Czech University of Life Sciences Prague

Faculty of Economics and Management

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Diploma Thesis

Economic Analysis of Internet Piracy in the Czech Republic

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DIPLOMA THESIS ASSIGNMENT

Petr Skála

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1. Introduction
2. Objectives of thesis and methodology
3. Literature overview
4. Analysis of Risk Related to Piracy
5. Tools for Mitigation of Internet Piracy
6. Conclusions
7. Bibliography
8. Supplements

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Bibliography:

References
Software Piracy Exposed / Paul Craig, Ron Honick, Mark Burnett (Editor)

Peer-to-Peer systems and applications / Ralf Steinmetz, Klaus Wehrle

Data sharing using a common data architecture / Michael H. Brackett

Česká protipirátská unie - http://www.cpufilm.cz/index.html

Economical aspects of software piracy / Jan Nemrava - http://209.85.135.132/search?q=cache:uo-TN8btTLkJ:nemrava.gasttour.cz/publikace/hp911-nemrava.pdf+peer-to-peer+network+czech+pirates&hl=cs&ct=clnk&cd=3&gl=uk

A Behavioral Model of Digital Music Piracy - http://papers.ssrn.com/sol3/papers.cfm?abstract_id=527344&rec=1&srcabs=511763

Sdílení.cz - http://www.sdileni.cz/phprs/view.php?cisloclanku=2005072301

P2P pirates - http://www.cbw.cz/en/p2p-pirates-/4551.html

Business Software Alliance - http://www.bsa.org/country.aspx

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Head of the Department

ČESKÁ ZEMĚDĚLSKÁ UNIVERZITA V PRAZE - Provozně ekonomická fakulta

Dean

In Prague: 22th December 2008

Declaration

I declare that I have worked on my diploma thesis titled "Economic Analysis of Internet Piracy in the Czech Republic" by myself, and I have used only the sources mentioned at the end of the thesis.

In Prague on 20 April, 2011 _____

Petr Skála

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Ekonomická analýza internetového pirátství v České republice

Economic Analysis of Internet Piracy in the Czech Republic

Souhrn

Diplomová práce se zabývá online pirátstvím. Teoretická část popisuje zrod online pirátství, který je spojován se vznikem P2P sítí. Také zmiňuje vývoj online pirátství a současné problémy týkající se internetového pirátství. Dále líčí, kdo jsou piráti a proč se této činnosti věnují. Odhady míry pirátství a utrpěné škody jsou zmiňovány v celosvětovém měřítku, a to v oblastech týkající se software, filmů, hudby a her. U všech těchto oblastí byly poskytnuty nejnovější možná data.

Praktická část mapuje online filmové pirátství v České republice, neboť autor této práce zjistil, že nelegální filmové kopie jsou stahovány v Čechách ze čtyř shora uvedených oblastí nejvíce. Analyzována jsou rizika spojená s pirátstvím a nástroje pro zmírnění internetového pirátství. Hlavním cílem této práce je demonstrovat vybrané socioekonomické determinanty, které by mohly ovlivňovat pirátskou činnost. Proto byl proveden průzkum, jehož nástrojem je dotazník. Hlavní výsledky se týkají postojů pirátů vůči riziku spojeným s pirátstvím, výpočtu celkového odhadovaného počtu online filmových pirátů a celkového počtu filmových pirátů v ČR založeném na výsledcích dotazníku, a dvou regresních analýz. Tyto analýzy zkoumají důležitost čtyř determinantů; a to věku, vzdělání, příjmu a pohlaví; a jejich vliv na stahování a ochotu zaplatit za originální DVD pod podmínkou zanechání pirátské činnosti týkající se stahování nelegálních filmových kopií.

Klíčová slova:

Bittorent, Česká republika, online filmové pirátství, nelegální filmová kopie, porušení autorského práva, postoj vůči riziku, P2P sítě, stahování, uploadovací server, riziko spojené s pirátstvím

Summary

The diploma thesis deals with online piracy. The theoretical part describes the origin of online piracy that is connected with P2P networks, its development, and current issues of internet piracy. Furthermore, it indicates who the pirates are and what the reasons behind their activities are. Piracy rates estimates and incurred losses due to piracy are demonstrated worldwide on software, movie, music, and game industries where the latest possible data is used.

The practical part concentrates on online movie piracy in the Czech Republic because of its prevalence. Risks related to piracy and tools for mitigation of internet piracy are analyzed. The main aim of the practical part is to demonstrate chosen socioeconomic determinants that may affect piracy involvement. Therefore a research was conducted and a questionnaire was used as its tool. The main results refer to the pirates' attitudes towards risk, usage of sample size calculator to find out the estimate number of movie online pirates and total number of movie pirates in the Czech Republic based on the questionnaire, and two regression analyses. These analyses dwell on the influence that age, gender, income, and attained education have on downloading and the willingness to pay for a legal DVD in order to stop downloading illegal film copies.

Keywords:

Attitude towards risk, bittorent, copyright infringement, Czech Republic, downloading, file hosting service, illegal film copy, online movie piracy, piracy risk, P2P network

CONTENTS

1. INTRODUCTION

Approximately until the end of the 20th century, the word piracy was mainly used within two contexts. The first was connected with maritime piracy. The second was associated with counterfeiting of consumer goods. Since 1999, this word has been used more and more in yet another connotation. A new possibility of piracy emerged thanks to technological inventions and a term *internet piracy* started to be used in the following years more frequently. Internet piracy is mainly used in the sense of unauthorized copying – downloading and uploading.

Not so many years ago, unauthorized copying was connected with physical exchange of floppy discs, CDs, and later on DVDs. Another option of obtaining a pirated copy was intentional or unintentional buying. Sometimes an original and the pirated copy look so alike that it is not easy to distinguish the original from the pirated copy. The most usual materials that are pirated are: audio files, video files, software, and games. There are different kinds of pirated material as well, but the aforementioned types are the most frequently pirated types.

Later on, CD and DVD burners started to be sold in the market. This helped piracy to proliferate immensely. Therefore the opportunities of intentional and cheaper buying of pirated copies of original CDs and DVDs started to be more frequent. Concerning the Czech Republic, burners were still too expensive to buy in the early 2000s and not many people had a burner at home. Nowadays, it is a standard equipment of any computer. Due to the Internet and its increasing speed, another way of piracy emerged. Moreover, inexpensive high capacity media storage facilitate further dissemination.

The Internet allows various products to move from one computer to another without any need of physical exchange. If someone decides to digitize a CD or DVD into a computer, the copy can be thanks to the Internet sent to infinite number of users, or uploaded and then downloaded by any internet user. Thus, the circulation of a pirated material is very fast and damaging to the concerning industries and economies.

Nowadays, the Internet has become the main source of illegal digitalized data and mainly software and entertainment industries are losing large sums of money because of internet piracy. Internet piracy has become a worldwide problem and countries all over the world try to limit the piracy rate as much as possible.

2. OBJECTIVES OF THESIS AND METHODOLOGY

Objectives of the thesis

The main aim of this paper is to demonstrate chosen socioeconomic determinants that affect piracy involvement. The practical part deals with movie internet piracy in the Czech Republic, and therefore the hypothesis was set up to be: The older the person is the less the person downloads illegal film copies, and men tend to download more than women. Partial objectives are as follows:

1) Finding who the pirates are and their reasons for the downloading activity
2) Finding attitude towards risk of these pirates based on the probability of being caught
3) Demonstrating the importance of chosen socioeconomic determinants in piracy behaviour
4) Recommendations concerning future limitations of online piracy behaviour

Methodology

The basic step for elaboration of the thesis was to acquaint myself with the literature covering internet piracy. As the piracy incorporates various areas of pirates' interests, the author analyzed in the practical part the movie piracy concerning the Czech Republic as this sphere of piracy is one of the most prevalent. Synthesis and deduction was employed in the literature review.

To obtain data that might be to some extent interpreted for the whole population, a research was conducted. A quantitative research was chosen as a method of the research and questionnaire as its tool. Descriptive approach is applied throughout the paper with comparative methods used. Further, regression analysis is used to demonstrate the importance of chosen socioeconomic determinants that affect piracy behaviour. A sample size calculator is used concerning the downloaders' age to find out the estimate total number of online and total number of movie pirates in the Czech Republic.

3. LITERATURE OVERVIEW

3.1 Intellectual property, copyright

The Internet is changing access to information fundamentally. World Wide Web enables us the access to enormous amount of information. Information technology that provides us this access also raises principal issues concerning the intellectual property because it enables and facilitates legal and illegal copying (The Digital Dilemma, 2000, ix). To prevent any misunderstanding, it is essential to clarify the meaning of the intellectual property.

> *Intellectual property* (IP) refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. Intellectual property is divided into two categories: "Industrial property", which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and "Copyright", which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Rights related to copyright include those of performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programs (WIPO, 2009).

First of all, it is necessary to distinguish intellectual property from physical property. A CD is a piece of a physical property, but the songs on the CD are intellectual property. That means that a customer can purchase a CD in a record store, but someone else has the copyright to these songs on the CD. This paper deals with internet piracy, and thus the physical property is not examined.

Three major distinguished types of the intellectual property are: *creative works* (music, books or any written material, movies, and software), which are protected by copyright law); *inventions*, protected by patent law; and *brand-name products*, which are protected by trademarks (Torr, 2004).

Data (pictures, music, films, games, etc.) on the Internet is digitalized. Information conversion into the digital form has its positives and negatives. The main positive might be seen in the publicity of the information itself, which is sometimes connected with the possibility of selling the product or the service. The digitalization brings this information to consumers, but it entails the problem of rewarding those who created and published it. The

problem that arises with the publication of some data on the Internet is the control of redistribution and downloading to motivate authors, inventors, and publishers (The Digital Dilemma, 2000, 3).

3.2 Internet piracy

This brings us to the topic of internet piracy. The name *piracy* in this sense originated from the name of illegal radio stations, which were located on ships that were anchoring in international seas (CPU (a), 2009). "Internet piracy is the unlawful distribution and/or reproduction of a copyrighted digital file" (Hill, 2009). Piracy is connected with violation of copyright law. The companies facing this problem are usually entertainment or software industries. The main areas connected with internet piracy are: audio files, video files, software, and games. It is important to remark what copyright is:

> *Copyright* is a legal right that protects creative works from being reproduced, performed, or disseminated without permission of the copyright owner. Essentially, a copyright gives its owner the exclusive right to make copies of the material in question (Torr, 2004).

3.2.1 History of internet piracy

The history is connected with a program called Napster, and it is described aptly by Mr. Waters:

> In June 1999 a US teenager wrote a computer program that turned the music industry on its head, and created shockwaves that are still being felt by the global entertainment business a decade later (Waters, 2009).

This program was created by Shawn Fanning in 1999. It was an online music service, and the users were enabled to trade digital music files. This program used a technology that is nowadays very well known for the use of downloading files. The technology is known as peer-to-peer (P2P) file sharing. This technology enables linking of computers all across the network. Thanks to this system, the Napster users were able to share their music files with the network users and could download a copy of a music file that was in this network. In July 2000, Napster claimed to have over 20 million users (Torr, 2004).

> By letting friends swap MP3 tracks, perfect digital copies of music, Napster made the casual copying and exchanging of music among friends into a global, automated and simple process that threatened the music industry, whose business model was in no way geared, or even prepared, for the digital online age (Torr, 2004).

This huge following of sharing music files raised many eyebrows, and Napster became the subject of a huge controversy over online file sharing. The unprecedented aspect of Napster was the access to apparently unlimited choice of music, and on the top of it, for free (Torr, 2004).

When internet piracy started to be discussed in a connection with Napster, many users and fans of Napster argued that Napster is not a tool for stealing, but for music sharing. Obviously, Recording Industry Association of America (RIAA), which is a trade group that represents the U.S. music industry, was against Napster's practices. What followed in December 1999 is obvious. Several record labels decided to file a suit against Napster. After couple of months of hearings, Napster was finally shut down in July 2001 (Torr, 2004).

Several other file-sharing services emerged afterwards. Some were not that popular, while others like Scour, Grokster, Morpheus, and Audiogalaxy were subjected to copyright-infringement lawsuit. After Napster, the most popular file-sharing service was Kazaa. This service enabled users not only to share their music, but even movies and software. RIAA and other organisations that were representing the music industry blamed online file sharing for 26 per cent fall in the global sales of CDs in the period between 1999 and 2003 (Torr, 2004).

The main "weapon" of Kazaa and other successors of Napster was the use of more decentralized P2P networks in comparison to Napster. That meant that one could not eliminate these services by shutting down a few servers as it happened with Napster. As a consequence of these technological innovations, the music industry had to change its stance to these P2P networks. The industry began to focus on individual file sharers rather than on P2P networks itself. Thus, many users were sued. In September 2003, RIAA filed lawsuits against hundreds of Kazaa users. RIAA dropped these lawsuits only due to the signings of affidavits promising to never ever share copyrighted music online (Torr, 2004).

It is argued that the music industry should not have taken such a strict stance against online file sharing, and that it should engage in digital music itself. Nowadays, there are

many legal online music stores that sell songs for a reasonable price. Many people are actually willing to pay for such service. However, the price is still too high for others. Music online stores partially fix some losses that are predominantly caused by online piracy, but the incurred losses are high.

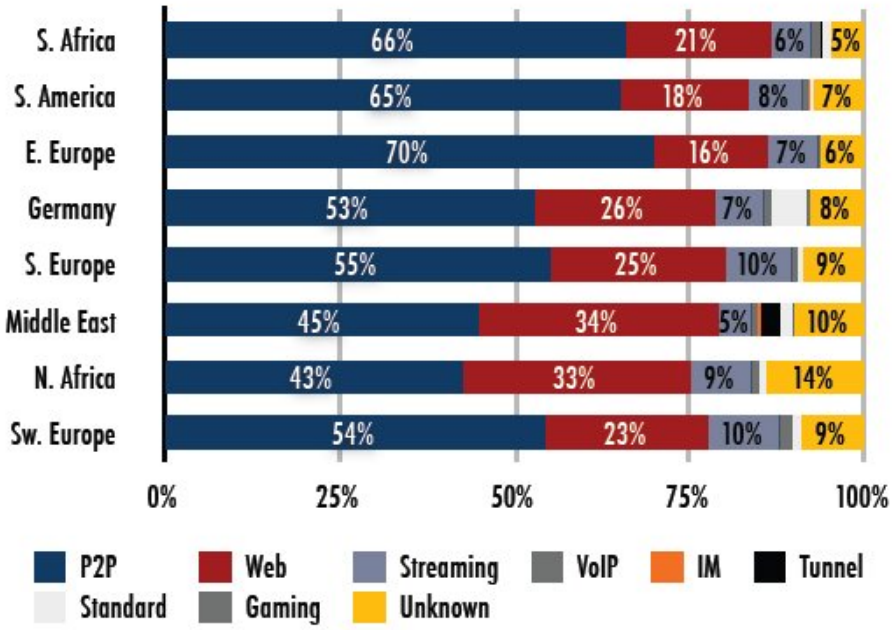
3.2.2 Current issues of internet piracy

Internet piracy is nowadays mainly connected with file hosting services and P2P networks. As Ghazi writes in his article related to piracy, about half of all internet traffic might consist of illegally transferred files (Ghazi, 2010, p. 4). This was mere science fiction at the beginning of the 21st century.

P2P networks

Nowadays, peer-to-peer (P2P) file sharing networks and file hosting services are the main sources of illegal data, and P2P is the main "enemy" (Price, 2011, p. 1). "P2P data currently represents 44 per cent of all consumer traffic over the Internet" (MultiMedia Intelligence, 2010). According to Ipoque, an analysing company, the traffic is in the majority of the monitored areas even higher.

Graph 1: P2P traffic on the Internet in 2007



Source: Ipoque, 2009, p. 2

Ipoque, monitored 850 000 users in these eight regions for two weeks. These results demonstrate that the P2P traffic on the Internet is substantial. It can be seen that the three areas with the highest P2P traffic – S. Africa, S. America, and E. Europe – are regions connected with lower per capita income.

P2P network is a system that enables its users to share files directly among themselves. It can be centralised or decentralised. The centralised network has a central server and the latter does not. Servers can be shut down, but the only possibility how to deal with users of a decentralised peer-to-peer file sharing network is by filing suits against them (techFAQ, 2009).

If you want to be a user of a peer-to-peer network, you need to have some file sharing software. Amongst the most used file-sharing software belong the ones that are for free and simple to use. Some of the most frequently used software is: *Limewire*, *BitComet*, *uTorrent*, *Frostwire*, *Mp3 Rocket*, and *BitTorrent* (P2pon, 2010).

As previously mentioned, this software is used mainly for swapping music, games, software, and film files. There is no problem in usage of multiple file sharing software.

After some time of using different file-sharing software, the users are able to guess what sort of file might be accessible on different networks (Mitchell, 2009).

In a P2P network, the time of the download depends on: the number of users who have downloaded the file and share it, the number of users who are downloading it, the bandwidth, and the size of the file. P2P networks are free of any charge.

Seeing the P2P networks as the main threat of internet piracy, one cannot say that even though if all illegal centralised P2P networks were shut down, it would sort out the problem. "As bandwidth continues to increase and compression technologies improve, users can continue to easily pirate songs (for example, emailing compressed songs to other users) even if centralized servers are shut down" (Gopal, 2002, p. 6). Still, that would not solve the problem of decentralised P2P networks. Whoever who wants to download some data from P2P networks is familiar with the word "torrent".

Torrents

A torrent is a small file (only about few kilobytes) that contains details of the desired file. The file has a suffix - *.torrent*. The torrent file contains the name of the file, its size, place where it can be downloaded, and other information (What-is-torrent (b), 2008).

Torrents can be found on many websites just by searching for word *torrent* or with the help of torrent search engines. Well-known search engines are: *torrentz.com*, *isohunt.com*, *mininova.org*, and *thepiratebay.org* (What-is-torrent (a), 2008). Torrents use a *BitTorrent* protocol which is the most common protocol for transferring files. This protocol enables users to "chop" the file that they want to download into many smaller parts. The parts that were downloaded by one user can be uploaded from him/her as well, and thus, the process of downloading is more effective and faster. The more people are downloading the same file, the higher the speed of the downloading. This is certainly one of the biggest pros of torrents. The largest disadvantage is connected with the illegality of this act. Uploading and downloading of files that are subject to copyright are uploaded and downloaded via P2P networks illegally.

File hosting services and its economics

These services provide servers where users can store huge amount of data. The users can download the data from these servers as well. The service is offered for free or for money. The main reason for subscription fee lies in the possibility of not being limited by the amount of downloaded data and especially in higher speed. These services have become very popular over the past few months not only thanks to the amount of the shared files, but due to the downloading speed as well.

Another huge pro to choose file hosting services for downloading of copyrighted material is that, however it might sound wrong, it might be legal. It depends on the laws of the particular country. Uploading of data that is protected by the copyright is illegal.

There are many file hosting services, and based on their traffic rank, five of them are among the worldwide top 100 web pages[1]. The only torrent site in the worldwide top 100 is *The Pirate Bay*, n. 85 (Alexa, February 26, 2011). *Megaupload*, a file hosting service, is number 55. To be able to imagine what means to be number 55, according to *Megaupload*, the page has more than 100 million registered users and other 45 million unique visitors every day (TorrentFreak (c), 2010).

