

Intellectual Property and the Film Industry: Economic Empirics and Legal Policy

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Abstract

This thesis provides an interdisciplinary and overarching work on the copyright issue of downloading films via peer-2-peer networks. First a review of the economic empirical work into the damages of downloading is given. A new data analysis exploring the role of video quality and leak timing in relation to US theatre revenues is then provided. The quality of a film's first leak was found to be of great importance here; a higher quality first leak was associated with a decrease in a film's lifetime theatrical revenues of -77,3%. The results of this study support the claim that downloading of films via P-2-P networks hurts film's theatrical revenues, and also refutes the claim that films can benefit from piracy via positive network effects. The findings of this study are subsequently put within a legal framework to make a discussion of the legal policy options possible.

Keywords: Copyright, Downloading, Economic Damages, Video Quality, Timing, *Betamax* case, *Napster* case, Policy Options.

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To my Loving Parents

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Dick Spruitenburg

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"I say to you that the VCR is to the American film producer and the American public as the Boston strangler is to the woman home alone."

Jack Valenti, President of the Motion Picture Association of America (MPAA) 1984.

1. Introduction

In the opening quote the president of the MPAA compares videotape recorders to a known serial killer. In hindsight it seems a bit odd, but it does show the film industry's fear of the possibility of home-copying. Looking back, the film industry's pleads seem ironic; for if anything the introduction of VCRs and pre-recorded films produced by the studios themselves boasted the overall demand for films (Thompson 1987). These positive developments followed the technical innovation, and quickly overshadowed the fears production studios had, adapting the new technology and using it for their own good.

This thesis looks into the relation of the film-industry with copyright issues, both from the legal and the economic perspective. Firstly, this thesis reviews the economic literature regarding the issue of illegal downloading of films, in order to assess the financial damages from downloading. Secondly, this thesis performs a statistical analysis aiming to establish the role of the timing of a pirate release (leak), and its effect on box office revenues. Also, this thesis assesses whether differences in the video quality of a leak play a role in affecting revenues. For these analyses I make use of the Baio (2005) dataset, which has been tracking the dates Oscar nominated films were leaked onto pirate networks, in their various qualities ever since 2003.

After having discussed the economic empiric side of the problem this paper shows the interdisciplinarity of the subject, by reviewing the legal history of copyright infringement in the film-industry, and tying this to the economic empirics. This makes a discussion about the best policies tackling the copyright problem of downloading possible.

It is here that the importance of research into this lies. Copyright aims to protect intellectual property, and provide incentives for innovation. With the problem of downloading of copyrighted material we are faced with important policy choices. As with the case of the VCR government has to make a decision about what the correct course of action is. It is a common made argument that weak protection of intellectual property is harmful because it hurts the supply side of the market. Without protection of intellectual property the incentive to invest is removed, and supply falls.

But how strong is this argument? Is it not the case, like Raustiala & Sprigman (2012) argue, that the film-industry overstates the damages of illegal downloading to increase protection of their intellectual property?

This makes for an important area of study for the interdisciplinary scholars on the border between economics and law. Understanding the legal perspective of copyright in combination with an economic understanding of illegal downloading and the film industry is key to finding a policy solution in society's best interest; policy protecting copyright and intellectual property, while not hindering technological innovation; the right balance between regulating and protecting the film industry.

2. Literature Review.

The most general overview of the various economic areas of study within the film-industry is provided by McKenzie (2012). He coins the terms “movie micro & macroeconomics”, making the most general division. Movie macroeconomics concerns the issues of aggregate demand and aggregate supply for films and digital content. Cameron (1986, 1988, 1990, 1999) is a good example of this. He looks into the aggregate demand and supply for cinema in the UK, and the effect technological innovations have on the UK industry, concluding that the UK industry has been in decline since the 60ies.

Movie microeconomics focusses, as is to be expected, on single films or companies. A good example of this is DeVany and Walls (1999) doing a statistical analysis to determine whether adding a superstar to the film helps to make it a less uncertain investment (it does not).

This paper has its roots in movie microeconomics, but concludes in discussion of policy on the macro level. I combine the useful insights of microeconomic research into the film industry the effects of piracy, to set the stage for a discussion of the policy possibilities for coping with the downloading of copyrighted materials.

Peitz & Waelbroeck (2006) present general findings on the effect of piracy on the affected industries (film, music, software etc.). They do a welfare analysis, and find that the effects of piracy of digital content differ in the long and the short run. They conclude that the short-run effects can be welfare improving (people who wouldn't normally spend money on films still get to see films). However, in the long run, this is not sustainable, as the people who would pay for their content start downloading content for free. On the film-industry specifically, they note that people tend to watch movies only once, and that therefore, the industry can prevent piracy more easily. They also predict the importance of video on demand services.

The long-run effect described by Peitz & Waelbroeck is not supported by the findings of Waldfogel (2012) in his analysis of the effects piracy has on the

demand and supply for music. He finds no evidence for the claim that piracy of music has caused a decline in supply. However, in his conclusion Waldfogel specifically notes that “*Even if we take the suggestive results of this study [...] we have no evidence that these results carry over to other media [...] that differ in their creative process*” (p107).

DeVany & Walls (2007) aims to conclude whether the question whether or not piracy hurts the film industry. They analyse confidential studio data, in combination with self-acquired data on the number of (pirate) sites offering a copy of the film to construct a regression model relating the number of available pirate sources to the decline in box office revenue. They conclude that an individual download site only adds marginally to the decline in revenue growth, but the aggregate is responsible for an average loss of 40 million USD per film.

However, this is in contradiction with the research done by Bounie, Bourreau, and Waelbroeck (2006), in their study on self-reported theatre attendance and download behaviour. Their findings supports the idea that (illegal) downloading supports demand for films, in the same way that VCRs boosted theatre attendance (Cameron, 1988). Word-of-mouth advertisement is very important for films, because they are a key determinant in prolonging a movies theatre run (DeVany 2004).

