be corrected in order to obtain the value for ether-only.
- Cooperation between non-national radio stations: based on the dataset and interviews, it turns out to be common practice for non-national licensees to exchange frequencies to optimize their coverage or to seek other kinds of cooperation. At the far end of the possibilities is the option for the licensee to pay a third party for the full operation of its radio frequency. A less rigorous example is a third party (holding a different licence) that is responsible for programming of a frequency while the licensee remains responsible for selling advertising time. Related financial flows are included in the datasets per radio station rather than per licence. The actual challenge is how to recalculate these financial flows to a specific licence, because this is vital in relating financial streams to objective licence characteristics. As various types of cooperation and of financial settling of services are used, the solution chosen is to consolidate non-national radio stations that are interlinked by these forms of cooperation into clusters. In this way all financial streams between the stations are related to one fictive multi-station conglomerate with objective licence characteristics.
- Format restrictions: an important element in the Dutch commercial radio licence structure is the regulation of the format of some licences, in order to guarantee a broad supply of radio content. The underlying argument is that supplying some particular formats might not be considered commercially viable by radio companies but might be in the public interest. Therefore, four licences are restricted in relation to their programming, in line with a specific format, such as 'News' or 'Dutch music'. This is reflected in the models by the inclusion of dummies for content constraints as potential explanatory variables.
- Defining an entrant: the explanatory variable 'number of years active' (YRS) is essential to determine the specific value for an entrant. When cash flows for an entrant are predicted, this variable starts at 1 in the first licence year and increases from there. This facilitates forecasting the development of cash flows during the licence period for a player that acquired the licence at the start of the licence period.

In conclusion, each cash flow item is modelled based on objective licence characteristics, whereas the variable YRS is used to model the specific

development of an entrant's revenues and costs in time. This results in generic models per cash flow variable. With the help of the characteristics of a specific licence, cash flows per licence per year are predicted. The licence value follows from discounting all yearly values to the start date of the licence. In the next sections, the models for each of the cash flow variables are discussed.

4. Modelling cash flow variables

In this section, the models derived for revenue and cost variables, as well as investment, divestment and depreciation are described.

4.1. Revenues

Gross advertising income includes the discounts on advertising fees given to advertisers, as well as commission paid to sales agencies. These are excluded to arrive at the Net Advertising Income (NAI), representing actual cash-in. It can be expected that the number of years a radio station is active will be a relevant variable in predicting NAI, which is to be tested within the GLS regression. However, including 'number of years active' (YRS) as an explanatory variable presents a potential pitfall if combined with the use of panel data. Data on NAI would not only be impacted by growing experience over time but also by the growth of the total advertising market. The coefficient of YRS would thus not only reflect growing experience of the individual radio company but also of general market growth – both resulting in increased NAI. Therefore, if the NAI of each station is taken as a dependent variable, the maturity effect would be overestimated. To prevent this, total revenues (NAI plus other revenues) have been normalized using data on the total radio advertising market. Thus, total revenues relative to the total radio advertising market (including both commercial and public stations) are modelled. Subsequently, the total revenues per licence per year are predicted by multiplying this variable by the market totals. In this way the exogenous impact of the development of the total market is taken out of the equation.

The results of the regression of total revenues relative to the total radio advertising market are shown in Table 3.[71] Demographic reach has a statistically significant and positive impact. For national licences this effect is close to linear. For non-national licences the coefficient (<1) implies

[71] One-sided minimum significance level for all variables is set at 90%. The relatively low limit is the result of the aforementioned clustering of non-national radio stations, which led to a reduction of the number of data points. Most variables are significant at 95% or 99%.

decreasing additional income per additional unit of demographic reach. This corresponds with the fact that non-national licences focus on smaller broadcast areas and that increasing demographic reach does not add as much value as for national licences. The variable for the 'number of years active' turns out to be highly significant: a company's total revenues increase with experience gained over the years, but the increase in market share diminishes in time. Finally, the content constraints 'News', 'Recent specific music' and 'Dutch' are statistically significant and negative. Format restrictions limit a station's market share, and thereby its income. Only the fourth content constraint, 'Non-recent music' (Golden Oldies), turned out not to have a statistically significant effect on total revenues.[72]

Table 3 – Total revenues relative to the total radio advertising market

Variable	Coeff.[a]	Std. err.	z	P-value
YRS	0.47	0.09	5.20	0.00
RCH-N	1.16	0.11	10.33	0.00
RCH-L	0.42	0.33	1.27	0.20
DFR-NWS	<0			0.00
DFR-NEW	<0			0.00
DFR-NL	<0			0.00
Constant	-7.92	0.47	-17.01	0.00
R-sq. (overall)	91%			
Observations	57			

[a] Values for the licences with a unique content constraint are not shown for confidentiality reasons.

Based on the model in Table 3 total revenues for a hypothetical averagely efficient entrant are predicted for each year of the licence renewal period. To do this, expected market development needs to be assessed up and until the end of the licence period.

Economic development (measured by gross domestic product, GDP) is assumed to be a key variable for the development of market NAI. Companies want to profit from economic growth and aim to achieve this, amongst others, by increasing advertising budgets, while these budgets are an easy target for cost cutting during an economic downturn. This is backed by NAI figures on the Dutch commercial radio market, which develop in line with

[72] To test the effect of competition within a geographical area on the revenues, the effect of a variable 'competition level within demographic reach' (CMP) has been tested. As could be expected, the coefficient was negative – more competition results in lower income – but the coefficient did not pass the (rather generous) threshold for significance that was used.

Dutch GDP. In addition, relating market NAI to GDP figures shows that a sharp decrease in the former is corrected within 2 to 3 years once GDP development turns positive again – implying strong growth of NAI during GDP recovery. Thereafter, NAI development returns towards its long term trend, i.e. to its 'fixed' relation compared to GDP.

In line with this, the sharp decrease of market NAI in 2009 as a result of the financial crisis (-15.7% in nominal terms), was followed by a solid growth of 5.0% in 2010, 2% above the nominal growth in GDP. The forecasts for nominal NAI development, real DGP growth and inflation that are used in our valuation are shown in Table 4. For 2011 a growth level of 1.5% above GDP is forecast, while NAI growth is expected to be equal to GDP growth in 2012. After 2012, NAI is expected to return to its long-term trend compared to GDP.[73] For this long-term trend, the compound annual growth (CAGR) rate of both variables was analysed. CAGR of market NAI is 0.1 percentage point lower than that of GDP during the 1996-2009 period. This figure is corrected downwards to 0.25 percentage point for the trend after 2012 in view of the expectation that NAI development will structurally fall behind GDP growth due to the crowding-out effect of other advertising media like the Internet.

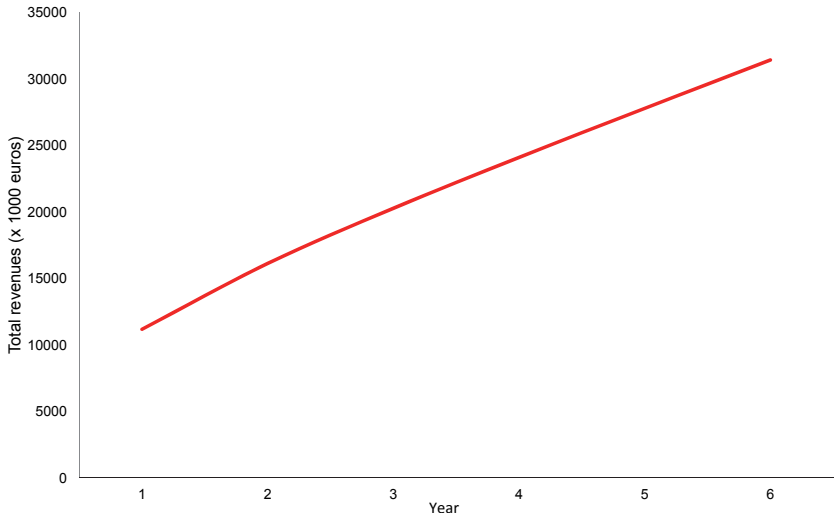
Table 3 and Table 4 combined can be used to project the total revenues for each licence per year. As an illustration, the total revenues projected for a single entrant that acquires a typical national licence with no format restrictions are presented in Figure 1.

Table 4 – Forecasts for NAI, inflation and GDP

	2010	2011	2012	2013	2014	2015	2016	2017
NAI growth (nominal)	*5%*	4.50%	4.00%	3.75%	3.75%	3.75%	3.75%	3.75%
Inflation	*1.3%*	1.5%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Real GDP growth	*1.7%*	1.5%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
NAI (Nominal)	*231*	241	251	260	270	280	290	301

[73] GDP growth in 2010 and 2011 is based on figures by Centraal Planbureau (www.cpb.nl). For subsequent years, structural GDP growth of 4% is assumed (2% real growth and 2% inflation).

Figure 1 – Average total revenues per year for a single entrant that acquires a typical national licence with no format restrictions



4.2. Cost variables

Four cost categories are defined: distribution costs, wages, other non-distribution operational costs and other non-distribution costs. Distribution costs include costs for analogue and digital distribution. The latter is addressed separately in Section 5.

Analogue distribution costs

Analogue distribution costs have not been based on econometric analysis of financial data of current licensees. They have been calculated using a bottom-up approach, based on the required network configuration per licence. Each licence requires a different number and type of broadcast sites. Distribution costs differ between these 'site classes', with cost categories including amongst others transmitters/amplifiers, installation costs, network monitoring facility and electricity usage. The costs for each site class have been estimated to acquire estimates of the entire distribution costs. The definition, and resulting operational costs, of each class are shown in Table 5. Based on the technical parameters the Telecom Agency has assigned to each licence, the number and type of sites per licence determines its analogue distribution costs.[74]

[74] Results have been calibrated based on the data on distribution costs received by the radio stations and discussions with those radio stations for which difference between received data on costs and calculated costs were substantial.

Table 5 – Definition of site classes and related OPEX

Site class		Station power (kW)	Transmitted power (kW)	OPEX (€)
Low Power	L1	0.25	0.5	25,763
	L2	0.5	1	28,845
	L3	1	2	33,010
Medium Power	M1	2	5	46,840
	M2	3	10	49,170
	M3	5	20	53,831
High Power	H1	10	50	103,502
	H2	12	100	108,162
Monitoring[a]				125,752

[a] Referring to a simple monitoring facility occupied by maximum 2 persons.

Wages

Wages refer to salary of personnel including taxes. The GLS results are shown in Table 6. Wages depend on demographic reach and on the number of years a licensee is active in the market. The former might refer to a larger income potential justifying personnel investments, the latter to the build-up of personnel in time.

Table 6 – Wages

Variable	Coeff.[a]	Std. err.	Z	P-value
YRS	0.24	0.11	2.21	0.03
RCH-N	1.35	0.19	7.28	0.00
RCH-L	0.94	0.31	3.06	0.00
DFR-NEW	<0			0.00
DFR-NL	<0			0.00
DFR-OLD	>0			0.00
Constant	2.38	0.78	3.07	0.00
R-sq. (overall)	83%			
Observations	50			

[a] Values for the licences with a unique content constraint are not shown for confidentiality reasons.

Other non-distribution operational costs

These costs include marketing costs, programming costs, housing, etc. Most radio companies rent their office space, and it is assumed that an averagely efficient entrant does the same. Although they are not the owner, it is common to make (small) investments in the rented office space – for instance to redesign space to the specific needs of radio activities. Related depreciation is treated as housing cost and not separately under

investments.[75] *Other non-distribution operational costs* are modelled as the sum of the underlying variables.[76] The results are shown in Table 7.

Table 7 – Other non-distribution operational costs

Variable	Coeff.[a]	Std. err.	Z	P-value
YRS	0.18	0.09	2.06	0.04
DNAT	4.10	0.38	10.72	0.00
CLUS	0.31	0.04	6.89	0.00
DFR-NWS	<0			0.00
DFR-NEW	<0			0.00
DFR-NL	<0			0.00
DFR-OLD	<0			0.09
Constant	3.90	0.35	11.22	0.00
R-sq. (overall)	94%			
Observations	47			

[a] Values for the licences with a unique content constraint are not shown for confidentiality reasons.

In this model, stations that have been in de market longer have higher costs, possibly to support a larger operation with higher income levels and cost levels. Conversely, format restrictions have negative coefficients: these stations have lower incomes as well as lower costs.[77] As might be expected for these cost categories, national licences face substantially higher costs than non-national licences. Another variable of importance is the number of radio stations in a cluster. More radio stations result in higher costs. The low coefficient points to economies of scale, most probably one of the *raisons d'être* for clustering.

Other non-distribution costs

The results for *other non-distribution costs* are shown in Table 8. From the coefficients it becomes apparent that there is a positive and significant relation with demographic reach for national licences. For regional licences there is a significant effect of the number of stations in a cluster.

[75] For technical reasons, the same is assumed for those few radio companies in the sample that bought instead of rented office space.

[76] As part of the sensitivity analysis all underlying variables have also been modelled separately. Predictive power of the resulting models, except for Royalties, was lower than that of the summarized variable.

[77] In Table 3, we saw that the format restriction 'golden oldies' has no significant effect on potential income as compared to an unrestricted licence. In this model, this dummy has a value that is over six times closer to zero than the other dummies, indicating that the negative effect on these cost levels is also much smaller.

Table 8 – Other non-distribution costs

Variable	Coeff.[a]	Std. err.	Z	P-value
RCH-L	0.78	0.10	7.48	0.00
CLUS	0.21	0.05	3.90	0.00
DFR-NWS	>0			0.00
DFR-NL	<0			0.02
DFR-OLD	<0			0.00
Constant	3.23	0.49	6.64	0.00
R-sq. (overall)	89%			
Observations	39			

[a] Values for the licences with a unique content constraint are not shown for confidentiality reasons.

4.3. Investment, divestment and depreciation

Investments are divided in analogue distribution and non-distribution assets. Investments in assets for digital distribution are discussed separately.

Table 9 – Analogue distribution investments and depreciations per site class

Site class[a]		CAPEX (€)	Depreciation (€)
Low Power	L1	11,515	768
	L2	12,290	819
	L3	13,375	892
Medium Power	M1	26,415	1,761
	M2	32,615	2,174
	M3	46,565	3,104
High Power	H1	106,240	7,083
	H2	125,615	8,374
Monitoring[b]		12,000	4,000

[a] For a definition, see Table 5; b Referring to a simple monitoring facility occupied by maximum 2 persons.

Analogue distribution assets

For analogue distribution investments, the same model as for analogue distribution costs is used. Relevant investments differ between the broadcast site classes as defined in Table 5, with important investment categories including for instance transmitters/amplifiers and belongings, spares and network monitoring facility. The resulting investments and depreciations per site class are shown in Table 9. Based on the technical parameters the Telecom Agency has assigned to each licence, the number and type of sites per licence determines its analogue distribution investments and depreciations.

Table 10 – Tangible fixed assets (non-distribution)

Variable	Coeff.	Std. err.	Z	P-value
RCH-N	0.63	0.18	3.51	0.00
CLUS	0.27	0.10	2.79	0.01
Constant	1.89	0.74	2.54	0.01
R-sq. (overall)	58%			
Observations	42			

Non-distribution investments

Non-distribution investments refer to tangible fixed assets[78], like housing, computers and furnishing, and to working capital. As explained, housing investments and related depreciation are treated as costs. The GLS results for tangible fixed assets are shown in Table 10.

The number of radio stations per cluster is statistically significant: the more radio stations, the higher the required investments. But, in line with expected economies of scope, the increase in investments diminishes significantly with the number of radio stations. In addition, national broadcasters face substantially higher investments than local broadcasters, and a higher demographic reach correlates with higher investments. The most striking aspect, however, is the lack of (statistically significant) predictive power of the number of years a station is active. This implies that licensees start off with investing in all assets that are needed during the licence period and thereafter invest only as much as is necessary to balance depreciation. This seems in line with the character of the related assets, i.e. computers and the like. The balance sheet value of the investments, in real terms, therefore remains constant during the licence period and will only increase with inflation. Assuming an average depreciation period of six years, equal to the licence period, the corresponding depreciation and investments in each year can be calculated. The balance sheet value at the end of the licence period is treated as a divestment.

Working capital

The results for working capital are shown in Table 11. In this model, total revenues (advertising plus non-advertising income) are introduced as an explanatory variable, as a direct impact of the total turnover on the required

[78] The only intangible assets of importance as part of 'normal exploitation of radio activities' is the payable licence fee, which may be booked as an intangible asset. As this exercise is aimed at calculating the value of the licence as a proxy for the licence fee, it is not included in the Net Present Value calculation.

working capital can be expected. Since total revenues increase during the licence period, so does working capital. Working capital at the end of the licence period is treated as a divestment.

Table 11 – Working capital

Variable	Coeff.	Std. err.	Z	P-value
Total income	0.43	0.16	2.61	0.01
Constant	3.78	1.54	2.45	0.01
R-sq. (overall)	29%			
Observations	25			

5. Digital radio

The Dutch government wishes to stimulate the development and uptake of digital radio. It has made simulcast (analogue and digital) broadcast a prerequisite for an incumbent for licence renewal. This means radio stations will have to invest in digital radio distribution and promote it to their listeners. Expected digital distribution costs and investments have been calculated using a model that is comparable to the model used for FM (analogue) distribution. This resulted in yearly costs and investments per licence for the use of one channel, as summarized in Table 12. Spare capacity that will result from setting up digital networks is expected to be used for launching new stations. Hence, the costs of this spare capacity are not allocated to the current licences.

Digital radio has several advantages compared to analogue broadcasting. Higher spectrum efficiency facilitates a larger number of radio stations. In addition, it provides a potentially better sound quality and offers opportunities for data services. For radio stations this might result in higher income due to, for example, improved attractiveness in view of enhanced quality and fees for data services. It is hard to draw any conclusions on the exact impact based on Dutch experience, as the uptake of digital radio has been modest so far. In Europe, the UK is the frontrunner in terms of digital radio uptake; almost 30% of all households have at least one receiver for digital radio (Ofcom 2009).[79] There is no proof as yet that the increased listening time in the UK resulted in higher advertising income. With some

[79] With more radio stations to listen to, listening time appears to increase after the purchase of a DAB receiver (Green 2009). For the largest part, however, this effect accrues to digital-only stations. Stations with simultaneous (analogue and DAB) broadcast experience only a very modest increase in number of listeners. Moreover, income generated by data services has been highly moderate.

years to go before uptake towards UK levels will be achieved in the first place, we assume there will be no net financial benefit to be gained in the Dutch market during the licence period. More specifically, it is assumed that any costs to promote DAB are equal to any additional income resulting in a zero net income effect. This leaves the investments and cost of digital distribution necessary for simultaneous broadcast, as discussed above.

Table 12 – Costs for Digital Audio Broadcast (DAB) per channel

DAB network	Capex	Capex
National	106	45
Regional	25	9

6. Licence value

Based on the bottom-up models for the distribution cost variables and the GLS models for the other variables, the value of all elements in the cash flow schedule in Table 1 can be calculated. Inputting the licence-specific characteristics in the models and the model outcome in the cash flow schedule, results in an overview of net cash flows per licence in each of the years of the licence period.

The final step is the calculation of the Net Present Value per the beginning of the licence period based on the (nominal) annual net cash flows. Future cash flows are discounted to the start date of the licence period based on the discount rate: the Weighted Average Cost of Capital (WACC). The WACC is a measure of the return that investors – providers of equity and debt – demand. One euro invested today should at least have grown with the WACC in a year time and, the other way around, one euro next year is worth only 1/(1+WACC) today. Discounting the cash flows using the WACC therefore results in a value of the radio licences that takes the return demanded by investors into account. Based on international data, a nominal post-tax WACC of 6.4% was used for national radio licences and a WACC of 7.3% for non-national licences. The WACC is defined by the following formula:

$$\text{WACC} = l \times (R_f + D) \times (1 - Tc) + (1 - l) \times (R_f + \beta_E \times MRP)$$

The underlying parameters and the values used are specified in Table 13.

Discounting the (nominal) cash flows to the beginning of the licence period based on the (nominal) WACC, provides the Net Present Value (NPV). Remember, however, that the models are based on the financial data of entire radio stations. This means that income, costs and investments of *all platforms* used to broadcast radio programmes are included – that is: value

generated via analogue air broadcasting, cable Internet and other platforms such as satellite. To estimate the value generated via air broadcasting, the resulting NPV should be corrected in order to reflect the value generated via this specific platform. This is done by assuming that the value of each platform is determined by the share of audience.[80] Availability of reliable data on this matter is, however, lacking – not even the radio stations themselves were able to determine the exact division of listeners over platforms. Based on (Intomart/GFK 2009), which provides insight in the listening share per medium instead of platform, assumptions are made for the division over platforms. Where (Intomart/GFK 2009) provides insight in the share of radio listening via car radios (medium), for instance, this is interpreted as 100% air broadcasting (platform), while listening to a radio or audio set at home is interpreted as 50% air broadcasting and the remainder via other platforms such as cable. This results in an estimated listening share for air broadcasting of 60%.[81]

Table 13 – Results for the WACC and underlying input variables

Symbol	Variable	National	Non-national	Calculation method/source
WACC	Nominal WACC	6.4%	7.3%	See above
R_f	Risk-free rate	4.0%	4.0%	Average interest on 10-year Dutch government bond
β_A	Asset Beta	0.57	0.57	Average of international radio peer group
β_E	Equity Beta	0.99	0.99	Average of international radio peer group
l	Leverage defined as debt over total assets	50%	60%	Expert opinions from Dutch banking sector and information from international radio peer group
MRP	Market risk premium	4.0%	4.0%	Based on literature, e.g. Dimson *et al.* (2002, 2003, 2009a, 2009b, 2010)
*T*c	Corporate Tax	25.5%	25.5%	Dutch corporate tax rate
D	Interest premium	2.5%	4.5%	Average of international radio peer group, calibrated with expert opinions from Dutch banking sector

The same share of the calculated NPV is assumed to be generated via ether broadcasting. Thus, the value of the current licences after renewal is arrived at. However, the costs of investing in digital broadcasting still have to be

[80] A similar approach is adopted in (Ofcom 2006) and (Ofcom 2010b, 2010a).
[81] This is in line with the general perception about these market shares in the industry, even though this general perception turned out to be ill-founded.

accounted for. As discussed in Section 5, the investment costs involved have been calculated, while there are no additional revenues expected during the renewal. Hence, all costs associated with digital distribution have to be subtracted from the value of the licence.[82] This is done by calculating the (negative) NPV of the digital broadcast business case, which is subtracted from the value of the ether licence.

In order to calculate appropriate licence fees, one final calculation had to be performed on the NPV as calculated in the way described so far. If this was the licence fee the Dutch government demanded for reassignment, the licensees would actually make an additional profit on top of the discount rate. The reason for this is that the licence fee is either a cost or an investment that is depreciated over the licence period. Either way, the licensee can deduct the fee from its income, thereby lowering profit and tax payable. The value corrected for tax deductibility, based on the Dutch tax rate of 25.5%, is provided in Table 14.[83]

The calculated licence values for the national radio licences for ether and digital broadcasting are given in Table 14. All non-national licences turn out to have no value for an entrant, given the current market structure. Differences in value are determined by licence-specific elements, mainly demographic reach. In addition, the number and type of broadcast sites necessary for operation can have the same effect. For national licences content constraints appear to be an important determinant for the value of a national licence. In Table 14 is shown that, apart from licence A2, all licences with a content constraint reflect no commercial value to an entrant. As explained, the reason for this is that the constraint limits the ability to attract market share and thereby income. This does not imply that these licences do not reflect any value to the incumbents. Licensees have invested, for instance in broadcasting sites, and have attracted a dedicated share of listeners over the years. The '-' value in the table does imply that opportunity costs for an entrant are zero and that reassignment without a licence fee is considered a market-efficient outcome. Licence A2 is the only licence with a constraint ('Golden Oldies') providing value to an entrant. This is in line with the outcome of the auction of radio licences in 2003.