The earnings of these sites come from two main sources. The first is advertising. Adverts are placed on the websites of many of these file hosting sites. The other financial source is the visitors of these sites who pay for membership, which guarantees the users better services. These are mainly represented by higher download speed, more downloads at the same time, and unlimited downloads per day without any waiting time[2]. Revenues of the owners of *Megaupload*, considering 100 million registered users and its 1 year premium membership that costs €59.99 might be substantial. That could be potentially up to the revenue of €5 900.99 million. Surely, the owners have to invest some of it back – especially into the storage capacities, which are getting bigger, and into its staff.

At some of these sites, its users can "enjoy" a scheme that is called reward programme. *Rapidshare* used to have this reward programme as well, but does not have it any more.

[1] Megaupload n. 55, MediaFire n. 58, 4shared n. 74, Rapidshare n. 93, Fileserve n. 95 (Alexa, February 26, 2011).

[2] Waiting time differs but generally, the more files you want to download a day as a free user, the longer the waiting time between the subsequent files that you want to download.

Rapidshare discontinued this programme because the site owners were scared of its legal consequences that might not have been too amiable. So how does this scheme works? To ensure that the users of these file hosting services will find what they are searching for, the owners of these sites have made a well-working plan. The terms and conditions differ among the file hosting services, but the idea remains the same. Generally speaking, the more people download the file that a user has uploaded onto these sites, the more money or free service the user will get. These are some of many examples concerning the money reward. *Filesonic* pays its users $6-30 for 1000 downloads of files (size 401-1024MB) and $8-35 for 1000 downloads of files (size 1025MB and more) that they upload (Filesonic, 2011). *Fileserve* pays $5-25 for files that are 450-2048MB (Fileserve, 2011). *Hotfile* pays $4-15 for 1000 downloads of files that have 100-2000MB (Hotfile, 2011).

Of course, these sites do not pay any copyright royalties or other fees. Therefore, there is huge amount of data on these sites that is uploaded there by its subscribers without the approval of the copyright owners. File hosting services are presently "winning" the legal battle. Their case is based on the fact that they are only providing the connectivity between the users and the storage capacity (TorrentFreak (c), 2010). Therefore they are not the ones who infringe the copyright law.

The reward programs are a very problematic issue. Is the reward program for people who have at least 1000 friends who want to download their photo album that has around 1000MB? That is questionable. Therefore it can be easily perceived as contributing to infringement. These reward programs should be prohibited, but first, the site owners should be sued and found guilty for contributory and vicarious copyright infringement because this service (reward program) facilitates copyright infringement.

3.2.3 Non-online spread of illegal data

Although that this paper's main aim is internet piracy, it is essential to at least briefly mention substantial non-online methods of production and dissemination of digitalized information that is copyrighted.

Gone are the days of the floppy disks that had very limited capacity comparing to present recording media. Today's computers have burners, and we use media like flash-

disks and external hard-drives, which have much higher capacity and speed of reading and writing.

Burners (CDs, DVDs)

Nearly every computer that is sold on the world markets has an optical drive (CD, DVD, Blue-ray, and HD-DVD readers and writers). These devices can be used for burning a CD or DVD. That exposes the market to illegally produced CDs and DVDs. Thanks to burners, any user can download a file into his/her computer, burn it on a media (CD or DVD), and give this disc to someone else.

Burners do not only help to get the illegally acquired data out of the PCs but into the computers as well. That is why new protective technologies that try to prevent the copying into the computers are on the rise. Unfortunately, not all of them are that effective as they were meant to be by its producers. Pirates are very creative and able to detect any mistake in the encryption. If a weak point is found by a pirate, the method fills the online pirate forums and the process of creation of a new encryption technology starts again.

Flash disks, external hard-drives

These devices can be used for secondary distribution. The capacity of these media has risen substantially in recent years. If someone lends his/hers flash disk or external hard-drive to someone, the latter "can" copy all the data from it into his/her computer.

3.3 Global overview of internet piracy

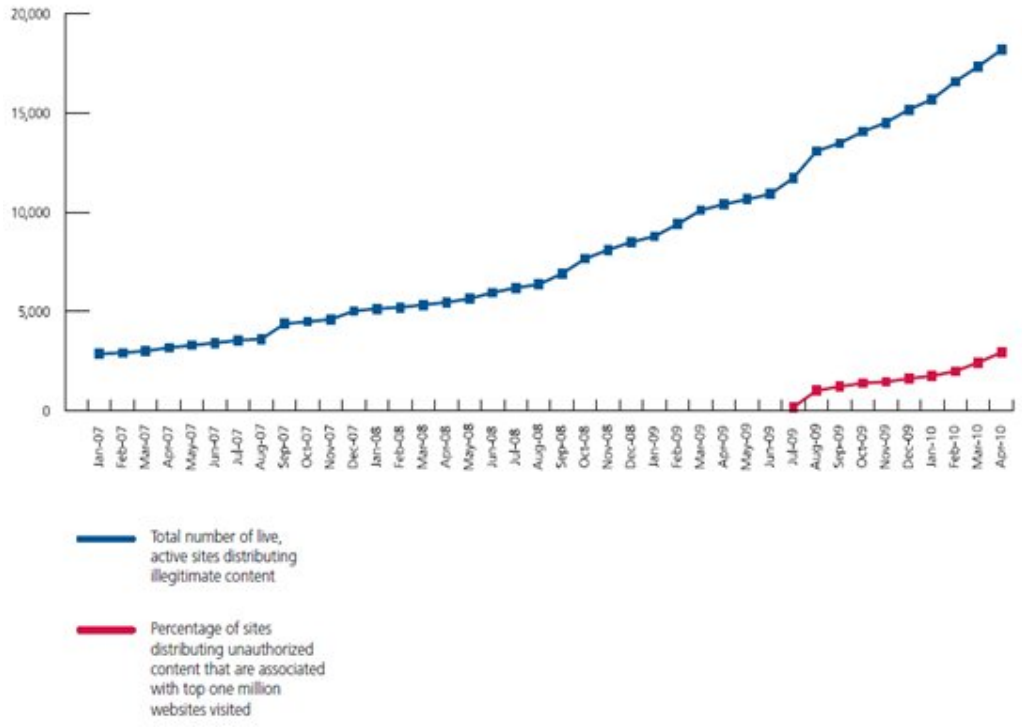
With Napster emerging on the Internet, internet piracy came into the limelight as a potential threat of copyright infringement. Since then, many years have passed by and piracy is even a more serious problem. Thanks to the technological improvements, the speed of internet connections has generally increased and so the number of its users (Internet World Stats (b), 2011). The number of pirates and pirated material is much higher as well. "More than three billion pirated files – music, movie, and software – are downloaded from the Internet each month, and such activity is increasing" (Shanahan –

Hyman, 2008, p. 1095). The founder and editor-in-chief of *TorrentFreak*, who uses a nickname *Ernesto*, writes about *BitTorrent* in 2005 compared to *BitTorrent* in 2010:

> *BitTorrent* landscape was totally different from what it is today. There were just a few hundred thousand files being shared, compared to the millions of files that are out there today (TorrentFreak (a), 2010).

The main reason is the escalation of the usage of P2P networks and file hosting services in recent years. This is shown in the following graph:

Graph 2: Number of live pirated content distribution sites (January 2007- April 2010)



Source: McAfee, 2010, p. 5

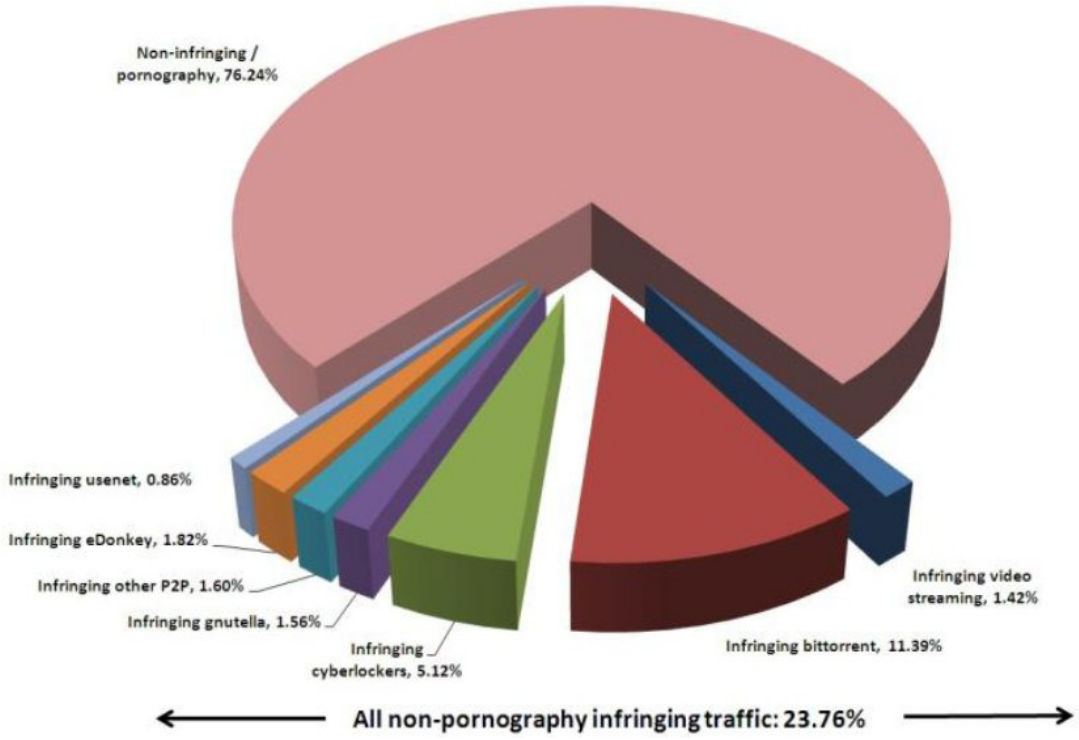
This graph clearly demonstrates that the amount of the sites containing pirated material has been constantly rising. In January 2007, there were about 3 000 sites distributing pirated content, and three years later it was about five times more – around 15 000. If the development continues in a similar way as in the above mentioned graph, there might be currently about 25 000 sites containing pirated material.

Another important factor is internet penetration and the speed of internet connection. Higher percentage of population has been using the Internet since the birth of Napster (Allaboutmarketsearch, 2010). Internet connections are generally faster as well. That enables more users to upload and download faster, and therefore it indirectly facilitates illegal downloading.

3.3.1 Infringing use of the Internet

Envisional, a monitoring company, made an estimate of infringing use of the Internet. As it can be seen in the following pie chart, the main places where users search for infringing data are file hosting services and P2P networks:

Graph 3: Estimate of infringing use of global internet bandwidth



Source: Price, 2011, p. 1

Some of the constituents of this pie chart were not previously mentioned. These are (from left) *Usenet*, *eDonkey,* and *Gnutella*; and they are all file sharing networks. As it can be seen in the previous pie chart, the largest share of infringing traffic falls within P2P

networks. These are in the chart: *Infringing Usenet* – 0.86 per cent, *Infringing eDonkey* – 1.82 per cent, *Infringing other P2P* – 1.60 per cent, *Infringing gnutella* 1.56 per cent, and *Infringing BitTorrent* – 11.39 per cent. Added up, P2P networks represent 17.23 per cent of the infringing traffic. *Infringing cyberlockers*[3] represent 5.12 per cent. The rest is *Infringing video streaming*, which counts for 1.42 per cent. *BitTorrents*' share of the total infringing traffic is approximately 50 per cent.

Concerning *Infringing BitTorrent*, Envisional monitored 10 000 torrents that had the most seeders[4] and leechers[5]. That means 10 000 torrents that were downloaded the most. The company estimates that 99.24 per cent of this material was subject to copyright, which means copyright infringing. About 85.5 per cent were video files.

Someone might expect that the level of copyrighted material might be substantially lower on *Infringing cyberlockers*. File hosting sites usually do not allow searching of stored content. Therefore, Envisional picked random sample of 2 000 cyberlocker links, and over 90 per cent of the analyzed content was copyrighted.

It is understandable that Envisional omitted pornography from the copyrighted material because it is very uneasy to discern copyrighted porn video from video that is not protected by copyright.

Obviously, this chart does not show illegal data transmissions with the usage of e-mails or social networks (e.g. Facebook. Twitter). However, that cannot be seen as a substantial shortage because concerning the amount of data sent via e-mails or social networks, the amount would be insignificant in comparison to P2P networks and file hosting services. Moreover, some files are so large that they could not be sent via these services, or the duration of the transmission would be too inefficient.

On the basis of this report, we can clearly see that the file hosting services and P2P networks are the main sources of illegally acquired copyrighted material.

[3] Also known as file hosting sites

[4] Seeders – users who have already downloaded the desired file/s and who enable leechers the possibility to download the file/s from them

[5] Leechers – users who are currently downloading the given file/s, but who have not downloaded the entire file

Number of torrent files on BitTorrent

BitTorrent has been holding its supremacy among P2P networks in recent years. In 2004, *BitTorrent* traffic made up about 50 per cent of all P2P traffic (Pouwelse et al., p. 1, 2004). As previously mentioned, Envisional's data even identified *BitTorrent* to make up about 50 per cent of the total infringing traffic in 2010. Because of that, it is very appropriate to mention the number of files that can be found using this application to give us a general outline of the amount of files that are available through *BitTorrent*.

There is nearly no information concerning the total number of infringing files on the Internet. The reason is simple. These files were all uploaded on the Internet illegally. Therefore, neither the pirates nor the owners of a file hosting service or a P2P network want to contribute to this statistic by counting these files and publishing it. Fortunately, Ernesto decided to publish information relating to *BitTorrent*.

As mentioned earlier, Envisional made an estimate of infringing use of the Internet. In this estimate, *BitTorrent* is being connected with about 50 per cent of the infringing use of the global bandwidth. Therefore, Ernesto's data can indicate the total number of infringing files/torrents that can be downloaded on the Internet.

Ernesto divided the torrents into the most frequent searched ones. The most frequent categories that can be found throughout the web as well as in this statistic are: audio, video, software, and games. This is the snapshot of *BitTorrent* at the end of 2010:

Table 1: Torrent files available publicly on BitTorrent

Category	Torrents	%	Data	%
Video	5,507,266	52.9	9,151.5 TB	76
Audio	2,215,469	21.3	845.0 TB	7
Software	975,192	9.4	334.4 TB	9.8
Games	340,416	3.3	657.8 TB	5.5
Other	1,377,560	13.2	1,049.3 TB	8.7
Total	***10,415,903***	***100%***	***12,037.9 TB***	**100%**

Source: TorrentFreak (a), 2010

The torrents exceed 10 million, and the video category has clearly the highest number of torrents. There were 2 012 432 films in this category. TV category falls within the video

category as well and had 1 011 607 torrent files. Therefore we can see that films and audio are the most wanted commodities on *BitTorrent* (TorrentFreak (a), 2010).

Ernesto also published the same categories, but the main monitored spheres were: number of seeders and number of leechers:

Table 2: Seeders and leechers on BitTorrent

Category	Seeders	%	Leechers	%
Audio	3,759,006	18.6	1,119,027	11.2
Video	12,857,328	63.6	7,337,257	73.5
Software	1,396,979	6.9	401,404	4.0
Games	737,688	3.6	412,812	4.1
Other	1,460,175	7.2	709,466	7.1
Total	***20,211,176***	***100%***	***9,979,966***	***100%***

Source: TorrentFreak (a), 2010

There were over 30 million peers[6] and more than 20 million were seeding a torrent. Unfortunately, this data provides only limited information. The number of seeders and leechers does not show us how many times a specific file was downloaded and gives us only a general outline. Moreover, it only shows us a part of the problem because *BitTorrent* is not the only P2P network, and another huge source of pirated material can be found on file hosting sites as well. Still, it points out that online piracy is rampant, and the number of people who partake in this activity is considerable.

3.4 Who are the pirates and why do they download illegal copies

3.4.1 Who are the pirates

Internet piracy is a theft and by doing so, the pirates are undermining innovations, jobs, and revenues that result from the legal activities that are being pirated (Ramayah – Chin – Ahmad, 2008). In fact, who are the pirates? In a book called *International software piracy: Analysis of key issues and Impacts,* Mr. Gopal and Sanders deal with this topic and come to the conclusion that:

[6] Peer – a seeder or leecher

> Studies have reported that females pirate less, older individuals (as opposed to younger college students) pirate less, and that individuals with an ethical predisposition towards legal justice (a primarily western notion; less important in the moral makeup of the eastern cultures) tend to pirate less (2002, p. 7).

These results are similar to those that were realised in the UK in 2009. UK-based IT services company Telindus surveyed 2 000 UK adults. According to their results "British men are much more willing to pirate online music and video content than women". This survey found out that "57 per cent of the 16-24 year old group said they were aware of where to find illicit digital goods". On the contrary, the same skills had only a fifth of adults (Cheng, 2009). This insinuates another Gopal and Sander's conclusion, namely that the older individuals pirate less.

Different survey, made in the UK as well, was questioning 3 000 Brits about their spending habits concerning music. Forty-two per cent of men admitted illegal downloading, and only twenty-nine per cent of women said that they download illegally (Slater, 2009). According to a research done by Sydney Jones in the USA, the main group that is most likely to download music and videos are teenagers, 18-32 years old, and 33-44 years old (2009).

Based on the aforementioned information, a person that has the highest chance to be amongst the illegal dowloaders is a teenager or young adult male. Although that the author of this paper is not aware of similar surveys regarding the Czech Republic, the results concerning age groups and gender depending on downloading and illegal downloading are believed to be very much the same. Men are usually more skilled technologically, and spending more time on computers "predestinates" them to higher inclination to upload or download pirated material. The generations born in the first half of 60s and earlier do not generally possess so many computer skills and therefore do not tend to belong among the main downloaders of illegal data. Nowadays, internet piracy is the fastest growing form of piracy and the most difficult to police (Andrews, 2005, p. 3-4).

3.4.2 Why do the pirates download illegal copies

As previously mentioned, the number of live pirated content distribution sites is constantly rising. Therefore there is still more and more download options for the pirates.

Moreover, it is "triggered by pricing and availability issues" (Tradearabia, 2010). Some people do not understand the availability issues until they try to download some illegally uploaded file. Then, they realize that there are millions of pirate files available online and that it might be easier to find an unlawful copy than a legitimate copy (Ferguson, 2010). Other important factors are desire for earlier access and that "everyone is doing it" (Fixmer, 2011). Especially considering films and TV shows, many people decide to download a film or a show because they can watch it earlier than they could if they bought a legal copy or if they had to wait for some TV station to televise it. Sometimes an illegal film copy can leak before its premiere as well. "High prices may contribute to the perception of being ripped-off", and such feeling can lead to a more positive attitude towards piracy (Coyle et al., 2009, p. 1033). To buy a legal CD or DVD is perceived by some shoppers as too expensive (Hill, 2011). For others, it is not expensive, but still, downloading almost "for free" is the better option for many. As it was mentioned regarding the *BitTorrent*, there is enormous number of illegally uploaded files that can be downloaded. It is very uneasy to run a legal and successive business and have such competitors as the P2P networks and file sharing services are.