Peukert, Claussen, and Kretschmer (2013) also use this finding of DeVany to interpret their empiric results. They use the shutdown of major file-sharing website *Megaupload* as a natural experiment in the market of illegal downloading to study box office revenues. Their model aims to compare box office revenues before and after the shutdown, while controlling for various factors that could explain intertemporal differences in revenue.

They conclude that the majority of movies did not increase their revenues after the shutdown. Only the large blockbusters could benefit from the shutdown of Megaupload, while for the mid-range of movies the effect of the shutdown on revenues was negative. They explain this by arguing that the extra availability of films via sites like Megaupload made more people see the film, and therefore gave the film more word-of-mouth advertisement, prolonging the film's lifespan and total revenues.

3. The Data

This thesis aims to add to the empiric economic literature by re-evaluating the effect piracy has on revenues. I do this by via a statistical analysis of the effects pirate release-timing and pirate video quality of illegal films have on a film's box office revenues. In order to do this I constructed a dataset from four publicly accessible sources.

Firstly, I use the Baio 2015 dataset "*Pirating the 2008 Oscars*" for data on pirate-leak dates. This dataset has continually monitored when films nominated for an Oscar were leaked, and thus became available for download via the BitTorrent networks. While doing this, the dataset distinguishes between the different video qualities of downloads one can encounter (see Appendix A1-5 for an explanation of the different qualities, and their terminology). The distribution of qualities in the sample is shown in figure 1.

This dataset was supplemented with the main variable of interest: US box-office performance. This data was acquired from *boxofficemojo.com*. This is a commercial provider of film industry data that is also used by other researchers in the field like DeVany & Walls (2007), and Peukert, Claussen, and Kretschmer (2013).

This thesis measures box office success in four periods; revenues made in the first four weeks after release, revenues made in the second four weeks after release, revenues made in the third four weeks after release, and total lifetime revenues of a film. The intervals were chosen to be able to distinguish between the initial spike in revenues and the rest of the film's run (as shown by DeVany 2004, and illustrated in fig. 1). This also makes it possible to see how the leak date of a film affects different periods in the lifecycle of a film.

Total Revenues and First Period Revenues

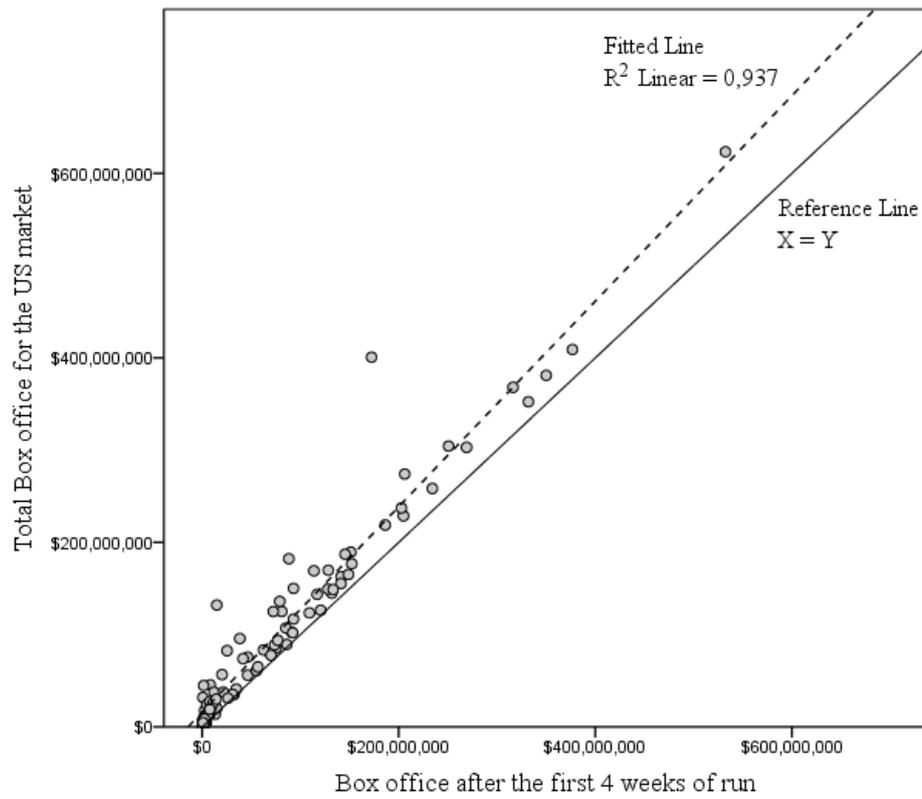


Figure 2, Total revenues Plotted Against Revenues made in the First Period.

Similar to Peukert, Claussen, and Kretschmer (2013) I used a log transformation on the box office variables, because they were highly skewed.¹

To account for the performance measure specified in the statistical model the rating by both professional critics and web users of the website *Rotten Tomatoes* were added to the dataset. *Rotten Tomatoes* is a film review aggregator. They collect film reviews from certified members of various writing guilds or film associations, and combine them into one aggregate grade on a scale from 0-100%. This grade represents the percentage of positive reviews by professional critics.

The same website also includes a user rating where non-professional can rate and discuss films. This grade was also included in the model. Even though these two ratings were correlated with $r = 0.7$ (see fig 3.), this did not cause problems of multicollinearity in the regressions, with VIF statistics never breaching the 2.5 threshold (see tables 2-8).

The initial dataset included all Oscar nominated films between 2003 and 2015. However, due to time constraints the dataset was trimmed to all Oscar nominated films of the years 2011, 2012, and 2013. 12 outliers were deleted. All of these outliers were small films, with a release only in the U.S., and all nominated in one of the less important Oscar-categories. This made the sample size after the deletion of outliers $N = 86$.