[82] This is in line with the approach adopted in (Ofcom 2006) and (Ofcom 2010b, 2010a). There, all shared costs are attributed according to audience share per platform, while distribution costs are attributed directly to each platform.

[83] The government could allow for deferred payments, e.g. annual, instead of a one-off payment. If this option is chosen, a market based interest rate should be charged to prevent state aid.

Table 14 – Value of Dutch Radio FM Licences (ether & digital) in € per 1-9-2011

Licence	Format restriction	Value[a]
A1	–	€ 25,592,000
A2	Non-recent ('Golden Oldies')	€ 20,692,000
A3	–	€ 26,804,000
A4	News	–
A5	Recent specific music	–
A6	–	€ 26,473,000
A7	–	€ 21,726,000
A8	Classical music & Jazz[b]	–
A9	Dutch/European music	–

[a] Value '-': an entrant would not assign any commercial value to the licence.
[b] No data were available for the format restriction 'Classical music/jazz'. Therefore cash flows for this licence have been estimated by averaging cash flows for licences A5 and A9 (both estimated to have no commercial value for an entrant).

7. Policy implications

The valuation of commercial radio licences for the purpose of licence extension or renewal is discussed in this paper. This is done by estimating what an averagely efficient entrant would be willing to pay for each of the Dutch radio broadcasting licences.

Cash flows, the key input parameters for NPV, have been forecast based on GLS regression models and on separate, bottom-up cost and investment models for distribution variables. The values in Table 14 reflect the net cash flow potential for an entrant that can be attributed to each licence discounted to the start of the licence period, including a return for investors. The government agency responsible for assigning the licences (Agentschap Telecom) has adopted these values as the fees payable by incumbents for licences to be reassigned.

Never before have policymakers in other countries taken licence valuation based on an objective, model-based approach as a starting point for reassignment fees, at least not in Europe. Although the model that is at the centre of the value assessment is based on data specific for the Dutch radio sector, its mechanisms can be used for policymakers in other countries to determine the (reassignment) value of commercial radio broadcasting licences.

In addition to this general observation on the valuation methodology, several insights were provided into the cost and income structure of national and non-national commercial radio. Demographic reach and time-in-market turn out to be key variables to explain both costs and incomes. The result that

advertising income increases in a more or less linear fashion with demographic reach for national radio, while it is strikingly concave for non-national radio, stresses the observation that these are two separate markets. The importance of the time-in-market variable underlines that despite relatively small sunk capital investments, incumbents have an important advantage to entrants in terms of advertising income. Most strikingly, several national and all non-national licences were estimated to have no commercial value for entrants, despite the fact that most incumbents are making modest profits with them. Therefore, policymakers that want to encourage entry in an auction should increase the number of licences or take other measures to ensure that entrants have a chance relative to incumbents. Finally, the exchange of frequencies and various types of co-operation encountered in the Dutch non-national radio market, can be perceived as a substitute to a proper market for radio spectrum. Restricting such co-operation would bridle market forces and would most probably lead to a welfare loss.

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9 Setting licence fees for renewing telecommunication spectrum based on an auction

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Abstract
This paper presents a methodology for setting fees for the renewal or extension of spectrum licences, by using the outcome of an auction for comparable licences but with a different licence period. The methodology is a combination of market and cash flow valuation and consists of two main steps. First, prices for spectrum corresponding to that of the licences to be extended are derived from the auction outcome. Second, the relative value addition of the extension period for the new licensee, compared to the value of the licences auctioned, is derived by using a model for the development of EBITDA for an operator over time. A combination of these two is used to calculate fees that match the opportunity costs of extension. Thus, optimum alignment is achieved with the policy objective of using licence fees only to promote efficient use of spectrum, while avoiding state aid at the same time.

Keywords
Licence renewal, licence extension, licence fee, administrative spectrum pricing, spectrum valuation, spectrum auction.

1. Introduction

In developed countries, spectrum licences for wireless communication are mostly awarded by means of an auction or a beauty contest or hearing (Zaber & Sirbu, 2012). Spectrum licences commonly have a predetermined duration. When they expire, governments can award them again, or under certain circumstances they can opt for renewal or extension. In the latter situation, licensees are offered the option to continue using the spectrum. Such an extension can be for a limited period, for instance to accommodate a transition, for a full new licence term or even indefinitely, and may be used to facilitate a change in the licence conditions concerning the use of

spectrum. Setting the appropriate licence fees is an important issue in such cases (Guermazi & Neto, 2005).

This paper describes how licence extension fees can be calculated if market information about the value of spectrum is available from a spectrum auction including the same or similar frequencies but for a different licence period. A methodology is presented which involves deriving prices from an auction that correspond to the extended licences in terms of underlying spectrum, and adjusting these for the deviating licence period by means of the curve describing value creation over time for a mobile network operator. Taking the auction outcome as a starting point implies the use of market information on the value of frequency bands and optimum alignment of the extension fees with the policy objective of using licence fees only to promote efficient assignment and use of spectrum, whereas state aid is avoided at the same time.

This paper is organized as follows. Section 2 provides a brief discussion of the literature and regulatory context of spectrum assignment, licence renewal or extension, and setting licence fees. The theoretical framework proposed for setting licence extension fees based on an auction is presented in Section 3. Section 4 elaborates this framework, after which Section 5 applies this methodology to a Dutch case study concerning the extension of licences for 900 and 1800 MHz bands. Section 6 concludes.

2. Literature and regulatory context

There is extensive literature on auction design,[84] and there is some literature in which auctions are compared with beauty contests or alternative procedures to award spectrum. Auctions score high on the efficiency, non-discrimination and transparency of the assignment procedure (Kruse, 2004). On average, they raise larger public revenues than beauty contests do and have no negative and perhaps even a positive effect on the speed of technology diffusion (Zaber & Sirbu, 2012). Moreover, they are generally claimed to promote efficient use and assignment of spectrum, for in a well-designed auction, licences are won by the most efficient operators that can create most value by using them (Cave, Doyle, & Webb, 2007; Hazlett & Muñoz, 2009; Bohlin, Madden, & Morey, 2010).

[84] See for instance Klemperer (2004) for an introductory overview, or Chapter 5 in Cave, Doyle and Webb (2007) for a basic assessment of the pros and cons of various spectrum auction formats.

Much less research has been done on the economics and pricing of licence renewal or extension, despite the fact that certain circumstances can render renewal or extension of licences preferable – or even necessary to new assignment in an auction. Generally, licence renewal can be beneficial from the perspective of ensuring certainty for incumbents and thus encourage investment (Guermazi & Neto, 2005). However, this may be detrimental to competition and innovation in the market if it entails that new players cannot enter. On the other hand, renewal might be opted for to encourage incumbents to invest in new technologies or standards (Kerste, Poort, & van Eijk, 2012), thus actually promoting or speeding up innovation.

Licence extension for a shorter period can be desirable to match the licence periods of various spectrum bands, which can then be combined in a multiband business case. In such cases, auctioning separate licences for the short time required to match licence periods is no option, since no other operator would be able to build a business case on such a short licence period. A temporary extension can also be required to allow for an orderly transition without any disruptions for subscribers, if there is too little time between the expiration of licences and the start of newly auctioned licences. Since mobile network operators (MNOs) base their investments in grids and base stations on the spectrum allocated to them (Lundborg, Reichl, & Ruhle, 2012), they may need time to make the transition from their old licences to the new ones. This was the background for the Dutch case described in Section 5.

If renewal or extension is opted for, spectrum fees have to be set administratively. The relevant question is how to do this. In Europe, the regulatory context for frequency distribution and the renewal of licences for frequency use have been laid down in the Framework Directive (2002/21/EC) and are further addressed in the Authorization Directive (2002/20/EC). These directives do not include any specific provisions with regard to licence renewal or extension, but there are some general criteria that can be considered applicable to licence renewal or extension, especially when it comes to imposing fees. According to consideration 32 of the preamble of the Authorization Directive, fees may be imposed to ensure optimum use of spectrum but should not hinder the development of innovative services and competition in the market. Hence, revenue maximization can be no objective in itself, and fees should be no higher than what is necessary for efficient assignment and use of spectrum.

On the other hand, setting licence fees too low could involve impermissible state aid under European law, as it could entail a waiver of state resources (in this case spectrum) to the selective benefit of current licensees. General criteria should be used to find out if state aid is provided for a renewal. These criteria can be largely derived from Article 107 of the EC Treaty and case law of the Court of Justice. For instance, allegations that licence fees for the fourth French 3G operator Free Mobile had been set too low, led to state aid investigations, after which the European Commission ruled that the procedure did not involve state aid (Hocepied & Held, 2011).

To be in conformity with the criteria above that follow from the European Regulatory Framework, the methodology presented in this paper takes the opportunity costs of the extension for the incumbent as a benchmark. In Section 3, it is argued that this methodology promotes optimal assignment and use of spectrum. Conceptually, this methodology relates to Administrative Incentive Pricing (AIP), which was developed by NERA/Smith for the UK Radiocommunications Agency (Marks, Viehoff, Saadat, & Webb, 1996). AIP was formally introduced in 1998 and was evaluated and revised by Ofcom in 2009-2010 (Ofcom, 2009; 2010a). It is used to set fees for both commercial and public spectrum "to reflect the opportunity cost of spectrum denied to other uses and users, rather than just the costs of managing the radio spectrum" (Ofcom, 2009, p. 1). This encourages spectrum users to use spectrum more efficiently and release it wherever they can.[85] Along similar lines, the Australian regulator proposed an opportunity cost approach for administrative spectrum pricing, claiming that "[p]ricing based on these principles is expected to promote productive, allocative and dynamic efficiencies in spectrum markets and related downstream markets" (ACMA, 2009, p. ii). As a general approach to setting administrative spectrum fees, the opportunity cost approach which underlies AIP has not met with any serious competition so far.

Setting administrative fees for commercially exploitable spectrum based on opportunity costs usually involves either the development of business cases for other users or uses, or a benchmark of spectrum prices from auctions or

[85] Licences that were awarded in a commercial setting (such as on auction) and could be traded, were initially exempted from AIP. For such spectrum, the market mechanism was believed to provide sufficient incentives for efficiency. Ofcom focused on costs to calculate fees, which resulted in fees that were not in line with commercial values on which market parties would base auction bids. After a government directive in 2010 requiring "Ofcom to revise the fees payable for licences to use radio spectrum in the 900MHz and 1800 MHz bands so that they reflect full market value" (Ofcom, 2013, p. 3), this was changed, and fees in these two spectrum bands were based on a range of evidence, particularly including results of the UK 4G auction and foreign auction results. Note that this use of auction results is still in line with the opportunity cost approach that underlies AIP and the methodology presented in this paper.

secondary market transactions in other countries. The benchmarking approach is used by DotEcon (2013). Business cases are developed by Cambini and Garelli (2011) for estimating the opportunity costs associated with the spectrum formerly used for analogue TV (the digital dividend) and by Kerste, Poort and van Eijk (2012) and Ofcom (2006; 2010b) for determining an extension fee for commercial radio licences. Poort *et al*. (2006) use a full business case to determine the fee for a three-year extension of 900MHz GSM licences based on opportunity costs.

The approach of developing *business cases* to set extension fees has the advantage that it is generally applicable. Disadvantages are that it is administratively burdensome and likely to be subject to controversy and litigation, because it is sensitive to assumptions about the costs and revenues of network operators and their strategies towards spectrum use and network investments. Basing renewal fees on a *benchmark* is possible if recent market outcomes from other countries are available. In theory, this yields fees that meet the requirements of the regulatory framework by being market-based. In practice, it can be as burdensome and controversial as the former approach, since it requires taking due account of a host of country-specific differences, such as population size and density, geography, GDP level, market structure, rollout obligations, spectrum availability in other bands, whereas relevant data points diverge and are limited in number. Although the outcomes of spectrum auctions in various countries can to a large extent be understood on the basis of the underlying licence characteristics and market conditions (Bohlin, Madden, & Morey, 2010), there is still considerable unexplained variation in auction outcomes between countries that will impact valuation. Moreover, differences in licence duration have non-linear effects which should be taken into account when benchmarking licence fees.

This paper presents a combination of business case valuation and benchmarking for setting extension fees, in the case that market-based valuations for similar licences in the same market are available. These are corrected for non-linear effects caused by discounting and the growth of revenues over the licence period, on the basis of a simplified business case and a generally applicable calculation. Given the fact that recent information about market valuation in the same market is available, this approach is administratively less burdensome and less assumption-sensitive. It is founded on the same economic principle of opportunity costs, and by deriving fees from a market outcome, state aid is prevented. This approach is also related to Bazelon and McHenry (2013), who use a combination of

market valuation and discounted cash flow for spectrum valuation outside the context of licence extension.

3. Theoretical framework

Economic theory offers, in broad terms, three ways to assess the economic value of an asset: reproduction costs, market value or cash flows. Reproduction costs cannot be used for spectrum, since it is a non-storable, non-reproducible good. Market value can be used for goods that are tradable and sufficiently liquid. For spectrum, a liquid market does not exist,[86] but auction outcomes can be seen as market valuations for licences. However, as argued in the previous section, these valuations are based on specific licence conditions and duration, at a specific moment in time, and given a specific economic and competitive environment.

Discounted cash flow (DCF) valuation can be used for non-tradable and non-reproducible unique assets, like spectrum licences. In this approach, the value of a licence is calculated on the basis of the net present value of the cash flows that an operator can create with the licence over the licence period. In theory, this equals the value attributed to the licence by the operator and thus the maximum price he is willing to pay in an auction. Since an incumbent has already sunk specific investments in operating the licence, for instance by making investments in a network and marketing, and acquired a client base, he will most likely have the highest valuation for the spectrum. However, charging an operator his own maximum value for extension would be at odds with the regulatory framework, which does not allow revenue maximization. This would punish the incumbent for its success and specific investments by extracting the rents associated with these. Moreover, it would not equal the theoretical market price, because in general an efficient incumbent would not have to pay his own maximum value to win the auction but that of his contestant to outbid him. Therefore, for the licence fee to be in concord with the regulatory framework, it must be based on the value of the spectrum for the contestant instead of on the value for the incumbent. This contestant can be either an entrant or another incumbent who operates less or different spectrum and will determine the outcome of a hypothetical, efficient auction. The net present value for the contestant thus represents the opportunity costs of the incumbent who extends or renews his licence, and a fee derived from it avoids revenue

[86] As Trosby, Johannessen, and Rabstad (2010, p. 36) note, requirements for rollout and coverage "do not go well together with a fluent and well-functioning second hand market."

maximization beyond what is necessary for optimum assignment of spectrum.

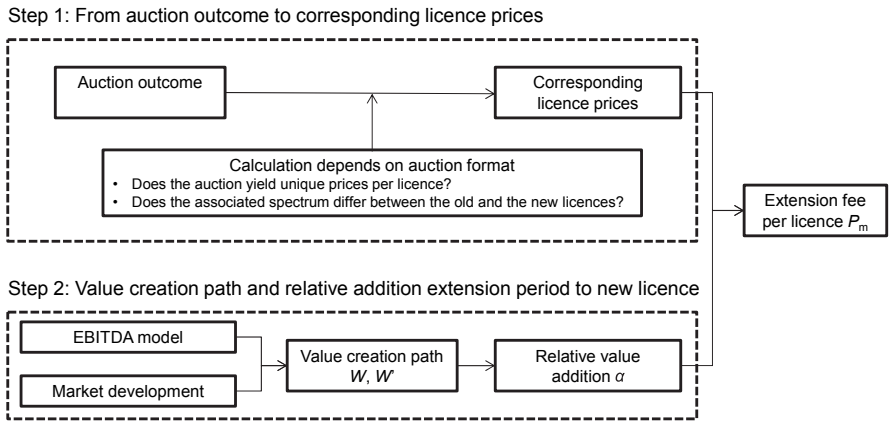
For a relatively short licence extension, DCF valuation of an entrant's business case will probably not yield a positive outcome. Yet, this does not imply that the spectrum is worthless for anyone but the incumbent and that it can be extended without a fee. As a result of the extension, a contestant in a subsequent auction can acquire the underlying spectrum later and for a shorter period. Acquiring it earlier and for a longer period, which would be the case without the extension, would add value for the contestant, and this extra value equals the maximum price he would be willing to pay for the hypothetical licence extension, which equals the opportunity cost for the incumbent and hence the appropriate extension fee.

In the absence of any market based valuation, these opportunity costs could be assessed by modelling two business cases for the contestant: a *base case* according to the subsequent auction and a *hypothetical case* that includes the preceding extension period (see Poort *et al.*, 2006). As was stressed in Section 2, this approach is administratively burdensome, however, and susceptible to litigation over the many assumptions required for these calculations. When a recent auction outcome for similar spectrum in the same market is available, however, this outcome can be used to derive these business cases in a calculation which is market-based and requires much less information and fewer assumptions. A detailed description of this approach is given in the next section.

4. Analysis and results

The methodology presented in this paper consists of two main steps. First, prices corresponding with the licences to be extended are derived from the auction outcome. Second, because the licence periods of the extension and the auctioned licences differ, the relative value addition of the extension period for the new licensee is derived by using a model for the development of EBITDA for an operator over time. Figure 1 gives a schematic overview of these two steps and the underlying elements. These steps are described in more detail in Sections 4.1 and 4.2. A combination of these two is used to calculate extension fees.

Figure 1 – Analytical framework



4.1. Step 1: From auction outcome to corresponding licence prices

The complexity of the calculations in this first step depends on the auction format used, and the extent to which the spectrum associated with the extended licences corresponds to that of the newly auctioned licences. If spectrum associated with each new licence is identical to that of a preceding (extended) licence, and if the auction yields a unique price for each licence, this first step is trivial. Most auction formats, such as sealed bid auctions, simultaneous ascending auctions, and ascending clock auctions, do yield a unique price for each new licence.[87] Combinatorial auctions only yield prices for packages of licences, which makes it somewhat more complex to derive a price for each licence for calculation purposes (see the Dutch case study in Section 5).

In ascending auctions, prices are generally identical for licences within the same frequency band, or they may exhibit differences that result from a sequential auction in case there are quality differences within frequency bands. In sealed bid auctions, the auction price for (nearly) identical licences may differ substantially, in which case it is most straightforward to use the average prices of such licences for setting extension fees.

[87] For a general discussion of these auction formats, see for instance Chapter 5 in Cave, Doyle and Webb (2007) or Klemperer (2004).

For any of these auction formats, the associated spectrum may differ between the old and the new licences. This requires calculating hypothetical auction prices for the licences to be extended. The most straightforward and objective approach for this is to assign the auction prices uniformly to the underlying spectrum and to aggregate this over the spectrum underlying the old licences.[88]

It follows that there is no one-size-fits-all calculation in this first step. The business case in Section 5 provides a calculation for one of the most complex examples: differing spectrum and a combinatorial clock auction lacking unique prices per licence. Other combinations of auction format and spectrum characteristics can be calculated based on the same methodology, leaving out calculation steps where necessary.

4.2. Step 2: Value creation path and relative addition extension period to new licence

4.2.1. Relative value addition α

Consider two alternative licences: one that starts after the extension and lasts T years, and one that is equal to the first but starts E years earlier as it *also* covers the extension period.[89]

The net present value (NPV) which the contestant derives from the first licence is called V and is described by:[90]

$$V = \sum_{i=1}^{T} \frac{CF(i)}{(1+D)^{i-\frac{1}{2}}} \times (1+D)^{-E} \qquad (1)$$

Here, $CF(i)$ represents the real net cash flows a contestant expects in year i. V is calculated per the *first day of the extension period* with the use of a real discount factor (D) and on the assumption that cash flows are realized halfway each year on average.

The NPV of the second licence that includes the extension period is called V' and, calculated for the same date, is described by:

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[88] If licences remain unassigned in the new auction, the reserve price in the auction could be used in this calculation as the best estimate of the value of these licences, although one can argue that in such a case the auction outcome indicated that the reserve price was set too high and a lower price should be used.

[89] For the sake of brevity, T and E are assumed to be integer values. If they are not, the last term $CF(i)$ in the summations (1) and (2) has to be corrected to account for this last partial year.

[90] In line with basic corporate finance, the value of an investment is calculated by discounting all cash flows using a discount factor, for which most commonly the WACC (weighted average cost of capital) is used. For a further discussion on net present value and the WACC, see for instance the standard text book on principles of corporate finance by Brealey and Myers (2003).

$$V' = \sum_{i=1}^{T+E} \frac{CF(i)}{(1+D)^{i-\frac{1}{2}}} \quad (2)$$

As set out in Section 3, the appropriate extension fee F for the existing licences equals the value an earlier start and longer duration of the new licence would add to the contestant's business case. Under the likely assumption that $V' > V > 0$, this is:

$$F \equiv V' - V \equiv \alpha V \text{ in which } \alpha \equiv \frac{V'-V}{V} \geq 0 \quad (3)$$

To determine the extension fee, it is therefore required to estimate α, the relative value addition resulting from an earlier start and a longer licence period, and to multiply this by the auction-based corresponding licence price derived in the former section.[91] The value of α can be calculated from $CF(i)$ and D, given the licence term T and extension term E.

4.2.2. Modelling cash flows by EBITDA over time

In equations (1)-(3), the growth path of value creation by the development of net cash flows is described. However, because only the *relative* development of value creation during the business case is relevant for α, sensitivity for underlying assumptions in a model-based valuation is tempered considerably. This allows for using Earnings Before Interest expenses (or income), Taxes, Depreciation and Amortization (EBITDA) as a proxy for net cash flows. While there is insufficient data available on free cash flows, this allows for a simpler, less assumption-sensitive regression analysis based on readily available data on EBITDA. Using EBITDA as a proxy for net cash flows is not uncommon. There is, however, one element that could distort results. Companies with high depreciation values often also have high investment and reinvestment needs. This will not impact EBITDA, but it will impact net cash flows. Because only relative developments of value creation are relevant here, which implies that the investment effect will be on both sides of the equation, investments do not impact results substantially, and EBITDA can be used as a proxy for net cash flows.

Thus, α is calculated by means of a model which predicts the EBITDA for telecom operators over time. To do so, a panel set with historic public data of comparable European mobile telecom operators has been analyzed. This

[91] Note that it is assumed here that the winning prices in the auction are due before the extension period, in line with equation (1). Different requirements for the payment of licence fees and extension fees would alter the discounting in these equations somewhat but would not change the analytical approach.

resulted in an econometric model for EBITDA, based on pooled generalized least squares (GLS) estimation with random effects.

The use of panel data to estimate EBITDA directly might result in incorrectly attributing total market development as well as inflation to the number of years active. This would entail overestimating company EBITDA development in time. Therefore, EBITDA values have been divided by the total mobile telecommunication turnover for the relevant country and year. This also facilitated the comparison of EBITDA development between companies operating in markets of different sizes.