3.4.2.1 Value of time – search cost, opportunity cost

The main economic incentive is saving money. There is a considerable financial issue – to buy a legitimate CD or DVD, or to download a pirate copy. If an individual decides to download some illegal file (music, movie, etc.), the time spent searching for the file represents the opportunity cost[7] for the individual (Fuller, 2010). The more time the person spends searching, the higher the opportunity cost. Unfortunately, the longer the pirate spends by searching the Internet for music, films, and other files; the shorter it takes to find the desired file as the user has "learnt" that by web searching. Therefore his/hers opportunity cost lowers with the time the person spends searching various networks and sites. We can for example liken *BitTorrent* to Tesco. Using *BitTorrent* every weekend is like going to Tesco every weekend. The more you go there, the easier and faster you find the desired product/s.

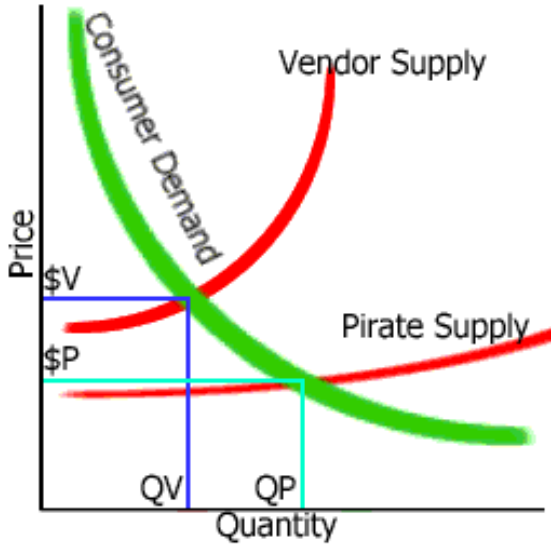
[7] The cost of an alternative that must be forgone in order to pursue a certain action. Put another way, the benefits you could have received by taking an alternative action (Investopedia (b), 2011).

3.4.2.2 Supply and demand

Supply and demand is one of the main concepts in economics and this concept drives piracy as well. However, in the case of piracy it is not only the producers who are a part of the supply chain, but pirates as well. The pirated material does not represent a redistribution of already manufactured material but it entails production of additional goods/copies that are unauthorized (Self, 2001).

In economics, *demand* represents the number of a given product that will be purchased for a set price. *Supply* represents the number of a product that will be produced for a specific price. Pirated material is nearly the equivalent of the original. Still, it is very uneasy to call it a substitute because it is "the same" product that has usually some minor deficiencies. Functionally, it is identical or nearly identical and depending on the product, it can have up to 100 per cent of the characteristics of the original. The pirated copy usually lacks some benefits (e.g. manuals and further support) and bears risks (e.g. criminal liability, possibility of viruses in the copy, involuntarily downloaded file than the wanted). "The two products have independent supply and demand curves. The relationship of these curves determines the real effects of piracy" (Self, 2001). The relationship can be seen in the following graph:

Graph 4: Economic supply and demand



Source: Self, 2001

It can be seen that the pirate supply curve is right shifted from the vendor supply, and thus, it is connected with lower price and larger quantity. The lower the price, the higher the consumers demand. If we consider the amount of possible downloads, pirate supply is just as unlimited as the legitimate one, but the price differs, and therefore, the quantity differs as well.

As mentioned previously, the pirated copy is connected with risks and usually lacks some benefits. That is the main reason behind the lower price of the pirated material in comparison to its original. That takes us to the conclusion based on the market economic principles. Some people might argue that the pirate supply means less legitimate buyers and therefore higher price. However, it is vice versa. The cost of a product in a market where piracy is present will be always lower than in a market without piracy. Piracy is so highly competitive market that the legitimate producers and sellers have to lower their prices to attract customers. Needless to say, it is usually connected with lowering the profit margins of the legitimate producers and sellers (Self, 2001).

The best would be to demonstrate the theory on real life. "In 2008, the worldwide monetary value of unlicensed software losses to software vendors – was $53 billion" (BSA-IDC (a), 2009). Nearly one-third of these losses is connected to Asia-Pacific region. That is the main reason of the software products large discounts in the Asia-Pacific region. Therefore prices of "legal copies of MS Office in the region sell at 50% or greater discounts to prices in the US or Western Europe" (Self, 2001).

As Mr. Gopal, Sanders and others describe in their document, piracy rate is mainly interconnected with the price of the product that is being pirated. Their answer covering this topic is that:

> In the domain of software piracy, [...] increasing software prices are generally correlated with increased piracy behaviour [...]. [...] The economic rationale is that as the price increases, the net value from obtaining an illegal copy increases, and hence the negative impact of price on piracy (Gopal, 2002, p. 4, 9).

In the case of music, people tend to be more willing to pay for known songs because the unknown songs possess very questionable value (Gopal, 2002, p. 9). Therefore, the most downloaded songs of legal online stores are the biggest hits.

3.4.2.3 Impulses for piracy

As mentioned, the search costs and price are very important for pirates. These are both very important financial considerations. Software programs like *AutoCad* or *Windows XP Pro* would cost the end users in the Czech Republic couple of thousands Czech crowns. Illegal download of such programs can save a considerable amount of money.

Apart from that, piracy behaviour is influenced by technological, ethical, and legal/sanction considerations (Gopal, 2002, p. 3). Another reason behind "being a pirate" might be the endeavour to "go against the system". People sometimes like doing what is prohibited so that might be another driving force for some.

According to the authors of a document *A Behavioural Model of Digital Music Piracy*, the key technological factors are "the growing pervasiveness of the Internet, rapid adoption of broadband technology, write-able CD technology, and the emergence of better compression technology" (Gopal, 2002, p. 3). The technological influence can be demonstrated on music. Thanks to the compression, the WMA format (the common format of music at CDs) is converted, by majority of PC users, into MP3. Nowadays, CD players are more or less part of history, and people listen to music on different types of portable devices. CD players are too big and have incomparably lower capacity in comparison with MP3 players. The most usual portable devices that are used for listening to music are mobile phones and MP3 players. The compression enables to store more songs into these devices. By this process, the quality is lowered, but the difference is almost indistinguishable. An MP3 song can be easily transmitted over the Internet and into an MP3 player from a PC. This is a huge drawback of CDs and "a thorn in the flesh" of the music industry. People all around the world like listening to music on their way to school, work, or other places. The MP3 format enables them to have a greater choice of music, because more files can be stored into the device that they use.

Ethical considerations are amongst the impulses for piracy as well. The ethical consideration is the reason for and against piracy at the same time. The view-points differ considerably. The best would be to demonstrate that on an example. As written before, RIAA is the trade group that represents the U.S. recording industry. Its mission is to foster a business and legal climate that supports and promotes their members' creative and

financial vitality. It is necessary to mention, that its members are the record companies. If you visit RIAA's pages you can read there:

> [...] it's a too benign term that doesn't even begin to adequately describe the toll that music theft takes on the many artists, songwriters, musicians, record label employees and others whose hard work and great talent make music possible. [...] Across the board, this theft has hurt the music community, with thousands of layoffs, songwriters out of work and new artists having a harder time getting signed and breaking into the business (RIAA, 2009).

To show the other side of the coin, this is what Robin Peckhold, a member of a US band called Fleet Foxes, said about piracy:

> I've downloaded hundreds and hundreds of records - why would I care if somebody downloads ours? That's such a petty thing to care about. I mean, how much money does one person need? I think it's disgusting when people complain about that, personally (Youngs, 2009).

He also mentioned that it had made it easier for musicians, including him, to discover lots of classical music that has influenced and inspired them. He said about illegal downloading:

> That was how I was exposed to almost all of the music that I love to this day, and still that's the easiest way to find really obscure stuff. I've discovered so much music through that medium. That will be true of any artist my age, absolutely (Youngs, 2009).

In this particular case, the author holds the view that the illegal downloading helped him in his musical development. He perceives the possibility of "boundless downloading option" as a great way of discovering various music genres that he would not find not having the option of downloading it illegally. Therefore we can see that some people, even the ones from musical business, do not perceive the illegal downloading as unethical. Some people do not consider this behaviour to be in conflict with their values, and therefore, they consider it being more or less appropriate.

However it might sound wrong, if a pirate considers that his crime is very unlikely to be punished, or if s/he perceives the illegal activity still profitable despite some punishment, a

badly functioning retributive measures or a bad legal system can be actually very favourable for pirates.

3.5 Organisations fighting piracy and their piracy rate estimates

There is no organization or a legal body that would work as the surveillance authority over piracy. The main organizations that, amongst other activities, monitor worldwide piracy are: *Motion Picture Association of America* (MPAA), *Business Software Alliance* (BSA), *Recording Industry Association of America* (RIAA), Inte*rnational Federation of the Phonographic Industry* (IFPI), and *Entertainment Software Association* (ESA). MPA monitors the movie market, BSA the software market, IFPI with RIAA the music market, and ESA the video games market. Unfortunately, ESA does not calculate incurred losses or the piracy rate due to internet piracy and offers only generalized information. Still, ESA's statistics are not used in this paper because ESA deals with video game consoles, such as the Play Station or the Xbox, and the main aim is to concentrate on data that is used in computers.

Apart from these organisations, a very important alliance whose main aim is to enforce and protect copyright is *International Intellectual Property Alliance* (IIPA).

The main industries that are covered in the following part of this paper are: movies, software (under software are included games as well), and music. Other industries that are amongst the main pirated materials are TV shows and porn. Porn is not included in these calculations because many monitoring companies find it difficult to discern copyrighted from what is not protected by copyright. TV shows are not mentioned as well because the available data is inadequate.

3.5.1 Motion Picture Association of America

Recent estimates point out that there are 130 000 illegal downloads of movies a day (Shanahan – Hyman, 2008, p. 1095). That would mean 47 450 000 films a year. MPA does not mention the range and expansion of worldwide piracy, but estimated that illegal streaming and film downloads accounted for 40 per cent of its piracy problem in 2009 (IFPI (b), 2010, p. 21).

Information from another source can indicate that films are one of the most pirated items on the Internet. As it was written in the section covering the infringing use of the Internet, the most infringing traffic on the Internet is via *BitTorrent*. *TorrentFreak.com* released a list of 10 most pirated films of 2010. Number one was *Avatar* that was downloaded by 16.5 million users. The whole list can be seen in the following table:

Table 3: Top 10 downloaded films of 2010 via BitTorrent

Rank	Movie	BitTorrent downloads	Total infringing downloads[8]	Worldwide grosses[9]	Cinema attendance estimate[10]
1	Avatar	16,580,000	33,160,000	$2,779,551,867	338,556,866
2	Kick-Ass	11,400,000	22,800,000	$96,130,432	11,708,944
3	Inception	9,720,000	19,440,000	$825,408,570	100,536,976
4	Shutter Island	9,490,000	18,980,000	$294,803,014	35,907,797
5	Iron Man 2	8,810,000	17,620,000	$621,751,988	75,731,058
6	Clash of the Titans	8,040,000	8,040,000	$493,214,993	60,074,908
7	Green Zone	7,730,000	15,460,000	$94,875,650	11,556,108
8	Sherlock Holmes	7,160,000	14,320,000	$523,029,864	63,706,439
9	The Hurt Locker	6,850,000	13,700,000	$48,612,915	5,921,183
10	Salt	6,700,000	13,400,000	$175,190,850	21,338,715
Total		***92,480,000***	***184,960,000***	***5,952,570,143***	***705,838,994***

Source: TorrentFreak (b), 2010

These are staggering numbers of downloads. Concerning *BitTorrent* downloads there is one highlighted film, *The Hurt Locker*, which was downloaded more times via *BitTorrent*

[8] Author's calculation – based on the Envisional's data that identified *BitTorrent* to make up about 50 percent of the total infringing traffic in 2010 (*Price, 2011, p. 1).*

[9] Worldwide grosses only include theatrical box office receipts (movie ticket sales) and do not include video rentals, television rights and other revenues.

[10] Author's calculation – based on average ticket prices in 26 countries, it was estimated that the worldwide average ticket price is $8.21 (Marquee Stars, 2010).

than seen in the cinemas. Concerning total infringing downloads, the movies K*ick-Ass, Green Zone,* and *The Hurt Locker* would be under given conditions downloaded more times that seen in the cinema.

As mentioned before, *Torrenfreak.com* made a "snapshot" of torrents on *BitTorrent* on a specific day at the end of 2010. The most torrents were in the categories video and audio, the total of 2 012 432 films under the video category (TorrentFreak (a), 2010). That actually does not mean that the pirates have the possibility to illegally download one out of more than 2 million films because particular film can be downloaded in various sizes and languages. For example, there are approximately 50 possibilities of downloading *Avatar* with a solid number of seeders and leechers. Still, that does not change anything about how serious this problem is.

Unfortunately, proliferation of online piracy leads to even more film swapping because a lot of people have a large number of films on their hard drives, and they usually own a flash disk or external hard drive, which makes it very easy to swap the films. It can be said without any hesitations that the total piracy rate would be considerably lower if the dissemination of the illegal film copies on the Internet was substantially limited.

3.5.2 Business Software Alliance

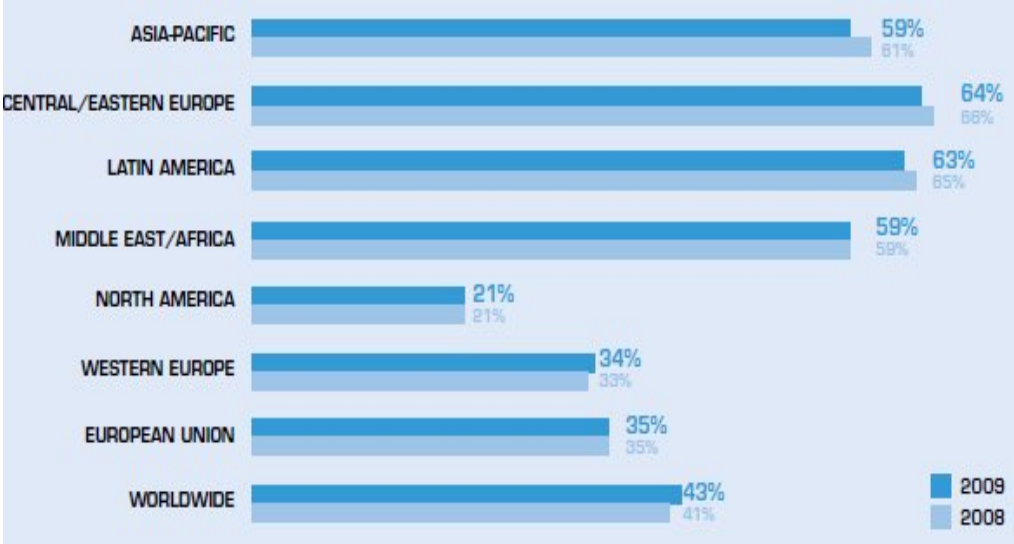
Monitoring of the pirate market is fairly elaborate from BSA. According to the BSA's *Global Software Piracy Study*[11] from 2008:

> [...] the worldwide piracy rate went up from 38 per cent in 2007 to 41 per cent in 2008. The global rate rose for the second year in a row because PC shipments grew fastest in high-piracy rate countries (BSA-IDC (a), 2009).

The piracy rate raised again from 41 per cent in 2008 to 43 per cent in 2009. According to BSA, the reason was based on PC sales and software installations in emerging economies with higher piracy (BSA-IDC (b), 2010). Concerning estimated software piracy rate by region, these are the latest results from BSA for years 2008 and 2009:

[11]The BSA/IDC study includes all types of software in the piracy equation, from consumer games and industry-specific applications to operating systems and antivirus programs. It also takes account of freeware and open source software.

Graph 5: Software piracy rate by region (2008 and 2009)



Source: BSA-IDC (b), 2010, p. 5

In this BSA study, there were 111 countries monitored. The Czech Republic was among the countries with the lowest piracy with its piracy rate of 37 per cent. More specific data relating to top 30 highest and lowest piracy rates countries are part of the appendices (p. 81). Based on purchasing power parity, these 30 countries with the highest piracy rates have low per capita income, and the countries with the lowest piracy rates have high per capita income (appendices p. 82-83).

3.5.3 International Federation of the Phonographic Industry

According to IFPI, there were 900 million copyright infringing music files available online in 2004 (Poddar, 2006, p. 54). IFPI's piracy report covering the year 2005 announced that nearly 20 billion songs were illegally swapped or downloaded (IFPI (f), 2006, p.4). During following three years, the number went up. The company claims that 95 per cent of all music downloads were unauthorized in 2008. IFPI estimated 40 billion illegally downloaded songs in 2008. To put this number into context, "just 1.4 billion legal single tracks were downloaded in 2008" (Adams, 2009). Global digital revenues made 20 per cent of the music industry in the same year. This number has been steadily increasing from 5.5 per cent in 2005 to 29 per cent in 2010 (IFPI (a), 2007, p. 4; IFPI (c), 2011, p.

12). More and more people buy legal music online and reduction of online piracy is a very important step in increasing revenues.

3.6 Losses incurred by piracy

The calculation of losses is a very delicate matter. There is not too much information covering the calculations of the main piracy sectors that are described in this paper. To find some calculations for a given country can be very uneasy, and some countries have not updated their calculations in recent years. For example the last estimates mapping the Chinese film piracy that are available online are from 2005 (BBC, 2006). There is usually a difference in estimates depending on the source, or the time period (e.g. one source calculates losses in a given industry in e.g. 2005 and another in 2008) so that monitoring of a trend in given industry from the same agency is fairly uncommon. There are generally no calculations of a given sector (movies, music, etc.) that would cover the piracy phenomenon worldwide on a long-term basis. Only BSA has been covering piracy statistics for some period now and above all, worldwide.

An important economic concept considering the losses is a *free rider problem*. This is a general concept that covers various goods and services. Generally, the concept states that "those who actually pay for a good or service are bearing all the costs of production while those who get the good or service for free are not contributing at all" (Ghazi, 2010, p. 3). Therefore, based on *economies of scale,* this might mean higher price of a product for legitimate buyers because if less units of some product are sold (bearing in mind the development, distribution, and support costs) the higher the unit cost and the higher the likely sale price (Ghazi, 2010, p. 3).

As written previously, there is no agency that would provide the necessary data concerning the worldwide piracy losses as a whole. Therefore the information comes from various authorized agencies that deal with this problem based on the particular monitored sector of the market. The main sectors affected by online piracy are: music, movie, TV shows, software, porn, and game industry. When data is used, the main aim is to give comprehensive and as up-to-date data as possible. If not mentioned otherwise, losses cover both online and hard copy piracy. Losses concerning TV shows and porn are not part of this paper as the data covering these areas is inadequate.

The calculation of losses incurred due to piracy might differ if we count it from the perspective of the offender or the "agency" that tries to protect the copyright law. If we consider the valuation of the illegally downloaded data from the perspective of its value from pirate's perspective, we "cannot" calculate the whole sum of the given product that was illegally downloaded as loss. Mr. Robin Andrews offers an apt depiction of the complication of the loss calculation that is incurred by online piracy:

> ... if an individual downloads an infringing copy of a copyrighted work, which he values at $10, and the purchase of a licensed copy would have cost $18, it would overstate the total social loss to conclude that the crime caused a net loss to society of $18. In this example, the perpetrator's utility gained by the good ($10) has been appropriated by, or transferred to, the perpetrator. However, the $8 difference between the perpetrator's utility for the work and the copyright holder's selling price would not exist in the absence of this crime because, based on the discrepancy assumed above, the perpetrator would never have purchased the work (2005, p.17).