¹ for example, the lifetime revenues mean = 111.211.697\$, and the median = 82.584.160

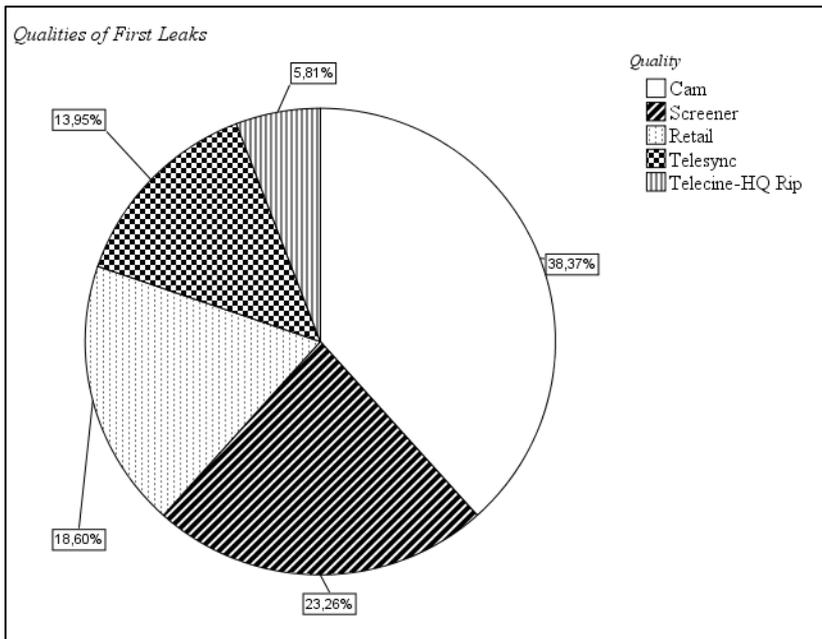


Figure 3, The Distribution of Different Video Qualities in the sample.

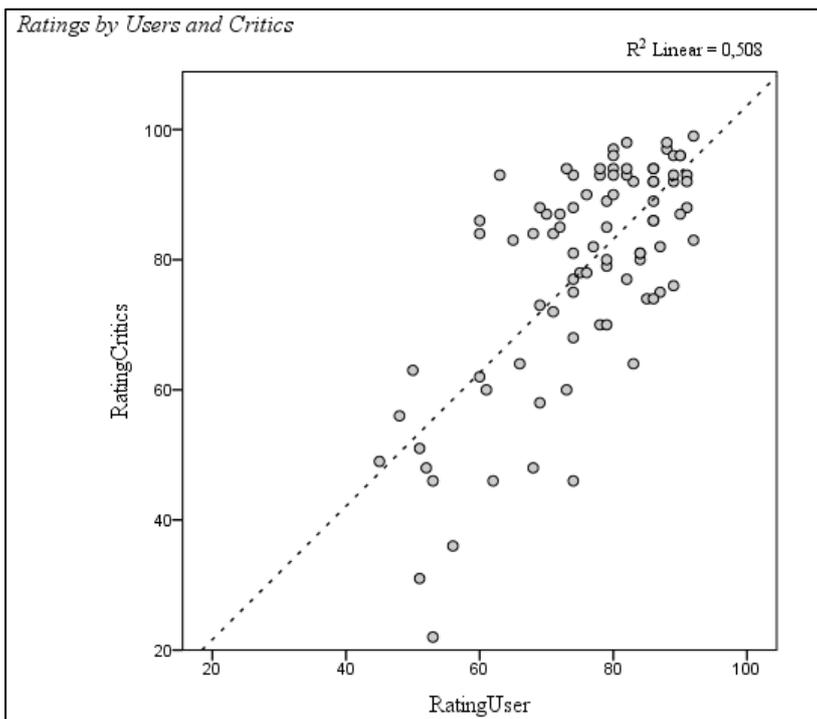


Figure 4, Scatterplot Visualizing the Associations Between User Ratings and Rating by Critics.

4. Methods & Modelling

This paper uses a method similar to those used by Peukert, Claussen, and Kretschmer (2013), Bounie, Bourreau, and Waelbroeck (2006), and DeVany & Walls (2007). In order to firstly establish the general relationship between downloading and box office revenues this thesis' first model does not yet account for the quality differences between the different leaks. Firstly I aim to model box office success in period t after release TR_t . Using multivariate regression, the first log-linear model is constructed:

$$\ln(TR_t) = \alpha + \beta_1 R_u + \beta_2 R_c + \beta_3 W_o + \beta_4 L_f + \epsilon \quad (1)$$

Here variables R_u, R_c, W_o are measures of success; respectively defined as the rating by online users, the rating by professional critics, and the number of Oscars won by a film.

The other variable in equation (1); L_f is the piracy variable. L_f is defined as the number of days between the official release and the first leak to become available online (not regarding video quality).

To check whether the differences in video quality within the variable L_f have an effect on box office revenues the first model is adapted to include the variable L_Q . The second model is defined as:

$$\ln(TR_t) = \alpha + \beta_1 R_u + \beta_2 R_c + \beta_3 W_o + \beta_4 L_f + \beta_5 L_Q + \epsilon \quad (2)$$

In this model variable L_Q is added. This is a dummy variable indicating the quality of the first leak. The dataset specified 5 different qualities (for a more detailed description of the different qualities see Appendix). To account for the differences between these categories a binary variable was constructed. L_Q indicates whether the first leak of a film was of low video quality or of high video quality. These terms were defined by the nature of the content; all camera recordings of a cinema screen were deemed low quality, while all the (digital) sources of a leak were deemed high quality. This disregards the quality differences between the different types of high qualities (3), and low qualities (2). However, this makes for a more convenient analysis, at a relatively low cost; differences between categories were much stronger than within category differences.

This paper only looks at the quality of the first leak. This choice deviates from the initial modelling approach of using days between the official US release date and the date of a leak at a given quality. This deviation was made out of time-constraints. Not all films are leaked at all qualities, and so insufficient data was available to stick to the initial approach. The new approach circumvents this problem by focusing on the quality of the first leak L_f , and because most revenues are made within the first four weeks after release any effect of quality difference should be most visible in the first leak.

5. Results

All tables referred to below can be found in chapter 10 of this thesis, pages 38-42.