Table 1 – Dependent and potential explanatory variables

Variable name	Variable definition	Data source
EBITDA/SIZE	Earnings before interest expenses (or income), taxes, depreciation and amortization of MNO, divided by total turnover from mobile telecommunications in the MNO country.	EBITDA values from Amadeus database (Bureau van Dijk) and annual reports. Total mobile turnover from Telecommunications database, OECD.[a]
AGE	Number of years MNO has been active in its country at the end of the calendar year.	www.mobileworldlive.com, The Netsize Guide (2005-2011).[b]
PSTART	Market penetration rate of mobile telephones in the MNO country in the year of its market entry. This number depends on the year of entrance but does not change over time for MNO.	Telecommunications database, OECD. Based on the number of mobile connections and the number of residents per country.
PRATE	Market penetration rate of mobile telephones in a given country and year.	Telecommunications database, OECD.[a] Based on the number of mobile connections and the number of residents per country.
NUM	Number of MNOs active in a given country and year.	The Netsize Guide (2005-2011).
LOSS3GMNO	Loss of market potential for MNO offering only 3G subscriptions.[c] LOSS3GMNO = 100% -/- market share of 3G in a given country (for MNOs offering only 3G); 0% (for other MNOs).	The Netsize Guide (2005-2011).

[a] The most recent year in the database is 2009. Data for 2010 and 2011 is calculated by multiplying 2009 data from the OECD database with growth rates for 2010 and 2011 from the The Netsize Guide (2010-2011).

[b] The beginning of the oldest licence for GSM or UMTS is taken as the starting date. After a merger, the new MNO is included as a new company with the age of the oldest of the merged companies.

[c] Offering only 3G might impact EBITDA potential, if a substantial part of the population does not use 3G yet.

In view of the innovative and changing character of the telecom industry, data over a relatively recent period has been used (2005-2011). The dataset was geographically restricted to MNOs active in the EU-15. Only EBITDAs specific for mobile activities in a specific country have been used (so no values for combinations of fixed and mobile activities or for several countries).[92] This resulted in a dataset of 42 MNOs and 202 observations. Since the database consisted of companies with a sufficiently large range for the number of years they had been in business (see Table 2), it could be used to model a growth curve covering the full licence periods in the hypothetical business cases.

Based on market analysis, a number of variables were selected which may be used to predict EBITDA. By including an explanatory variable for the time MNOs are active in a given market, the growth path of EBITDA could be predicted. Table 1 describes the dependent variable, EBITDA divided by market size, and the variables which were tested as explanatory variables, as well as the data sources used. Table 2 presents descriptive statistics for these variables.

Table 2 – Descriptive statistics for variables used to model EBITDA (N = 202; 42 MNOs)

	EBITDA/SIZE	AGE	PSTART	PRATE	NUM	LOSS3GMNO
Mean	0.130	12.6	0.197	1.209	3.8	0.015
Maximum	0.373	19.6	1.226	1.853	7.0	0.575
Minimum	-0.036	2.3	0.003	0.764	2.0	0.000
Standard deviation	0.077	3.6	0.280	0.201	0.9	0.082

These independent variables were used to test several model specifications and functional forms. Table 3 presents the model for EBITDA/SIZE with the highest predictive power. All variables presented in Table 3 have $p < 0.05$. Robustness was checked by analyzing results when restricting the dataset to saturated markets: leaving out observations with a PRATE lower than 80% or 90% results in only minor changes to the original model. The negative coefficient of 1/AGE reveals that EBITDA relative to market size increases with the number of years an MNO has been active. This corresponds with the intuitive notion that a more mature MNO – with a brand built up over the years, more experience with market specifics et cetera – will realize higher EBITDA for a given market size. The negative coefficient of Ln(PSTART) indicates that entry in a more saturated mobile market has a negative effect

[92] This restriction was tested to have no systematic effect on the composition of the data set.

on EBITDA. The same is true for the number of players in the market: more competitors results in lower EBITDA for a given market size.

Table 3 – Model for EBITDA/SIZE

Variable	Coefficient	Standard	t value	p value
C	0.094	0.022	4.22	0,000
1/AGE	-0.101	0.051	-1.99	0.048
Ln(PSTART)	-0.029	0.007	-4.10	0.000
NUM	-0.0078	0.0024	-3.20	0.002
R2 (unweighted)	0.26			
Observations	202			

The model in Table 3 can be used to predict EBITDA during the licence period of the hypothetical business cases, in order to calculate α from equations (1)-(3). To do so, values referring to the specific market in which licences are extended or renewed are required for the explanatory variables in the model, market size and the discount factor *D*. This is illustrated in Section 5.

5. Case study: Setting extension fees for 900 and 1800 MHz licences in the Netherlands

5.1. Auction design and outcome

The methodology in this paper was developed and used to determine extension fees for licences in the 900 and 1800 MHz bands in the Netherlands.[93] Radio spectrum in the 800, 900, 1800 and 2600 MHz frequency bands was auctioned for 17 years in a procedure that started in October 2012. However, existing licences for the 900 and 1800 MHz bands would end in February 2013, leaving only about two months between the expected end of the auction and the start of these new licences. To allow for an orderly transition, the Minister of Economic Affairs offered the licensees an optional extension of the existing 900 and 1800 MHz licences for a period of up to 24 months after the end of the auction (*Staatscourant*, 2012b). Incumbents would have to pay a one-off licence fee, if they opted for this extension.

The new licences were auctioned by means of a combinatorial clock auction.[94] As was mentioned in Section 4.1, this auction format adds some

[93] It was consulted with the licensees during the research process and adopted by the Dutch government (Minister van Economische Zaken, Landbouw en Innovatie, 2012).

[94] Details are described in Staatscourant (2012a). Cramton (2013) gives a discussion of this type of auction which is becoming increasingly popular.

complexities to the calculation of auction prices corresponding to the extended licences, as it only yields prices for packages of licences. The combinatorial clock auction started with a *simultaneous clock auction* for generic lots per spectrum band, which in its final round yielded prices per band which were to some extent binding but not yet conclusive. Next, there was a *supplementary round* in which participants could decide individually which packages of spectrum they wished to combine and bid a series of prices for different combinations of generic spectrum per band. This round yielded winning prices for packages of generic licences per bidder, which could be higher or lower than the sum of the final clock round prices of the underlying generic lots. The auction was concluded with an *assignment round*, in which the winners of the supplementary round could bid extra prices for specific lots within the bands in which they had acquired licences.

The multiband auction ended on 14 December 2012, and all available licences in the 900 and 1800 MHz bands relevant for extension, were assigned. Table 4 presents the main outcomes of the auction. A total of €3.804 billion was paid for the new licences.

Table 4 – Outcome of the 2012 multiband auction in the Netherlands

Band	Period	KPN	Tele2	T-Mobile	Vodafone
800 MHz	17 years	2 x 10 MHz	2 x 10 MHz	-	2 x 10 MHz
900 MHz	17 years	2 x 10 MHz	-	2 x 15 MHz	2 x 10 MHz
1800 MHz	17 years	2 x 20 MHz	-	2 x 30 MHz	2 x 20 MHz
1900 MHz	4 years	-	-	1 x 14.6 MHz	-
2100 MHz	4 years	2 x 5 MHz	-	-	2 x 5 MHz
2600 MHz	17 years	1 x 30 MHz	-	1 x 25 MHz	-
Basic price		€1,349,851,000	€160,813,000	€910,582,000	€1,380,793,000
Extra price		€2,001,000	€0	€99,000	€7,000
Total price		€1,351,852,000	€160,813,000	€910,681,000	€1,380,800,000

Source: Agentschap Telecom (2012).

5.2. Calculating extension fees and follow-up

In order to determine the extension fees, the basic prices from the *supplementary round* first had to be translated into prices per licence. This was done by using the prices per licence in band T in the *final simultaneous clock round* (PC_T), which gives information about the relative valuation of the different frequency bands in the auction:

$$BP_{TA} = \frac{PC_T}{\sum_{assigned\ licences} PC_T} \times \sum_{winners} PS_i \qquad (4)$$

Here, BP_{TA} is the basic licence price per band of type T (of all assigned licences A), and PS_i is the total price that winner i pays in the supplementary round.

The extra prices in the assignment round express bidders' preferences for specific parts of frequency bands. These extra prices were uniformly assigned to the underlying spectrum. This was done per 100 kHz because there were some changes in the spectrum assigned to the old and new licences. For instance, if a participant acquired four blocks of 5 MHz in the 1710-1730 MHz frequency range, paired with four blocks in the 1805-1825 MHz range paying an additional €5 million for this, an extra price of €12.5 thousand per 100 kHz was attributed to this part of the spectrum. Corresponding licence prices for the old extended licences were then calculated by aggregating basic and extra prices per 100 kHz over the relevant spectrum.

The next step was to calculate the relative value addition α (see Figure 1). To this end, values for the explanatory variables as well as market size and the discount factor (D), relevant for the Dutch market, were needed:

- Telecompaper (2012) was used for market size. It provides growth estimations up to 2016. These are in line with historic development and the stabilizing and eventually diminishing growth one would expect for a new technology. For the years after 2016, market growth was assumed to equal an inflation rate of 2%, i.e. 0% real growth.[95]
- The relevant value for the AGE variable from Table 3 depends on the nature of the *contestant* in the auction. This is determined by the nature of the bidders in the two final simultaneous clock rounds. If this is an entrant, AGE = 1 at the end of the first licence year should be taken; in case of an incumbent, the actual age should be taken. In the 900 and 1800 MHz bands relevant for extension, the auction outcome was determined by incumbents. Therefore, the average of the actual age of the three Dutch MNOs was taken in each year during the licence periods.[96]
- The Dutch market is highly saturated. With the diminishing growth of market turnover, a constant penetration rate was assumed from 2012 onwards that is equal to the penetration rate of 125.6% in 2011. For the

[95] Real-growth rates have been calculated, by using CPB (2012) for 2012-2013 and assuming 2% inflation for later years.
[96] At the beginning of the extension period, KPN, Vodafone and T-Mobile had an average age of 16.90 years, a year later 17.90 et cetera.

incumbents, the average penetration rate in the year of market entry was 9.42%.

- For NUM, the number of players that actually purchased spectrum in the auction (4) was taken.
- For discounting real EBITDA per year in equations (1) and (2), a real discount factor of 8.45% was used.[97]

The resulting value of α for various extension periods is presented in Table 5. For instance, the value 0.2420 in the last row means that when the auction outcome is determined by an incumbent, the appropriate fee for a 24-month extension is 24.20% of the auction outcome for a corresponding (17-year) licence. All values refer to a market with four players. The α values for any other extension period and number of players can be calculated by means of the same models. As can be seen in Table 5, extension fees are lower when the auction outcome is determined by an incumbent: as the relative EBITDA growth rate for an incumbent is smaller, the relative value addition of a longer licence period would also be smaller.

Table 5 – The α values for different extension periods in a market with four players

Extension period (months)	α when auction outcome is determined by	
	Entrant	Incumbent
1	0.0103	0.0088
6	0.0652	0.0569
12	0.1337	0.1167
18	0.2037	0.1778
24	0.2773	0.2420

After the auction outcomes in Table 4 have been converted into corresponding prices for the extended licences, extension fees can be calculated from the values for α in Table 5. For instance, extension fees per licensee in the 900 and 1800 MHz band for an extension of 24 months are presented in Table 6. The total amount is €447.5 million.

[97] Because EBITDA is a pre-tax cash flow, a discount factor equal to the pre-tax WACC (weighted average cost of capital) is used. The value for the WACC is taken from the Dutch telecom regulator OPTA (2010). The Dutch court (CBb) used this report, including the WACC, to set tariffs for mobile communication. As a pre-tax WACC is used, the debt-related tax shield is not taken into account. Because this is a recurring advantage, this will not have any substantial impact on the relative value that is relevant for α.

Table 6 – Extension fees per licensee per band for a 24-month extension

Band	Licensee	Extension fee
900 MHz band	T-Mobile	€ 95,786,151
	KPN	€ 118,962,389
	Vodafone	€ 109,476,200
1800 MHz band	T-Mobile	€ 66,600,779
	KPN	€ 45,000,580
	Vodafone	€ 11,701,189

Fees for an optional 1-month to 24-month extension of licences in the 900 and 1800 MHz bands were determined by means of this methodology. The auction, however, brought no major changes in the spectrum allocation in these bands. As a consequence, the Dutch licensees decided not to apply for extension and to arrange the transition by means of mutual agreements instead. Given the outcome of the auction, which reduced the need for a transition period, this scenario was attractive for them for several reasons.

First, the auction price for the newly acquired spectrum was due shortly after the auction, irrespective of the extension period. Hence, the longer the extension lasted, the lower the present value of the new licences would be while the auction price due was fixed. After the auction, transition without extension turned out to be technically feasible, facilitating an earlier start of the new licences without additional costs. The fact that extension was not opted for, implied a shorter licence duration at the *end* of the new licences. The cash flows at the end of the licence period, however, are discounted over 17 years and therefore do not weigh up against the costs of licence extension *before* the new licences. All in all, the limited transition needs, combined with the payment scheme and the possibility to start the licence period directly, gave a strong incentive to skip the extension. Finally, the auction yielded considerable revenues, as a result of which the incumbents' cash position deteriorated. This spoiled their appetite to spend any more money on extension.

6. Conclusion

This paper presents a methodology to derive fees for renewal or extension of spectrum licences from the outcome of an auction in the same market, for comparable licences but with a different licence duration. The methodology consists of two main analytical steps. First, prices for licences corresponding with the licences to be extended are derived from the auction outcome. Second, the relative value addition of the extension period for the new licensee, compared to the value of the licences auctioned, is derived on the

basis of an econometric model for the development of EBITDA over time. A combination of these two is used to calculate extension fees.

Conceptually, this methodology is a combination of market and cash flow valuation. Taking the auction outcome as a starting point for setting extension fees implies optimum use of market information on the value of frequency bands. This implies that the derived extension fees can be deemed market-based, and applying them entails no state aid. The extension fees are derived from the opportunity costs for the incumbent. Thus, they promote efficient use and assignment of spectrum, as they encourage incumbents not to apply for extension if others can use the spectrum more efficiently.

The methodology is applied in a Dutch case to determine fees for an optional 1-month to 24-month extension of licences in the 900 and 1800 MHz bands. This optional extension was expected to be required for an orderly transition between the expiration of old licences and the start of new licences. The Dutch case study shows the practical use and applicability of the methodology, even against the background of a fairly complex auction format and differences in the spectrum underlying the old and new licences.

The methodology is readily available for any regulator or policymaker who needs to set licence extension fees if extension or renewal is required, for instance to ensure a fluent transition after a spectrum auction or to match licence periods, provided that a recent auction outcome for comparable licences in the same market is available.

This methodology has been developed to be in line with the European Regulatory Framework, but since it promotes optimal assignment and use of spectrum, it is also valuable in other jurisdictions. Alternative methodologies to set extension fees in the situation described would involve either the development of business cases for other users or uses, or a benchmark of spectrum prices from auctions or secondary market transactions in other countries. In comparison, the methodology presented here is administratively less burdensome and less assumption-sensitive. It is flexible with respect to the extension period and the number of players in the market. When no auction outcome is available in the national market, outcomes from comparable markets could be used. However, this would yield a second-best estimate as it would require adjusting these outcomes as much as possible for all the differences in market and licence conditions (as in DotEcon, 2013).

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10 Measuring the welfare effects of public television

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Abstract
This paper presents the results of an explorative case study in the Netherlands, to develop a methodology to assess the welfare effects of public service broadcasting (PSB). It does so both for individual programmes and at an aggregate level, based on a combination of revealed and stated preferences, using readily available data for all programmes broadcast on all Dutch public and commercial channels starting between 6.00 and 11.55 p.m in the first three quarters of 2011.

Keywords
Public service broadcasting, public broadcasting, television, welfare effects, impact

1. Introduction

Most countries around the globe have a system for public service broadcasting (PSB).[98] Public broadcasters receive funding from specific taxes or licence fees, contributions, or directly from government budgets. In return for these subsidies governments typically require that PSB cater for a broad variety and diversity of interests (e.g. Brown, 1996b; O'Hagan & Jennings, 2003). Also, governments demand that PSB provides high quality programmes, which inform and educate people. Moreover, these programmes should be reliable and independent from government and vested interests. Governments require that these services be provided at the same quality to all. Is this public funding well spent?

From an economic perspective, government funding is only efficient if it solves market failures. In most papers, it is merely assumed that market failures exist (Brown, 1996b; Picard & Siciliani, 2013; Van der Wurff & van Cuilenburg, 2001) or the concept of market failure is rejected (Tjernström &

[98] Brown (1996a) notes that non-commercial broadcasting is referred to as *public broadcasting* in North America and *Public Service Broadcasting* (PSB) in Europe and Australia.

Tjernström, 2008). Already in 1966, Coase concluded that the assumption that market failures do indeed persist in broadcasting needs thorough academic analysis. Anderson & Coate (2005) took up the gauntlet and analysed under which circumstances market provision of socially valuable programming is possible using an advertisement model. Their models show that market provision is not impossible a priori. Left unregulated, equilibrium-advertising levels may be too high or too low, depending on the nuisance cost to viewers, the substitutability of programmes, and the expected benefits to advertisers from contacting viewers. The equilibrium amount of programming may also be below or above the socially optimal level.

Armstrong (2005) gives a broader analysis of market failures. He concludes that subscription television overcomes many market failures. For instance, broadcasting is no longer a public good because it is no longer non–excludable. After all, by using subscription models or pay TV it is possible to exclude people who do not pay. Setting piracy aside, there is no free riding. Armstrong also rationalizes the external effect argument that is put forward by many authors (e.g. Meijer, 2005). According to Armstrong, externalities and 'citizenship-enhancing' effects can exist: "if large numbers of people view particular kinds of programmes, this will affect the wider population in some way that the viewers themselves do not take into account" (Armstrong, 2005, p. 289). Such effects will be positive when television educates people or makes them more community-oriented, more tolerant or better-informed voters. Also, think of people talking or tweeting to others about a programme they saw, which revealed a political, environmental or medical scandal. On the other hand, Armstrong explains that these externalities are hampered because people have an increasing ability to avoid unappealing, but perhaps socially desirable content. Moreover, externalities can also be negative, for instance, if watching violence on TV induces violent behaviour. This may be a cause for regulation of programme content, particularly for the protection of minors. Also, watching too much TV may in itself negatively affect people's health and social contacts, which may in turn have a negative spill-over effect on the rest of society. Nevertheless, in line with most of the literature, it is assumed here that insofar as they occur, external effects will be predominantly positive. Note that this does not automatically imply that government subsidies are justified from an economic perspective.

Apart from this discussion on the economic right to exist, more attention is paid to the negative effects of public funding of broadcasting. A prevalent issue relates to unequal competition. In most countries PSB coexists with

commercial broadcasting. In many cases, these two systems compete on both sides of the market – both for audience and for advertising revenues – yet they are not always easily distinguishable in terms of programming. Nevertheless, PSB receives funding from the government, while commercial broadcasters are taxed like any other company and may even have to pay license fees for the use of radio spectrum. The question then is whether PSB corrects a market failure or cannibalizes commercial broadcasters.

In the Netherlands, ever since the first commercial broadcaster entered the market in 1989, public broadcasters have been competing with commercial broadcasters. Based on Hotelling's law, the presumption is that fierce competition between (public and commercial) broadcasters may lead to excessive sameness. It is not yet clear whether this law holds true in practice. In a report on the future of PSB, the Council for Culture, therefore, advises the Dutch government to perform a baseline measurement to identify the overlap with the commercial broadcasters (Raad voor Cultuur, 2014, p. 69).

Yet another issue relates to shrinking government budgets. In times of austerity, governments may be urged to rethink their role in broadcasting in line with the discussion on market failures above: What are the public interests they are safeguarding by supplying PSB? How does the continued digitalization and growth of commercial broadcasting affect the need for PSB? What market failures justify public provision of broadcasting and do its social and economic benefits outweigh the costs? The need to ask these questions goes beyond austerity. Although public provision of broadcasting is bound by state aid regulations in Europe[99], one may well wonder what the rules of engagement should be from an economic perspective, when public entities compete with commercial suppliers in a market.

This paper presents the results of a case study on the Netherlands, which explores the welfare effect of PSB. Its background is linked to the specifics of the Dutch PSB system, which consists of three public TV channels (NPO 1, 2 & 3) that compete with seven commercial channels provided by RTL Nederland Holding (viz. RTL4, 5, 7 & 8) and SBS Broadcasting (viz. Net5, SBS6 & Veronica). The public channels are programmed by eight PSB 'associations', which are state funded but operate independently of the government and aim to serve the specific interests of their own members in their programming.[100] Next to these, there are two public broadcasters

[99] Official Journal C 257 of 27.10.2009.
[100] The advertising revenues that are generated on Dutch public television are incorporated in the state funding they receive.

without members (NOS and NTR) that are mainly charged with providing programmes on news, sport and culture. Traditionally, funding and airtime are divided amongst these associations based on the number of members each of the PSB associations has. At the time these associations were established (some 90 years ago), Dutch society was strictly divided into religious and political groups. Each of these associations represented one of the groups. Nowadays, the strict boundaries between these groups have disappeared and people are less prone to becoming and remaining members. Consequently, the membership numbers show a declining trend. After a peak in 1992, when 62% of Dutch households were members of a broadcasting association, in 2014 only 46% hold a membership.[101]

1.1. A précis of the plot: main question and outline

With membership numbers decreasing, this measure has gradually become outdated. The Scientific Council for Government Policy and the Council for Culture, both important advisors to the government, recognize this fact. In 2012, the Minister for Culture decided to no longer allocate budget based on membership numbers[102] and instead base the allocation on quality and originality. Until now there has been no new allocation methodology. This paper fills that gap.

The question addressed in this paper is to what extent the social impact of programmes on public television can be objectively assessed and whether a measure to this end can be developed. In an explorative analysis, this paper aims to do so on the basis of data that are currently collected for public and commercial television programmes in the Netherlands. It outlines the theoretical foundation for such an analysis (section 2), and presents its outcomes (section 3). Subsequently, it discusses how this approach can be elaborated and calibrated (section 4).

1.2. Contribution to the literature

This paper also aims to fill a gap in the literature. In 1996, the Journal of Media Economics published a special issue on PSB. This issue was introduced by Allan Brown (1996a) who noted that throughout its first eight years of publication (1988-1995), only two articles on PSB have appeared. Since then the number of papers on PSB in the Journal of Media Economics

[101] This is a slight increase in comparison to the last count, which results from active campaigns by PSB associations to increase their membership for this count. Note that often one household has more than one membership, because they want to support several associations in their effort to be admitted to the public system and to acquire budget. Therefore, this percentage is an overestimation.

[102] Members are of importance in order to obtain access to public broadcasting, but not to cover the funding base.

and in other Journal has increased slightly (e.g., Lin et al. (2013), Rothbauer & Sieg (2013), Solberg(2007), Solberg (2007, 2008), Tjernström & Tjernström (2008)), but academic papers that assess welfare effects of PSB are still incredibly rare. Lin et al. (2013) use a willingness to pay (WTP) study to measure welfare effects of PSB in Taiwan. Based on a sample of 376 respondents, the authors estimate that household average WTP per year for PSB is approximately US$30, which is equal to 0.18% of GDP per capita in 2007. From the fact that such a WTP estimate is much higher than the current government subsidy per household for the public broadcaster (called PTS), Lin et al. conclude that respondents have a high appreciation of PSB as well as its potential benefits for families.