This example shows that we "cannot" take the whole market value of illegally downloaded product as loss incurred to society or to the copyright owner. An illegally downloaded song or album does not mean lost sales concerning that song or album. We cannot take for granted that a pirate download equals to not buying the same item legally. Obviously, many agencies usually calculate that an illegal download equals to lost sales.

3.6.1 Records & Music

There is no agency covering the worldwide losses in this sector. IIPA tried to monitor the losses worldwide but the number of countries in individual continents was insufficient (e.g. monitored only 15 countries in Europe and 9 in Asia) and some of the countries were mentioned under continents where they do not belong – e.g. IIPA mentioned Tajikistan, Turkmenistan and Uzbekistan under "Europe" (IIPA (a), 2009).

Data covering the most countries can be found on an information platform called Havocscope. This company is tracking the global black market and builds its statistics on information from reliable sources. Its data on music piracy losses cover 40 countries. Their data is the most recent data available. Some countries have not updated their losses so not all losses cover 2010. Some are from 2009 and some from 2008. Havocscope provides data

covering 40 countries because these are the only countries that reported their losses. According to Havocscope, these are the 15 countries with the highest incurred losses a year (U.S. is missing as the data is not part of the Havoscope´s data):

Table 4: Music piracy losses by country

Rank	Country	Market value
1	China	$466.3 Million
2	Mexico	$436.4 Million
3	Russia	$313 Million
4	Bangladesh	$180 Million
5	United Kingdom	$165 Million
6	Brazil	$147 Million
7	Poland	$118 Million
8	Philippines	$112.1 Million
9	Argentina	$63.4 Million
10	Peru	$57.2 Million
11	Israel	$55 Million
12	Nigeria	$55 Million
13	Italy	$45 Million
14	Czech Republic	$35 Million
15	Ukraine	$35 Million
Total		***$2.2834 Billion***

Source: Havocscope (a), 2011

The Czech Republic (highlighted) is 14th with the estimate of $35 million losses. USA has to be clearly on the first position in this list because there are a huge number of American music artists among the best selling albums worldwide, and the easiest found and downloaded or bought pirated copies are usually the ones that are wanted the most (BookRags, 2008). The supposed U.S. economy losses due to music piracy are $12.5 billion (IPI, 2007, Executive Summary). That is approximately 5.5 times more than the total sum of the aforementioned 15 countries.

Usually, we can read that online piracy is "killing" the music industry. However, there are persons who believe that online piracy helps music industry and that music industry is not worse off because of the illegal downloading. Such statement is quite bold and by some might be perceived as despicable and ill judged. Dr. Michael Geist, a law professor at the University of Ottawa, mentions on his internet blog that Canadian's government

commissioned study found out that "there is a positive correlation between peer-to-peer downloading and CD purchasing" (2007). This study claims that the people who use the P2P networks are also amongst the most frequent buyers of music (Moya, 2009). Peitz and Waelbroeck in their paper concerning file-sharing in music distribution also remark that "the music industry may actually benefit from file-sharing networks" (2004). The reason is that a large number of users download music for sampling purposes (Peitz – Waelbroeck, 2004). Still, if that would be true, a large share of the consumers who use these copies for sampling might subsequently use them as substitutes for originals. Why should they buy the original, when they already downloaded illegal copy? Such a decision might vary from person to person and is usually a question of ethics.

3.6.2 Movies

Concerning movies, Havocscope has statistics that monitors 39 countries. The Czech Republic is not amongst these countries. These are the 15 countries that are at the top of this statistics:

Table 5: Movie piracy losses by country

Rank	Country	Market value
1	United States	$25 Billion
2	Australia	$1.3 Billion
3	South Korea	$1 Billion
4	India	$959 Million
5	United Kingdom	$818 Million
6	Japan	$658 Million
7	China	$565 Million
8	Mexico	$483 Million
9	France	$322 Million
10	Argentina	$318 Million
11	Russia	$266 Million
12	Spain	$253 Million
13	Italy	$161 Million
14	Germany	$157 Million
15	Thailand	$149 Million
Total		***32.409 Billion***

Source: Havocscope (b), 2011

Clearly, USA has to top this list with its largest film industry (Farley, 2010). In the two previous tables covering music and movie losses, it is evident that movie industry is worse off even providing that the USA is a part of the first statistics.

3.6.3 Business Software

As written earlier, BSA provides statistics relating to the losses in software industry. These statistics include computer games that are played on computers. BSA-IDC study revealed that the worldwide piracy rate had raised from 38 per cent in 2007 to 41 per cent in 2008. The losses to software vendors grew by more than 11 per cent ($5.1 billion) to $53 billion in the same period[12]. The main reasons behind the increase in piracy in the software sphere were: growth of the consumer PC market, greater access to the Internet, and higher sophistication of pirates (BSA-IDC (a), 2009, ii).

In 2009, the piracy rate went up again, but the value of unlicensed software meant 3 per cent decrease to the monetary value of $51.4 billion. "However, in real terms and factoring in adjustments for exchange rates, the value of unlicensed software stayed the same in 2009 as 2008" (BSA-IDC (b), 2010).

Although that the BSA numbers are sufficient, it is fundamental to present Havocscope's numbers so that we can compare this sector with the music and movie segment. Havocscope lists 66 countries and these are the top 15:

[12] These calculations are based on 110 countries that were monitored by BSA (BSA-IDC (a), 2009, ii).

Table 6: Software piracy losses by country (2008)

Rank	Country	Market value
1	United States	$9.14 Billion
2	China	$6.67 Billion
3	Russia	$4.21 Billion
4	India	$2.77 Billion
5	France	$2.76 Billion
6	United Kingdom	$2.18 Billion
7	Germany	$2.15 Billion
8	Italy	$1.89 Billion
9	Brazil	$1.64 Billion
10	Japan	$1.49 Billion
11	Canada	$1.22 Billion
12	Spain	$1.02 Billion
13	Mexico	$823 Million
14	Poland	$648 Million
15	South Korea	$622 Million
Total		***39.23 Billion***

Source: Havocscope (c), 2011

The Czech Republic is in this list on 42th place with estimated losses of $168 million. Total losses from the 66 listed countries add up to 49.83 billion, and these sums correspond with the sums that BSA-IDC mentions with the same countries in its statistics in the corresponding year. Therefore we can see that these top 15 countries make about 74 per cent of the total losses out of BSA-IDC's 110 monitored countries.

There is no surprise that these are the top 15 countries. All of these countries (except Poland) are amongst the top 20 countries concerning the number of internet broadband[13] subscribers (Internet World Stats (a), 2007). There is no doubt that BSA should act globally, but it should mainly concentrate on the countries with the largest markets and losses. That would reduce the worldwide level of piracy substantially.

[13] Broadband - a type of high-speed data transmission (dictionary.com).

4. ANALYSIS

The analysis deals with online movie piracy in the Czech Republic. The author of this paper decided to monitor movie piracy in the Czech Republic because films were found to be the most downloaded from games, movies, music, software, and TV shows. The analysis consists of two main parts. The first engages in the risk related to piracy, and the second in tools that are important for mitigation of internet piracy. Subsequently, finding socioeconomic determinants that may affect piracy involvement is another pivotal part of the analysis. These findings are based on the results from the questionnaire.

From 13 January 2011 to 13 February 2011, the author was monitoring the number of files, seeders, and leechers on websites: *Hellspy.cz*, *Cztorrent.net*, and *Torrentz.eu*. It was found that the most wide-spread files were the movie files and movie torrents.

Hellspy and *Cztorrent* are mainly used by the Czechs. *Hellspy* has a search option that shows the most downloaded files, and films are at the top of this list. This search option demonstrated that for the period of one month, about 90 per cent of the most downloaded 100 files were illegally uploaded films. Films were at the top of the list on *Cztorrent* as well. Comparison of torrents on the basis of the number of its seeders and leechers showed that films had generally the most seeders and leechers for the whole period of one month. Moreover, film torrents made more than one third of all the torrents on *Cztorrent* for the whole period of the observation. Based on the number of seeders and leechers, *Torrentz.eu* had the highest number of seeders and leechers in the movie category as well.

4.1 Risk related to piracy

Regarding films, pirates are usually concerned about: the quality of the downloaded film, possibility of downloading a virus, the risk of downloading an utterly different file than the intended film, and the possibility of being caught by the Police. Being caught means the possibility of being charged with piracy. That can lead to paying a fine, forfeiture, or imprisonment.

4.1.1 Quality, viruses, different file

Quality is usually easy to estimate, and downloading a virus should not be a problem because of the antivirus programs the users usually have. Therefore, apart from the possibility of being caught, the online pirates can be never sure what they download until they download it. By this activity, they put themselves at risk for downloading a completely different file than they intended. This is a huge weakness that should be exploited by the copyright owners. If the copyright owners or other interested parties decided to regularly put a considerable number of fake film files on various P2P networks and file hosting sites, they might frustrate the pirates so much that some of them might even stop downloading illegally uploaded films and would opt for a legal purchase.

4.1.2 Fine and confinement

According to the Czech law, if a person breaks the copyright laws – including the participation in this crime in the form of helping, instructions or organisation; s/he is a subject to the possibility of: imprisonment of up to 2 years, a fine up to 5 million Czech crowns, and the punishment of forfeiture of various assets. For breaking the copyright laws in substantial extent, the culprit can be imprisoned for the period of 6 months to 5 years (CPU (a), 2009, translated by the author).

4.1.3 Value of time – search cost, opportunity cost

Concerning internet piracy, it is important to determine the value of time – the search costs – because the time spent by searching for an illegal copy of a movie has a financial value. As it was written, the more time a person spends searching, the higher the opportunity cost. If it took too long to find a desired illegal copy, it would not be financially/time expedient. There is no study that would monitor the average time spent by this searching. Therefore the author of this paper asks this question in a questionnaire that is a part of this paper.

4.1.4 The probability of being caught (2009 and 2010)

The buyers of the most frequently pirated material have two options. The illegal method yields a positive consumer surplus, and the legal process carries lower consumer surplus (Gopal, 2002, p. 4). The earlier mentioned option is connected with the risk of punishment. The second means no punishment, but higher price. There are many files on the Internet and the question is – to download or not to download? The majority of people who decide for downloading of illegal material take this decision in the belief that the probability of being caught is low. However, is it really so?

Piracy is connected with a risk that a certain person undergoes in an effort to obtain some data cheaper. When we try to describe the risk quantitatively, it is important to first list all the possible outcomes of that event and the likelihood of that outcome to happen. An important concept in this case is probability. "Probability is the likelihood that a given outcome will occur" (Pindyck – Rubinfeld, 2005, p. 154). Important is to consider "the frequency with which certain events (in this case: capture and fine/confinement) tend to occur" (Pindyck – Rubinfeld, 2005, p. 154). To calculate the probability of being caught, we need to find out how many pirates are in the given country and how many people were prosecuted.

According to the Czech Anti-piracy Union, there was 48 per cent audio-visual piracy rate in the Czech Republic in 2009 (CPU (b), 2011). That is a very substantial rate of piracy. Unfortunately, the Czech Anti-piracy Union does not mention the alleged number of movie pirates in the Czech Republic. Surely, the more someone downloads the films, swaps the films, sells it or buy it; the higher the chance of being apprehended. However, the chance of being caught will be calculated without the emphasis on the scale of piracy that the individuals engage in.

Film piracy is an illegal activity and it is impossible to find out the exact number of film pirates in the Czech Republic. There are sometimes automatic counters of the number of downloaded torrent files but that does not apply to all torrent files. Moreover, there are file hosting services and these do not make the download information public for apparent reasons. Finally, there is illegal sale of CDs and DVDs and swapping, which has to be part of this statistics. Therefore the author decided to make an estimate of the online film

pirates and the total amount of film pirates based on the results of the questionnaire that is a part of this paper.

To calculate internet movie piracy, the author decided to use data covering the number of internet users divided into the same age groups as in the questionnaire. The newest data covering the number of internet users is from 2008. There were 10 491 492 persons living in the country as of 1 July 2009 (CSU (a), 2009, p. 1).

Table 7: Number of movie pirates in the Czech Republic

Age group[14]	Population[15]	Internet users[16] (%)	Internet users[17]	Percentage of internet pirates (%)[18]	Number of internet pirates[19]	Total number of pirates[20]
0-15	1,602,746	27.5[21]	432,790[22]	10[23]	43,279	86,558
16-25	1,363,286	90.3	1,231,047	79	972,527	1,945,054
26-35	1,748,492	73.9	1,292,136	69	891,574	1,783,148
36-45	1,485,135	69.4	1,030,684	65	669,945	1,339,890
46 -	4,291,833	39	1,272,468	23	292,668	585,336
Total	***10,491,492***	***x***	***5,259,125***	***x***	***2,869,993***	***5,739,986***

[14] The source of this statistic (CSU (c), 2011) divides the age groups as: 16-24, 25-34, 35-44, 45-54, 55-64, 65+. The author uses almost the same age groups and therefore uses for age group 16-25 the same ratio of the Internet users as Czech Statistical office for 16-24. The same applies to the other groups.

[15] Source: CSU (a), 2009, p. 1.

[16] Source: CSU (c), 2011.

[17] Author's calculation based on population and percentage of the Internet users.

[18] These percentages result from the author's questionnaire.

[19] Author's calculation.

[20] Author's estimate – the ratio of people who download at least one illegal film copy a month vs. the number of people who acquire a film copy via different media (e.g. hard drive, flash disk and other media) was estimated to be 1:1.

[21] Author's estimate (Appendices page 84).

[22] Author's estimate (Appendices page 84).

[23] Author's estimate.

Based on the aforementioned data, there would be 2 869 993 movie internet pirates and the total of 5 739 986 movie pirates in the Czech Republic in 2010. The result suggests that 57.7 per cent of the population had an illegal copy of a film on some media of theirs in 2010. That is a very substantial and shocking number. That means that there was a possibility that they might have been apprehended for having an illegal film copy. This number of pirates is used for the calculation of probability of being caught in 2009 and in 2010 as well because there is no statistic covering number of persons in these age groups in 2009 and 2010. The number of pirates would be in the given groups more or less the same because only 35 193 persons more lived in the Czech Republic in 2010 (CSU (b), 2010).

The percentage of internet users in the age group 0-15 had to be estimated because there is no source covering an estimate of internet users in this group. The percentage of internet pirates was estimated by the author as well because there were only four respondents in this age group in the questionnaire, and therefore, the sample size would be deficient.

The Police of the Czech Republic registered 276 cases of breaching copyright in the country in 2009 (Police of the Czech Republic (a), 2009). That means that the Czech movie pirate's probability to get into this statistics was ~0.005 per cent in 2009. That means one in ~20 000 chance[24].

Concerning the year 2010, there were 10 526 685 persons living in the Czech Republic as of 30 September 2010 (CSU (b), 2010). Based on the Czech Anti-piracy Union, there was a 55 per cent piracy rate of audio-visual material (CPU (b), 2011). That was a higher audio-visual piracy rate than in the previous year. Overall, 650 persons were apprehended (Police of the Czech Republic (b), 2010). Based on the presumption that the number of pirates stayed the same, which would mean that the pirates watched pirated movies more than in the previous year, their probability of being caught went up. Hence the probability of a pirate being caught increased to ~0.01 per cent. That is one in ~10 000 chance of being caught.

The estimate of the online film piracy and the total number of movie pirates illustrates that the act of illegal downloading is a widespread phenomenon. Generally, the law relies on high sanctions, but the probability of being caught is very low. Such methods of deterrence are highly ineffective. Therefore the pirates see a lot of gain in illegal

[24] Nick Mokey was calculating these odds for the pirates in the USA. Their odds in any given year in the time period 2005-2008 were one in 8,129 chance of getting caught (2009).

downloading, and no one can expect a distinct change under the present conditions (Andrews, 2005, p. 25, 27).

With the usage of the sample size calculator we can determine the probability of the correctness of the aforementioned results. These are the confidence levels[25] and confidence intervals[26] concerning the analysed age groups in accordance with the number of internet users in these age groups:

a) **16-25**: with the confidence level 95 per cent and the confidence interval 8.2 per cent, the sample size needed is 143 respondents (1 231 047 internet users).
b) **26-35**: with the confidence level 95 per cent and the confidence interval 9.4 per cent, the sample size needed is 109 respondents (1 292 136 internet users).
c) **36-45**: with the confidence level 95 per cent and the confidence interval 21.7 per cent, the sample size needed is 20 respondents (1 030 684 internet users).
d) **46 and more**: with the confidence level 95 per cent and the confidence interval 19.1 per cent, the sample size needed is 26 respondents (1 272 468 internet users).

Result

a) **16-25**: we can be 95 per cent certain that that if we had asked the question of the entire relevant population between 70.8 and 87.2 per cent would have picked the same answer, which means that they would download illegal film copies.
b) **26-35**: we can be 95 per cent certain that that if we had asked the question of the entire relevant population between 59.6 and 78.4 per cent would have picked the same answer.

[25] The confidence level tells us how sure we can be. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. The 95% confidence level means we can be 95% certain (Surveysystem, 2011).

[26] The confidence interval is the plus-or-minus figure usually reported in newspaper or television opinion poll results. For example, if we use a confidence interval of 4 and 47 per cent of our sample pick an answer, we can be "sure" that if we had asked the question of the entire relevant population between 43% (47-4) and 51% (47+4) would have picked that answer (Surveysystem, 2011).

c) **36-45**: we can be 95 per cent certain that that if we had asked the question of the entire relevant population between 43.3 and 86.7 per cent would have picked the same answer.
d) **46 and more**: we can be 95 per cent certain that that if we had asked the question of the entire relevant population between 3.9 and 42.1 per cent would have picked the same answer.

Interpretation

Statistically, the first two age groups could be perceived as quality results concerning the number of respondents and the resultant confidence intervals. Confidence intervals in the third and fourth age groups are too high to provide a result of a sufficient quality. Still, we can see that if we focus only on the first two age groups where the confidence intervals were low and thus more predicative, the number of movie internet pirates in the Czech Republic is enormous. Therefore the usage of the sample size calculator with the first two age groups confirms the alleged high audio-visual piracy rates in the Czech Republic.

4.1.5 Attitude towards risk

The people who download illegally can be divided on the basis of their attitude towards risk. In a simplified way, they can be divided into three groups: *risk averse, risk neutral,* and *risk loving* (Experimental Economics Centre, 2006). However, it is not so easy to allocate people into these or even broader groups. Some people can be risk averse, but they tend to download illegal files because they perceive the possibility of being imprisoned or fined as very low or nearly none.