5.1. Descriptive results.

The descriptive statistics in table 1 confirm the general trend that films make most of their money in the first four weeks of their life in the cinema, a trend also illustrated in figure 1. On average it takes 26.4 days for a movie to get leaked, with a standard deviation of 35.7 days. Also, like other authors have already mentioned (e.g. DeVany 2004); the film business is an uncertain one. This can be seen in the high standard deviation. As DeVany put's it: *"there doesn't seem to be an average movie"* (DeVany 2004, p.224). A further elaboration on the statistical properties of the film-industry, and how these properties could affect the results of this thesis is given in section 6.3.

5.2 First Model

5.2.1 Lifetime Revenues

The first log-linear model yielded the results presented in table x. The regression was significant at the 0,000 level, and had an R^2 model fit of 0.353. The significant independent variables in this regression are the rating by users R_u with a coefficient = 0,053, the rating by critics R_c with a coefficient = -0,027 and the piracy variable L_f with a coefficient = -0,019.

5.2.2 First Period Revenues

The first log-linear model yielded the results presented in table x. The regression was significant at the 0.000 level, and had a R^2 model fit of 0.351. The significant independent variables in this regression are the rating by users R_u , the rating by critics R_c , and the piracy variable L_f . The beta-weights are respectively 0.052, 0.032, and -0.026.

5.2.3 Second Period Revenues

The same model presents us the results for period two; the second four weeks after US release. Results are presented in table x. The regression was significant at the 0.000 level, and had a R^2 model fit of 0.239. The significant independent variables in this regression are the rating by users R_u , and the piracy variable L_f . The beta-weights are respectively 0,044, and -0,011.

5.2.4 Third Period Revenues

Results of the regression on the third period revenues can be found in table x. The regression was significant at the 0.000 level, and had a R^2 model fit of 0.231. The significant independent variables in this regression differed from the other periods; the rating by users R_u , and the Oscar win variable W_o were significant. The beta-weights are respectively 0,040, and 0,329.

5.3 Second Model; Including Quality Differences

6.3.1 Lifetime Revenues

All regressions on the second model, which includes quality differences, were significant at the 0.00 level. The results of the regression for the lifetime revenues are presented in table x. R^2 was = 0,527, and the significant variables here were the rating by critics R_c , with a coefficient of -0,02, the rating by users R_u with a coefficient of 0,043, and the new quality variable L_Q . The latter had a negative coefficient of -1.482. Piracy variable L_f was insignificant, but only nearly so, with a P value = 0,059.

5.3.2. First Period Revenues

Table x presents the results from the regressions for first period revenues. The model fit R^2 was = 0,568. The significant variables for this regression were R_u with a coefficient = 0,39, L_f with a coefficient =-0,10, and L_q with a coefficient =-2,092.

5.3.3 Second Period Revenues

Results of the regression for second period revenues are presented in table 8. This model had an $R^2 = 0,346$, with significant variables R_u and L_q . User rating had a coefficient of 0.038, and quality kept its negative sign. Rating by critics lost significance.

5.3.4 Third Period Revenues

The third period regression's results are presented in table 9. The model had an $R^2 = 0,262$. User ratings remained significant with similar coefficients as in the second period. As in the first model's last period the Oscar wins variable W_o becomes significant only in the last period, with a coefficient of 0,297

5.3.5 Notes

I also experimented with an interaction effect between first leak variable L_f , and quality variable L_q ; however, this produced no significant results. Also, the L_f was recoded by squaring it, to check for any non-linear effects. This, to, provided no significant results.

6. Discussion

6.1 First Model

Findings from the first model provide us with a couple of insights. First and most interesting is the fact that piracy variable L_f has a significant negative relation with box office revenues in the first period, second period, and lifetime. The coefficients are small (-0,019 for lifetime, -0.026 in the first period, and -0,011 in the second), however they indicate that, for the first period, leaking a film one day earlier is associated with an increase in revenues for that period of 2.8%. And because the average revenue of a film in the first period after release is 85,4 million US; this translates the impact of a pirate leak coming out one day earlier to an average increase in revenues of 2.4 million dollars.

This indicates a positive relation between movie piracy and downloading. This positive relation is also found by Peukert, Claussen, and Kretschmer (2013), who found that, even though there are films with a negative association with piracy (big blockbusters), the large share of medium-revenue films have a positive association with piracy. Bounie, Bourreau, and Waelbroeck (2006) also report such a positive association between movie piracy and theatre attendance, in their study of (self-reported) theatre attendance in French students.

The intuitive explanation Peukert, Claussen, and Kretschmer (2013) provide might also be applicable here. They studied the shutdown of the website Megaupload, a large video streaming website, and observed a general decrease in film revenues after Megaupload was shut down. They explain this by arguing that the positive social network effects created by the increase in people who see a film, outweighs the possible negative effects of piracy due to a decline in theatre attendance. This idea seems loosely based on DeVany's comments on a film's lifespan.

He notes:

“Successful movies move off the typical path and leap to new ones as they get ‘legs’ when enough people have seen the movie to transmit a large flow of positive quality information about them.” (DeVany 2004, p62.)

Relevant here is the study done by Becker & Clement (2006). They studied people’s incentives for file sharing, and this provides an alternative interpretation of my results. Becker & Clement (2006) empirically test the incentives for illegally sharing files, and identify a small group of “heavy users” who share large amounts of files. They note about this type of user that: *“the more a user believes it is ‘cool’ to be identified as a sharer the more files he/she offers. [...] The intrinsic motivation [for file sharing] seems to be very strong in this segment”* (p. 20).

This intrinsic motivation for sharing is also reported by Andy Baio, in the article accompanying the original dataset used in this paper (Baio, 2015). He comments on how these films are leaked, and notes that behind these leaks are certain “leak teams”, working in competition with each other to “earn bragging rights” by being the first to leak a film in the highest possible quality.

This is the basis of an alternative explanation for the positive relation between piracy and revenues. If a film is more popular, and lots of money has been put into the production (the so called “blockbuster-strategy” DeVany (2004) analysis in chapter 6), this film might be perceived as more desirable by the file sharing community, and therefore the leak-teams put more effort into leaking the film early.

In the end this is a problem of causality beyond the scope of this thesis. However, the results provided by the second model of this thesis do give an indication that the latter explanation of the positive relation between downloading and revenues seems more plausible.