The authors also cite a WTP study for the BBC among a nationally representative panel of 2,257 people. Respondents valued the BBC at between £18 and £24 per month. Four out of five people support the licence fee of £121 per year. However, in case a subscription-funded model would be introduced for the BBC that would cost £13 per month, only 60% of the British households would subscribe.

The methodology that these studies use is called contingent valuation method (CVM). It has several drawbacks. A questionnaire is used to elicit people's preferences for a public good by finding out what they are willing to pay for specified improvements of these goods. For instance, in the case of the Taiwanese broadcasting study, respondents are implicitly asked to choose between a situation with and without PSB. Households are asked this question: "Considering the benefits that the PTS brought to your household, are you willing to pay [amount] every year to maintain the operation of the PTS?" Depending on the amount depicted in the question, 22 to 62.5% of respondents were willing to pay this amount.

This kind of questioning may entail overestimation (Baarsma, 2000), which Lin et al. acknowledge. First, because of the direct way of posing the WTP question, strategic bias may occur if respondents overstate their WTP in an effort to raise the mean and thereby ensure provision. Second, hypothetical bias occurs because it is unclear whether a respondent's declared intentions (stated WTP) can be taken as meaningful guides to his or her actual behaviour (true value). Hypothetical bias might occur if the very fact that respondents are asked for valuations in a hypothetical market makes their responses differ systematically from real cash ('true') values. This is the case for all stated preference methods. After all, stated preference methods are based on preference data that are not observable in the market and that have

to be drawn from people's stated responses to questions in surveys, whereas revealed preference methods are based on preference data that are observable in the market and that can be revealed from observations of real-world choices.

This paper uses a combination of stated and revealed preferences. The majority of the data used is measured directly in households and thus presents revealed preferences. Insofar as stated preferences are used, these do not directly refer to willingness to pay, but only to ex post quality scores of programmes. As far as the authors are aware, the methodology developed in this paper is the first to assess the social impact of programmes on public television using revealed preferences, that is, actual viewing behaviour.

2. Theoretical framework

This paper operationalizes the social impact of television programmes in terms of their contribution to social welfare. Despite the common critique that PSB should not focus on viewing figures in the way commercial broadcasting does, they are a natural starting point for this: all other things being equal, a programme that attracts more viewers will entertain, educate, influence, or if you like enlighten more people. A larger audience also implies that more people can talk about it at the water cooler at work or tweet about it to others, and by doing so, they create more spill-over effects for non-viewers and other viewers.

Let w_i^p be the net welfare effect of watching programme *p* for viewer *i*, which is assumed to include any positive (or negative) spill-over effects which her viewing has on others. This would imply that for the aggregate net welfare effect of programme *p*:

$$W^p = \sum_i w_i^p \tag{1}$$

This then equals the total number of viewers V^p of programme *p*, multiplied by the average welfare effect per viewer of programme *p*:

$$W^p = \sum_i w_i^p = V^p \cdot \frac{\sum_i w_i^p}{V^p} = V^p \cdot \overline{w}^p \tag{2}$$

To evaluate this, one would need to determine $\overline{w}^p$, the average welfare effect per viewer of programme *p,* inclusive of any spill-overs. In normal markets, the price of a good is an important indicator of the value it has for its consumers. By paying this price, consumers signal that it has a value for them, which is above the costs. However, free to air PSB has no price to go

by, other than the time people invest to watch it.[103] Assuming that viewers behave rationally, watching a television programme can be considered the optimum use of that particular time span for them, given their preferences at the time. In welfare economic terms, this implies that the net individual utility which viewer *i* derives from watching programme *p* is greater than or equal to the utility $u_i^{A_j}$ she derives from any alternative activity A_j at that moment, which may be watching another programme, reading a book, mowing the lawn, sleeping, etc.:

$$\forall_j \, (u_i^p \geq u_i^{A_j}) \qquad (3)$$

Both u_i^p and $u_i^{A_j}$ are defined as the net individual utility here, exclusive of any spill-over effects. They are net of marginal costs incurred by activity *p* and A_j. In case of watching a television programme on free to air television or via a flat rate subscription, these costs are primarily the opportunity costs of spare time. In welfare economic analysis, the marginal opportunity costs of an hour spare time are generally set equal to a person's marginal net hourly income I_i.[104]

It is an empirical question by how much the utility of watching programme *p* exceeds these opportunity costs.[105] To assess this, one could potentially use the methodology which Goolsbee & Klenow (2006) propose to estimate the total welfare which consumers derive from the leisure time they spend online. Like the methodology presented here, Goolsbee & Klenow derive consumer surplus from the opportunity cost of time, based on hourly wages. The present paper does not address this empirical question, but *assumes* that, on average, the consumer surplus for leisure activities – including any spill-over effects – equals 25% of the costs incurred. However, viewer *i* would also derive utility from many of the alternative activities A_j, which should be subtracted to arrive at the net welfare effect w_i^p of watching programme *p* for viewer *i*.[106] Given the dense landscape of ten Dutch

[103] When a licence fee is due or a cable subscription has to be paid to be able to watch television, this gives some information on consumers' willingness to pay, but at a very rudimentary and aggregate level.
[104] This is based on the assumption that people rationally optimize their working hours which implies that the marginal value of spare time equals the marginal income derived from working. For papers on the economic theory of time see Becker (1965) and De Serpa (1971). Munasinghe (1980) gives an empirical application of these theories for the valuation of power failures for residential electricity consumers.
[105] Note that the opportunity costs of spare time are used as proxy and lower bound for the utility u_i^p, not as a cost in a demand function. No information on costs for consumers is available at a programme level, other than the duration which is not only a cost but also a proxy for utility: average viewing figures *increase* with duration. Hence, it is not possible to derive a demand function here.
[106] From a different angle, this same argument could be made by pointing out that net utility derived from the best alternative is part of the opportunity costs of watching programme *P*.

television channels and the many alternative uses of time that are possible, it is assumed here that on average the utility of watching a programme on television exceeds the utility of the best alternative by no more than 10%. In the Netherlands, the marginal net income for an average person is approximately equal to €12[107], which implies for the assumed net welfare effect of an average programme $\bar{p}$ with a duration of $d^{\bar{p}}$, for viewer i with net hourly income I_i:

$$w_i^{\bar{p}} = \alpha \cdot d^{\bar{p}} \cdot I_i = 0.25 \times 0.10 \cdot d^{\bar{p}} \cdot I_i \qquad (4)$$

For the average viewer, this is:

$$\bar{w}^{\bar{p}} = \alpha \cdot d^{\bar{p}} \cdot \bar{I} = 0.25 \times 0.10 \times € 12 \cdot d^{\bar{p}} = € 0.30 \cdot d^{\bar{p}} \qquad (5)$$

Thus α, the *average* hourly welfare effect of watching television relative to net income is set as equal to 0.025 in this paper. Ultimately this value should be determined empirically.[108] For an average viewer this value for α amounts to an hourly welfare addition of €0.30.

As previously stated, viewing figures and the average surplus over time are a natural starting point, but not the whole story. The net welfare effect of programme p for viewer i, w_i^p, is likely to vary substantially around the average $w_i^{\bar{p}}$. Some programmes may entertain or inspire a viewer immensely or may have large spill-over effects. People might stay home to watch them or invite friends over. They may record such programmes on hard disk recorders or watch them through catch-up TV. Other programmes may have almost been forgotten before they end. People may watch certain programmes to help them to fall asleep, or zap away during the next commercial break. Where a specific programme lies on this continuum is highly personal, but the average impact a programme has on its viewers will not necessarily be reflected in viewing figures. In fact, it could be uncorrelated or even negatively correlated. A programme with a modest number of viewers may have a lot of value for a select group. Some would

[107] The average gross hourly wage in 2012 was € 21.16 (Statistics Netherlands/ Statline, accessed 9-9-2014). Given the most common marginal tax rate of 42%, the marginal net hourly wage is on average € 12.27.

[108] Note that this is a very conservative assumption when compared to the welfare effect in Goolsbee & Klenow (2006). They find a welfare effect which corresponds to a surplus between $6.20 to $9.40 per hour spent online: a surplus over the opportunity cost between 28% and 42%. Pantea & Martens (2014) use the same methodology for five countries in the EU and find welfare effects corresponding to a similar relative surplus. However, Goolsbee & Klenow point out that their estimates may be too high, given the fact that their model assumes only two spare time activities for people: using the Internet and the rest. In reality, leisure activities such as watching TV or reading the news is likely to be a close substitute to being online and accounting for this would significantly lower their estimates.

even claim that this is the *raison d'être* of PSB: while viewing figures – eyeballs – have a rather linear relationship with advertising revenues, the total welfare effect could be more elusive. A second reason why the welfare effect of a programme may diverge from viewing figures is that to some extent television programmes are *experience goods*. A viewer can better assess the value that a programme has for him or her after watching it.

Thus, more important than the average net welfare effect $\overline{w}^{\overline{p}}$ of an average programme, are the deviations of specific programmes from this average. Such deviations arise when a programme attracts viewers with a higher average value of time, and when a programme creates a higher hourly surplus than the average (α).

Currently, a permanent panel representative for the Dutch population is in use at SKO to collect information for individual programmes (see Section 3.1 for more details). From the available information, four variables – apart from average income and viewing figures – are identified which can be a proxy for such deviations:

1. The average quality score of a programme: The higher the score, the larger the welfare effect of a programme is likely to be.
2. The percentage viewing a programme 'postponed' from a recording device (e.g. a hard disk recorder, video recorder or catch-up service from a TV set top box): it is argued that people who record a programme watch it more consciously and deliberately than those who watch it on linear TV.
3. The percentage viewing a programme via Internet based catch-up services: this will correlate with (2) above, but may also be a proxy for spill-over effects, as people will be inclined to use such a service after hearing or reading about a programme.
4. Website visits, as a proxy for the wider interests a programme creates.

Using ordinary least squares (OLS) models, the latter three variables have been corrected for a number of exogenous programme characteristics that turn out to have an effect on the scores on these variables, which is unrelated to any welfare effects. For instance, programmes that are scheduled late in the evening are watched from a recording device or via catch-up TV more frequently than programmes scheduled during prime time. However, this will stem from the fact that people think the programme is broadcast too late and want to go to bed, which implies that the effect of the starting time distorts this variable as a measure for the welfare effects. Similarly, genre has a distorting effect on 'postponed' viewing which requires correcting for:

sports and news for instance are watched from a recording device and catch-up TV less frequently for obvious reasons which have nothing to do with their welfare effect. The according models are discussed in Section 3.2. For these variables, the scores have been substituted with the residuals from the OLS models.

Just like the value of α in equation (4), the relative effects of differences in quality score, viewing from recording devices, catch-up TV, and website visits on the welfare effect of a programme ultimately need to be determined empirically: what is the trade-off between a higher quality score and a smaller share of viewers from recording devices? The spread of these variables differs substantially (see Table 3), which is why for lack of *ex-ante* empirical testing, all four variables X_n^p(with n = 1,...4) have been given equal weight by standardizing and transforming them in the following way into correction factors for the estimated welfare effect:

$$X_n^{p\prime} = \exp\left[\frac{X_n^p - \bar{x}_n}{\max(X_n^p) - \min(X_n^p)}\right] \tag{6}$$

It is readily seen that the argument has an average of 0 and that the spread is equal to 1. This implies a correction factor of e^0 =1 on average. A positive value for the argument implies an above average score on this variable, which would entail a higher than average welfare effect and thus a correction factor $X_n^{p\prime}$ greater than 1. A below average score entails a lower than average welfare effect and a correction factor $X_n^{p\prime}$ smaller than 1. Inserting these correction factors for specific programmes in equation (5) and substituting the result in equation (2) yields for the welfare effect of programme p:

$$\begin{aligned} W^p = V^p \cdot \bar{w}^p &= V^p \cdot \alpha \cdot \bar{I}^p \cdot d^p \cdot \textstyle\prod_n X_n^{p\prime} \\ &= 0.025\, \bar{I}^p \cdot V^p \cdot d^p \cdot \textstyle\prod_n X_n^{p\prime} \end{aligned} \tag{7}$$

That is, the welfare effect of programme p is the product of viewing figures, a surplus of 2.5% over the average net income of its viewers, its duration and the four correction factors $X_n^{p\prime}$. In the next section, the empirical implications of this framework are explored.

3. Data analysis

3.1. Data sources and key statistics

For this study, a dataset is used of all programmes broadcast on all ten Dutch public and commercial channels between 1 January and 30 September 2011, with a starting time between 6.00 and 11.55 p.m. This dataset is compiled from data obtained from Stichting Kijkonderzoek (SKO) and Kijk- en Luisteronderzoek (KLO).[109] In total, this dataset contains 24.221 programmes or episodes for which a number programme characteristics and outcome variables are available, such as title, airdate, starting time, duration, viewing figures, quality score, genre, etc.

Table 1 – Genre classification, number of programmes or series in dataset and viewing figures

First level	Viewing figures*	Second level	Viewing figures*	Third level	Viewing figures*
Fiction (1426)		Foreign fiction (1356)		Foreign films (1224)	
				Foreign series (132)	
		Dutch fiction (70)		Dutch films(35)	
				Dutch series (35)	
Children (0 - 12 yrs) (53)		Fiction for children (36)		Children films (26)	
				Children series (10)	
		Children: amusement (5)		Children: entertainment (5)	
		Children: music (6)		Children: music (6)	
		Children: non-fiction (6)		Children: non-fiction (6)	
Music & dance (70)		Pop music & dance (38)		Pop music: live registration (15)	
				Pop music: programme (11)	
				Pop music: miscellaneous (12)	
		Other music & dance (32)		Other music: live registration (7)	
				Other muisic: programme (13)	
				Other music: miscellaneous (12)	
Non-fiction (677)		News & current affairs (59)		Current affairs (29)	
				News (26)	
				Weather report (4)	
		Other non-fiction (618)		Other non-fiction (618)	
Entertainment (264)		Cabaret & satire (57)		Cabaret & variety (39)	
				Satiric programme (18)	
		Games & quizzes (61)		Games & quizzes (61)	
		Talent show & audition programme (31)		Talent show & audition programme (31)	
		Other entertainment (115)		Other entertainment (115)	
Sport (196)		Sports information (54)		Current sports information (44)	
				Other sports information (10)	
		Sport report (142)		Soccer report (92)	
				Other sport report (50)	
Other / unknown (4)		Other / unknown (4)		Other/unknown (1)	
				RTV programme information/promo (1)	
				Text information (2)	

* Average viewing figures for all programmes in genre after correcting for other programme characteristics

Subsequently, episodes or recurrences of the same programme broadcast by the same broadcasting association or on the same commercial channel have

[109] SKO provides television audience figures (and background variables) for the Netherlands based on a continuous panel representative for the Dutch population. KLO is part of the Dutch public broadcasting coordinator NPO and provides appreciation/quality scores for programmes with a sufficiently large audience. For more information see: https://kijkonderzoek.nl/research and http://www.publiekeomroep.nl/oud-organisatie/klo/waarderingscijfers.

been aggregated: think for instance of episodes of the daily evening news, a recurring game show or a series. To do so, average values have been used. For each programme or series, genre is available on three nested levels of detail as defined by SKO. After removing four programmes in genre-category 'other/unknown' for the sake of the robustness of the analysis, this yielded a set of 2686 unique programmes or series. Table 1 describes these genres and the corresponding number of programmes or series (in parenthesis) for each level. The bars in this table represent average viewing figures per genre after correcting for programme characteristics (see Section 3.2.1).

Table 2 – Variables for all programmes/series on Dutch television between 1-1-2011 and 30-9-2011

Variable	Observations
Programme characteristics	
Title	2686
Broadcasting association	2686
Channel	2686
Dummy commercial or public	2686
SKO1-genre	2686
SKO2-genre	2686
SKO3-genre	2686
Number of episodes, of which	2686
- % first broadcast	2686
- % rerun within 7 days	2686
- % rerun after more than 7 days	2686
Starting time*	2686
Net duration* (net of commercials)	2686
Gross duration* (incl. commercial breaks)	2686
Outcome variables	
Viewing figure* (≥6 years of age)	2686
Percentage postponed viewers within 7 days* (on hard disk recorder, etc)	2686
Average income of viewers*	2686
Average quality score*	1247
Number of Internet views at *Web-TV**	1129
Website visits*	261

* Means variable is defined as average over episodes/recurrences

Table 2 gives an overview of the variables that were available for this set and distinguishes programme characteristics from outcome variables. The number of episodes was added as a separate variable while the airdate was dropped in this aggregation. Table 2 also gives the number of observations for each variable. Programme characteristics are available for the full dataset, but the number of observations drops for some of the outcome variables. Quality scores are only available for programmes with a sufficient number of viewers, and not all programmes are available through the

Internet based streaming service *Web-TV*.[110] Moreover, information on website visits was not available for programmes from commercial channels, which implies it cannot be used to asses differences between public and commercial television.[111]

Table 3 – Basic statistics for outcome variables and correlations

	Viewers (×1000)	Postponed viewers	Income	Quality score	Website visits	Streams *Web-TV*
Mean	396	2.8%	€	7.51	15,062	14,794
Median	278	1.7%	€	7.50	3,333	5,006
Maximum	4996	37.1%	€	8.70	547,000	350,584
Minimum	6	0.0%	€	6.00	48	0.1
Stand. Dev.	382	3.7%	€	0.35	51,358	30,665
Observations	2686	2686	2686	1247	261	1128
Postponed viewers	-0.10 (0.00)					
Income	0.07 (0.00)	0.03 (0.11)				
Quality score	0.04 (0.13)	0.31 (0.00)	0.07 (0.07)			
Website visits	0.31 (0.00)	-0.03 (0.67)	0.08 (0.20)	0.06 (0.48)		
Streams *Web-TV*	0.43 (0.00)	0.18 (0.00)	0.16 (0.00)	0.05 (0.23)	0.33 (0.00)	

Table 3 provides basis statistics for the outcome variables, as well as correlation coefficients with p values in parentheses. There is large variation within most variables except for average income and quality scores. Many of the correlations are highly significant. The number of viewers has a rather strong, positive correlation with the use of *Web-TV* and website visits, which also correlate strongly amongst themselves. There is also a positive correlation between the quality score of a programme on the one hand, and the percentage of postponed viewers and the average income on the other. However, there is *no* significant correlation between the quality score of programmes and the number of viewers, *Web-TV* streams and website visits. Finally, there is a *negative* correlation between the number of viewers and

[110] The number of observations for the more popular catch-up TV service *Uitzending Gemist* was even much smaller, as only the 500 most streamed programmes were available. Moreover, this service exclusively offers programmes from public television. Therefore, the Web-TV variable was preferred.

[111] In addition to absolute viewing figures, viewing figures relative to total viewing at that time were available for each programme. These two variables correlate highly (correlation coefficient 95%) and as was argued in Section 2, absolute viewing figures are preferred in a welfare measure.

the percentage of postponed viewing. This may stem from the fact that niche programmes are broadcast at less convenient time slots, or lose out in the household decision process in relation to which programme is watched live.

3.2. Models

As discussed in Section 2, OLS models have been estimated to explain the outcome variables in terms of the exogenous programme characteristics. For postponed viewing, the use of Internet bases catch-up TV (*Web-TV*) and website visits, the models have been used to correct these variables in order to eliminate distorting effects on the welfare measure. For these variables, the scores have been substituted with the residuals from the OLS models presented below.

In addition, OLS models for the number of viewers, the quality scores and the average income of viewers have been estimated. Since these models are not used to correct the outcome variables for the welfare impact measure, they are not presented in this paper. A few highlights from these models are, however, worth mentioning.

3.2.1. Highlights from models for viewing figures, quality score and income

As regards the absolute viewing figures, it is unsurprising that genre and starting time are important explanatory variables. The impact of genre is illustrated in the bars in Table 1: correcting for other programme characteristics, football reports are the most popular genre, closely followed by talent shows and weather reports. Interestingly, programmes that have a relatively high gross/net duration ratio due to commercial breaks have lower viewing figures. The independent public broadcaster NOS has significantly more viewers after correcting for all other factors. The PSB associations combined do not have a significantly smaller or larger audience than the commercial channels.

Quality scores are also significantly explained by genre, with children's programmes receiving the highest scores and 'entertainment' receiving the lowest scores. Longer programmes and programmes with more episodes have higher scores while commercial breaks do not impact scores. Apparently, commercials provide disutility, which causes the number of viewers to drop but does not affect the quality ratings given by the actual viewers (who might use commercial breaks as an opportunity to get refreshments or for a restroom break).

Reruns receive higher scores than first broadcasts. An elitist explanation would be that the audience has to learn to appreciate a programme. A more profane explanation would be that there is a selection effect on both the broadcasters' and the viewers' side. The most important observation for the purpose of this paper, however, is that public service broadcasters receive significantly higher quality scores, after correcting for other programme characteristics: they make better programmes in the eyes of the audience.

There is no robust evidence for a difference in income of viewers, between programmes from public and commercial broadcasters. However, the independent public broadcaster, NOS, attracts significantly higher income groups, also after correction for genre and other relevant factors.

3.2.2. Postponed viewers

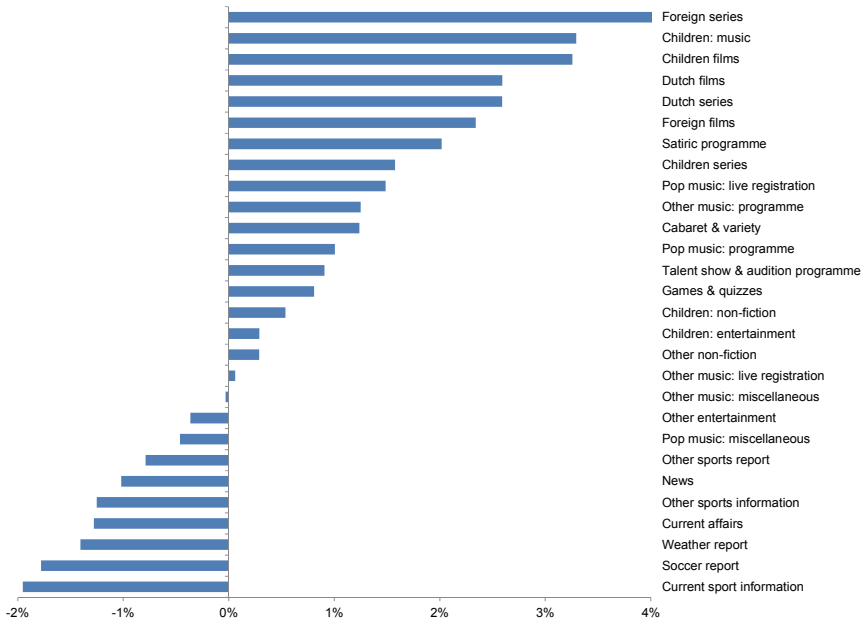
Table 4 presents the OLS model used for correcting the 'postponed viewers' variable; Figure 1 presents the genre dummy values graphically.[112] DUM20H is a dummy variable for a programme starting between 8.00 and 8.59 p.m. etc. As previously mentioned in Section 2, postponed viewing is significantly driven by the starting time and genre of a programme: programmes starting after 8 p.m. are viewed from a recording device of catch-up TV relatively more frequently. As seen in Figure 1, sports, weather, and news programmes are the least frequently watched from a recording device. Films, series, and children's programmes have the highest percentage of postponed viewers. On top of that, first broadcasts are recorded significantly more often. Other programme characteristics turn out to have no significant effect when correcting for genre.