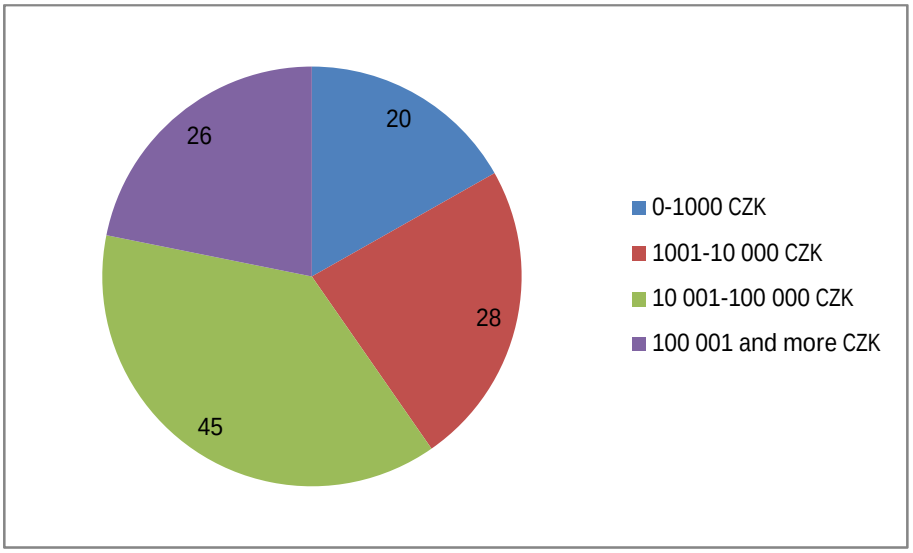
4.1.5.1 Attitude towards risk based on the questionnaire - questions 8 and 9

There were 302 respondents in the questionnaire and questions 8 and 9 were monitoring the attitude towards risk. For better orientation regarding the results in these two questions,

the author would suggest to first read *chapter 4.3.1* (p. 52) where the results of the whole questionnaire can be found.

Concerning the attitude towards risk[27], the respondents who answered *I don't believe that I will be caught so no fine can discourage me* in question 8 had to be left out of the 211 respondents. Then, the attitude towards risk in questions number 8 and 9 could be calculated. WTP is compared with the probability of being caught *times* the fine. These would be the resulting graphs:

8. What fine would discourage you from illegal downloading of films at the current probability of 0.02% that you will be caught? (119 respondents)



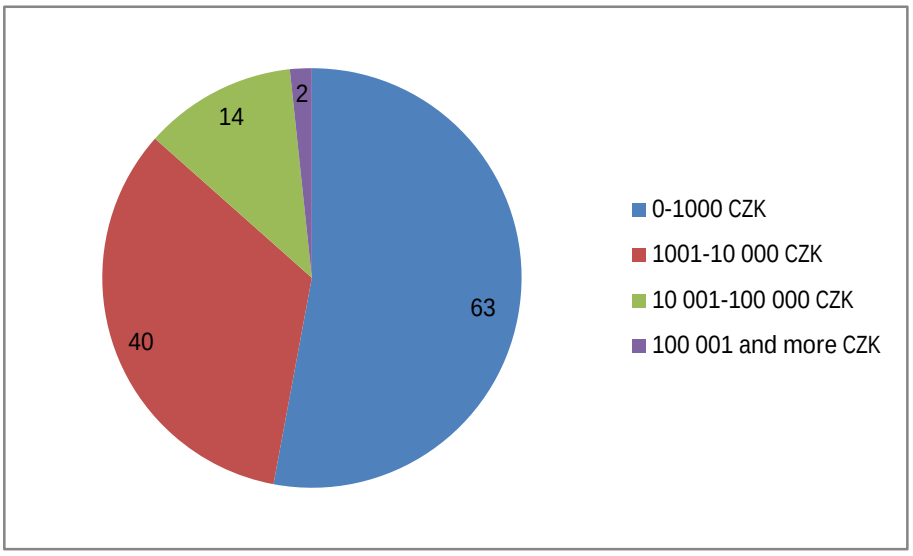
Seventy-one respondents (approx. 60 per cent) would be discouraged by *10 001 and more CZK*. The author had believed that even more respondents should have been discouraged by *10 001 and more CZK*, but it is still a substantial portion of the respondents. The results demonstrate that the downloaders realize that the probability is really small, and therefore, they would be discouraged by a large fine.

Concerning the attitude towards risk, an absolute majority of the respondents were risk averse. Only 11 respondents were risk loving. These eleven persons answered that under given conditions, the fine of *100 001 and more CZK* would discourage them. All of them

[27] The author calculated the attitude towards risk as: the average of the fine that would discourage the given respondent from downloading *divided by* 100 and compared to the WTP of the given respondent. WTP was calculated as an average – therefore e.g. 0-50 CZK was calculated as WTP 25 CZK.

answered in the question n. 6 that they would be willing to stop downloading illegal film copies if the legal copies would cost 0-50 CZK.

9. How large fine would discourage you from illegal film downloading if you were sure that you will be caught? (119 respondents)



There is a huge difference when we compare this graph with the previous one. This time, 103 respondents (approx. 87 per cent) would be discouraged by the fine of *0-10 000 CZK*. This result confirms belief that the larger the number of caught and punished downloaders, the smaller the piracy ratio might be because the downloaders would be more scared of being caught.

Surprisingly, regarding the attitude towards the risk, with the certainty of being caught, there were more respondents who were risk loving in question n. 9 than in the previous question. Altogether, 34 respondents could be described as risk loving. That is because 22 out of these 34 answered in the question n. 6 that they would be willing to stop downloading illegal film copies if the legal copies would cost 0-50 CZK. The rest are part of this group because they answered that they would be discouraged from illegal film downloading by the fine of *10 001-100 000 CZK* which is with the certainty of being caught quite unexpected.

Interpretation

The WTP is the same for a given respondent in question 8 and 9 and so the final results are a little bit misleading. For that reason, a more telling indicator concerning the attitude towards risk might be just to compare the answers of the 119 respondents in questions 8 and 9 without the comparison with the WTP. These answers clearly display that a higher ratio of caught pirates might lower online film piracy significantly.

4.2 Tools for mitigation of internet piracy

The main tools are: legal, retributive, technological, economic, and ethical. It is not only the direct actions against the illegal activity of pirates that are important. Another necessity is to draw public attention to this problem through educational system and media campaigns (Gopal, 2002, p. 7).

Concerning the Czech Republic, recent campaign, which was unfortunately the first one, was called *Films are not for free* (auth. trans.) The creators of this campaign tried to appeal to the pirates' morality. In the campaign, stealing of digitalized data is compared to stealing of a car, wallet, and other items. This campaign was released in more countries all around the world. Consideration of the consequences that the infringement of copyright has on the creators of the given product is very important. Many pirates are rather indifferent to it and others think that their single illegal download cannot cripple the authors' livelihood too much. Therefore, various campaigns that point to this misconduct are very important.

4.2.1 Legal and retributive

There are differences concerning the legal system of various countries with respect to internet piracy. Therefore, the present author depicts the situation in the Czech Republic as the author is Czech.

Uploading a film without an approval of the author of that piece of work infringes the Copyright Act. Dispersion of such file can be qualified as a "crime of unauthorized dissemination of the author's work according to the Article 152 of the Penal Code" (IFPI (e), 2009). Concerning internet piracy in the Czech Republic, the main problem is

undoubtedly file sharing and file hosting. Concerning films, the legal consequences of uploading and downloading films differ in these two types of networks. Based on the Czech legal system, uploading and downloading of films is illegal on P2P networks. However, uploading films on file hosting services is illegal but downloading is legal. It sounds strange but downloading of films via file hosting sites does not infringe the Copyright Act.

According to the Article 30 clause 1 and 2, the person who is downloading (gathering of duplicates) a copyrighted film does not need any approval of the author of that particular piece of work if this "duplicate" is being downloaded for his/her personal need. Unfortunately for the pirates, having in mind the operating principles of P2P networks, it is very clear that every user of P2P network is breaking the Copyright Act. Everyone who is downloading a file in this type of network is simultaneously "offering" the file to other users of the network. That is how P2P networks work. By "being online", the file that is being downloaded by a user can be (and usually is) simultaneously being downloaded from his/hers computer by the users of this network (IFPI (e), 2009).

Another possibility of the authors (or specific institutions) to handle the problem of dissemination of a copyrighted file in a network might be their effort to achieve the legal liability of the network operators in court. The network operator himself/herself does not violate the Copyright Act, but is it possible to blame him/her for an indirect responsibility for the doings of the users of his/her P2P network? The answer is *yes* providing that the operator of the network broke the general obligation to not cause damage (neminem laedere) according to the Article 415 of the Civil Code. That obliges the network operator to stand the loss incurred by his/her action/s, according to the Article 420 of the Civil Code. This responsibility is controversial, taken into account P2P networks with the decentralised searching (IFPI (e), 2009).

Generally speaking, despite good legal framework, there is no effective use of it and thus the deterrence factor is with a little exaggeration good for nothing (IIPA (b), 2006, p. 453). It is clear that more legal actions against the pirates should be taken. As mentioned, only 650 persons were apprehended concerning piracy in 2010. Possible financial retribution and imprisonment are substantial, but more apprehensions might help reducing the amount of the pirate material much more than a high retribution.

As Jiří Čermák mentions in his book *Internet and copyright law* (auth. trans.), the copyright law is very unique in the sense that if interpreted strictly, all the users are infringing it all the time (Čermák, 2003, p.19). According to Jiří Čermák, about 90 per cent of web pages infringe someone's copyright laws.

4.2.2 Technological - CD/DVD copy protection

In the last couple of years, many CDs and DVDs have started to use a copy protection. The main reason is piracy. What is somewhat bewildering is the fact that any user (regarding the legal system in the Czech Republic) can create a copy of a CD or DVD for his/her own use. Thus, such protection seems illegal. However, the producers, as the bearers of the copyright law, are entitled to decide about the form and the method of accessibility of the information on the discs. Moreover, the producer is not obliged to enable the user creating of the copy for his/her own use. So, the producer can enable it but is not obliged to do so (IFPI (d), 2009).

There are various protection systems that are used for DVDs and CDs. The disk encryption uses various methods. Unfortunately for the producers, the developments of new and better technologies that are created for the encryption are immediately followed by decryption methods of pirates. The most of the technological protections are easily circumvented (Kříž, 2005; Andrews, 2005, p. 27).

The use of such protective measures is connected with an effort of music, software, gaming, and movie industries, to lower the illegal distribution of their "material". John A. Halderman came in his work *Evaluating New Copy-Prevention Techniques for Audio CDs* yet with another idea. These copy protection methods can prevent some computers to read the CDs and can be the cause of redistribution (Halderman, 2002). That can take us back to the "vicious circle" of saving a CD or DVD into a PC and offering its content to others in a P2P network from a "sheer solidarity".

4.2.3 Economic

From the economic perspective, it is very important to lower the price of the media. The lower the price the higher the probability that the pirates will give up their search for pirated copies. Therefore it is important to reduce the prices as much as it is feasible for the

given industries in an effort to lower the piracy rate. To lower the costs, the Internet should be used more for selling legal CDs and DVDs in digitalized form. That would mean that expenses like transport or warehousing would be noticeably lowered.

4.2.4 Ethical

Through the use of campaigns and media, people all around the world are being informed that piracy is a bad thing to do. These campaigns should point out that piracy preys on the artists in question, and that by such behaviour we contribute to destroying of the particular industry or artist. Ethics is an important factor in piracy, and reshaping the social norms in an effort to lower piracy is one of the essentials for the nearest future (Andrews, 2005, p. 28).

4.3 Movie internet piracy - finding socioeconomic determinants that affect piracy involvement

In order to propose effective policies to mitigate internet piracy, it is important to understand who participates in the infringing activities. Therefore, a research was conducted to find importance of chosen socioeconomic determinants that may affect piracy involvement. The tool of this research is a questionnaire. The questionnaire is focused on downloading from P2P networks and file hosting services because, as it was mentioned in the theoretical part, these are the main threats to film industries.

There were 302 respondents who answered nine questions via a web page *Vyplnto.cz*[28]. A sample size calculator was used so that the results might be interpreted for the whole population of the Czech Republic. Concerning the structure of the questionnaire, the questions might be divided into two sections. The questions that fall within the first group are of a socioeconomic character and ask about:

1) age

2) gender

[28] *Vyplnto.cz* is a questionnaire service that helps to realize Internet surveys.

3) **education**
4) **net monthly income**

These questions were chosen because they should play a very important role in the piracy behaviour. The questions that fall within the second group ask about:

5) **the number of films the respondents download a month** (this is a distributive question so if a respondent answers that s/he does not download any films from P2P networks or file hosting sites, then the respondent does not reply the following questions)
6) **the price the respondents would be willing to pay for a DVD instead of downloading an illegal copy**
7) **time spent by searching for the films the respondents aim to download** because the more time the person spends searching, the higher the opportunity cost.
8) **the fine that would discourage them from downloading illegal film copies if their probability of being caught would be 0.02 per cent**,
9) **the fine that would discourage them from downloading illegal film copies if they were sure of being apprehended**.

These questions were chosen because they demonstrate the willingness to pay for a legal copy to forgone downloading of an illegal copy, technical/time difficulty, and attitude towards risk. Moreover, a division of the respondents on the basis of these questions was made so that a subsequent regression analysis could show:

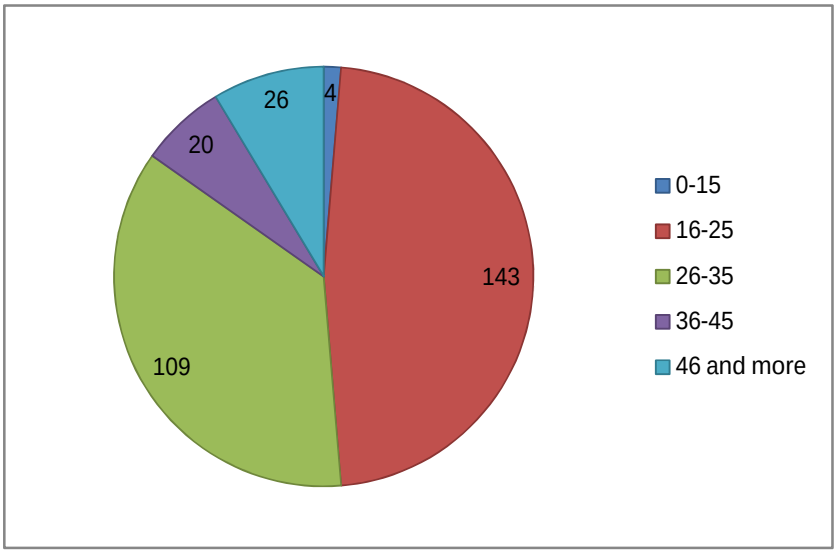
a) from how many per cent do the first four variables of the socioeconomic character explain the amount of downloaded films and
b) the price the respondents would be willing to pay for a DVD instead of downloading its illegal copy (based on the same four variables).

As mentioned in the theoretical part, studies have reported that females pirate less and older people pirate less. Therefore, the questions concerning gender and age were asked.

As written previously, high prices can lead to a positive attitude towards piracy. A recent study that was focused on media piracy in emerging economies argues that lower media prices could decrease piracy around the world (Hill, 2011). Otter Alastair even introduces his article after reading this study by saying: "Anti-piracy campaigns are failing because the real issue is around cost of media, not stronger enforcement" (2011). Coyle, Gould, Gupta P. and Gupta R. also mention in their research *To buy or to pirate* that "demographic variables such as gender, age, and household income are likely to predict music piracy intentions" (2009). Therefore the income variable was chosen. Logically deduced, the higher the income, the lower the interest in pirated film copies as the person can afford to purchase an original DVD. The last variable was chosen because the author perceived education to play an important role in movie piracy. It was assumed that the higher the attained education, the lower the piracy rate among the pirates because the more the people are educated the more they should understand the importance of copyright and that piracy destroys the movie industry.

4.3.1 Results of the questionnaire

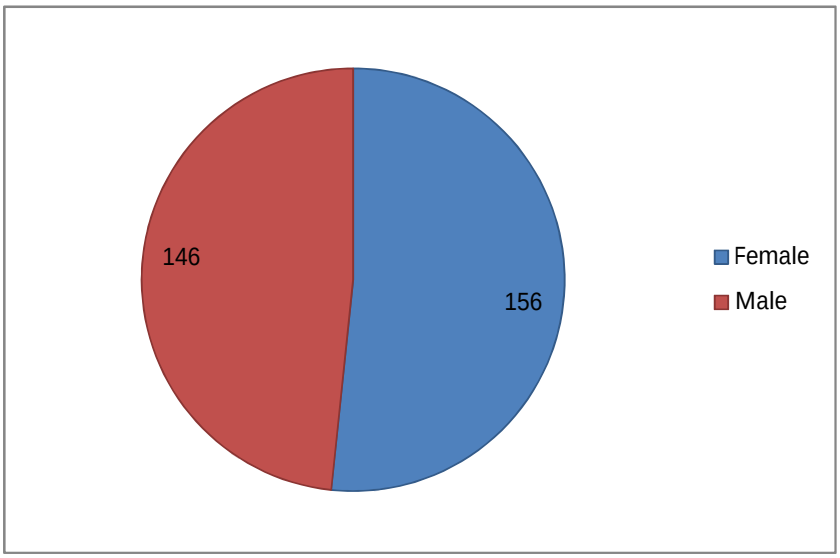
1. Your age is: (302 respondents)



An absolute majority of the respondents are from two age groups: 16-25 and 26-35. They make up about 83 per cent of the respondents. There are only 4 respondents in the age group 0-15 so this group was not further analysed because the number of respondents is

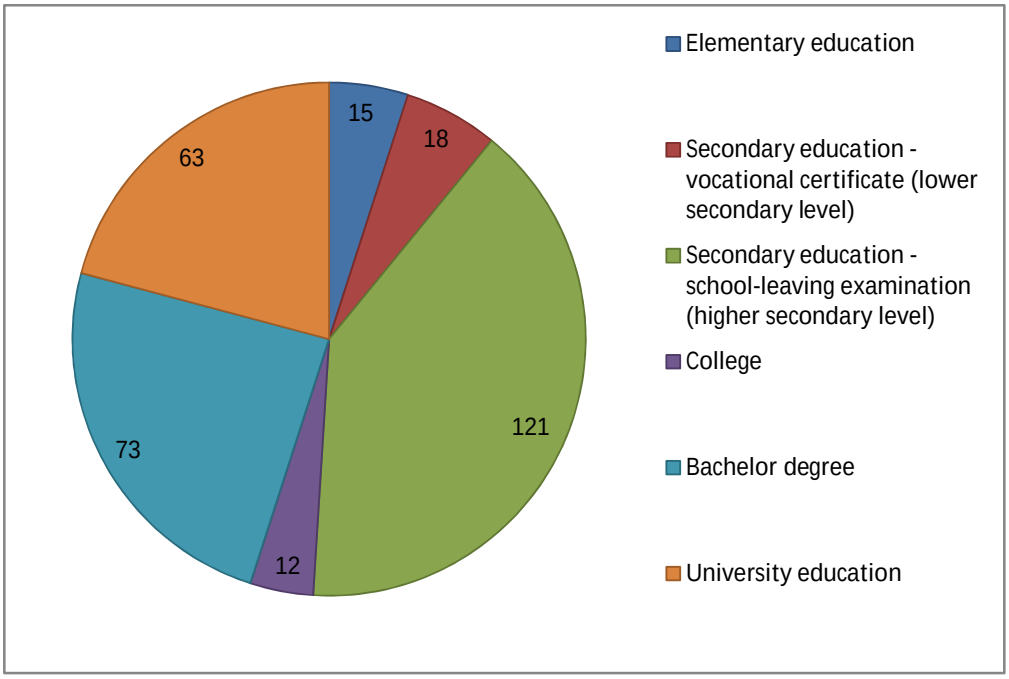
deficient. The last age group is quite broad and it is *46 and more* because as it was mentioned, only 39 per cent of the people in this age group use the Internet. The age group was set to be *46 and more* because the author had not believed to acquire a substantial amount of respondents to further subdivide this age group into more groups.