Another interesting observation is the negative sign of the coefficient for the rating by critics variable, R_c , which is significant in the first period, and for total lifetime. On the other hand, rating by users R_u has the expected positive relation with revenues, and remains significant over all periods.

It seems plausible that the ratings by critics are only significant in the first period and the lifetime period; official reviews are only published in the first few weeks after the official release. This result confirms the claim that a positive or negative review only affects a film in the first period (when most money is made, explaining the lifetime significance). However this does not explain the negative relationship; why is a low score by critics associated with higher revenues?

A possible explanation lies in the nature of the data. This dataset only includes films nominated for an Oscar, and therefore only includes films that were already deemed successful by film professionals eligible to vote for the Oscar nominations.²

However, one could also make a new reverse causality argument; the films that make most money, are the blockbusters lots of people see. However, blockbusters are not always seen as the “very good” films. Probably more often they are looked at as being entertainment, instead of art. This might explain the negative relation; film critics have a taste for different films; not the blockbusters, but the more special films, destined to make smaller revenues. This could also explain why user reviews are significant in all periods, and have a positive effect: they reflect the opinions of the general consumer more directly, which is, in the end, where the money comes from.

The fact that the Oscar win variable W_o only becomes significant in the last period can be intuitively explained. The Oscar ceremony is held only once a year. The timing of a film in relation to the Oscar ceremony is therefore of great importance for this variable, especially when taking into account that most revenues are made in the first period.

² for a detailed description of this process see: The Academy, 2015.

6.2 Second Model; Accounting for Quality

The regressions on the second model had the best model fit, and poses an interesting addition to the first model, and the other empiric findings. Firstly, the video quality of the first leak seems to be of great importance when talking about the damages of downloading on revenues. The sign of the coefficient is negative, indicating that a higher video quality of the first leak hurts revenues more than a lower quality leak. The percentage change in box-office revenues in period t when going from a low quality first leak to a high quality first leak is given by equation 3.

$$\frac{\Delta TR_t}{TR_t} = 100 * (e^{\beta_5} - 1) \quad (3)$$

For the lifetime period this indicates that a change in the video quality of the first leak from low to high is associated with a shocking -77,3%. As expected most of this loss is accounted for in the first period (-87,7%), and decreases over the next two periods (to -58% and -43,6% respectively). It is worth mentioning that these results only indicate the effect of a change from a low quality to high quality first leak. However, the results are still relevant, as it seems that leaking has become the standard. No sufficient data was available to say something about the effect of a leak compared to no leak; only 1 film in the sample of 86 was never leaked.

However the additional information on the effect of quality does provide an indication about which earlier explanation for the positive association between an early leak and higher revenues is more plausible, and can thus still be used to estimate the sign of the effect of downloading.

It could be, as Peukert, Claussen, and Kretschmer (2013) argue, that the positive and significant sign of the L_f variable in the first regression is a sign of positive networking effects caused by the increased number of people who've seen the film. This larger audience would create a larger stream of information about the film, leading to even more people seeing it (DeVany 2004) However, this would be hard to consolidate with the negative signs of the beta-weights for quality variable L_Q ; for why would a higher quality download hurt the positive networking effect? If anything, watching the film in a higher quality would strengthen the proposed positive feedback stream, responsible for the positive effect of downloading on revenues.

The more plausible alternative is that DeVany & Walls (2007) were right in concluding that downloading hurts revenues, and accept the reversed causality argument; films with higher revenues are under greater pressure to be leaked, and this explains the positive association between an early leak and higher revenues.

The most fundamental question in measuring the effects of downloading is: does one illegal download equal one lost ticket? (This is also brought up in the legal case *A&M Records, Inc. v. Napster, Inc. (2001)*, which more closely studied in Chapter 9.1.2)

Most probably not; it seems highly plausible that some people who wouldn't pay to go see a film would download it. However, it also seems highly plausible that some people, who would normally go see a film in the theatre, would remain at home when they can download the film for free.

If the first group is significantly large, and the second group not, then the film industry might benefit from downloading through the positive networking effect downloading brings about by allow a larger group of people see the film. But, if the second group is significantly large, this positive networking effect can be offset by the loss in ticket sales. In short, damages come from the overlap in figure 4.

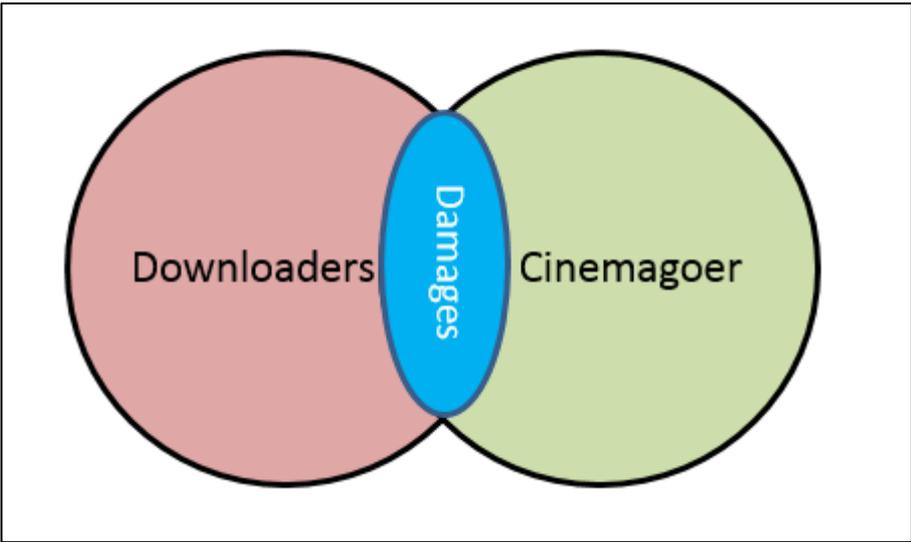


Figure 5 Locating Economic Damages of Downloading

The results of this thesis suggest that the high quality leaks are most harmful to revenues. This means that the availability of a subgroup of the potential theatre attendees decide to download, instead of going to the theatre, resulting in lower revenues. Because the associated damages for a lower quality leak are smaller this suggests that as long as the first leak is of low quality, people who usually pay to see the film will do so anyway, and won't download instead; indicating a preference for quality. However, when the first leak is of a higher quality then there is a cheap substitute available because downloading can then substitute the cinema experience. This makes a significant group of people choose to stay at home instead of going to the theatres, causing damages to revenues.