[112] For variables other than the genre-dummies, a 95%-significance threshold (Prob.<0.05) was used for inclusion.

Table 4 – OLS model for share of viewers via recording devices and catch-up TV (N = 2686)

	Coefficient	Std. Error	Prob.
DUM20H	0.01	0.00	0.00
DUM21H	0.01	0.00	0.00
DUM22H	0.02	0.00	0.00
DUM23H	0.01	0.00	0.00
% First broadcast	0.01	0.00	0.00
Current sports information	-0.02	0.01	0.00
Soccer report	-0.02	0.00	0.00
Weather report	-0.01	0.02	0.41
Current affairs	-0.01	0.01	0.06
Other sports information	-0.01	0.01	0.26
News	-0.01	0.01	0.14
Other sports report	-0.01	0.01	0.13
Pop music: miscellaneous	0.00	0.01	0.65
Other entertainment	0.00	0.00	0.31
Other music: miscellaneous	0.00	0.01	0.98
Other music: live registration	0.00	0.01	0.96
Other non-fiction	0.00	0.00	0.21
Children: entertainment	0.00	0.02	0.85
Children: non-fiction	0.01	0.01	0.70
Games & quizzes	0.01	0.00	0.10
Talent show & audition programme	0.01	0.01	0.16
Pop music: programme	0.01	0.01	0.34
Cabaret & variety	0.01	0.01	0.03
Other music: programme	0.01	0.01	0.20
Pop music: live registration	0.01	0.01	0.10
Children series	0.02	0.01	0.15
Satiric programme	0.02	0.01	0.02
Foreign films	0.02	0.00	0.00
Dutch series	0.03	0.01	0.00
Dutch films	0.03	0.01	0.00
Children films	0.03	0.01	0.00
Children: music	0.03	0.01	0.02
Foreign series	0.04	0.00	0.00
Adjusted R-squared	0.14		

Figure 1 – Genre dummy values in OLS model for share of viewers via recording devices and catch-up TV



3.2.3. Catching up via Web-TV

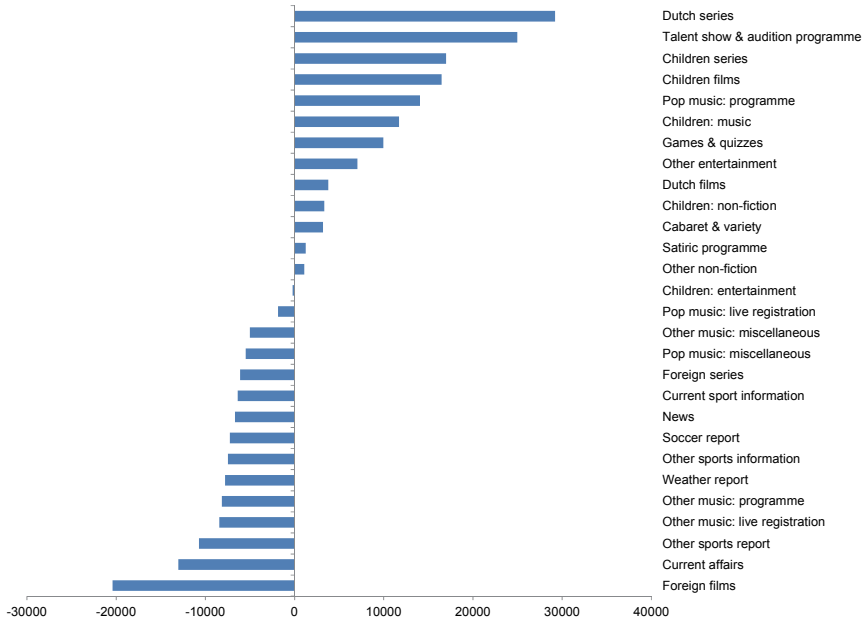
From Table 2, it can be seen that the use of the Internet based catch-up TV service *Web-TV* is only known for less than half of the dataset (1128 observations). Hence, using this variable in the current dataset could create a bias. Nonetheless, Table 5 present the OLS model for streams at *Web-TV*, while Figure 2 presents the genre dummy values graphically. The number of streams per episode is larger for programmes with a starting time between 8 and 11 p.m., specifically between 8 and 9 p.m. This should not come as a surprise, as this is also the most popular time for watching TV and the most successful programmes are planned in this slot. Apart from this, first broadcasts are more frequently viewed via *Web-TV* than reruns.

Figure 2 illustrates that Dutch series, talent shows, and children's programmes are the most popular on web-TV. Foreign films are the least popular, which is likely due to the fact that most foreign films, in particular the more popular and recent ones, are not available via Web-TV for copyright reasons. Just like the correlation of postponed viewing and Web-TV streams in Table 3, the correlation between the dummy values in Figure 1 and 2 is far from perfect, which emphasises the fact that these two variables measure different things.

Table 5 – OLS model for Web-TV streams per episode (N = 1128)

	Coefficient	Std. Error	Prob.
DUM20H	16879	2429	0.00
DUM21H	9575	2529	0.00
DUM22H	7289	2532	0.00
% First broadcast	6575	2290	0.00
Average duration	108340	54103	0.05
Foreign films	-20401	4377	0.00
Current affairs	-13025	6495	0.05
Other sports report	-10726	7802	0.17
Other music: live registration	-8442	11396	0.46
Other music: programme	-8143	8430	0.33
Weather report	-7785	16495	0.64
Other sports information	-7468	10377	0.47
Soccer report	-7239	6478	0.26
News	-6678	6521	0.31
Current sports information	-6362	8087	0.43
Foreign series	-6102	6856	0.37
Pop music: miscellaneous	-5487	9413	0.56
Other music: miscellaneous	-5005	8960	0.58
Pop music: live registration	-1860	9265	0.84
Children: entertainment	-212	12835	0.99
Other non-fiction	1103	2735	0.69
Satiric programme	1252	7635	0.87
Cabaret & variety	3191	7513	0.67
Children: non-fiction	3327	11677	0.78
Dutch films	3767	6163	0.54
Other entertainment	7031	4829	0.15
Games & quizzes	9962	4739	0.04
Children: music	11697	12914	0.37
Pop music: programme	14074	11946	0.24
Children films	16488	9558	0.08
Children series	16992	10868	0.12
Talent show & audition programme	24969	6406	0.00
Dutch series	29193	5485	0.00
Adjusted R-squared	0.14	30665	

Figure 2 – Genre dummy values in OLS model for Web-TV streams



3.2.4. Website visits

The number of observations for website visits is much smaller again. Moreover, this variable is only available for programmes from PSB associations. Table 6 gives the OLS model for this variable, which has a very limited explanatory power. Only the percentage of first broadcasts and the average duration of the programme are significant.

Table 6 – OLS model for website visits (N = 261)

	Coefficient	Std. Error	Prob.
C	-17971	9378	0.06
% First broadcast	17736	9029	0.05
Duration	719027	207573	0.00
Adjusted R-squared	0.05	51358	

3.3. Results

The models presented in Section 3.2 are used to correct the outcome variables for postponed viewers, web-TV streams, and website visits.[113] Combined with the uncorrected variables for the number of viewers, the

[113] The relatively small explanatory power of these models is no impediment for this, since this simply implies that the distorting effect of the programme characteristics is very limited.

average income of viewers per programme[114], deviations in the average income of viewers from the overall average and the quality score, these are used to estimate the welfare effect using equation (7) in Section 2.

It should be noted that the cumulative use of the variables for quality scores (N = 1247), Web-TV (N = 1129) and website visits (N = 261) entails a cumulative reduction of the total dataset. Given that disclaimer, Table 7 presents the top 15 programmes with the highest estimated welfare effect per episode. Dutch programme titles have been translated and described for convenience. Programmes broadcast on public television are marked with an asterisk (*).

As illustrated in Table 7, programmes with massive viewing figures such as important football matches and 'The Voice' feature prominently, but there are some programmes with much lower viewing figures, such as the *National memorial of WWII victims*, which derive their top position from the other factors. This top category contains programmes from both commercial and public television, with PSB having a slight majority, also after taking football out of the equation.

Based on the measure in the leftmost column of Table 7 (i.e. excluding Web-TV and website visits because of lower data availability), Table 8 shows the top 15 programmes with the highest aggregate estimated welfare effect over all episodes in the first three quarters of 2011.

As a next step, these welfare effects can be aggregated to PSB associations. Aggregating over all PSB associations plus the public broadcaster without members (NOS) yields a total welfare contribution of €695 million. Extrapolating this linearly to a full year would give a welfare effect of €927 million. This would be an underestimation, since it is based only on programmes for which a quality score was available and started between 6 and 11.55 p.m.

[114] More precisely, to obtain $\bar{I}^p$ in equation (7), the average income for programme p is divided by the average over all programmes in the dataset and multiplied by the average net marginal income of € 12.

Table 7 – Top 15 of programmes with highest estimated welfare effect per episode

Viewing figure, income, quality score and postponed viewing (N = 1247)	+ Web-TV (N = 556)	+ Website visits (N = 130 only available for public TV)
Farmer wants a wife (reality dating show)*	Farmer wants a wife*	Farmer wants a wife*
CL final Barcelona-Man United (football)*	Voice of Holland	Who is the mole*
Voice of Holland (talent show)	Who is the mole*	Flikken Maastricht'*
Who is the mole (celebrity reality series)*	'Flikken Maastricht'*	National IQ test 2011 (quiz)*
Voice of Holland - The results (talent show)	Voice of Holland - The results	'Spaanse schaep'*
EC qualification NL- Hungary (football)	'Spaanse schaep'*	Untraceable *
'Spaanse schaep' (Dutch drama series)*	Expedition Robinson (celebrity reality series)	Radar (consumer rights non-fiction)*
'Flikken Maastricht' (Dutch police series)*	Untraceable (relational reality show)*	Adultery (Dutch drama series)*
CL Arsenal-Barcelona (football)*	National memorial of WWII victims*	Reunion (relational reality show)*
CL Barcelona-Arsenal (football)*	Máxima, portrait of a princess (non-fiction)*	DNA unknown (relational reality show)*
CL semi-final Real Madrid-Barcelona (football)*	I love Holland (game show)	Memories (relational reality show)*
CL semi-final Barcelona-Real Madrid (football)*	Voice of Holland - The sing off (talent show)	Andre Rieu at the Vrijthof (classical concert)*
National memorial of WWII victims*	EC qualification Finland-NL (football)	Sam het afscheid (documentary)*
EC qualification NL-San Marino (football)	Adultery (Dutch drama series)*	Hello goodbye (relational reality show)*
X factor the final (talent show)	The boys against the girls (game show)	Rembrandt en ik (documentary)*

* Programme broadcast on public television

Table 8 – Top 15 of programmes with highest aggregate estimated welfare effect (in € mln.)

Programme	Aggregate
8 p.m. news*	€ 68
News hour (daily current affairs programme at 10 p.m.)*	€ 39
'De wereld draait door' (diner time talk show)*	€ 38
7.30 p.m. news	€ 35
Rtl boulevard (celebrity gossip talk show)	€ 32
Primary league (soccer competition summaries)*	€ 26
'Pauw & witteman' (late night talk show)*	€ 26
Good times, bad times (Dutch soap series)	€ 25
Heart of the Netherlands (national news show)	€ 23
X factor (talent show)	€ 17
Ncis (crime series)	€ 15
I love Holland (game show)	€ 15
Shownieuws (celebrity gossip talk show)	€ 14
Farmer wants a wife*	€ 14
6 p.m. news*	€ 14

* Programme broadcast on public television

4. Conclusions and discussion

This paper presents the results of an explorative case study in the Netherlands, to develop a methodology to assess the welfare effects of public service broadcasting (PSB). It does so both for individual programmes and at an aggregate level, based on a combination of revealed and stated preferences. In order to do this, a dataset is compiled of all programmes broadcast on all ten Dutch public and commercial channels in the evening period in the first three quarters of 2011. This dataset contains various programme characteristics such as starting time, duration and genre, as well as readily available outcome variables, such as viewing figures, quality ratings, and viewing from recording devices and catch-up TV.

The underlying idea of the proposed methodology is that the time people spend watching a programme is a lower bound for the utility they derive from watching this programme. If a person chooses to watch a specific programme over other programmes or activities, this implies that he or she experiences a surplus over this time spent which is larger than the surplus other programmes or activities would give him or her. How large this surplus is, will differ between programmes. Hence, the average value for this surplus is adjusted by variables for the ex-post quality score viewers give a programme, the percentage of viewers watching from recording devices (as

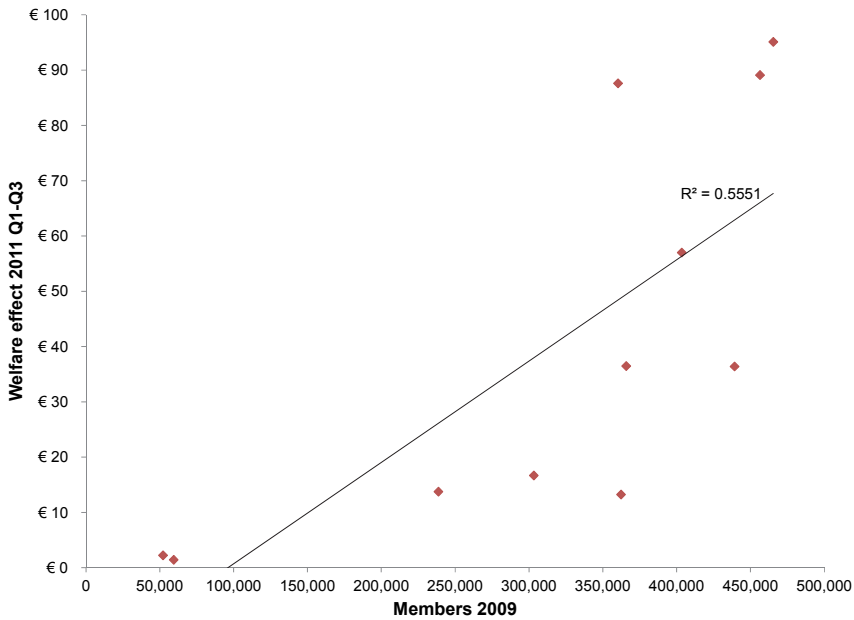
a proxy for consciously watching) and the number of people watching from web-based catch-up TV (as a proxy for both consciously watching and spill-over effects), website visits (as a proxy for the wider interests a programme creates), and the average income of the viewers of a programme.

This yields a measure for the welfare value of programmes, which can be aggregated to channels and the entire PSB system. As indicated in this paper, two basic steps in this methodology ultimately need empirical validation: one is the surplus that watching an average programme creates over time spent, which for the purpose of this paper is conservatively assumed to be 2.5%. At an average marginal net income of €12, this implies an average welfare effect of €0.30 per hour. Note, however, that this value is only required for an *absolute* assessment of the welfare value of programmes or PSB organisations. For the purpose of comparing the relative welfare performance of programmes or organisations, calibration of this surplus is not necessary. The second step that requires further empirical testing is the relative weights of the various variables to adjust the average, which in this paper have been assumed to be equal. To prevent overestimation (c.f. Section 1.2), it is better not to use contingent valuation methodology to estimate these weights. Instead, one could perform a conjoint analysis or discrete choice experiment.

The background of this paper is linked to the specifics of the Dutch PSB system, which consists of three public TV channels programmed by eight state funded PSB 'associations'. Traditionally, funding and airtime are divided amongst these associations based on the number of members they have, but membership numbers have declined since 1992; as a result this measure has gradually become outdated. Hence, the question is to what extent the social impact of programmes on public television can be objectively assessed and whether an alternative measure to this end can be developed.

The methodology presented here aims to provide such an alternative. Despite the fact that this methodology may seem technocratic, that elements of it call for further empirical testing, and that taking the average income of the viewers into account may be considered by some to be politically controversial or even unethical, the results presented here are promising.

Figure 3 - Aggregate welfare effect per PSB association in first three quarters of 2011 vs. membership*



* Excluding PSB organisations without member and co-productions between different PSB associations

In general, the lists of programmes with the highest welfare value were recognizable for experts from the PSB associations. Moreover, aggregation of these values over PSB associations yields results that are not identical but not completely at odds with the current criteria for allocating funds. This is illustrated in Figure 3, by the fairly strong correlation between the aggregated welfare effect per PSB association as calculated for the first three quarters of 2011, and membership according to the last preceding count (2009). And finally, at the highest level of aggregation, this methodology also provides information about the total welfare value of PSB, which may be compared to the subsidies given. For the Netherlands, and based on the conservative assumptions made here, there seems to be a positive return on investment: in 2012, PSB organisations received €796 million in subsidies, which was used not only for television but also for radio and Internet activities (Tweede Kamer, 2011-2012). This is substantially less than the estimated minimum welfare value of €927 million for television alone.

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11 Synthesis: The role of economic evidence

1. Introduction

This concluding chapter analyses the role and impact of the case studies in the preceding nine chapters as well as the underlying policy reports, on policymaking, court rulings, and public debate. Is this a normative role, in which economic efficiency or wealth maximization are guiding principles or even the ultimate goal for decision making or advice? Does economic research serve as a stepping-stone to make recommendations about what should happen to enhance economic efficiency or social welfare? Or is it a positive role, in which economic research provides facts or insights on which policymakers or stakeholders can base their own conclusions, drawing from their own normative framework? As was outlined in Section 3 of the introductory Chapter, for each case an analysis is made of:

- *The research question of the policy report and the ex-ante positioning of this research.* In most cases, these are also outlined in the introduction of the report itself. Analysis of the research question and positioning of the study provides information about the role that was envisaged *ex-ante*, before the research was carried out.
- *The ex-post impact on policy documents, parliamentary proceedings and court rulings.* The role envisaged in the research question is compared to the ex-post role, which is analysed by studying the impact on policy documents, parliamentary proceedings, and court rulings. Relevant questions for this analysis are whether the report was sent to Dutch Parliament or mentioned in letters to Parliament or policy papers; to what extent the conclusions and recommendations in the report have been adopted and implemented; and whether the report played a role in court rulings.
- *The role in the public debate*. This role is assessed concisely by looking at references to the policy report or the journal article in national and international offline and online media and blogs, as well as public responses by stakeholders or lobbying groups. In addition, references are searched using the *LexisNexis Academic* database. Given the diversity of such sources, language issues, and the implicit form that references often take, however, this analysis does not claim or aim to be comprehensive. Rather it aims to reveal striking differences between the impacts of the various case studies on public debate.

In cases that had a suitable counterpart in the past, the role of the policy reports in the case studies on policymaking or court rulings is compared to the role of economic evidence on these earlier and comparable policymaking or rulings. The assessment in this chapter is kept mostly factual and descriptive and the conclusions of this assessment are inevitably tentative, given the rather limited number and wide variety of cases studied. Moreover, one should be cautious when assessing the impact of one's own work. Despite this modest scope, it provides some insight into the changing and as it appears growing role of economic evidence in the field.

2. Universal services and disabled people

2.1. Research question, approach and outcomes

Chapter 2 of this dissertation, entitled *Universal services and disabled people*, is largely based on *Toegang tot telecom* (Akker, van Eijk, Janssen & Poort, 2009), a study that the Dutch Ministry of Economic Affairs commissioned in anticipation of the revised *Universal Services Directive*.[115] The central research question as expressed in the call for proposals and the introduction of the report is:

"*Which measures should the Ministry of Economic Affairs take to guarantee disabled persons an accessible and affordable basic level of telecommunication services, considering the needs of this group, developments in the telecommunication industries and the requirements following from EU regulation?*" (Akker et al., 2009, p. 1)

Preceding the revision of the Directive, there was no specific regulation aimed at disabled persons in the Dutch Telecommunication Law, even though text relay services were offered by KPN (see Chapter 2, Table 3 and Table 4), and arrangements had been made for the accessibility of the emergency number 112 and directory services (see Chapter 2, Table 5 and Table 6). However, the use of the existing service had been declining over the preceding years due to the development of text telephony services developed for mobile phones and incompatibility of the existing terminal equipment with digital networks and services.

The research question is explicitly normative, but the role for economics to provide these norms is limited. As made clear in Chapter 2, the revised

[115] After completion, a second study was commissioned to gain more insight into the costs that the introduction of a video relay service would entail: *Telefonie in Beeld* (Akker & Poort, 2009).

Universal Services Directive requires that Member States take specific measures to ensure that disabled end-users have functionally equal access to telecommunication services in a non-discriminatory way. The principle of equality is the primary driver behind this revision and no cost-benefit analysis or efficiency consideration is requested to assess whether such measures maximise social welfare and hence should be taken or not. At first sight, efficiency and social welfare play no role at all.

Instead, a combination of legal and economic analysis is used to determine how the concepts 'disabled end uses', 'functionally equal access', and 'telecommunication services' can be understood within the European legislation. It is only within this confined normative setting that there is room for the use of such concepts as efficiency and innovation. Within these confines, recommendations were made for market-conform and network-independent solutions that comply with international standards, so as to enhance competition and innovation and to benefit from economies of scale in the production of terminal equipment. Subsequently, the tendering of relay services was recommended to advance competition *for* the market in circumstances where competition *in* the market is not feasible due to lack of scale (Chapter 2, Section 5).

2.2. Follow up and policy impact

The Ministry of Economic Affairs published the policy report on 10 February 2010. Its publication received little attention in the newspapers or on the Internet. Searching all national and the major regional Dutch newspapers using LexisNexis Academic (accessed 14 August 2014), only a brief news item by press agency ANP was found. Nevertheless, the impact of this report on policy was substantial. After a public consultation in April-May 2010[116], a proposal for the implementation of the new regulatory framework in the Dutch Telecommunication Law was sent to Parliament on 4 November 2010 (*Kamerstukken II* 2010/11, 32 549, nr. 2). The explanatory memorandum to the proposal (*Kamerstukken II* 2010/11, 32 549, nr. 3, pp. 17-21) expressed the intention to implement a text mediation service and a video mediation service for auditory impaired end-users, and directory inquiry services for visually impaired end-users. These services would no longer automatically be assigned to the former monopolist KPN. They were formulated in a technology neutral way, and were to be tendered. Provisions were made for these services to be financially accessible for the target groups while the

[116] http://www.internetconsultatie.nl/nrfimplementatie

costs of the mediation services would be distributed among providers of telecommunication services based on their turnover. Lower regulation was envisaged for the further implementation of the new services. After some revisions, the proposal was enacted 10 May 2012.[117] Following a public consultation in March-April 2012[118], the implementation was set out in more detail in the *Besluit implementatie herziene telecommunicatierichtlijnen* (*Stb*. 2012, 236).

The explanatory memorandum refers explicitly to the policy report, stating that this study contributed to forming an adequate picture of the services and facilities required for equal access for disabled end users (*Kamerstukken II* 2010/11, 32 549, nr. 3, p. 17). Also in response to discussions in Parliament, reference is made to the report, when the Minister states that the results from the comparison of measures in five other countries have been a basis for the proposed implementation in the Netherlands (*Kamerstukken II* 2010/11, 32 549, nr. 7, p. 22). Thus, the 'fact finding' element of the study formed an explicit foundation for policy. Although no explicit reference is made to the more normative recommendations on efficiency and innovation (technology neutrality, tendering of services), the adopted policy is also in line with these.