2. Gender: (302 respondents)



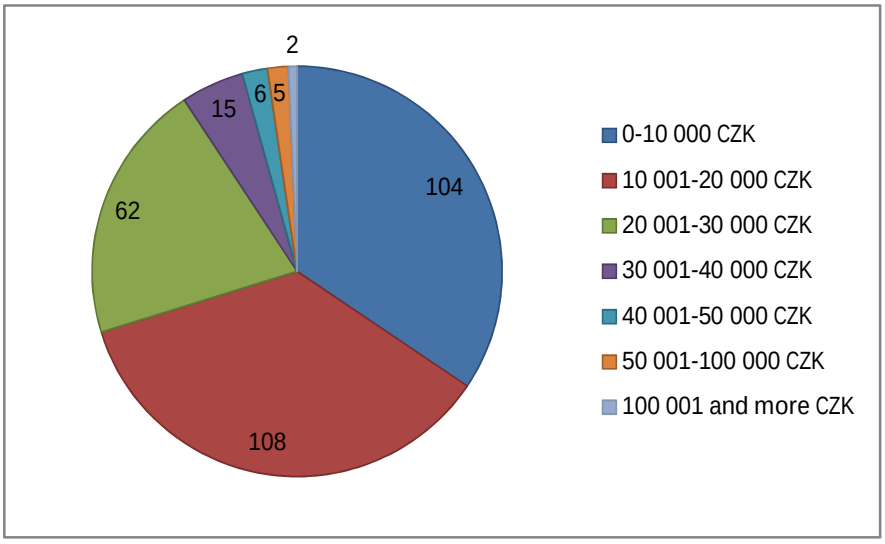
Division of men and women is about 50/50 per cent. That is very similar concerning the ratio of men and women who use the Internet (CSU (c), 2011).

3. Educational attainment: (302 respondents)



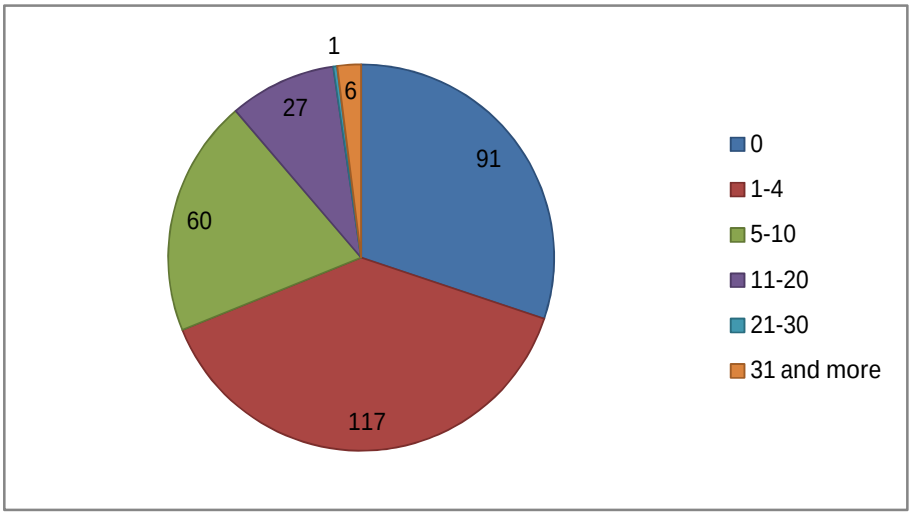
The majority of the respondents have secondary education, bachelor degree, or university education.

4. Your net monthly income is: (302 respondents)



There were 143 respondents in the age group 16-25 so it is not surprising that there were so many respondents whose net monthly income is 0-10 000 CZK. 81 persons from this age group answered that their income is 0-10 000 and 47 answered 10 001-20 000 CZK. Gross average monthly wage was 23 951 CZK in the Czech Republic in 2010 (CSU (d), 2011).

5. Approximately how many films do you download from file hosting sites and P2P networks every month? (302 respondents)



These answers point out that internet piracy is in this sample size really substantial. “Only” 91 respondents out of the total 302 do not download films via P2P networks or file hosting services. It is uneasy to say if it is positive that 117 out of the rest 211 download “only” 1-4 films a month. That would be on average 30 films a year. Altogether, the results point out that there were approx. 70 per cent of the respondents who download films from P2P networks and file hosting services and approx. 30 per cent who do not indulge in this activity.

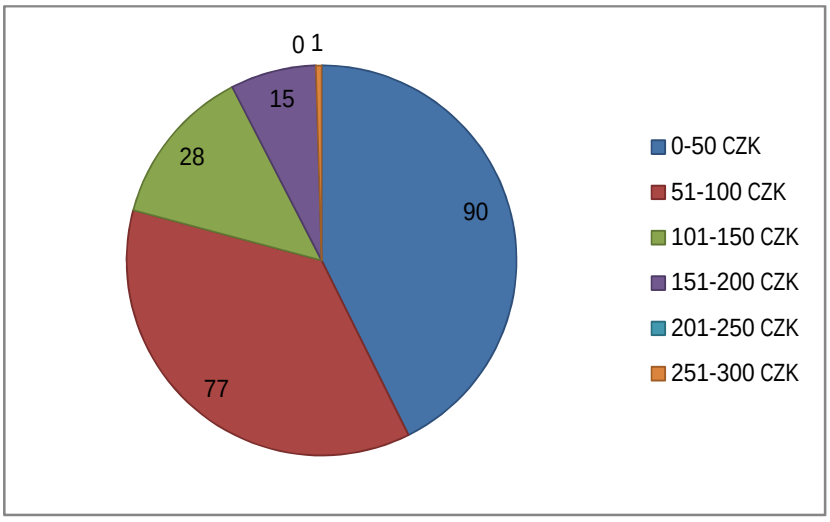
Concerning the respondents who download immensely (11 films a month and more), there were 34 persons who do so. That is about 11 per cent of the total respondents. Out of these 34, approximately 53 per cent would be willing to pay for a DVD 0-50 CZK to stop downloading illegal copies and 33 per cent 51-100 CZK. More importantly, nearly 60 per cent is not worried about being caught. 19 out of these 34 are 16-25 years old and 11 are 26-35 years old. Males make up nearly 68 per cent of these downloaders. 31 of these

respondents earn 0-30 000 CZK a month. These results imply the importance of income, gender and age in piracy behaviour.

There were 26 respondents who are 46 years and older and 20 of them are amongst the people who do not download films. Among the ones that do not download are 58 women and 33 men. These results support the statement in the theoretical part that females and older people pirate less. 83 out of these 90 respondents who do not download have net income of 0-30 000 CZK. More accurate results concerning gender and age, as well as the influence of income and education will be seen in the regression analysis concerning downloading.

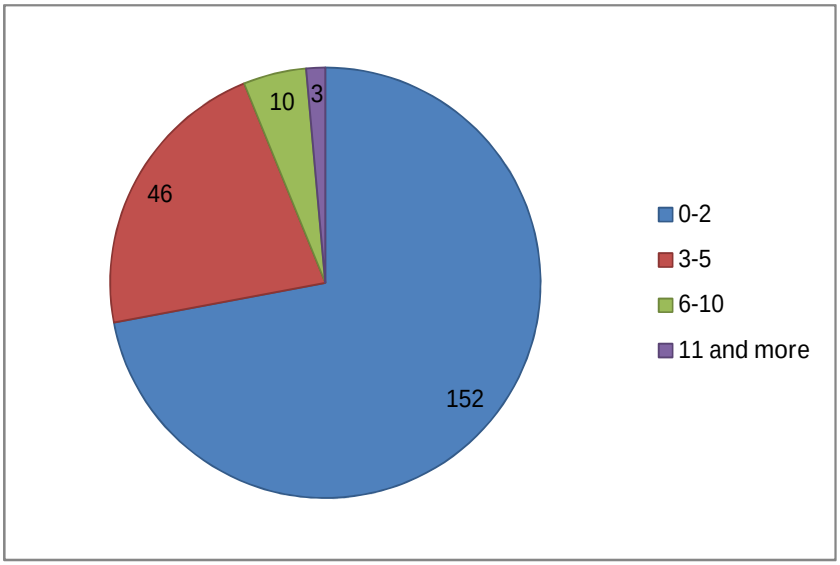
There is a slight possibility that the respondents might have underreported their actual downloading habits concerning the nature of this research and the possible fear of some of the respondents that they might be somehow tracked down after completion of this survey. There was even one person who refused to complete this questionnaire when asked to by the author lest his answers might be discovered by the Police or other authorities.

6. An average price of a newly released DVD in the Czech Republic is 310 CZK. How much would you be willing to pay so that you would not download films from file hosting sites and P2P networks? (211 respondents)



The maximum price in the questionnaire is 300 CZK because the average price of a newly released DVD in the Czech Republic was calculated to be 310 CZK[29]. As the answers indicate, 167 respondents would be willing to pay[30] 0-100 CZK. That is approx. 80 per cent of the respondents. Therefore, to lower the piracy rate, it is necessary to lower the price of the newly released DVDs even more. The dependence of willingness to pay for a DVD on age, gender, education, and net monthly income will be seen in the regression analysis.

7. How many hours a month do you spend by searching for films that you aim to consequently download from file hosting sites and P2P networks? (211 respondents)



It was expected that there might be more respondents in the groups: 3-5 and 6-10 hours. Approximately about 72 per cent of the respondents (152 people) need only 0-2 hours to find the films that they want to download, and these people download 1-10 films a month. On average, they need 1 hour to find 3.8 films that they intend to subsequently download. Therefore it is evident that this process is quite easy and fast. This searching time can be even shorter than going to a DVD shop and buying the searched film on the DVD so the concept of value of time regarding internet piracy is insignificant.

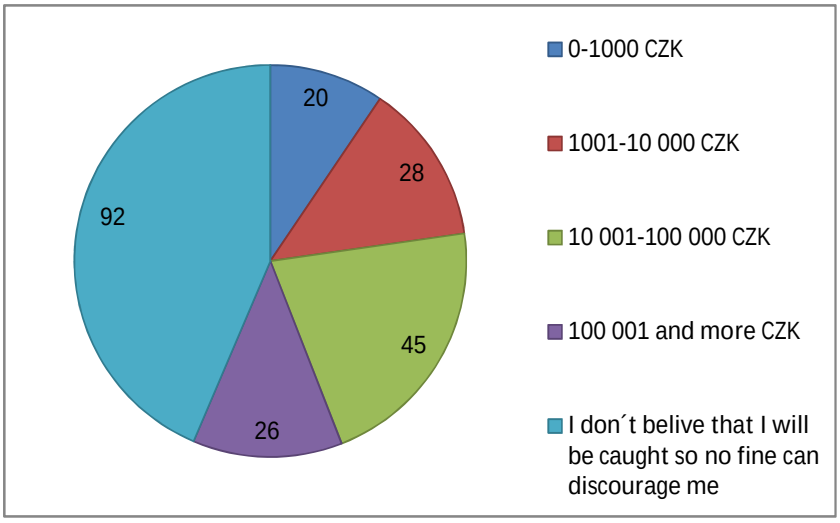
[29] Author's calculation – price calculated via Bontonfilm's e-shop *Film4u.cz*, regarding the last 54 newly released DVDs on 19 February, 2011 (Film4u, February 19, 2011).

[30] Thereinafter, sometimes the abbreviation *WTP* is used instead of the term *willingness to pay.*

It is fast to find a pirated film copy, but the pirate usually still has to pay some money to some internet service provider (ISP) to have an access to illegally uploaded films. Surely that a pirate can download a pirated film copy at school or at some coffee-house with a Wi-Fi access point for free, but it is more probable that pirates tend to download pirated films "safely" and "unnoticed" at their homes. A person who wishes to download an illegally uploaded film has to pay to its ISP a fee for this service. The fee for ADSL or cable internet connection starts at around 400 CZK in the Czech Republic and does not usually exceed 1 000 CZK (DSL, 2011). The average price of a newly released DVD is 310 CZK. Thus, if someone decides to download at least 2 or 3 pirated copies of a newly released DVD a month instead of buying a legal copy, this wrongdoing can "pay" the ISP fee providing that s/he is not caught by the Police.

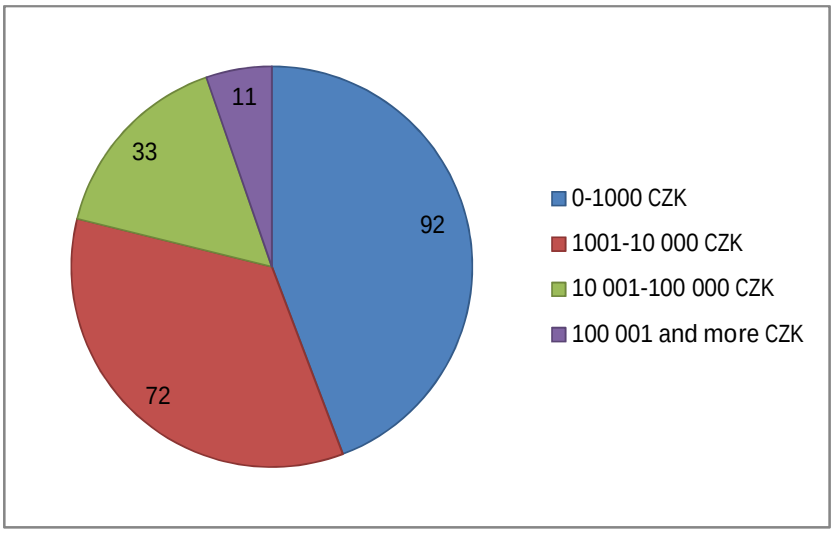
8. What fine would discourage you from illegal downloading of films at the current probability of 0.02% that you will be caught? (211 respondents)

(By downloading films from P2P sites, you are infringing copyrights and the related rights. By doing so, according to § 152 of the Penal Code you are subjected to the possibility of: imprisonment of up to 2 years, a fine up to 5 million Czech crowns, and the punishment of forfeiture of various assets.)



Nearly 44 per cent (92 respondents) do not believe that they might be caught. Therefore the Police should concentrate on catching more pirates than they did in 2010. The more pirates they catch, the more will be the ones who download illegal copies scared of being caught. That should limit the piracy activity substantially.

9. How large fine would discourage you from illegal film downloading if you were sure that you will be caught? (211 respondents)



The majority of the respondents would be discouraged from illegal film downloading with the fine of 0-10 000 CZK. These answers suggest that the best form of deterrence is not a large fine but rather a small one. To ensure that the deterrence system works more effectively, a "small" fine should be combined with a higher ratio of caught pirates.

4.4 Regression analysis

Two regression models concerning internet piracy were chosen to indicate the role of age, gender, attained education, and income. These four factors should play an important role in piracy behaviour. The factors will be judged concerning their influence on willingness to pay for a legal DVD so that the respondents would not download films from file hosting sites and P2P networks, and the amount of downloading. The regression analysis will display from how many per cents the models are explained by the combination of these four factors.

4.4.1 Regression analysis - downloading

This multiple regression model deals with online downloading of illegal film copies in the Czech Republic and the chosen variables that influence the downloading. The purpose

of this regression model is to prove that the downloading is influenced by the selected variables and to demonstrate how these variables influence the amount of downloaded illegal copies of film. The chosen variables and expectations are:

- **age** – it is assumed that the higher the age, the lower the downloaded amount of the films (and vice versa).
- **gender** – women should pirate less.
- **attained education** – the higher the education, the lower the downloaded amount is expected as higher education should be connected with awareness of economic consequences of this activity (and vice versa). The respondents were divided into 6 groups on the basis of their attained education.
- **income** – the higher the income, the lower amount of the films should be downloaded (and vice versa).

The explained variable is: y_1 (downloading), and the explanatory variables are: x_1 (age), x_2 (gender), x_3 (attained education), x_4 (income), and e (error term[31]). β_0 is the intercept and $\beta_{1...n}$ are regression coefficients of $x_{1...n}$. The model is part of appendices (p. 85). The model for the multiple regression takes the form:

- $y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e$

Result

There were 302 observations in this model. The chosen model is explained by the explanatory variables by 26.3 per cent. That is a very low percentage. Statistically important are age, attained education, and income. Gender is in this model statistically insignificant. The model shows that:

[31] Error term – a variable in a statistical and/or mathematical model, which is created when the model does not fully represent the actual relationship between the independent variable(s) and the dependent variable. As a result of this incomplete relationship, the error term is the amount at which the equation may differ during empirical analysis (Investopedia (a), 2011).

1) The higher the age, the lower the downloading by 0.1 DVD a month. That means that if a person from the sample is a year older, s/he downloads 0.1 DVD a month less.
2) The higher the education, the lower the downloading by 0.75 DVD a month. That means that the person downloads 0.75 DVD a month less in every single higher attained education than in the previous one. That means that concerning this research, a person with university education downloads 3.75 DVDs a month less than a person with elementary education.
3) If the income increases by 1 000 CZK a month, the downloading will increase by 0.05 DVD a month. That is very surprising information because the income plays in this model the opposite role than it was expected.

Gender is statistically insignificant in the model but that does not mean that it is not an important explanatory variable. If we try to explain the explained variable only by gender, it shows that women download 1.74 DVDs a month less than men. That confirms the expectation that women download less pirated copies than men.

Interpretation

The result shows that these four explanatory variables do not play such an important role in the model as it was expected. It is evident that apart from income, all the other variables play the expected role in the model. All these explanatory variables are to some degree important factors influencing downloading. However, it is apparent that other variables should be added into this model. The author would suggest these variables: broadband (there is a positive correlation between the number of broadband internet subscribers and the piracy rate since 2003 and so the question concerning the type/speed of connection should be included), ethics, and some consumer behaviour aspects.

Ethics is a very important factor because some online pirates might tell themselves: “If I download a couple of films a month, it cannot destroy the film industry”. However, if the same is believed by a considerable number of Czechs, it can. Therefore some question/s should be used as an explanatory variable in the model to find out the ethical reasons that

explain why some people download and why the others do not. That could help to create more efficient campaigns against piracy.

Finally, explanatory variables regarding consumer behaviour aspects should be used. It is important to find out what do the pirates think about supply and demand of legal and illegal copies of films. It might be discovered that the legal business is not only fighting against a cheaper product, but against a higher volume of a certain type of product that is at the same place, the Internet, and that the illegal service offers more products than the legal one. Surely, the film industry should target selling more of its products online and offer a high-quality and lower price.

Apart from the aforementioned factors, there can be many social factors that influence the downloading behaviour – family, friends, life partner, children, locality (the place where a person lives), social situation, social norms (behaviour), attitude towards piracy, morals, etc. The author would suggest leaving out income from the used explanatory variables and adding some of the aforementioned variables. Then, the newly created regression model could explain the downloading behaviour with higher accuracy than the model created by the author.