So, availability of the high quality is a key factor in the effect of movie piracy on box office revenues. Welter (2015) explained the more general importance of availability in the relation between downloading and a legal alternative; in his case the streaming service *Netflix*. He shows that the launch of a film on Netflix will tend to decrease the number of illegal downloads of the film. This poses another interesting question about the choice between legal and illegal supply of films. In this study the effect of a pre-release leak cannot be identified (i.e. $L_f < 0$). This is because only 14 cases in the sample were leaked before their official release. This rendered a study into the effect of the availability of a legal alternative impossible. However in light of Welter (2015) this would be an interesting follow up study, especially when taking into account the release gap between different geographical areas, found to be an important aspect when looking at downloads and the different international markets (McKenzie & Walls, 2013).

6.3. Methodological Critique

The methodological approach of this paper can be criticized in a couple of ways. First and most important is the distribution of the revenue data. DeVany (2004) notes that from a statistical point of view the film industry is a special one. He notes that film profits do not follow the standard Gaussian distribution, and instead follow a stable Paretian distribution.

Such a model was out of the scope of this thesis. However, the methods used in this thesis are still credible and defensible. Indeed, film revenues were highly skewed. However a log transformation posed a quick-fix solution to this problem (see figure 5). This also used by other authors like Peukert, Claussen, and Kretschmer (2013). The fact that the significant results can be interpreted in a way consistent with the existing literature also indicates that the assumption of normality did not pose a problem.

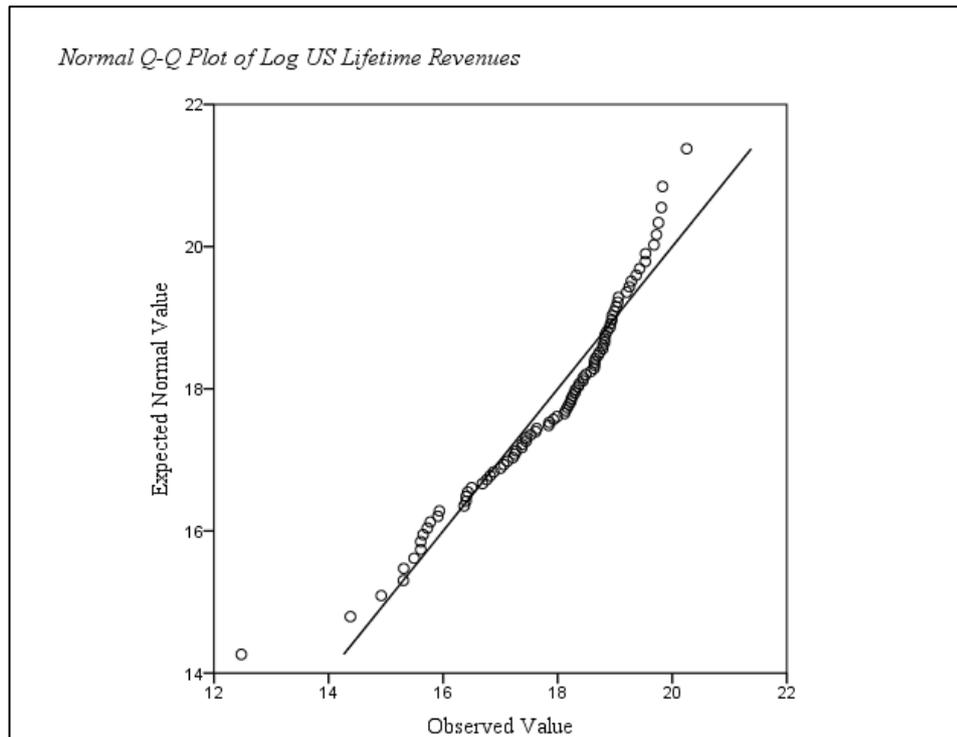


Figure 6, Normal QQ plot, comparing the data's observed values against the model's expected values

It was already pointed out earlier that, due to time constraints, this paper only looks at US market data (i.e. revenues at all periods were US only). This might cause this paper to underestimate the damage of downloading, since films are usually released in the US first, before other international markets see the film. This is pointed out by (McKenzie & Walls, 2013) to be an important factor in download demand in Australian students.

A similar critique is that this paper focusses on the theatre market for films, and does not look into the damages of piracy to the film industry's other means of distribution like DVD sales, or legal streaming services like Netflix, Hulu, or HBO GO. This can be subject of further research.

7. Economics and Law

The purpose of this thesis is providing an extensive analysis of the practice of illegal downloading, and the implications of this practise for the film industry in order to start a policy discussion on dealing with modern copyright issues. In the chapters leading up to this chapter I provided an analysis of the economic empiric research into the subject, and made a contribution to this literature by doing a data analysis on the role of video quality, and leak-timing, in relation to film theatrical revenues.

The empiric analysis concluded that an early leak of a film is associated with higher theatrical revenues. However, the fact that an increase in video quality of the first leak had a large negative effect on revenues suggests that the initial positive-looking effect of downloading can be explained by reversing causality. Then a more intuitive explanation draws from the intrinsic motivation of the leakers to be the first and the best in leaking highly anticipated films, and that this would explain the initial positive association.

In the next section this thesis will look at the legal aspect of this problem of copyright, by looking at two major cases in U.S. copyright law, and address the discussion these two cases sparked amongst legal scholars of copyright. This will make an interdisciplinary discussion of the subject and future policies possible, and will thus make the analysis of the problem of illegal downloading more complete.