2.3. Historical comparison

Before implementation of the revised *Universal Services Directive*, former monopolist KPN provided a text mediation service and directory inquiry services for visually impaired end-users without any legal obligation to do so and without receiving any compensation (*Kamerstukken II* 2010/11, 32 549, nr. 3, p. 18). When these services were introduced in 1983, the assignment to KPN was a logical step: by that time telephony was provided by a state owned monopoly. KPN provided the mediation services without a legal obligation, along with the other universal service obligations, which in 1988 included the provision of fixed telephone lines, mobile telephony, telex and telegraph services, and fixed and mobile data lines. These other universal service obligations had formally been imposed on KPN, also without compensation, but KPN could decide to cease providing them, in which case a new solution would have to be found (Van Eijk, 2003).

After the disruptive technological and institutional changes that took place in the telecommunication industries in the 1980s and 1990s (see Section 1.2)

[117] Wet van 10 mei 2012 tot wijziging van de Telecommunicatiewet ter implementatie van de herziene telecommunicatierichtlijnen (*Stb*. 2012, 235).
[118] http://www.internetconsultatie.nl/nrfuitvoeringsbesluit

this informal and voluntary solution to provide the mediation service was increasingly at odds with the market structure. In the general market, KPN operated more and more in a competitive environment. Moreover, the extent of the universal service obligations had gradually been reduced (Van Eijk, 2003). KPN was losing money by providing the mediation service, while users were not satisfied with the quality and the price and complained about a lack of innovation (Akker *et al*. 2009, p. 18). When KPN tried to cut costs by closing the service down during the night in the summer of 2008, users severely objected. However, the Ministry and the regulator had no authority to force KPN to keep the service open around the clock.

Against this background, the current provisions and their implementation deviated from the historical trend in two respects. First, instead of a further reduction of the universal service obligations, the revised Directive leads to an extension of these. Second, for the first time in the Netherlands, the universal service is not imposed on the incumbent without compensation, but tendered with a compensation paid for by providers of telecommunication services based on their turnover. Not only does this provide a framework for setting a socially desirable quality level for mediation service, the technology neutrality and tendering also incentivized the provision of a high service level and innovation, which the former solution failed to do.

3. Digital fixation

3.1. Research question, approach and outcomes

The article in Chapter 3 is partly based on a study commissioned by the Dutch Ministry of Education, Culture and Science: *Digitaal gebonden* (Poort, Akker, van Eijk, van der Sloot, Rutten, 2011). A few months later, an English translation was published: *Digitally binding* (Poort, Akker, van Eijk, van der Sloot, Rutten, 2012).

This study was announced when the (first) evaluation of the Resale Price Maintenance (Books) Act (RPM Books Act)[119] for print books was sent to Parliament in 2010. The Minister wrote that he would commission a study:

"*Into the implications of the advent of e-books for the functionality of the RPM Books Act as well as into the desirability and enforceability of fixed prices for e-books. The study should produce a number of scenarios for the future setting out the pace and nature of the development of e-books for each market*

[119] In Dutch: Wet op de vaste boekenprijs (Wvbp).

segment as well as the changing position of market players in the supply chain. Additionally, the study should address the question of whether fixed prices for ebooks could serve a purpose in ensuring the broad availability of books and whether price fixing is, in fact, enforceable." (Kamerstukken II 2009/10, 32 300, nr. 1, pp. 5-6).[120]

The call for proposals explicated the research questions and the requested scenarios in more detail. It focused primarily on a set of questions about the *functionality* of a fixed price for e-books – questions about the implications of a fixed price for e-books for the diversity and availability of e-books and print books, and for market structure – as well as questions relating to the feasibility and enforceability of a fixed price. These are all positive questions concerning how the instrument of a fixed price for e-books would contribute to a set of predetermined policy goals and whether this instrument would be legally feasible and enforceable. The *objectives* of the RPM Books Act[121] were not to be questioned, and only within the confines of these objectives was there some room for taking a normative position: for each scenario, the *need* and *desirability* of a fixed price for e-books vis-à-vis these objectives had to be discussed.

The study was carried out using a combination of legal an economic analysis. The latter was supported by evidence concerning developments of the Dutch book market in general as well as the e-book markets in the United States, United Kingdom, Germany and France. In addition, stakeholders in the field have been interviewed and a workshop was organized in which preliminary results were discussed. Building in this empirical input, scenarios have been constructed for the development of the Dutch book market and the position of (brick and mortar) bookstores in the medium and long term.

The report concluded that the European legal framework does not in principle rule out a fixed price for e-books, but that it would not, with certainty, be feasible. Moreover, publishers could circumvent price fixing relatively easily by applying a business model fashioned after rental or subscription models or by enhancing e-books by other digital content so that they would no longer fit any feasible definition of an e-book. In particular for potential bestsellers, this could be a profitable strategy, which would undermine the rationale for price fixing in general. So far, the development of the Dutch e-book market has been modest and publishers and authors

[120] Translation taken from Poort et al., (2012).
[121] I.e. to promote the diversity of supply of book titles, the wide availability of print books in book stores and public participation (purchasing and reading habits).

have been hesitant due to fear of unauthorised distribution (aka piracy). However, the potential for this market was considered to be high, while it was concluded that a fixed price for e-books would hamper the development of this market and even increase piracy. Meanwhile, it was determined that the contribution of a fixed price in relation to objectives such as supporting bookstores would be limited as best. The primary mechanism by which is would do so, would be by stalling the development of the e-book market. The report stressed that the developments in the e-book market and the legal framework would be uncertain and called for a judicious approach. It advised keeping "close tabs on developments rather than going for rash intervention." (Poort, Akker *et al.*, 2012, p. i).

3.2. Follow up and policy impact

The policy report was sent to Parliament on 23 November 2011, accompanied by a letter from the State Secretary of Education, Culture and Sciences (*Kamerstukken II* 2011/12, 32 300, nr. 2). This letter largely consisted of a summary of the report, followed by a conclusion – fully in line with the report – that extending the RPM Books Act to e-books was undesirable, as it lacked a cultural interest and would slow down innovation in the book market. In line with the recommendation in the report, the State Secretary announced that he would follow the developments in the market and in European legislation closely.

This letter received minimal attention in the Dutch media, and there was no focus on the underlying report (e.g. NRC, 2011). The discussion in Parliament was combined with other issues concerning the fixed price for print books. Interestingly, the Dutch competition authority took a rather political stance by stating in a press release a week before the debate that it was glad the State Secretary decided not to introduce a fixed price for e-books (NMa, 2011).[122] In the debate itself, the decision not to introduce a fixed price for e-books proved to be uncontroversial. Despite fundamental discussions about the future functionality and desirability of a fixed price for *print* books, in which different political parties took opposing positions, not a single party objected to the decision not to extend it to e-books (*Handelingen II* 2011/12, 34-3).[123]

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[122] It did so again in an article in the Dutch national newspaper NRC on 11 June 2014, arguing – supported by some anecdotic evidence from Denmark and the UK – that the fixed price for *print* books does help to promote its policy objectives and that abolishing the RPM Books Act would be better (Van Sinderen, Tichem & Visser, 2014).

[123] By contrast, amendments were discussed to exclude scientific books from price fixing and to evaluate the existing law for print books earlier than planned. Also, a motion was proposed to introduced a low VAT tariff for e-books.

In February 2014, the second evaluation of the RPM Books Act was sent to Parliament (Bongers, Notenboom, Veldkamp, Schrijvershof, & Gielen, 2014). In their chapter on digitisation, Bongers *et al*. (2014) refer to the scenarios developed in Poort, Akker *et al.* (2011) for the development of the Dutch e-book market in the short and long term. They observe that current developments are a mix of scenarios 1 and 3 in Poort, Akker *et al.* and extend the analysis of long-term developments. A letter containing policy conclusions based on the evaluation was promised after the *Raad voor Cultuur* (Council for Culture) published its advice on a number of follow up questions (*Kamerstukken II* 2013/14, 32 300, nr. 4).

3.3. Historical comparison

In the Netherlands, the (minimum) retail price of books has been fixed by publishers since 1923. This had been arranged pursuant with private law in the *Reglement Handelsverkeer,* under the responsibility of the *Koninklijke Vereniging van het Boekenvak* (KVB). On its own, this arrangement was at odds with competition laws that were introduced in 1962, but it had been exempted since. Such an exemption seemed no longer viable under the new Competition Law enacted in 1998. Therefore, Members of Parliament Dittrich and Halsema initiated the RPM Books Act in 2002 (*Kamerstukken II* 2002/03, 28 652, nr. 2 & 3).

Before this proposal for the RPM Books Act was sent to Parliament, the *CPB Netherlands Bureau for Economic Policy Analysis* and *The Netherlands Institute for Social Research* had performed a joint study into the effectiveness and efficiency of a fixed price for books (Appelman & van den Broek, 2002). They evaluated this with respect to the relevant cultural policy objectives to promote diversity in the availability of book titles, wide availability of books and consumer participation. The study concluded unambiguously that:

"*Maintaining the present fixed book price system for general and scientific books is not [an] appropriate option given the inefficiency of the system compared with the possible alternatives. Depending on the prevailing cultural policy objectives with regard to ensuring a wide diversity and accessibility of books offered for sale, more efficient options would be to introduce a slimmed-down version of the fixed book price, a subsidy for booksellers, or not to employ any policy instruments at all.*" (Appelman & van den Broek, 2002, p. 11).

With respect to the effectiveness of the instrument, the authors do not deny that the fixed book price can make a contribution to the underlying cultural policy objectives. However, they state:

"*The contributions of the book sector to the achievement of cultural policy aims do not give a satisfactory answer to the question of whether the fixed book price is effective. In the first place, there is a lack of tools to measure this; in the second place, in addition to the fixed book price commercial and personal considerations in respect of market prices and trends in the book market also influence the cultural policy 'performance' of the book sector*." (Appelman & van den Broek, 2002, p. 14).

An important reason for uncertainty about the effectiveness of the instrument is the fact that it is not compulsory for bookstores to use the enhanced profit margins under a fixed price to offer a wider collection and in particular to offer books with low and uncertain expected returns. Moreover, fixed prices discourage the development of alternative channels and lead to higher retail prices. This harms sales and the possibility for new authors to gain readership. In addition, the study stresses that the cultural policy objectives ought to be elaborated in more detail. Only then can an assessment be made in relation to which policy alternative is the best approach (Appelman & van den Broek, 2002, pp. 11-18).

The explanatory memorandum to the proposal for the RPM Books Act largely ignores the conclusions of this study. It simply assumes the effectiveness of the instrument by stating that a fixed price positively influenced the number and geographical spread of book retailers. In addition, it asserts that the instrument enables publishers and bookstores to bear the risk of publishing commercially uncertain new works, which would benefit debutants and not-so-well selling authors. According to the explanatory memorandum, doing away with the fixed price would cause publishers to publish fewer books with uncertain potential and would lead to fewer bookstores with a diverse supply of stock (*Kamerstukken II* 2002/03, 28 652, nr. 3, pp. 4-5).

In the first evaluation of the RPM Books Act, Notenboom, Schrijvershof & Goudriaan (2009, p. 62) conclude that the law has contributed to the cultural policy objectives of diversity in the availability of book titles and wide availability of books. This conclusion is not so much based on any evidence for causation, but rather on the absence of any shock or significant deterioration vis-à-vis several possible measures for these cultural policy objectives. Nevertheless, it led the Minister for Education, Culture and

Science to conclude in a letter to Parliament that the first evaluation proved that the law is functioning well (*Kamerstukken II* 2009/10, 32 300, nr. 1, p. 8).

The previously mentioned second evaluation concludes, with respect to print books, that under the RPM Books Act the diversity of supply remained stable or even improved slightly. The share of bookstores with a wide diversity of stock also remained stable between 2006 and 2012, but the average number of titles supplied per bookstore decreased since 2008. The authors note, however, that the book market is in transition, caused by digitisation of books and sales channels, changing reading habits and the economic downturn affecting all retailers. These developments make a real evaluation of the effectiveness of the RPM Books Act impossible, since its effect cannot be isolated from the effect of other factors (Bongers, Notenboom, Veldkamp, Schrijvershof, & Gielen, 2014, pp. 8-9). Hence, although this evaluation was performed partly by the same authors as the first, it is more careful not to equate correlation with causation. The authors write:

"In comparison with [Appelman & van den Broek, 2002], the conclusions about the impact of abolishing the RPM Books Act on the effectiveness and efficiency of achieving the cultural policy objectives have remained approximately the same. Putting an end to price fixing has an uncertain effect on diversity. Some sources speak of increasing diversity, others argue against this. A methodological issue here is that we cannot compare "the Netherlands with" and "the Netherlands without" a fixed price at the same moment in time." (Bongers, et al., 2014, p. 97)

Upon sending this report to Parliament, the Minister for Education, Culture and Science announced that she had asked the *Raad voor Cultuur* (Council for Culture), the legal adviser of the government in the fields of the arts, culture and media for advice on the matter and that a letter containing policy conclusions would be sent to Parliament after this advice had been received (*Kamerstukken II* 2013/14, 32 300, nr. 4).

This advice was published in July 2014 (Raad voor Cultuur, 2014a). Given the dire economic circumstances, the *Raad voor Cultuur* considered it irresponsible to abolish the RPM Books at this moment and recommended a four-year extension of the policy. However, the Council also recommended a number of conditions for this temporary extension. One of which is the search for more conclusive evaluation instruments concerning the effectiveness of this law.

From the above, it can be observed that a lack of conclusiveness from economic research regarding the effectiveness of the instrument gives politicians and stakeholders the opportunity to assume effectiveness as an article of faith. Economic research and effect studies can narrow down the scope for them to simply assume effectiveness of interventions. By doing so, economic research can improve policymaking by improving the alignment between the (acclaimed) objectives of a policy and its actual consequences.

Secondly, the case studies on the fixed retail price for print books and e-books seem to indicate that much more conclusive evidence is required to change the status quo than to keep it. Up until today, a lack of concrete evidence that maintaining the RPM Books Act actually serves its policy objectives has not led to its abolition. On the other hand, not extending price fixing regulation to e-books was hardly controversial.

4. Legal, economic and cultural aspects of file sharing

4.1. Research question, approach and outcomes

The article in Chapter 4 of this dissertation is based on *Ups and downs: Economische en culturele gevolgen van file sharing voor muziek, film en games* (Huygen, Poort, van Eijk, Rutten, Huveneers, Limonard, Leenheer, Janssen, Helberger, 2009a).[124] This study was commissioned by the Ministries van Education, Culture and Science, Economic Affairs and Justice.

The research questions (in line with the call for proposals) are outlined in Section 1.3 of the report. The central question is to identify the economic and cultural implications of file sharing for music, films and games in the Netherlands. To this end, sub-questions are addressed such as: What are the key characteristics and trends in these markets, and how do these developments relate to file sharing? What is the legal framework, and what are relevant developments in legislation, regulation and policy? What are people's motives and considerations in file sharing? How much file sharing takes place in the Netherlands and what are the implications for consumer behaviour? What are the welfare effects and the effects on the industries in the short and long term? How does this affect the diversity and accessibility of culture?

[124] This report was published in January 2009. A month later, an English translation was published (Huygen, Poort, van Eijk, Rutten, Huveneers, Limonard, Leenheer, Janssen, Helberger, 2009b).

While the public debate on file sharing tends to be very normative as well as heated, these questions are all positive: economic and legal research are called upon to provide facts and insight into the implications of file sharing and into the underlying questions above. To do so, a consumer survey was conducted and analysed, literature and secondary data were analysed, developments in legislation and policymaking were studied, and stakeholders were interviewed. On top of these positive research questions, the call for proposals asked for policy recommendations, bearing in mind the role of the ministries to safeguard public interests such as innovation and entrepreneurship as well as consumer interests such as freedom of choice, transparency, as well as the diversity and accessibility of content. Thus, within this rather wide array of interests, normative analysis resulting in recommendations was sought.

The main findings of the study are presented in the article in Chapter 4. The study observes that the proliferation of digital distribution networks combined with the availability of digital technology among consumers has broken the entertainment industries' control over access to their products. As a result, file sharing is a widespread phenomenon and 44% of the Internet using population admitted to sharing music, films or games in the preceding year. It turns out that file sharing and buying go hand in hand, and that file sharers are, on average, larger legal customers of recorded media. They also attend concerts more often. Having said that, determining the causal impact of file sharing on media sales is a difficult and controversial endeavour. Only part of the decline in music sales can be attributed to file sharing and there is no one-to-one relation between file sharing and foregone sales. Many file sharers would not have bought the content from legal sources, and the sampling effect will counter at least some of the substitution. On the whole, static welfare effects are robustly possitive since any sales displacement is basically a transfer of social welfare from producers to consumers while file sharing that does not displace sales, enhances welfare. Despite the losses for the entertainment industry, file sharing is observed to increase the accessibillity of culture.

Following on from these findings, it is recommended that the entertainment industries explore new business models to sustain their businesses: not to alienate or even sue file sharers –their biggest customers – but to seduce them with innovative propositions and to educate them. It is recommended that governments stimulate innovation in the entertainment industries and do not criminalise individual file sharers, but rather educate them instead. Civil law enforcement by the industry itself against large scale and

commercial infringers shoud be the focus, but should not lose sight of proportionality and other fundamental and procedural rights. Finally, it is recommended that governments monitor developments in the entertainment industries in order to gain better insight.

4.2. Follow up and policy impact

The policy report was sent to Parliament in early 2009, accompanied by a joint letter from the Minister for Education, Culture and Science, the Minister for Justice and the State Secretary of Economic Affairs (*Kamerstukken II* 2008/09, 29 838, nr. 14). This letter briefly highlighted some of the key conclusions of the report, while keeping some distance from the conclusions about the welfare effects. In line with the recommendations in the report, it stressed the importance of new business models for the music and film industry and the importance of innovation. Also it stated that the ministries would follow the developments in the industries closely, given the transitional period that they are in.

A letter to Parliament on several copyright policy issues provided a more extensive reaction from the cabinet by the end of 2009 (*Kamerstukken II* 2009/10, 29 838, nr. 22, pp. 9-10). According to the cabinet, the report made a valuable contribution to discussions about file sharing and provided ingredients for a nuanced vision on the effects of file sharing for both creators and consumers. In order to gain a better understanding of the issue, it announced the establishment of new research amongst individual artists and creators.[125] In addition, the cabinet emphasised its support of several initiatives to stimulate innovation, and the need for the development of new business models in the entertainment industries, to counter the negative effects of file sharing. It highlighted findings in the report that suggest that such digital business models should be possible. This reaction from the cabinet is fully in line with the recommendations in the report. Even though the cabinet expressed sympathy with the proposal by a parliamentary working group (the *Commissie Gerkens*, see below) to no longer allow downloading from illegal sources under the private copying exception once new digital business models have been developed by the industry, it stressed that enforcement against individuals could undermine public support for copyright, and that there is a need for coordination of such a policy with other European countries. It also stressed that the government enforcement policy would remain focused on large scale illegal uploading and noted that

[125] The article presented in Chapter 7 of this dissertation, *Perspectives of creators and performers on the digital era*, is based on this follow up research. See also section 7 in this chapter.

sufficient legal instruments for enforcement under civil law against such uploading seemed to exist. Nevertheless, the letter announced that it would prepare regulation to make downloading from illegal sources illegal, while keeping the above-mentioned considerations in mind (*Kamerstukken II* 2009/10, 29 838, nr. 22, pp. 14-18).

One and a half years later, in the so-called *Speerpuntenbrief Auteursrecht 20©20*, the State Secretary for Justice announced his intention to make downloading from evidently illegal sources unlawful but not punishable under criminal law (*Kamerstukken II* 2010/11, 29 838, nr. 29, pp. 8-11). The focus for enforcement was to remain on civil law measures against commercial websites and other facilitators of unlawful distribution. Enforcement against Internet users who download or upload without authorization on a limited scale, or cutting off Internet connections – an enforcement measure initially adopted in France under the *Loi Hadopi* – were out of the question. Although the policy report *Ups and downs* did not recommend making downloading from illegal sources unlawful, the choice not to criminalise individual Internet users concords with it. The proposal to make downloading from illegal sources itself illegal did not make it through Parliament, however, as a motion against it was adopted in December 2011 (*Kamerstukken II* 2010/11, 29 838, nr. 41).[126]

The Dutch policy report and the English translation received wide media attention both nationally and internationally. In the Netherlands, the major newspapers paid attention to the report, as well as several national radio channels and many news sites and blogs. The report was also picked up by various international blogs and was discussed in newspapers and on news sites ranging from France to Sweden and from Spain to Peru.[127] The report and the subsequent article for *Communications & Strategies* in Chapter 4 of this dissertation also received massive attention in terms of downloads. At

[126] On 10 April 2014, however, the EU Court of Justice ruled that downloading from illegal sources is not acceptable under the private copying exception (CJEU, 2014). This effectively means downloading is illegal as of that date.

[127] E.g. http://alternative.blog.nl/algemeen/2009/01/20/meer-downloaden-voor-grotere-welvaart#more-2724; http://business.webnews.it/news/leggi/9967/il-file-sharing-fa-bene-alleconomia/; http://www.remixtures.com/2009/01/estudo-holands-conclui-que-a-partilha-de-ficheiros-boa-para-a-economia/; http://www.myce.com/news/15439-Unpaid-downloads-not-so-bad-Netherlands-says.html/; http://www.technewsreview.com.au/article.php?article=7078; http://www.liveleak.com/view?i=7dc_1232493446&c=1; http://www.electronista.com/articles/09/01/20/dutch.study.file.sharing/; http://www.makarras.org/2009/01/20/el-p2p-es-bueno-para-la-economia/; http://torrentfreak.com/economy-profits-from-file-sharing-report-concludes-090119/; http://arstechnica.com/tech-policy/2009/01/dutch-government-study-net-effect-of-p2p-use-is-positive/; http://www.numerama.com/magazine/11765-les-effets-economiques-et-culturels-du-p2p-sont-extremement-positifs.html.

SSRN, the report had been viewed more than 2700 times and downloaded more than 500 times by June 2014, while the article had been viewed nearly 2700 times and downloaded over 370 times. In addition, the Dutch and English versions of the policy report and the article have together been downloaded more than 25 thousand times from the institutional websites of the Institute for Information Law, SEO Economic Research and TNO.[128]

The policy impact from thereon is hard if not impossible to trace systematically, but as an example it can be pointed out that the report made its way to a study by the Swiss government, on the basis of which it decided not to make downloading of music and films from illegal sources illegal (Schweizerische Eidgenossenschaft, 2011). The report was published at a time when several countries were struggling with the question of how to deal with massive online copyright infringement by their citizens and it was one of the first – if not the first – objective policy studies in the field. Up until that time, non-partisan government commissioned research into the topic had been lacking, and this debate had been framed mainly by the music and film industries on the one hand, and by Internet libertarians on the other. Most countries decided to abstain from enforcing against individual downloaders under criminal law and even France decided in 2013 to temper the sanctions under its HADOPI-legislation, after a committee chaired by Pierre Lescure concluded it had failed to promote legal services. Most notably, punishment by Internet suspension was revoked and the imposition of a fine remains the only sanction (see Cammaerts, Mansell, and Meng (2013) for a brief discussion).