4.4.2 Regression analysis – willingness to pay (WTP)

This multiple regression model deals with the price that the respondents would be willing to pay for a DVD in order not to download illegal film copies. The purpose of this regression model is to prove that the willingness to pay is influenced by the selected variables, and to demonstrate how these variables influence the willingness to pay for a legal film instead of downloading an illegal copy. The chosen variables are:

- **age** – it is assumed that the higher the age, the higher the price the respondent would be willing to pay for the legal copy of a film (and vice versa).
- **gender** – women should pirate less than men and therefore it might be easier for them to forgone the option of downloading an illegal film copy and pay for the legal copy more than men.
- **attained education** – the higher the education, the more the respondents should be willing to pay because it is assumed that the people with higher attained education

pirate less and therefore should be willing to pay more than persons with lower attained education who download more illegal film copies.

- **income** – the higher the income, the more the respondents should be willing to pay (and vice versa).

The explained variable is: y_2 (willingness to pay), and the explanatory variables are: x_1 (age), x_2 (gender), x_3 (attained education), x_4 (income), and e (error term). β_0 is the intercept and $\beta_{1...n}$ are regression coefficients of $x_{1...n}$. The model is part of appendices (p. 86). The model for the multiple regression takes the form:

- $y_2 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e$

Result

All the chosen explanatory variables in the model are statistically insignificant. The only substantial explanatory variable is age. If we try to explain the explained variable only by age, it shows that the older the person is, the more willing s/he is to pay for an original DVD to forgone the option of downloading an illegal copy. If the person is older by a year, s/he is willing to pay 0.85 CZK more for a DVD.

Interpretation

The model demonstrates that from the chosen explanatory variables only the age could be used as an explanatory variable and the rest of the explanatory variables are insignificant in this model. Concerning the gender, attained education, and income, it shows that the persons cannot be divided into these groups to illustrate the reasons behind the willingness to pay a higher or lower price for a legal copy in order to forgone downloading of an illegal alternative.

It shows that willingness to pay might be more individual. Every person values various things differently and thus is willing to pay for them a different price. Therefore gender, attained education, and income do not play such an important role. Again, there can be many social factors that influence the willingness to pay – family, friends, life partner,

children, locality, social situation, social norms, attitude towards piracy, morals, etc. Broadband, ethics, and consumer behaviour aspects might have an important role in the model just like in the model concerning downloading. Therefore, a newly created model engaged in the willingness to pay should use different explanatory variables from gender, attained education, and income.

5. EVALUATION AND RECOMMENDATION

The problem of piracy lies in four main factors. These are availability issues, price, "everybody is doing it", and "no-one" gets caught. Considering films and TV shows, desire for earlier access might be of a high importance as well. Pirates have got used to visiting P2P networks and file hosting services, and they have no reason to stop downloading under current conditions. Their wrongdoings cost "nothing", they find immense number of illegally uploaded digitalized data, and download it fast. When people have the feeling that everybody is doing it as well, they do not perceive their activity to be so wrong, and that is an important factor that makes the situation even worse. Another problem is the deterrence factor because it does not work too effectively.

The lower the price of the pirated product, the higher the legal demand should be. Thus, the price of the products that are pirated the most should be reduced. Furthermore, it is necessary to develop communications that would emphasize the ramifications emerging from piracy behaviour. There should be more campaigns with famous and popular persons who convey the consumers a simple message that is: *online piracy is wrong*! If online movie pirates realize that their actions are damaging the movie industry, as well as the other industries, they might at least substantially reduce their piracy behaviour. The research that was conducted by the author suggests that the age plays a very important role in the downloading activities. Therefore the campaigns should be focused on teenagers and young adults in particular.

Another important factor that might disrupt piracy would be raising the search cost to online pirates. If more files that contain different content than they should have were uploaded, it would take longer time to find the desired file. That could discourage some pirates from downloading.

Better supervision of file hosting sites and higher ratio of caught uploaders would help to reduce piracy as well. Site owners of file hosting sites with reward programs should be sued and found guilty for contributory and vicarious copyright infringement because this service (the reward programme) facilitates copyright infringement. Regarding P2P networks, more uploaders and downloaders should be caught and punished. If more people were caught, less of them would be lured to the piracy activity. It is very clear that more legal actions against the pirates should be taken to disrupt online piracy.

6. CONCLUSION

Online piracy is a huge worldwide problem. The theoretical part depicts that online piracy has expanded unbelievably since the creation of Napster. Since that year, 1999, the speed of internet connection has generally increased and so did the number of its users. The illegally uploaded data is mainly spread through P2P networks and file hosting services. These online services are usually at the beginning of the piracy problem because this material can be later on spread via various media like DVDs, CDs, USB flash drives or external hard drives. The main pirated data is music, films, TV shows, software, and games. Studies show that the pirates tend to be usually teenage or young adult males without ethical predisposition towards legal justice. The main reasons behind these pirate activities are pricing and availability issues. Concerning films and TV shows, an earlier access is of a substantial importance, and the fact that piracy is so widespread and the probability of being caught nearly none makes it even worse. The incurred losses to the given entertainment and software industries are immense and despite anti-piracy laws, online piracy has become a problem that does not seem to cease, clearly not in the nearest future.

The practical part was focused on risk related to piracy and tools for mitigation of movie internet piracy in the Czech Republic. Finding socioeconomic determinants that affect piracy involvement was pivotal as well. The author conducted a quantitative research and used a questionnaire as its tool. There were 302 respondents. The author's research demonstrated that the chosen socioeconomic determinants – age, gender, income, and attained education – affect piracy behaviour. To prove the influence of these determinants on piracy behaviour, two regression models were created. The first monitored downloading behaviour and the second willingness to pay for a DVD in order not to download illegal film copies.

Concerning downloading, the riskiest group in the questionnaire was the youngest, 16-25 years, where 79 per cent of the respondents downloaded illegally uploaded films. Based on the questionnaire, there would be 2 869 993 movie internet pirates in the Czech Republic in 2010. Apart from income, the chosen determinants influenced piracy behaviour as it had been expected. The higher the age and attained education, the lower the downloading. Surprisingly, the results point that if the income increases by 1 000 CZK a

month, the downloading will increase by 0.05 DVD a month. The regression analysis concerning downloading showed that the chosen model was explained by the four chosen determinants only by 26.3 per cent. Gender was even statistically insignificant in the model, but on its own points that women download 1.74 DVDs a month less than men. These results proved the hypothesis. It had been expected that the model should be explained much better by the given determinants so the model should be rebuilt and other determinants should be used in it. The author would suggest to include in the future model other social determinants that might influence the downloading behaviour e.g. – family, friends, life partner, children, locality (the place where a person lives), social situation, social norms (behaviour), attitude towards piracy, morals, etc. Broadband, ethics, and consumer behaviour aspects might have an important role in the model as well.

The model that focused on the willingness to pay surprisingly showed that all the chosen determinants in the model were statistically insignificant. The only substantial explanatory variable was age. If we try to explain the willingness to pay only by age, it shows that the older the person is, the more willing s/he is to pay for an original DVD to forgone the option of downloading an illegal copy. If the person is older by a year, s/he is willing to pay 0.85 CZK more for a DVD. This result demonstrates that there are other more important determinants influencing the willingness to pay for an original DVD in order to forgone the piracy activity than the chosen ones. The author would suggest using different determinants to find out the reasons behind the willingness to pay.

Regarding the attitude towards risk, it was surprising that with the certainty of being caught, there were more respondents who were risk loving than when the probability of being caught was only 0.02 per cent. That was caused by the fact that the respondents replied only once what would be their willingness to pay for a DVD in order to stop downloading illegally uploaded films regardless of their probability of being caught. If this question was asked twice depending on the probability of being caught, the results would be more telling. Still, when we compare the fine that would discourage the downloaders from downloading, on the basis of their probabilities of being caught, it clearly shows that when the respondents would be sure to be caught, they would be discouraged by a very low fine. It is clear that the best option in deterrence of pirates is a high ratio of caught pirates and not an excessively high fine. Nearly 44 per cent of the respondents who download illegally uploaded movie copies do not believe that they might be caught, and

they answered that no fine would discourage them with the 0.02 per cent probability of being caught. Unfortunately, based on the author's estimate, this probability might be very close to the reality concerning the Czech Republic. Based on the calculation resulting from the questionnaire, the probability of being caught would be 0.005 per cent in 2009 and 0.01 in 2010. When the probability is so low, we cannot expect that the pirates are scared of being apprehended. That is one of the problems that has to be changed as soon as possible.

7. BIBLIOGRAPHY

Publications

ČERMÁK, J. *Internet a autorské právo*. Linde Praha, a.s. – Právnické a ekonomické nakladatelství Bohumily Hořínkové a Jana Tuláčka, 2nd actualized version, 2003. ISBN 80-7201-423-4.

PINDYCK, R. S. – RUBINFELD, D. L. *Microeconomics*. Pearson Education, Inc., 2005, 6th edition. 720 p. ISBN 0-13-191207-0.

The Digital Dilemma : Intellectual Property In the Information Age. National Academy Press, Washington, D.C., 2000. 340 p. ISBN 0-309-06499-6.

Electronic sources

Allaboutmarketsearch. *Internet Growth Statistics* [online]. All About Market Research, 2010. [cit. 2010-03-24]. Available at: <http://www.allaboutmarketresearch.com/internet.htm>.

ADAMS, S. *95% of music downloads in 2008 were illegal : DiS reacts and suggests two solutions* [online]. drownedinsound.com, 2009. [cit. 2011-03-13]. Available at: <http://drownedinsound.com/news/4136081-95-of-music-downloads-in-2008-were-illegal-dis-reacts-and-suggests-two-solutions>.

Alexa. [online]. Alexa, The Web Information Company, 2011. [cit. 2011-02-26]. Available at: <http://www.alexa.com/topsites>.

ANDREWS, R. *Copyright Infringement and the Internet : An economic analysis of crime* [online]. Boston University, 2005. [cit. 2010-02-20]. 28 p. (PDF). Available at: <http://www.bu.edu/law/central/jd/organizations/journals/scitech/volume112/AndrewsNoteWEB.pdf>.

BBC. *China film piracy 'cost $2.7bn'* [online]. BBC News, June 19, 2006. [cit. 2011-04-21]. Available at: <http://news.bbc.co.uk/2/hi/entertainment/5093772.stm>.

BookRags. *List of best-selling music artists* [online]. BookRags, 2008. [cit. 2011-03-29]. Available at: <http://www.bookrags.com/wiki/List_of_best-selling_music_artists>.

BSA. *Fifth Annual BSA and IDC Global Software Piracy Study* [online]. Business Software Alliance, 2008. [cit. 2010-11-06]. 16 p. Available at: <http://www.bsa.org/country/Research%20and%20Statistics/~/media/2E18170AA3FA40F48C5878DD8C035E00.ashx>.

BSA-IDC (a). *Sixth Annual BSA-IDC Global Software 08 Piracy Study* [online]. Business Software Alliance, 12 May 2009. [cit. 2009-08-25]. 24 p. Available at: <http://www.bsa.org/country/Research%20and%20Statistics.aspx>.

BSA-IDC (b). *Seventh Annual BSA-IDC Global Software 09 Piracy Study* [online]. Business Software Alliance, May 2010. [cit. 2011-03-20]. 22 p. (PDF). Available at: <http://portal.bsa.org/globalpiracy2009/studies/09_Piracy_Study_Report_A4_final_111010.pdf>.

CHENG, J. *UK men pirate more than women : everyone confused over rights* [online]. Ars Technica, 2011. [cit. 2011-03-12]. Available at: <http://arstechnica.com/media/news/2009/07/uk-men-pirate-more-than-women-everyone-confused-over-rights.ars>.

COYLE, J. R. – GOULD, S. J. – GUPTA, P. – GUPTA, R. *"To buy or to pirate" : The matrix of music consumers' acquisition-mode decision-making* [online]. Journal of Business Research 62 (2009) 1031–1037, 2009. [cit. 2011-03-26]. Available at: <http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7S-4ST45WC-1&_user=10&_coverDate=10%2F31%2F2009&_rdoc=1&_fmt=high&_orig=gateway&_origin=gateway&_sort=d&_docanchor=&view=c&_searchStrId=1694529564&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=e8a785caaa308f28c72a0704ae2518af&searchtype=a>.

CPU (a). *Co je to pirátství a jaké tresty za něj hrozí? : Pirátství* [online]. Czech Anti-piracy Union, 2009. [cit. 2019-06-07]. Available at: <http://www.cpufilm.cz/piracy.html>.

CPU (b). *Grafické přehledy audiovizuálního pirátství* [online]. Czech Anti-piracy Union, 2011. [cit. 2011-03-29]. Available at: <http://www.cpufilm.cz/prehled.html>.

CSU (a). *Population by age as of 1 July 2009* [online]. Czech Statistical Office, July 1, 2009. [cit. 2011-02-12]. 26 p. (PDF). Available at: <http://www.czso.cz/csu/2010edicniplan.nsf/t/0C001BB2A0/$File/400310004.pdf>.

CSU (b). *Skončilo období vyšší porodnosti : Pohyb obyvatelstva - 1. až 3. čtvrtletí 2010* [online]. Czech Statistical Office, December 13, 2010. [cit. 2011-02-12]. 2 p. (DOC). Available at: <http://www.czso.cz/csu/csu.nsf/informace/coby121310.doc>.

CSU (c). *Internetová infrastruktura* [online]. Czech Statistical Office, 2011. [cit. 2011-03-03]. Available at: <http://www.czso.cz/csu/redakce.nsf/i/internetova_infrastruktura>.

CSU (d). *Průměrná hrubá měsíční mzda 2000-2010* [online]. Czech Statistical Office, 2011. [cit. 2011-04-10]. Available at: <http://www.czso.cz/csu/dyngrafy.nsf/graf/mzda_v_kc>.

DSL. *Připojení k internetu* [online]. DSL.cz, 2011. [cit. 2011-04-02]. Available at: <http://www.dsl.cz/pripojeni-k-internetu>.

Experimental Economics Centre. *Decision-Making Under Uncertainty - Basic Concepts* : *An Introduction to Risk-Aversion* [online]. EconPort, Experimental Economics Centre, 2006. [cit. 2011-01-21]. Available at: <http://www.econport.org/econport/request?page=man_ru_basics4>.

FARLEY, E. *The Chinese Film Industry Storms the Globe* [online]. Suite101, suite101.com, May 11, 2010. [cit. 2011-03-28]. Available at: <http://www.suite101.com/content/the-chinese-film-industry-storms-the-globe-a236929>.

FERGUSON, A. *Would music albums for £1 reduce piracy problems?* [online]. Thinkbroadband.com, October 15, 2010. [cit. 2011-03-26]. Available at: <http://www.thinkbroadband.com/news/4428-would-music-albums-for-1-reduce-piracy-problems.html>.

Fileserve. *Make More Money with FileServe!* [online]. Fileserve.com, 2011. [cit. 2011-02-12]. Available at: <http://www.fileserve.com/partner-info.php>.

Filesonic. *Affiliate program* [online]. Filesonic.com, 2011. [cit. 2011-02-12]. Available at: <http://www.filesonic.com/affiliate-program>.

Film4u. *Novinky na DVD* [online]. Film4u.cz, 2011. [cit. 2011-02-19]. Available at: <http://www.film4u.cz/?p=searching&news=DVD>.

FIXMER, A. *Movies, TV May Be Priced Too High to Deter Piracy, Survey Finds* [online]. Bloomberg, February 15, 2011. [cit. 2011-04-20]. Available at: <http://www.bloomberg.com/news/2011-02-15/movies-tv-may-be-priced-too-high-to-deter-piracy-survey-finds.html>.

FULLER, S. *Cons of Downloading Music* [online]. eHow, November 25, 2010. [cit. 2011-03-30]. Available at: <http://www.ehow.com/list_7556218_cons-downloading-music.html>.

GEIST, M. *Gov't Commissioned Study Finds P2P Downloaders Buy More Music* [online]. Michael Geist, 2007. [cit. 2010-03-12]. Available at: <http://www.michaelgeist.ca/content/view/2347/125/>.

GHAZI, K. *Pc Game Piracy Examined* [online]. Tweakguides.com, 2010. [cit. 2010-10-21]. 10 p. Available at: <http://www.tweakguides.com/Piracy_1.html>.

GOPAL, R. D. – SANDERS, G. L. – BHATTACHARJEE, S., et al. *A Behavioral Model of Digital Music Piracy* [online]. Social Science Research Network, Social Science Electronic Publishing, Inc., 2002. [cit. 2009-08-10]. Available at: <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=52734>.

HALDERMAN, J. A. *Evaluating New Copy-Prevention Techniques for Audio CDs* [online]. Princeton University, Department of Computer Science. 18 November 2002. [cit. 2009-08-25]. 18 p. (PDF). Available at: <http://www.cse.umich.edu/~jhalderm/pub/papers/cdcopy-drm02.pdf>.

HAVOCSCOPE (a). *Current Data on Music Piracy Losses by Country* [online]. Havocscope black markets, online database of black market activities, 2011. [cit. 2011-03-28]. Available at: <http://www.havocscope.com/music-piracy-losses-by-country/>.

HAVOCSCOPE (b). *Current Data on Movie Piracy Losses by Country* [online]. Havocscope black markets, online database of black market activities, 2011. [cit. 2011-03-28]. Available at: <http://www.havocscope.com/movie-piracy-losses-by-country/>.

HAVOCSCOPE (c). 2008 *Software Piracy Losses by Country* [online]. Havocscope black markets, online database of black market activities, 2011. [cit. 2011-03-28]. Available at: <http://www.havocscope.com/2008-software-piracy-losses-by-country/>.

HILL, A. *What is Internet Piracy?* [online]. WiseGEEK, Conjecture Corporation, 2009. [cit. 2009-06-07]. Available at: <http://www.wisegeek.com/what-is-internet-piracy.htm>.

HILL, J. *Lower media prices could decrease piracy around the world* [online]. Gametell.com, March 16, 2011. [cit. 2011-03-20]. Available at: <http://www.gamertell.com/gaming/comment/lower-media-prices-could-decrease-piracy-around-the-world/>.

Hotfile. *Partnerský program* [online]. Hotfile.com, 2011. [cit. 2011-02-12]. Available at: <http://hotfile.com/affiliate.html>.

IFPI (a). *Digital Music Report 2007* [online]. IFPI – International Federation of the Phonographic Industry, 2007. [cit. 2011-03-27]. 22 p. (PDF). Available at: <http://ifpi.org/content/library/digital-music-report-2007.pdf>.

IFPI (b). *Digital Music Report 2010* [online]. IFPI – International Federation of the Phonographic Industry, 2010. [cit. 2010-03-09]. 32 p. (PDF). Available at: <http://www.ifpi.org/content/library/DMR2010.pdf>.

IFPI (c). *Digital Music Report 2011* [online]. IFPI – International Federation of the Phonographic Industry, 2011. [cit. 2011-03-27]. 31 p. (PDF). Available at: <http://www.ifpi.org/content/library/DMR2011.pdf>.

IFPI (d). *Ochrana CD* [online]. IFPI – Mezinárodní federace hudebního průmyslu, Národní skupina České republiky, 2009. [cit. 2010-03-10]. Available at: <http://www.ifpicr.cz/?rubrika=1148>.

IFPI (e). *Právní aspekty P2P* [online]. IFPI – Mezinárodní federace hudebního průmyslu, Národní skupina České republiky, 2009. [cit. 2010-03-10]. Available at: <http://www.ifpicr.cz/?rubrika=1141>.