7.1. US Case law in Copyright

This section looks at two major legal cases in U.S. copyright law. Firstly the case of *Sony Corp. of America v. Universal City Studios, Inc. (1984)* is discussed. This is one of the first landmark legal cases in US copyright law. Universal studios, in cooperation with Walt Disney Productions, sued the Sony Corporation of America for allegedly contributing to the violation of their exclusive rights as owners of copyrighted material because Sony produced *Betamax* video tape recorders that the general public used to copy the material they broadcasted via the public airwaves.

This case is interesting for our discussion of the modern copyright issue of piracy because it was the first ruling in this area of law, establishing jurisprudence assessing a new technology's ability of producing recordings and copies in light of copyright law.

The second case discussed in this section is the case *A&M Records, Inc. v. Napster, Inc. (2001)*. In this case, a long list of subsidiaries of the four major record companies (EMI, Sony Music Entertainment, Universal Music Group, and Warner Music Group) sued the peer-2-peer file sharing network Napster, holding it liable for both contributory infringement and vicarious infringement of their copyright.

This case is relevant to our discussion because it was the first instance of a peer-2-peer network, today the most prominent form of digital piracy (DeVany & Walls 2007), being sued for contributory and vicarious copyright infringement. This case draws on the previous one in two ways. Firstly, the court applies the general test for assessing fair use that was developed in the former case, and applies it to peer-2-peer technology. Secondly, the defendants draw attention to the previous case to strengthen their argument against contributory infringement.

7.1.1 Sony Corp. of America v. Universal City Studios, Inc. (1984)

In this case Sony America was sued by Universal City Studios, and Walt Disney Productions for contributing to copyright infringement by producing Video Tape Recorders (VTRs). The case started in a district court, but through two appeals ended up at the United States Supreme Court. This paper uses the case material of the latter court. This was the final ruling, and also recaps the arguments made in the earlier stages of the case.

The district court found the recording of copyrighted material for non-commercial home use, broadcast over the public airwaves not infringing on the exclusive rights of the copyright holders. The court emphasized the fact that the copyrighted material was broadcast over the public airwaves; free for the public. They established that the primary use of the VTRs was to time-shift (i.e. record something you're unable to watch, in order to watch it later), and emphasized the non-commercial and private character of this use.

The district court ruled that even when entire copyrighted works were recorded, this would not be infringing, because "there is no accompanying reduction in market for the plaintiff's work" (section 12).

The court also raised the point that even if the home-use was unfair; Sony could not be held liable as a contributory infringer. Sony sells a product with a variety of uses, some of which might be unfair, but the product has lots of fair uses (as the defendants showed by asking other broadcasters (e.g. sports leagues, educational TV stations) whether they minded home recording; they did not).

In the Court of Appeals this ruling was overturned. They concluded that the home use of VTRs was not fair. The court argued that "*without a 'productive use', i.e. when copyrighted material is reproduced for its intrinsic use, the mass copying of the sort involved in this case precludes an application of fair use.*"

Furthermore, the Court of Appeals found that it was not necessary to prove harm to the potential market, because they found it to be obvious that the mass reproduction made possible by VTRs would tend to diminish the potential market.

Finally, the Court of Appeals rejected the argument that VTRs could also be used for non-infringing purposes. Deeming the primary purpose of the VTR the reproduction of TV programs, and because practically all TV programs are copyrighted, there could be no significant fair use of the VTR.

Before the Supreme Court looked at the case it made an important note on copyright law in general, very relevant for the later discussion of piracy. The court stated that technological change can render the literal terms of the

Copyright Act ambiguous, and that if this is the case, the court must rule in light of the basic purpose of the Copyright Act. Therefore, the Court first set of to determine the basic purpose of the copyright act.

The constitution of the United States gives Congress the power to “*promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries*” (U.S. Const. art. I, §8.8). This is the most basic article in US copyright law. To protect the progress of science and arts Congress can, for limited times, give the authors and inventors the monopoly rights to their creation. The Court notes that the monopoly right is not designed for the private benefit of artists and inventors, but instead “*the ultimate aim is, by this incentive, to stimulate artistic creativity for the general public good. [...] The primary objective in conferring the monopoly lies in the general benefits derived by the public from the labours of the authors.*” [26].

With the basic purpose of copyright in mind the Court overruled the Court of Appeals’ decision, mostly reaffirming the District Court’s reasoning. They focus on article 17 U.S.C 107, which provides four factors to take into account when determining fair use:

- (1) The purpose and character of the use, including whether such use is of a commercial nature or is for non-profit educational purposes;*
- (2) the nature of the copyrighted work;*
- (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and*
- (4) the effect of the use upon the potential market for or value of the copyrighted work.*

The Supreme Court affirmed that VTRs are predominantly used for time-shifting, and that this is a non-commercial, non-profit activity. With regard to the nature of copyrighted work it was noted that the work was provided through public airwaves freely *by the plaintiffs themselves*. Also, because time shifting is a private use, it does not damage the potential market. VTRs serve the public good by making access to TV programs wider.

However, the court makes a note with future copyright cases in mind. It states that if non-commercial use of copyrighted work is *harmful* or *widespread*, then it would affect the market surely, and showing “some meaningful likelihood of future harm” would be sufficient for ruling against fair use, and in favour of infringement of copyrights.

In the end attempts of the film-TV-producers seemed futile. The use of videotape recorders had become widespread, and the U.S. congress was unwilling to make changes in the law deeming the use of VTR’s illegal. However, arguably the most important section of this case is the referral to the constitution, and the reaffirming the initial goal of copyright law, and the protection of intellectual property. The court realized that in this area of law it is especially important to keep up with technology, noting that ““When technological change has rendered its literal terms ambiguous, the Copyright Act must be construed in light of this basic purpose” (section 26).

7.1.2. *A&M Records, Inc. v. Napster, Inc. (2001)*

As stated at the start of this chapter, this case is important to our discussion of the issue of copyright and downloading because it is the first case in which a large group of copyright holders jointly sued a peer-2-peer network facility. This case set the first jurisprudence in the field of copyright law in the internet age, and is therefore worth discussing. This case refers and relates to the previous case by employing the framework for assessing fair use that was previously developed, and in the way the defence’s argument about liability directly refers to the other case. This case also shows us the importance of economic research into this area; as both parties presented studies into the effects of peer-2-peer downloading on the market for music.