Items on news sites and blogs in turn evoked many – primarily positive – reactions from the general public. Clearly, the report covered a hotly debated topic. In the media coverage, the welfare analysis in the report played a central role, but in several news items and in many reactions, this analysis was misunderstood to imply that downloading from illegal sources would be good for the economy, i.e. GDP.[129]

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[128] Google Scholar gives 37 documents referring to the English version of the policy report, 2 documents referring to the Dutch version and 21 references to the article in Communications & Strategies. These documents are in six different languages and range from published journal articles and academic book chapters, to academic working papers, dissertations and policy reports. Some examples are Karaganis (2011), Borghi, Montagnani, Maggiolino & Nuccio (2012), Mansell & Steinmueller (2013) and Larsson, Svensson, Mezei, & de Kaminski, (2014). The list from Google Scholar is incomplete and can be supplemented with academic working papers such as Grassmuck (2010), Smith & Telang (2012) and Watson, Zizzo & Fleming (2014).

[129] E.g. http://www.parool.nl/parool/nl/30/ECONOMIE/article/detail/125561/2009/01/19/Downloaden-van-internet-is-goed-voor-economie.dhtml.

Understandably, the report was vehemently criticized by the trade association of the Dutch entertainment industry, who published an official response on 2 April 2009. Therein, they announced that they would publish a new study later that month which paid more attention to the dynamic and future effects of file sharing (NVPI, 2009). This study did not appear until May 2011. Very much in line with *Ups and downs*, the central question of this study was to determine the state of affairs with respect to legal and illegal online supply of copyright protected works and their consumption in the Netherlands (Schermer & Wubben, 2011, p. 9). Although the study focused more on existing legal business models and possible negative dynamic effects of file sharing on supply, it turned out to be largely a validation and update of *Ups and downs.*

4.3. Comparison and conclusion

In its final report, the previously mentioned parliamentary working group chaired by Arda Gerkens recommended making downloading from illegal sources punishable under criminal law after the content industry created adequate digital supply (Gerkens, Smeets, Teeven, van Vroonhoven-Kok, 2009, p. 28).[130] The working group took this position on the basis of legal arguments and interviews with stakeholders. It was not founded on any empirical evidence or quantitative information about the impact or effectiveness of such measures. As stated, the cabinet intended to follow this recommendation, as it would – in its opinion – take away the need to revive the copyright levy system. However, the cabinet stressed the disadvantages of enforcement in terms of privacy and the negative effect it could have on the public support for copyright and the willingness to pay for content. Moreover, it stressed that it would continue to focus its enforcement efforts on large scale illegal uploading (*Kamerstukken II* 2009/10, 29 838, nr. 22, pp. 18-19).

In the ensuing parliamentary debate, a motion was adopted *not* to make downloading from illegal sources illegal. Empirical findings from *Ups and downs* were stressed in this debate in order to justify this, particularly, the above average legal content consumption by downloaders and their continued willingness to pay for legal content.

From the above it follows that there are strong indications that the empirical economic evidence concerning file sharing in the policy report *Ups and*

[130] This working group consisting of members of the Dutch Parliament was initiated on 23 January 2008, with the aim of enhancing the Parliament's knowledge of copyright policy, to develop a vision on the future of copyright, and where possible to provide solutions to problems that were identified.

downs has played a significant role in defining the focus and way forward for copyright policy in the Netherlands. Also, it seems to have had influence on the debate and policymaking in other countries and the tendency for policymakers and enforcers to move away from enforcement against individual downloaders. The factual, positive claims in the study provided a foundation for a normative decision not to criminalise or enforce against end users, and for urging the content industry to focus on developing innovative business models instead, as recommended in the report.

5. Elvis is returning to the building

5.1. Research question, approach and outcomes

Chapter 5 is primarily based on *File Sharing 2©12: Downloading from Illegal Sources in the Netherlands*, a policy report that appeared in Dutch in October 2012 and in English one month later (Poort & Leenheer, 2012).[131] This study was not commissioned, but was conducted at the initiative of IViR and CentERdata, with financial support from various stakeholders: the Netherlands Ministry of Education, Culture and Science, Ziggo, KPN, XS4ALL, DELTA, CAIW and the Royal Dutch Book Trade Association (KVB).[132]

The aim of this research project was to provide a repeat measurement of the state of affairs with respect to downloading from illegal sources in the Netherlands, about four years after the policy report *Ups and Downs* (Huygen, Poort, van Eijk, Rutten, Huveneers, Limonard, Leenheer, Janssen, Helberger, 2009b). The methodology was to perform a survey amongst a representative sample of consumers and to analyse the results. This time, books and TV-series were also included, and a wider perspective was taken by comparing four channels for consuming content: 1) physical formats (acquired from offline or online stores); 2) paid-for downloading or streaming from legal sources; 3) free downloading or streaming from legal sources; 4) downloading or streaming from illegal sources. Also, questions were included about perceived changes in the behaviour of respondents over time and about the effects of a recent court ruling, which ordered Internet Service Providers (ISPs) to block access to the torrent-tracker site The Pirate

[131] Parts of the paper draw from *Digitale drempels: Knelpunten voor legaal digitaal aanbod in de creatieve industrie* (Weda, v.d Noll, Akker, Poort, v. Gompel, & Leenheer, 2012). This study was commissioned by the Dutch Ministry of Economic Affairs, Agriculture and Innovation to investigate the legal, economic and technical causes for the legal online market for content to fall behind the offline market. The purpose of that study was exclusively positive: giving policy recommendations was explicitly exempted in the call for proposals.

[132] Several other stakeholders (Ministries, network providers as well as representatives of rights holders and the content industry) were approached for co-funding but declined.

Bay. The paper in Chapter 6 is also partly derived from this research project and specifically focuses on this last issue.

A prominent finding of the study, which is also stressed in Chapter 5, is that downloading music from illegal sources declined between 2008 and 2012, while downloading audio-visual material still increased. Over the entire population, illegal sources were the third most popular channel for acquiring content, after physical formats and free legal sources. The paper in Chapter 5 links these diverging trends to differences in the perceived quality of legal supply: adequate legal services for downloading and streaming music helped to reduce file sharing, while a lack of good digital audio-visual services made consumers turn to illegal alternatives. The study also confirmed the finding in *Ups and downs* that people who downloaded from illegal sources in the preceding year, were on average more frequent consumers of legal content than those who did not.

5.2. Follow up, policy impact and conclusions

Just like *Ups and downs*, the policy report received much attention in the online media and blogs in the Netherlands and abroad[133], as well as on Dutch national radio. A considerable share of the coverage focused on the apparent lack of effectiveness of blocking access to The Pirate Bay (see Section 6). In addition, the policy report made its way to a policy report by Spotify's Director of Economics Will Page – gloating upon the apparent success of Spotify in reducing music file sharing in the Netherlands (Page, 2013), as well as the aforementioned second evaluation of the RPM Books Act (Bongers, Notenboom, Veldkamp, Schrijvershof, & Gielen, 2014).

[133] E.g. http://www.techdirt.com/articles/20121018/02011120745/empirical-data-suggests-that-website-blocking-is-useless-weapon-against-infringement.shtml; http://www.actualitte.com/legislation/telechargement-les-pirates-vous-veulent-du-bien-37613.htm; http://www.heise.de/newsticker/meldung/Studie-Filesharer-kaufen-mehr-Musik-als-Nicht-Filesharer-1730464.html; https://torrentfreak.com/file-sharers-buy-more-movies-121018/; http://www.boekblad.nl/onderzoek-kansen-voor-legaal-digitaal-aanbod.198633.lynkx; http://www.spitsnieuws.nl/archives/tech/2012/10/brein-brenno-kletst-maar-wat; http://www.spitsnieuws.nl/archives/tech/2012/10/brenno-tegen-brein-kom-eens-met-bewijs; http://www.techzine.nl/nieuws/31912/universiteit-amsterdam-illegaal-downloaden-stijgt.html; http://tweakers.net/nieuws/85008/twee-procent-gestopt-met-downloaden-na-pirate-bay-blokkade.html; http://www.nu.nl/internet/2935673/dowloaden-neemt-niet-af-ondanks-bestrijding.html; http://nos.nl/artikel/430388-illegaal-downloaden-minder-in-trek.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+nosjournaal+%28NOS+Journaal+Nieuws%29; http://www.entertainmentbusiness.nl/nieuws/2012-W42/brein-noemt-ivir-onderzoek-onverantwoord; http://www.entertainmentbusiness.nl/nieuws/2012-W42/nederlanders-blijven-illegaal-downloaden-ondanks-maatregelen; http://www.elsevier.nl/web/Nieuws/Internet-Gadgets/352199/Blokkade-The-Pirate-Bay-heeft-nauwelijks-effect.htm; http://www.ad.nl/ad/nl/1100/Consument/article/detail/3333092/2012/10/17/Slechts-2-procent-gestopt-met-downloaden-na-blokkade.dhtml; http://www.ereaders.nl/17101203_ruim_6_procent_nederlanders_downloadt_ebooks_uit_illegale_bron; http://www.bright.nl/pirate-bay-blokkade-heeft-downloadgedrag-nauwelijks-veranderd.

As can be seen from the description above, the research questions in this project were strictly positive: the aim was to provide evidence about the current state of affairs concerning media consumption from legal and illegal sources and about the effect of blocking access to The Pirate Bay. The debate about unauthorized file sharing and enforcement measures to fight it is so fierce, however, that any evidence in this arena will not only receive attention but will also raise controversy. Nevertheless, perhaps because the report was not commissioned, its direct impact on policy is less clear than that of most other cases in this dissertation, other than the role played by the 'Baywatch'-paper, which was also partly derived from the report.

6. Baywatch

6.1. Research question, approach and outcomes

The article in Chapter 6 is also partly derived from the policy report *File Sharing 2©12: Downloading from Illegal Sources in the Netherlands.* It combines the findings from the consumer survey in that report about the effects of blocking access to The Pirate Bay with a second measurement of these effects, as well as with the outcomes of BitTorrent monitoring.[134] The central research question in this paper is how effective blocking access to The Pirate Bay is in order to reduce unauthorized file sharing by consumers.

While a small group of respondents are reported to download less from illegal sources or claim to have stopped doing so, no impact is found on the percentage of the Dutch population downloading from illegal sources. BitTorrent monitoring reveals slight changes on the distribution of Dutch peers, but these seem related to the awareness raised by blocking rather than the blocking itself.

6.2. Follow up and policy impact

A preliminary version of the Baywatch-article in Chapter 6 was published as a working paper at SSRN (Poort, Leenheer, van der Ham & Dumitru, 2013), accompanied by a press release at the university website (Universiteit van Amsterdam, 2013-8-22). Again, this received substantial coverage in Dutch media, including national radio and a national television news broadcast.[135]

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[134] The latter study was carried out by researchers from the System and Network Engineering research group at the University of Amsterdam.

[135] E.g. http://www.volkskrant.nl/vk/nl/2664/Nieuws/article/detail/3496716/2013/08/22/Nederlandse-blokkade-The-Pirate-Bay-heeft-weinig-effect.dhtml; http://www.telecompaper.com/nieuws/blokkeren-tpb-leidt-niet-tot-minder-illegaal-downloaden--962568; http://www.nu.nl/tech/3556546/blokkade-pirate-bay-zinloos.html; http://nos.nl/audio/543029-blokkade-pirate-bay-weinig-effect.html; http://www.nrc.nl/nieuws/2013/08/22/ondanks-blokkade-pirate-bay-neemt-downloaden-toe/;

Most likely, the timing of the working paper contributed significantly to this: a few weeks later, the court hearing was planned for the appeal of the ISPs Ziggo and XS4ALL against the ruling by the Court of The Hague that they were to block access to The Pirate Bay.

The ISPs presented the working paper together with the earlier policy report *Filesharing 2©12* and studies by TNO in the court hearing, to make the point that the intervention ordered by the Court of The Hague was ineffective as a means of reducing downloading from illegal sources. In its ruling, the Court of Appeals in the Hague overturned the earlier ruling and lifted the blocking (Gerechtshof Den Haag, 2014). In the ruling, several references were made to the working paper. According to the Court of Appeals, the increase in the number of downloaders from illegal sources that was measured in the working paper showed that the blocking mechanism did not prevent a significant percentage of the Internet users from downloading from illegal sources (Gerechtshof Den Haag, 2014, 5.21). This apparent lack of effectiveness of the intervention played a central role in the decision by the Court of Appeals to overturn the earlier ruling by the Court. The ruling by the Court of Appeals was widely covered in the national and international media, in particular on the Internet, which in some instances explicitly linked the ruling to the working paper.[136]

6.3. Comparison and conclusion

As mentioned in the article in Chapter 6, the effectiveness of the requested measures was already an important issue in both lawsuits at the Court of The Hague (Rb. 's-Gravenhage, 2012a, 2012b). During these lawsuits, rights holders' representatives presented evidence from Italy and Denmark that blocking access to TPB had significantly reduced its number of unique visitors, despite the claim by the defendants that the intervention is easily circumvented, for instance, by making use of virtual hosting or an anonymous web proxy provider (Rb. 's-Gravenhage, 2012a, 4.34-4.36). From an economic perspective, however, the relevant question is not whether blocking access to TPB decreased the number of visitors to this specific

http://www.spitsnieuws.nl/archives/tech/2013/08/blokkeren-pirate-bay-heeft-geen-effect; http://www.belegger.nl/nieuws/2638485/blokkade-the-pirate-bay-niet-erg-effectief.html; http://www.boek9.nl/boek9-berichten/norbert-pek-brein-heeft-een-tunnelvisie-in-de-strijd-tegen-de-torrentsites.

[136] E.g. http://www.techdirt.com/articles/20140128/07532926020/dutch-court-strikes-down-pirate-bay-block-ruling-it-is-disproportionate-ineffective-harming-entrepreneurial-freedom.shtml; http://www.wired.co.uk/news/archive/2014-01/28/the-pirate-bay-blockade-lifted-in-holland; http://torrentfreak.com/isps-no-longer-have-to-block-the-pirate-bay-dutch-court-rules-140128/; http://rt.com/news/court-unblock-pirate-bay-308/; http://boingboing.net/2014/01/28/dutch-court-unblocks-the-pirat.html; http://news.idg.no/cw/art.cfm?id=7E929AE0-F54C-B143-E7C8C11F80430F7A.

website, but what the effect was on online copyright infringement as a whole.

In the second of these cases, ISPs presented a study by the System and Network Engineering research group at the University of Amsterdam as evidence of the lack of effectiveness of the intervention. That study concluded that the claim that blocking access to The Pirate Bay by Ziggo and XS4ALL led to a decrease in copyright infringement by their subscribers had to be rejected. No significant effect had been measured (Van der Ham, Rood, Dumitru, Koning, Sijm & De Laat, 2012, p. 18). However, the Court argued that the claim was not that the measure in itself would lead to a decrease in infringement, but that infringement could not be fought effectively without blocking, and that blocking in combination with other measures would be suitable to prevent infringement. Moreover, the Court emphasised the evidence presented by Brein that the intervention led to a decrease in the number of Dutch visitors to The Pirate Bay (Rb. 's-Gravenhage, 2012b, 4.20-4.21).

The finding that blocking access to a website reduces traffic to this website should not come as a surprise. What is remarkable, however, is that the Court of The Hague framed the effectiveness question quite differently from the Court of Appeals, by narrowing it down to the direct effectiveness on the traffic to The Pirate Bay, while assuming wider effectiveness in combination with other measures, even though no evidence for the latter was given. In the first case the Court basically argued that there is no harm in trying: "In any case, blocking will mean an extra barrier." (Rb. 's-Gravenhage, 2012a, 4.35). In the second case, it described the intervention as a "necessary but not sufficient condition for effective enforcement against infringements", while "not all additional measures had already been taken by the time the study was performed" (Rb. 's-Gravenhage, 2012b, 4.18-4.20). The sobering conclusion is, that even in its positive role of providing evidence about the effectiveness of blocking access to The Pirate Bay, the paper in Chapter 6 could only play a role in the court ruling due to the fact that the judge asked the economically relevant question.

7. Perspectives of creators and performers on the digital era

7.1. Research question, approach and outcomes

The article in Chapter 7 is based on a study commissioned by the *Wetenschappelijk Onderzoek- en Documentatiecentrum* (WODC), the research and documentation centre of the Dutch Ministry of Security and Justice, on

behalf of the Ministry of Security and Justice and with financial support from the Ministry of Education, Culture and Science. The study was published in a policy report entitled *Wat er speelt. De positie van makers en uitvoerend kunstenaars in de digitale omgeving* (Weda, Akker, Poort, Rutten, Beunen, 2011).

As previously mentioned in Section 4 of this chapter, this study amongst individual creators and performers had been announced in a letter to Parliament regarding several copyright policy issues (*Kamerstukken II* 2009/10, 29 838, nr. 22). The aim was to gain a better understanding of the interest of creators and performers in their dealing with collective management organisations and other intermediaries, as well as their position on unauthorized file sharing and new business models. The main research questions were (Weda *et al*., 2011, pp. 1-2):

- What are the opinions of individual creators and performers about digital developments *inter alia* in relation to new distribution channels, and the role of copyright therein?
- What are their opinions about new exploitation models for their work and their relationship with commercial intermediaries, such as publishers and record labels?
- What are their opinions about the performance and role of collective management organisations and about the way they respond to digital developments?

As follows from these research questions, the suitable methodology for this study is a survey among creators and performers in the musical, audio-visual, and book publishing industries, performing arts, etc. However, no panel of this diverse group exists and ordinary consumer panels would only yield a very small number of eligible respondents. Therefore, considerable effort was put into gaining access to the members/associates of all collective management organisations and unions for creative professionals. Although the research questions were all strictly positive – to find out what the opinions and experiences of creators and performers are – and no policy recommendations were requested, the study was met with considerable scepticism by these organisations. In the end, however, most of them cooperated and as described in Chapter 7, this resulted in a nearly comprehensive survey, which targeted up to 23,500 individuals, with a net response of 3,935 completed surveys.

Among many other issues, the survey showed that many creators and performers primarily perceive digitisation as a threat. They do not fit the

lenient image that is often created of them in the media. Instead, they take a rather strict position on copyright, oppose unauthorized file sharing and remixing, and call for more stringent enforement. Although age is a relevant explanatory factor for the opinions, the notion of a generation gap is shown to be an oversimplification. Other relevant dimensions include income development, education level, and the way digitisation has affected the respective respondents' discipline.

7.2. Follow up and policy impact

The report was sent to Dutch Parliament on 4 November 2011, together with the *Speerpuntenbrief Auteursrecht 20©20* (*Kamerstukken II* 2010/11, 29 838, nr. 29), which was discussed in Section 4 of this chapter. In this letter, the Secretary of State set out his vision on various copyright issues, as well as his intended policy initiatives. He expressed his appreciation for "the thorough way in which SEO had conducted the research" and made extensive reference to the outcomes of the study which, he wrote, "provided useful information for shaping copyright policy and improving collective management". He announced that he would discuss the outcomes with stakeholders in the near future to identify points for improving the copyright practice.

The Secretary of State observed that the findings of the study supported the policy expressed in the letter in many respects. The study showed that creators were largely positive about various aspects of proposed new legislation concerning contractual arrangements for authors, which is one of the four focal points for proposed copyright policy in the letter: A majority of all creators and performing artists consider their bargaining position vis-à-vis clients and publishers to be weak and about half of them occasionally transfer more rights in their contracts than they would prefer to. Many are in favour of collective bargaining about minimum fees and of creating the possibility to annul the transfer of copyright or a licence if the copyright or licence holder does not actively exploit the work (the so-called *non-usus* principle). Also creators and performing artists generally favour a right to additional compensation in case a work generates unexpectedly high revenues (the so called bestseller-provision) (*Kamerstukken II* 2010/11, 29 838, nr. 29, pp. 4-7). Thus, the study provided evidence for this new legislation, or more precisely, evidence that this policy had the popular vote of creators and performing artists. On 19 June 2012, the proposal for changing the Dutch copyright law was sent to Parliament (*Kamerstukken II* 2011/12, 33 308, nr. 2 & 3). The media attention generated by the

Speerpuntenbrief Auteursrecht 20©20 focused on the letter itself, rather than the accompanying study.

7.3. Comparison and conclusion

As previously stated, the study that lies at the basis of the article in Chapter 7 of this dissertation provided evidence for the approval by creators and performing artists of the proposed new legislation concerning contractual arrangements, albeit in retrospect. The legislative process had started on 30 June 2010, almost a year and a half before the study was published, with the consultation of a preliminary version of the new legislation.[137] A legal study by Hugenholtz & Guibault (2004) provided an important foundation for the initiative. However, by the time of the consultation economic evidence was lacking, both for the severity of the problems addressed, and for the adequacy of the proposed solutions.

In a normative economic analysis of the preliminary version of the new legislation, Poort & Theeuwes (2010) are very critical of many of its elements. They question the economic justification for the intervention and the effectiveness and efficiency of the instruments. They conclude that there is too little evidence for the alleged buying power to justify a far-reaching restriction of authors' contact freedom and that information asymmetry is more likely to benefit experienced authors than harm them. From the perspective of economic justification and the efficiency and effectiveness of intervention, only the *non-usus* principle passes unconditionally. This critique is largely repeated in a study by the CPB Netherlands Bureau for Economic Policy Analysis (Zwart & van 't Riet, 2011). However, despite some additional checks and balances that were introduced, the proposal for changing the Dutch copyright law that was sent to Parliament was in economic terms largely identical to the preliminary version. The proposal to make copyright non-transferable for natural authors was taken out, but other elements that raised the economists' eyebrows remained, such as the right to a 'fair compensation' that is set for the entire market and the bestseller clause.

In hindsight, the policy report underlying Chapter 7 provided evidence for the perceived weak bargaining position of creators and authors and the undesirable transfer of rights. It also revealed majority support of the proposals which had been argued to be ineffective or inefficient. This led Akker, Poort & Weda (2011) to conclude that artists were "happy with but

[137] See: http://www.internetconsultatie.nl/auteurscontractenrecht.

not helped by the proposed new legislation". On a positive note, it can be concluded from this case study, that while economic evidence was initially lacking in this legislative process, there was eventually demand for such evidence. However, this example also shows the normative role of economic analysis to be limited. The initial intention to make copyright non-transferable for natural authors was taken out of the proposal and normative economic analysis may have played a role in that, but other elements remained, despite their disputable effectiveness and welfare effects.

This leads to a paradoxical observation: an economist would not just have to take a normative position, but a paternalistic one as well, to object to legislation aimed at protecting authors and creators and advocated by a majority of them. Here, an economist should rest his case, bearing in mind Posner's famous quote about the valuation of sea otters in Chapter 1.

8. Valuing commercial radio licenses

8.1. Research question, approach and outcomes

Chapter 8 is based on two policy reports commissioned by the Dutch Ministry of Economic Affairs: Poort, Kerste *et al*. (2010) en Poort, Kerste *et al*. (2011). The research question as it was phrased in the call for proposals is repeated in Poort, Kerste *et al*. (2010, p. 1): "What is a realistic value of [the spectrum for commercial radio] for an entrant, expressed as an amount which a licence represents." The aim of the study was to develop a methodology for valuing the radio licences, which was "preferable" on economic and legal grounds and to apply this methodology on 9 national FM-licences, 38 regional FM-licences and 12 AM-licences. By doing so, several policy choices had to be taken into account. Also, a new obligation for licence holders to invest in digital radio broadcasting had to be accounted for.