IFPI (f). *The Recording Industry 2006 PIRACY REPORT : PROTECTING CREATIVITY IN MUSIC* [online]. IFPI – International Federation of the Phonographic Industry, July 2006. [cit. 2009-08-25]. 20 p. (PDF). Available at: <http://www.ifpi.org/content/library/piracy-report2006.pdf>.

IIPA (a). *International Intellectual Property Alliance : Statistics* [online]. IIPA, June 30, 2009. [cit. 201-03-12]. Available at: <http://www.iipa.com/statistics.html>.

IIPA (b). *International Intellectual Property Alliance 2006 Special 301 Special Mention : Czech Republic* [online]. IIPA, Country Reports, Czech Republic, 2006. [cit. 2010-03-12]. pp. 451-454. (PDF). Available at: <http://www.iipa.com/rbc/2006/2006SPEC301CZECHREPUBLIC.pdf>.

Internet World Stats (a). *Broadband Internet Statistics : Top World Countries with highest Internet broadband subscribers in 2007* [online]. Internet World Stats, Usage and population statistics, 2007. [cit. 2011-03-29]. Available at: <http://www.internetworldstats.com/dsl.htm>.

Internet World Stats (b). *Internet World Stats* [online]. Internet World Stats, 2011. [cit. 2011-04-20]. Available at: <http://www.internetworldstats.com/>.

Investopedia (a). *Error Term* [online]. Investopedia.com, Dictionary, 2011. [cit. 2011-04-10]. Available at: <http://www.investopedia.com/terms/e/errorterm.asp>.

Investopedia (b). *Opportunity cost* [online]. Investopedia.com, Dictionary, 2011. [cit. 2011-04-10]. Available at: <http://www.investopedia.com/terms/o/opportunitycost.asp>.

IPI. T*he True Cost of Sound Recording Piracy to the U.S. Economy* [online]. Institute For Policy Innovation, IPI Policy Report, 2007. [cit. 2011-03-28]. 28 p. Available at: <http://www.ipi.org/IPI%5CIPIPublications.nsf/PublicationLookupFullText/5C2EE3D2107A4C228625733E0053A1F4>.

Ipoque. *Internet study 2008/2009* [online]. Ipoque, 2009. [cit. 2011-01-30]. 14 p. Available at: <http://www.ipoque.com/resources/internet-studies>.

JONES, S. *Generations online 2009* [online]. Pew Research Centre, 2011. [cit. 2011-03-12]. Available at: <http://pewresearch.org/pubs/1093/generations-online>.

KŘÍŽ, L. *Jak obejít ochranu kopírování u audio CD* [online]. Technet.cz, MAFRA a.s., February 3, 2005. [cit. 2009-08-22]. Available at: <http://technet.idnes.cz/jak-obejit-ochranu-proti-kopirovani-u-audio-cd-f4o-/tec_audio.asp?c=A050202_124316_digital_kuz>.

Marquee Stars. *Movie Ticket Prices Worldwide* [online]. Marquee Stars, January 29, 2010. [cit. 2011-03-23]. Available at: <http://www.marqueestars.com/tools/movie-ticket-prices-worldwide/>.

MITCHELL, B. *Top 10 Free P2P File Sharing Programs : Free P2P Software* [online]. About.com, a part of the The New York Times Company, 2009. [cit. 2009-08-11]. Available at: <http://compnetworking.about.com/od/p2ppeertopeer/tp/p2pfilesharing.htm>.

McAfee. *Music and Movies : Entertainment Versus Online Risk* [online]. McAfee, 2010. [cit. 2011-03-27]. 9 p. (PDF). Available at: <http://us.mcafee.com/en-us/local/docs/Digital_music_movies.pdf>.

MOKEY, N. *Music, Movie and Software Piracy : What's Your Chance of Getting Caught?* [online]. Digital Trends, October 23, 2009. [cit. 2011-03-31]. Available at: <http://www.digitaltrends.com/features/music-movie-and-software-piracy-whats-your-chance-of-getting-caught/>.

MOYA, J. *STUDY : Pirates Buy 10 Times More Music Than They Steal* [online]. Zeropaid.com, 2009. [cit. 2010-03-12]. Available at: <http://www.zeropaid.com/news/86009/study-pirates-buy-10-times-more-music-than-they-steal/>.

MultiMedia Intelligence. *P2P Traffic to Grow Almost 400% over the Next 5 Years, as Legitimate P2P Applications Become a Meaningful Segment* [online]. Multimediaintelligence.com, 2010. [cit. 201-11-06]. Available at: <http://www.multimediaintelligence.com/index.php?option=com_content&view=article&id=133:p2p-traffic-to-grow-almost-400-over-the-next-5-years-as-legitimate-p2p-applications-become-a-meaningful-segment>.

OTTER, A. *Piracy caused by high cost of media* [online]. Mybroadband.co.za News, March 16, 2011. [cit. 2011-03-20]. Available at: <http://mybroadband.co.za/news/general/19129-Piracy-caused-high-cost-media.html>.

PEITZ, M. – WAELBROECK, P. *Making Use of File-Sharing in Music Distribution* [online]. University of Mannheim, ECARES – Université Libre de Bruxelles, 2004. [cit. 2011-03-27]. 22 p. (PDF). Available at: <http://www.eea-esem.com/papers/eea-esem/2004/2194/mp3advert20040213.pdf>.

PODDAR, S. *Music product as a durable good and online piracy* [online]. Society for Economic Research on Copyright Issues, serci.org, 2006. [cit. 2011-03-26]. pp. 53-56. (PDF). Available at: <http://www.serci.org/docs_3_2/poddar.pdf>.

Police of the Czech Republic (a). *Statistické přehledy criminality* [online]. Police of the Czech Republic, December 31, 2009. [cit. 2011-02-09]. Available at: <http://www.policie.cz/clanek/statisticke-prehledy-kriminality-327216.aspx>.

Police of the Czech Republic (b). *Statistické přehledy criminality* [online]. Police of the Czech Republic, December 31, 2010. [cit. 2011-02-09]. Available at: <http://www.policie.cz/clanek/statisticke-prehledy-kriminality-650295.aspx>.

POUWELSE, J. – GARBACKI P. – EPEMA, D. – SIPS, H. *The Bittorent P2P File-sharing System : Measurement and Analysis* [online]. Delft University of Technology, Delft, The Netherlands, Department of Computer Science, Parallel and Distributed systems group, 2004. [cit. 2011-03-27]. 13 p. (PDF). Available at: <http://www.csd.uoc.gr/~hy558/papers/bittorrent.pdf>.

PRICE, D. *Technical Report : An Estimate of Infringing Use of the Internet – Summary* [online]. Envisional, 2011. [cit. 2011-03-19]. 3 p. (PDF). Available at: <http://documents.envisional.com/docs/Envisional-Internet_Usage_Report-Summary.pdf>.

P2pon. *Top Ten Most Downloaded P2P File Sharing Clients* [online]. January 17, 2010. P2P ON!, p2pon.com. [cit. 2011-02-27]. Available at: <http://www.p2pon.com/2010/01/17/top-ten-most-downloaded-p2p-file-sharing-clients-8/>.

RAMAYAH, T. – CHIN, L. G. – AHMAD, N. H. *Internet piracy among Business Students: An Application of Triandis Model* [online]. Case Study, School of Management, Universiti Sains Malaysia, March 2008. [cit. 2011-03-12]. pp. 85. (PDF). Available at: <http://www.safaworld.org/ijbms/abs/Abstracts%20v1n12008/IJBMS%20Vol%201%20No%201%20July%2008-abs%205.pdf>.

RIAA. *PIRACY : ONLINE AND ON THE STREET* [online]. Recording Industry Association of America, 2009. [cit. 2009-08-02]. Available at: <http://www.riaa.com/physicalpiracy.php>.

SELF, K. M. *Economic Supply and Demand* [online]. 2001. [cit. 2009-08-24]. Available at: <http://linuxmafia.com/~karsten/Rants/piracy.html>.

SHANAHAN, K. J. – HYMAN, M. R. *Motivators and enablers of SCOURing : A study of online piracy in the US and UK* [online]. Mississippi State University, College of Business, New Mexico State University, Department of Marketing, College of Business, USA, 2008. [cit. 2011-03-26]. pp. 1095 – 1102. Available at: <http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7S-4X5YWPY-1&_user=10&_coverDate=10%2F31%2F2010&_rdoc=1&_fmt=high&_orig=gateway&_origin=gateway&_sort=d&_docanchor=&view=c&_searchStrId=1694486121&_rerunOrigin=scholar.google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=d686f48f69d43d07bf9414d878e182d3&searchtype=a>.

SLATER, L. *Men more likely to download music illegally, but the girls shop around…* [online]. Drownedinsound.com, 2011. [cit. 2011-03-12]. Available at: <http://drownedinsound.com/news/4137981-men-more-likely-to-download-music-illegally-but-the-girls-shop-around>.

Surveysystem. *Sample Size Calculator* [online]. Surveysystem.com, 2011. [cit. 2011-04-10]. Available at: <http://www.surveysystem.com/sscalc.htm>.

TechFAQ. *What is peer-to-peer (P2P) file sharing?* [online]. Tech-FAQ, 2009. [cit. 2009-08-10]. Available at: <http://www.tech-faq.com/p2p-peer-to-peer-file-sharing.shtml>.

TorrentFreak (a). *A Snapshot of the Public Bittorent Landscape* [online]. TorrentFreak.com, 2010. [cit. 2011-03-24]. Available at: <http://torrentfreak.com/a-snapshot-of-the-public-bittorrent-landscape-101214/>.

TorrentFreak (b). *Avatar Crowned The Most Pirated Movie of 2010* [online]. TorrentFreak.com, 2010. [cit. 2011-03-22]. Available at: <http://torrentfreak.com/avatar-crowned-the-most-pirated-movie-of-2010-101220/>.

TorrentFreak (c). *US Court : RapidShare Not Guilty of Copyright Infringement* [online]. TorrentFreak.com, 2010. [cit. 2011-02-26]. Available at: <http://torrentfreak.com/rapidshare-not-guilty-of-copyright-infringement-us-court-rules-100520/>.

TORR, J. D. *At Issue : Internet Piracy* [online]. Ed. James D. Torr. San Diego: Greenhaven Press, 2005. August 2004. [cit. 2009-06-07]. Available at: <http://www.enotes.com/internet-piracy-article/54083>.

Tradearabia. *Digitalisation only way to kill film piracy* [online]. Tradearabia.com, 2010. [cit. 2011-03-26]. Available at: <http://www.tradearabia.com/news/bank_180651.html>.

VILCHES, J. *French "three-strikes" law ruled unconstitutional* [online]. TechSpot.com, 2009. [cit. 2010-03-10]. Available at: <http://www.techspot.com/news/35048-french-threestrikes-law-ruled-unconstitutional.html>.

WATERS, D. *Napster: 10 years of change* [online]. BBC News, British Broadcasting Corporation (BBC), 8 June 2009. [cit. 2009-06-20]. Available at: <http://news.bbc.co.uk/2/hi/technology/8089221.stm>.

What-is-torrent (a). *Torrent search engines* [online]. What-is-torrent.com, 2008. [cit. 2009-08-08]. Available at: <http://www.what-is-torrent.com/search-engines>.

What-is-torrent (b). *What is a torrent* [online]. What-is-torrent.com, 2008. [cit. 2009-08-08]. Available at: <http://www.what-is-torrent.com/search-engines>.

WIPO. *What is Intellectual Property?* [online]. World Intellectual Property Organization, 2009. [cit. 2009-06-16]. Available at: <http://www.wipo.int/about-ip/en/>.

YOUNGS, I. *Bands 'better because of piracy'* [online]. BBC News, British Broadcasting Corporation (BBC), 12 June 2009. [cit. 2009-06-20]. Available at: <http://news.bbc.co.uk/2/hi/entertainment/8097324.stm>.

8. APPENDICES

The following table shows 30 countries with the highest software piracy rates and 30 with the lowest. The Czech Republic is highlighted.

Table 8: Software piracy - 30 highest and lowest piracy rates (2009)

HIGHEST PIRACY		LOWEST PIRACY	
Georgia	95%	United States	20%
Zimbabwe	92%	Japan	21%
Bangladesh	91%	Luxembourg	21%
Moldova	91%	New Zealand	22%
Armenia	90%	Australia	25%
Yemen	90%	Austria	25%
Sri Lanka	89%	Belgium	25%
Azerbaijan	88%	Finland	25%
Libya	88%	Sweden	25%
Belarus	87%	Switzerland	25%
Venezuela	87%	Denmark	26%
Indonesia	86%	United Kingdom	27%
Vietnam	85%	Germany	28%
Ukraine	85%	Netherlands	28%
Iraq	85%	Canada	29%
Pakistan	84%	Norway	29%
Algeria	84%	Israel	33%
Cameroon	83%	Ireland	35%
Nigeria	83%	Singapore	35%
Paraguay	82%	South Africa	35%
Zambia	82%	UAE	36%
Montenegro	81%	Czech Republic	37%
Bolivia	80%	Taiwan	38%
El Salvador	80%	France	40%
Guatemala	80%	Portugal	40%
Botswana	79%	Reunion	40%
China	79%	Hungary	41%
Ivory Coast	79%	South Korea	41%
Kenya	79%	Spain	42%
Nicaragua	79%	Slovakia	43%

Source: BSA-IDC (b), 2010, p. 7

The Czech Republic is with its 37 percentage points amongst the countries included among the lowest piracy rates. Piracy rates positively correlate with GNI per capita based on purchasing power parity (PPP). The countries with the highest piracy rates have low per

capita income and the countries with the lowest piracy rates have high per capita income. That can be seen in the following table:

Table 9: GNI per capita in 2009, PPP (current international $)

Country/software piracy rate	GNI per capita
Georgia 95%	4 700
Zimbabwe 92%	x
Bangladesh 91%	1 550
Moldova 91%	3 010
Armenia 90%	5 410
Yemen 90%	2 330
Sri Lanka 89%	4 720
Azerbaijan 88%	x
Libya 88%	16 400
Belarus 87%	12 740
Venezuela 87%	12 220
Indonesia 86%	3 720
Vietnam 85%	2 790
Ukraine 85%	6 180
Iraq 85%	3 330
Pakistan 84%	2 680
Algeria 84%	8 110
Cameroon 83%	2 190
Nigeria 83%	2 070
Paraguay 82%	4 430
Zambia 82%	1 280
Montenegro 81%	13 320
Bolivia 80%	4 250
El Salvador 80%	6 420
Guatemala 80%	4 570
Botswana 79%	12 840
China 79%	6 890
Ivory Coast 79%	x
Kenya 79%	1 570
Nicaragua 79%	2540

Sources: BSA-IDC (b), 2010, p. 7; The World Bank, 2011

All the countries in the previous table have its GNI per capita based on purchasing power parity (PPP) lower than 20 000.

Table 10: GNI per capita in 2009, PPP (current international $)

Country/software piracy rate	GNI per capita
United States 20%	45 640
Japan 21%	33 470
Luxembourg 21%	59 550
New Zealand 22%	27 870
Australia 25%	38 210
Austria 25%	37 960
Belgium 25%	36 550
Finland 25%	34 730
Sweden 25%	38 590
Switzerland 25%	46 990
Denmark 26%	37 800
United Kingdom 27%	37 230
Germany 28%	36 780
Netherlands 28%	39 780
Canada 29%	37 410
Norway 29%	54 880
Israel 33%	27 110
Ireland 35%	33 510
Singapore 35%	49 780
South Africa 35%	10 050
UAE 36%	x
Czech Republic 37%	23 610
Taiwan 38%	x
France 40%	33 930
Portugal 40%	23 750
Reunion 40%	x
Hungary 41%	18 570
South Korea 41%	27 310
Spain 42%	31 880
Slovakia 43%	21 600

Sources: BSA-IDC (b), 2010, p. 7; The World Bank, 2011

In the previous table, all the countries except the two highlighted countries (Hungary and South Africa) have its GNI per capita higher than 20 000. On the basis of the two previous tables, we can assume that income plays an important role in the software piracy rate.

Table 11: Estimated number of internet users (0-15years)

Age group	Population	Percentage of internet users (%)	Estimated number of internet users
0	119 304	0	0
1	117 582	0	0
2	110 928	0	0
3	105 092	0	0
4	101 179	0	0
5	96 803	0	0
6	94 545	10	9 455
7	93 244	10	9 324
8	91 516	15	13 727
9	89 874	20	17 975
10	89 960	35	31 486
11	90 725	50	45 363
12	91 098	60	54 659
13	93 887	70	65 721
14	102 284	80	81 827
15	114 725	90	103 253
Total	***1 602 746***	***x***	***432 790***

Source: Author's estimate

Table 12: Regression analysis - downloading

SUMMARY OUTPUT								
Regression statistics								
Multiple R	0,262783552							
R Square	0,069055195							
Adjusted R Square	0,056517218							
Standard Error	7,215818884							
Observations	302							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	4	1147,096939	286,774235	5,507682307	0,000273236			
Residual	297	15464,20852	52,0680422					
Total	301	16611,30546						
	Coefficients	*Standart Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*		
Intercept	11,68544549	1,976348496	5,91264421	9,23864E-09	7,796024335	15,57486664		
X 1	-0,099051399	0,034958389	-2,8334086	0,004920793	-0,16784893	-0,030253868		
X 2	-1,259394325	0,851212209	-1,4795304	0,140058503	-2,934565875	0,415777226		
X 3	-0,753068976	0,28721952	-2,6219283	0,009194019	-1,318312242	-0,18782571		
X 4	5,22119E-05	1,93683E-05	2,69573694	0,007423776	1,40954E-05	9,03285E-05		

Source: Author's calculation

Table 13: Regression analysis - willingness to pay (WTP)

SUMMARY OUTPUT									
Regression statistics									
Multiple R	0,162746195								
R Square	0,026486324								
Adjusted R Square	0,021828364								
Standard Error	47,26607472								
Observations	211								
ANOVA									
	df	*SS*	*MS*	*F*	*Significance F*				
Regression	1	12703,5467	12703,55	5,686249531	0,017992324				
Residual	209	466923,1002	2234,082						
Total	210	479626,6469							
	Coefficients	*Standart Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*			
Intercept	46,11958262	9,993630724	4,614898	6,85739E-06	26,41834475	65,8208205			
X 1	0,858403551	0,359980146	2,384586	0,017992324	0,148746102	1,568061			

Source: Author's calculation

9. BIBLIOGRAPHY – APPENDICES

BSA-IDC (a). *Sixth Annual BSA-IDC Global Software 08 Piracy Study* [online]. Business Software Alliance, 12 May 2009. [cit. 2009-08-25]. 24 p. Available at: <http://www.bsa.org/country/Research%20and%20Statistics.aspx>.

BSA-IDC (b). *Seventh Annual BSA-IDC Global Software 09 Piracy Study* [online]. Business Software Alliance, May 2010. [cit. 2011-03-20]. 22 p. (PDF). Available at: <http://portal.bsa.org/globalpiracy2009/studies/09_Piracy_Study_Report_A4_final_111010.pdf>.

World Bank. *GNI per capita, PPP (current international $)* [online]. The World Bank, 2011. [cit. 2011-03-20]. Available at: <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>.