The methodology that was used and the outcomes are described in detail in Chapter 8. The conceptual starting point that was used for the valuation of each individual licence was an averagely efficient entrant: the value that such an entrant would be able to create with a licence is equal to the *opportunity costs* for the incumbent of operating the licence himself instead of selling it to the entrant. It is also the expected outcome in case the licence would be auctioned. Charging a renewal fee to incumbents that is equal to the value for an averagely efficient entrant implies that the incumbents, if they agree to pay this price, value the licence at least as much as an entrant. Thus,

optimum assignment of spectrum licences is guaranteed, without penalizing incumbents if they are more than averagely successful or efficient.[138] By using financial data obtained from the licence holders, models were estimated for the costs and revenues an entrant was expected to have on each licence. Combining these with projections for the development of the total radio advertising market resulted in the expected value of each licence for an entrant. Eventually, only five national licences turned out to have a positive value for an entrant.

The research question in this study can be considered normative within boundaries set by legislation and policy. As is explained in Chapter 8, the European and national legal framework has a substantial impact on which methodology is appropriate for setting spectrum fees: fees may be charged to ensure optimal assignment of spectrum but not to maximize revenues. At the same time they must not be so low that they entail state aid. In Chapter 8, it is argued that compliance with these legal criteria is achieved by taking an averagely efficient entrant as a benchmark for valuation. Simultaneously, this approach promotes an economically efficient assignment and use of licences. Thus, the legal framework and the research question, which takes the value for an entrant as a starting point, are fully aligned with normative economic analysis. On the other hand, the policy choices with respect to the number of licences, licence duration, format restrictions, compulsory investments in digital radio broadcasting, etc. were a given and not subject to economic analysis.

8.2. Follow up and policy impact

During the research process, the licensees were consulted intensively in relation to the methodology and the draft report (Poort, Kerste *et al*., 2010, pp. 5-6). On 18 May 2010, the report was sent to Dutch Parliament, accompanied by a short letter without further policy conclusions (*Kamerstukken II* 2009/10, 24 095, nr. 257). A formal consultation of the report and the ensuing draft licences renewals followed in November of that year, on the basis of which the dataset for the analysis was extended and some other aspects of the methodology were refined or updated in Poort Kerste *et al*. (2011). Subsequently, this report was sent to Parliament, accompanied by a letter stating that regulations for licence renewal based on this report would be published a few days later (*Kamerstukken II*, 2010/11,

[138] This valuation methodology based on opportunity costs is in sync with the definition of economics by Robins cited in Chapter 1, as "the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses". It is the alternative use of the spectrum that justifies and determines the renewal fee.

24 095, nr. 271). Licence fees for renewal were completely based on Poort, Kerste *et al*. (2011). As the studies related to a very specialist topic, they did not attract much media attention. Using LexisNexis Academic, no references to the research other than *De Telegraaf* (2014-3-27) and *De Telegraaf* (2014-3-28) were found in Dutch media. Apart from these, some references on specialist websites were found.[139]

All national licensees opted for renewal, but those who had to pay a licence fee appealed. Also, a radio company appealed against the use of 80% of the valuation for licence renewal, to determine the minimum bid in the assignment of a free national licence in 2011. Thus, the study has been contested in several court cases since 2011 (Rb. Rotterdam, 2011, 2012, 2013; CBb, 2015a, 2015b). In these cases, as well as in the earlier consultation, radio companies produced confidential studies by several consultants (Deloitte, Stratix Consulting, PwC Economics, Interbrand and prof. Wansbeek) to criticize the approach and the outcomes. The conceptual normative framework in the valuation reports was not contested in these studies. Instead, the choices made for the implementation of this framework were criticised, such as the modelling approach and the discount factor that was used. In addition, some licensees challenged the interpretation of the outcomes. This highlights the fact that even if the normative economic framework is agreed on, the actual implementation of this framework can still lead to controversy when the stakes are high. The Trade and Industry Appeals Tribunal rejected the renewal fee set for one of the licensees (CBb, 2015b), although all court cases before the Court of Rotterdam have been won by the defendant (Rb. Rotterdam, 2011, 2012, 2013). The methodology was claimed to be insufficiently able to distinguish between the performance of an individual licensee and the revenue potential of a licence with a specific format restriction, while the restriction for this specific licensee to broadcast mainly golden oldies was presumed to have a negative effect on revenues.

8.3. Historical comparison

For a historical comparison, it is interesting to consider the way in which the initial licences had been assigned in a beauty contest ('vergelijkende toets') in 2003. In the beauty contest, candidates had to hand in a combination of a business plan and a one-off financial bid in a sealed bid setting. For licences

[139] E.g.: http://radio.nl/74077/bedragen-verlenging-vergunningen-nu-officieel-bekend; http://radio.nl/80726/fm-vergunningen-worden-definitief-verlengd-update; http://radio.nl/787404/538-sky-q-en-veronica-krijgen-geen-cent-terug; http://www.radiofreak.nl/nieuws/9600/Landelijke-zenders-betalen-meer-dan-30-miljoen-euro-voor-verlenging-frequenties/; http://www.radiofreak.nl/nieuws/12937/Onderzoek:-radiostations-betalen-niet-teveel-voor-FM-frequenties/.

with format restrictions, candidates also had to make a programmatic bid, in which they could propose to exceed the minimum requirements defined for the licence. To determine the winner of a licence with such a format restriction, this programmatic bid was considered first. Only when several candidates scored equally on this criterion, the business plan was looked at, and finally the financial bid would decide the winner. For licences without format restrictions, a programmatic bid was not requested, so that first the business plan and after that the financial bid was decisive (Drenth *et al.,* 2005, p. I). Two additional complexities are worth mentioning here. First, as a safeguard against market concentration, combining two national licences without format restrictions was not allowed. A company could win no more than one restricted and one unrestricted national licence. Second, a one-off licence fee ('eenmalig bedrag') had been calculated for each national licence, which was due on top of the financial bid.

A government commissioned evaluation of the assignment procedure was performed by Drenth *et al.* (2005). It concluded that the aims of the procedure (i.e. diversity and quality of supply, continuity, integrity and plurality of suppliers) had only partially been realized. The format restrictions had not led to more diversity of supply, despite the fact that more spectrum for commercial radio had become available. Moreover, the required business plans had provided no guarantee for continuity or quality. Overall, the evaluation concluded that the beauty contest had not led to an efficient and effective assignment of frequencies in all respects. It advised that more attention should be paid to reducing the risk of a winner's curse in future procedures and that quality should be safeguarded differently (Drenth *et al.,* 2005, p. 10).

Like the valuation described in Chapter 8, this beauty contest spurred a host of lawsuits, with the ultimate outcome being that in 2006 – three years after the initial allocation – the Station '100%NL' was awarded licence A9 with the format restriction Dutch/European. Previously, this licence had been awarded to 'RTL FM', but 100%NL successfully claimed that it should have won based on the programmatic bid, since it offered much more Dutch music than was required in the format restriction (e.g., see Cbb (2006) for an overview of the judicial history of this saga). The fact that RTL FM put forward a financial bid of €23 million, and 100%NL only €8000, proved irrelevant in the end.

This case illustrates the uncertainty or even arbitrariness that is inherent in using a beauty contest as an assignment procedure. Recalling the aphorism

attributed to Plato that beauty lies in the eyes of the beholder, one may conclude that if the stakes are high, a beauty contest is a recipe for disaster – if not for a Trojan war. Moreover, one may argue that combining format restrictions with a programmatic bid is like wearing both belt and braces. If well-defined public interests need to be safeguarded, format restriction may be suitable but these should be formulated in such a way that any bid that complies with them is sufficiently in line with these interests. Only if public interests are unclear and regulators want to be surprised by innovative proposals, a beauty contest may be apt.[140]

What is more, not all format restrictions seem to be required to safeguard public interests. In the beauty contest, the financial bid of €33.6 million for licence A2 with format restriction 'golden oldies' was higher than that for the unrestricted licence A7 (€ 32.8 million), while the demographic reach of A7 is larger (Poort, Kerste *et al.*, 2010, p. 9). Notwithstanding the ruling by the Trade and Industry Appeals Tribunal (CBb, 2015b), this outcome suggests that no intervention by means of a format restriction may be needed to ensure the provision of a golden oldies station. This was underscored once more in 2013, when the unrestricted licence A7 was reassigned and the winner decided voluntarily to turn it into a golden oldies station (Radio 10 Gold).

The evaluation by Drenth *et al*. (2005) does not examine the way in which the administrative one-off licence fee ('eenmalig bedrag') for each national licence had been calculated. This may be because of the fact that these fees were dwarfed by the financial bids, which were, on average, about a factor ten higher (Drenth *et al*., 2005, p. 34).

These fees had been based on a calculation involving a rough estimation of the future development of the radio advertising market, the demographic reach of licences, and a correction factor for licences with format restrictions (*Regeling vaststelling eenmalig bedrag landelijke commerciële radio-omroep 2003*, *Stcrt*. 2003, 40 37). Several steps in these calculations seem to be based on rough estimates, namely the discount factor (10%), the expected annual future growth of the advertising market (5%), and the economies of scale for licences with a larger demographic reach. Two crucial steps appear to be no more than a wild guess: First, to set the fee at 7.5% of the net present value

[140] In line with this argument, Maasland, Onderstal & Rutten (2005) recommend for future assignment of radio licences that the business plan be treated purely as a criteria to decide if a candidate is allowed to the bidding phase and also formalize a trade-off between the financial bid and the programmatic bid, or to eliminate the latter altogether.

of the expected advertising revenues, which, as it was phrased, the government considered reasonable; second, the correction factors for the expected revenues of licences with format restrictions, ranging from minus 40 to minus 80%.

The financial bids in the beauty contest show that this 7.5% yielded fees that were across the board way below the commercial value of the licences. In defence of this, one could claim that these fees were not meant to extract the full commercial value of the licences, since they would be supplemented with the financial bid. However, the rules of the beauty contest did not guarantee in any way that a significant payment would be due in addition to the fee. The eventual outcome for A9 illustrates this. On the other hand, the correction factors were in some cases too modest. For licences A4 (news) and A5 (recent specific music) the financial bid was comparable to the fee,[141] while the valuation per 2011 did not yield a positive value for an averagely efficient entrant.

8.4. Conclusion

In this case study, the role of economic research is more normative than in most other cases, but as stated, boundaries have been set by legislation and policy. The legal framework turned out to be in concord with the normative economic position to valuation, which promotes efficient assignment and use of licences. The policy choices with respect to the number of licences, licence duration, format restrictions, etc. were not subject to economic analysis. The case study also shows that while the consultants that were hired by radio companies to criticize the studies did not contest the conceptual normative framework, the actual approach and the outcomes were criticized in almost all conceivable ways. This illustrates that when the stakes are high, economic evidence will not be beyond dispute.

Having said that, the role for economic research for the renewal of the licences was much more substantial than it was for the initial assignment in 2003, when the beauty contest was primarily a political instrument and the calculation of the one-off fees little more than a rough estimation.

[141] C.f. Staatssecretaris Onderwijs, Cultuur en Wetenschap (2003) and Regeling vaststelling eenmalig bedrag landelijke commerciële radio-omroep 2003 (*Stcrt*. 2003, 40 37).

9. Setting licence fees for renewing telecommunication spectrum based on an auction

9.1. Research question, approach and outcomes

The article in Chapter 9 is also based on a policy report commissioned by the Dutch Ministry of Economic Affairs: Kerste, Poort *et al*. (2013). The research question is similar to that of Chapter 8 in several ways: "How should the extension fee for the current licences for mobile telecommunication be determined?" (Kerste, Poort *et al*., 2013, p. 1). Again, the aim was to develop and to apply a methodology to determine the value of spectrum licences. In this case the valuation concerned a temporary extension of licences for mobile telecommunication in the 900 MHz and 1800 MHz bands. Apart from the short duration of the extension, as a result of which a full business case for an entrant would not be feasible, an important conceptual difference was that the extension period was flexible with the aim of enabling an orderly transition to new licences that would be awarded in an upcoming multiband auction. The objective was to develop a methodology that derives the extension fees from the outcome of the auction.

This methodology and the outcomes are described in detail in Chapter 9. As in Chapter 8, the research question is normative in principle, but within strict boundaries, with a similar relevant legal framework. This resulted in a methodology that has the same conceptual starting point. As in Chapter 8, the value of the licences for an averagely efficient entrant (or more generally, a contestant) was the benchmark for valuation. In this case, the value of a new licence for a contestant could be derived from the outcome of the multiband auction. The methodology was developed to draw from this outcome a value for a longer licence period, including the extension. The difference between the value of the actual new licence and the value of a hypothetical longer licence was the basis for the extension fee.

9.2. Follow up and policy impact

During the research process, two informal consultations with the licensees and potential entrants were held, after which an independent research bureau, VKA, was requested by the Ministry of Economic Affairs to provide a second opinion (Kerste, Poort *et al.*, 2013, pp. 1-2). The report was not sent to Parliament, but published as an annex to the draft regulation for determining the extension fees. Subsequently, a formal consultation of this

draft regulation and the methodology was held.[142] After the auction, the methodology was used to determine the extension fee for different extension periods. As discussed in Chapter 8, the outcome of the auction, however, made a transition without extension possible. Given the circumstances, this was financially more attractive for the licensees.

Since no licence extension was required eventually, the methodology to determine the extension fees and the actual outcomes of this methodology were no longer of interest to stakeholders. The methodology was not challenged in lawsuits over the auction design and did not receive media attention. Only some references on the specialist website of *Telecompaper* were found (behind paywall).

9.3. Historical comparison

A coincidence of assignment of spectrum in an auction and extension of the same spectrum lay at the basis of the methodology in Chapter 9, which could rely on market valuations without developing a full business case. The only preceding licence extension for mobile telecommunications in the Netherlands, was that of the 900 MHz licences in 2010. In that case, no recent market valuation of the relevant spectrum was available, which is why full business cases were developed for a hypothetical entrant that could enter the market directly in 2010 or after the extension in 2013 (Poort, Gerritsen *et al.*, 2006; Poort & Gerritsen, 2006). Although, as argued in Chapter 9, this approach is more elaborate and assumption sensitive than that of Chapter 9, the economic foundation is similar.

Based on the aforementioned studies, fees for a three year extension were set at €39.8 million for KPN and €36.6 million for Vodafone. Initially, KPN and Vodafone argued that these fees were too high, while their competitor Orange argued they were too low (Poort & Gerritsen, 2007, p. 2). KPN and Vodafone did not, however, challenge the fees in court. When the MVNO Tele2 did challenge the extension in court, KPN and Vodafone ended up supporting the extension and the underlying study. In its ruling, the Court of Rotterdam concluded that SEO had studied, in a careful and extensively documented way, what a market based compensation would be. Tele2 had not proven this study to be flawed and had not provided any new insights that would urge one to abandon the starting point for valuation. Nor did Tele2 make its claim convincing that the licence fees were much too low.

[142] See: http://www.internetconsultatie.nl/eenmaligbedraggsm. Since this consultation took place before the auction, the annex was an earlier version of the report, without the actual extension fees.

Therefore, the Minister could base the fees on the studies by SEO (Rb. Rotterdam, 2009).

9.4. Conclusion

As in the case study in Chapter 8, the role of economic research in this case study is normative in principle within boundaries set by legislation and policy. However, these boundaries are no obstacle, since they are aligned with the normative economic framework. As the transition from the old to the new licences could be arranged in mutual agreement, licensees declined an extension to acquire their expensively obtained licences without costly delay and did not challenge the methodology. The methodology for setting fees for extending the 1800 MHz licences in 2010, which shared the same conceptual economic foundation, was challenged in court but ultimately accepted.

10. Measuring the welfare effects of public television

10.1. Research question, approach and outcomes

The paper in Chapter 10 is based on an unpublished policy report for the public Dutch broadcasting associations AVRO, NCRV and VARA. There was no call for proposals.

The background of the study was that traditionally, membership numbers of public service broadcasting (PSB) associations have been the primary measure for the amount of government funding (and airtime) they receive. However, being a member of a PSB association is losing its appeal and significance rapidly: after a peak in 1992, when 62% of Dutch households were members, by 2014 membership had decreased to only 46%. Even those figures are likely to be overestimations, since one household can have more than one membership. Moreover, official membership counts are flattered by preceding campaigns by PSB associations to increase their membership. The aim of the study was to investigate alternative ways to measure the involvement with, and impact of, public broadcasting. Based on an explorative analysis of data that are currently collected for public and commercial programmes in the Netherlands, the article in Chapter 10 outlines the theoretical foundations and preliminary outcomes of an alternative approach.

The methodology that is proposed operationalizes the social impact of television programmes in terms of their contribution to social welfare. By proposing this as a measure for the allocation of budgets, it tallies with the

normative economic framework. After all, it implies that funding should be based on the welfare economic effects PSB associations create with it, taking differences in perceived quality and involvement (expressed through viewing from recording devices and catch-up TV) into account.[143]

10.2. Follow up and policy impact

The report has not been published but was presented for representatives (mostly chairpersons) of the public broadcasting associations. The outcomes for individual programmes were often in line with their own perception of their impact or importance, and the study yielded overall indications that public programmes were slightly more successful in creating impact in terms of welfare effects than commercial programmes.

Nevertheless, the study was met by some with considerable scepticism. Certain representatives of PSB associations were uncomfortable with this 'technocratic' approach, which they felt lacked transparency and reduced their autonomy in deciding which programmes were important or impactful. Also, taking the average income of viewers into account, something that is hardly controversial in welfare economics, was felt to be at odds with the mission of PSB, to be 'for everyone'. One might conclude that those who preferred different albeit unspecified norms to prevail did not easily accept the normative economic framework that was proposed. One might also suspect more prosaic strategic motivations for being sceptical from those who were still successful in attracting or retaining members. All in all, there was insufficient backing to advocate this framework in favour of membership criteria and no tangible follow up was given to the study. Since the report has not been published, no media attention was generated.

10.3. Conclusion

This brief analysis of the case study illustrates that what conceptually may have been the most normative study of all, has so far been the least successful in terms of impact. As yet, media policy and economic efficiency as a normative concept do not seem to go together well. Nevertheless, this may gradually change: membership numbers as a criterion for funding is increasingly problematic, so the need for an objective alternative measure remains. In a recent report, the *Raad voor Cultuur* (Council for Culture) advises to abandon membership numbers as a hard criterion for access to the public broadcasting system (Raad voor Cultuur, 2014b, p. 9). In sync with

[143] As is argued in Chapter 10, this does not automatically imply a justification for funding or an assessment of the optimal amount of funding.

the case study in Chapter 10, it stresses that membership numbers are falling and are becoming outdated and writes: "A more present-day model will have to be found" (Raad voor Cultuur, 2014, p. 70). Therefore, the challenge to provide an alternative and more or less objective criterion for the distribution of funding and airtime is not likely to go away in the near future.

11. Conclusions

Nine case studies have been analysed to investigate the role of empirical economic evidence in the fields of copyright, telecommunication, and broadcasting. These case studies address different research questions and use different methodologies, ranging from simple fact-finding supplemented with economic analysis, to more abstract econometric analysis and modelling. Nevertheless, all these case studies share an economic foundation and the objective of contributing to policymaking by providing empirical economic evidence.

Given the rather limited number and wide variety of cases studied, the assessment in this chapter is kept mostly factual and descriptive and the conclusions of this assessment are inevitably tentative. Having said that, a first observation to be made from the case studies is that there seems to be no clear correlation between the economic methodology used in a study and the impact or acceptance of the results. Secondly, there are no indications for a correlation between the media attention for a study and its impact on policymaking. Some topics, in particular anything to do with unauthorised file sharing, always seem to welcome wide media attention, regardless of their policy impact. Other topics, for instance those in Chapter 2 (on universal services for disabled end users), Chapter 3 (on a fixed price for e-books), and Chapter 8 and 9 (on the calculation of extension fees for radio and telecommunication) had a very direct and discernible impact on policy but kept a very low profile in the media.

As was set out in Chapter 1, the role of economics in policymaking or court rulings could on one extreme be normative, in line with the 'moral principle' or 'ultimate goal' of economic efficiency or wealth maximization as advocated by Posner and Teulings *et al*. In such a role, economic analysis would point the way towards which policy choices or rulings should be made, in order to maximise social welfare. At the other extreme, the role could be a purely descriptive, positive one, providing evidence for others to weigh, or assessing the implications of policies or measures proposed by others. This is more in line with Mackaay's (2000) plea for empirical work by lawyer-economists. In such cases, legal or social norms maintain the upper

hand as guiding principles. Naturally, there is also a middle ground, on which economic research is called upon to maximise social welfare within the confines of predetermined, non-economic policy objectives or when the normative economic position is considered along with other normative positions.

In the case studies presented and studied in this thesis, economic analysis hardly ever lives up to any purely normative ambitions economists may have. The study to measure the impact and welfare effects of public television (Chapter 10) probably came closest to a normative economic analysis, but was met with scepticism for the same reason and so far it has had no observable impact. Most of the other studies in this thesis have been commissioned and in this process, the policy objectives within which the analysis had to fit were a given. In the policy domains studied here, it remains mainly up to politicians to determine the normative goals and to set the policy objectives. The studies in Chapter 8 and 9, about setting licence fees for spectrum renewal could be considered normative in the sense that the economically most preferable methodology for setting fees is requested, but this endeavour takes place within the confines of a regulatory framework and a policy background which is not subject to economic scrutiny. Only since the regulatory framework and the normative economic framework are aligned, has the economically preferable outcome also become feasible from a regulatory perspective.

Of course, this observation could be turned around and claimed to be a triumph of normative economics for becoming embedded in the regulatory framework. Moreover, even in cases when the policy objectives are a given and not subject to economic analysis, there is often room for introducing economic efficiency arguments, as was shown in Chapter 2, in the recommendations for how to implement the Universal Services Directive for disabled end users, and in Chapter 4, in the recommendations based on the study into unauthorised file sharing.

In other cases, economic research was all about providing evidence or finding facts and providing recommendations was even explicitly excluded from the assignment. Yet this does by no means render economic analysis useless. On the contrary: in such cases, policymakers and lawyers require economic analysis and economic evidence to make an informed decision about new policy measures, to make optimal decisions within existing legal boundaries, and to fathom the consequences of proposed legal interventions. In the absence of clear evidence, for instance, in relation to the effectiveness

of measures, effectiveness can and will be assumed or denied an article of faith as was seen in the discussion on the fixed price for print books (Chapter 3), but also in the discussion on the Auteurscontractenwet (Chapter 7) as well as in the first court rulings that ordered blocking access to The Pirate Bay (Chapter 6). The historical comparisons in this chapter suggest that the role of economic evidence in the field of information law is increasing and that there is a trend towards evidence based policymaking. The cases here indicate that telecommunications is leading the way in this respect, while media policy is still struggling. However, the increasing role for economic evidence does not mean that it will always be accepted easily: The valuation of radio licences (Chapter 8), for instance, has been contested up to the highest Dutch court, even though the methodological economic principles have not been challenged and any evidence in the economics of copyright can be sure of opposition and controversy.

Despite all this, most of the case studies showed that economic analysis and economic evidence are requested *and* weighted in policy decisions. In this positive role, economics appears to be increasingly successful and inevitable, more so than in a normative role. Does this make economics, to paraphrase John Locke, the handmaiden to political and legal decision-making? Maybe so. But by playing this role, economics may accomplish its normative ambitions after all.

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