There are two main questions the court was tasked with answering: is the file sharing done through peer-2-peer network *Napster* infringing the specific rights of the copyright holders? And if this is the case, can *Napster, Inc.* be held liable for infringement done through their file-sharing services. This case was concluded in the Court of Appeals for the Ninth Circuit, which largely affirmed the District

Court's decision to hold *Napster* liable for both vicarious and contributory infringement.

Napster's main defences were based around an appeal on fair use. Napster posed three alleged fair uses of their system:

- (1) Sampling; users making temporary "sample" copies of copyrighted music, before purchasing a record.
- (2) Space-shifting; users access music they already own (on CD or on another medium) from different places, through the Napster system
- (3) Permissive distribution; artists themselves choose to distribute their music through the Napster network, in order to reach a larger audience cheaply.

The Court of Appeals agreed with the District court, and rejected the entire fair-use defence. In short, the Court found that Napster's services could not be deemed sampling, because Napster does not provide access to samples, they provide access to full songs. Also, sampling was deemed a commercial use, and therefore a lone right of copyright holders.

The space-shifting argument was also rejected. The court found this argument reasonable, if it weren't for the fact that Napster does not only provide the serves of space-shifting; the service also include the distribution of the copyrighted material from the user to the general public; which is again a lone right of the copyright holders.

Lastly, the court looked at the third fair-use of the network. Both the Court and the Plaintiffs found no problem with these services, these services were deemed non-infringing, and could continue. However, in concluding the discussion of fair-use the Court noted that the owners of Napster could control the infringing behaviour of users, and therefore had a duty to do so.

After it was established that Napster provided services that were deemed unfair use, and therefore infringed upon the copyright of the plaintiffs, the court turned to the question of liability: Is *Napster, Inc.* liable for the infringement of its users?

To prove that Napster was guilty of contributory infringement the plaintiffs had to show that Napster had knowledge of the fact that copyrighted files were shared across their network, and that Napster provided material support to make this possible. In order to prove the vicarious infringement charges, the plaintiffs had to show that Napster had the ability to control the infringing activities, and had a direct financial interest in the activities.

The Ninth circuit court found Napster guilty of contributory infringement and vicarious infringement, arguing that Napster had knowledge of the copyrighted files being shared on their network, the illegality of that, their ability to control and/or police their network, and their potential financial gains from not doing so. Here reference is made to the earlier case. The court noted that *Sony v. Universal* did not protect Napster, because of Napster's actual, specific knowledge of direct infringement.

This case reached the opposite outcome of the previous case. Sony was deemed not guilty of contributing to copyright infringement by the sale of videotape recorders. Napster on the other hand, was deemed guilty and liable for setting up and maintaining a peer-2-peer network through which files were shared (both copyrighted and not).

7.2. Legal Scholar debate

This latter case gave rise to heavy discussion in the field of copyright law. Important critical arguments were presented in the brief *amicus curiae* amended to Napster's appeal to the Ninth Circuit Court. A consortium of 18 American professors of copyright law plead to the court that the Napster ruling is in conflict with the goals of copyright law, as explicitly stated in the *Sony v. Universal* case, and should therefore be reversed. This section summarizes the claims put forward in the brief *amicus curiae* in order to provide an overview of the impact and consequences of this case, and provide an easy transition into a discussion on future legal policies in copyright law, and the issue of downloading.

In the brief *amicus curiae* the authors make three main claims. Firstly they argue that copyright law should not be extended to disable new and upcoming technologies. Secondly they argue that, in the Napster case, the District Court incorrectly imposed contributory liability on a technology capable of substantial non-infringing uses. These two claims are combined in the last concluding claim, arguing for a repeal of Napster's liability because the ruling would create jurisprudence favouring existing business models, that *"significantly impedes the deployment of useful technology that could greatly enhance the value of the internet for copyright owners as well as consumers"* (p1).

Firstly Litman et al (2000) defend the claim that copyright law should not be extended to disable new technologies. They refer to a large variety of cases to show how other previous courts responded cautiously to claims aiming to shut down new technologies because they facilitate copyright infringement. They also make reference to the U.S. Constitution article referenced earlier in this thesis (U.S. Const. art. I, §8.8), to explain why court were so careful;

"Outlawing a useful technology merely because [it is used as] a tool for infringement will rarely promote the progress of science and the useful arts. Only when the technology is not capable of legitimate uses does it make sense to outlaw it." (p2)

The professors recognize that peer-2-peer services allow individuals to bypass central providers of content, and instead exchange content amongst each other.

They also note that the entertainment industry is threatened by this development, because their business models are based on the centralized control over content distribution. Litman et al use these two observations to formulate the consequences of convicting Napster; instead of promoting innovation, copyright law would be used to hinder innovation by banning a new and upcoming technology, in order to protect existing business models.

In order to legitimize this claim the authors bring up several possible legal applications of peer-2-peer technology (p5). These legal applications could possibly solve a number of internet problems; they refer to various studies to show that peer-2-peer technology could be used to improve search engines, more efficient data distribution, and improving the structure of the internet itself. This intends to show how peer-2-peer technology is a very promising one, and that deeming it illegal would hurt innovation.

Secondly the authors claim that the imposed contributory liability should not have been imposed on such a technology capable of substantial non-infringing use. Napster exercises no control over the selection and transmission of the files shared by its subscribers. The authors argue that this fact makes the district court's ruling in direct opposition with the Supreme Court's ruling in the *Sony v. Universal* case. Since there the court held that "*the 'progress of science and the useful arts' precludes an injunction so long as the tool is capable of substantial non-infringing uses*" (p8.).

In addition to the argument of the progression of communication technology mentioned earlier, Litman et al also argue that the district court incorrectly treated all unauthorized uses of Napster as infringing, and in doing so applied an inappropriately narrow view of the term fair use. In this way, the court turned the ruling of the Supreme Court in the *Sony v Universal* case upside down.

8. Discussion of Policy Options Introduction

Together the cases of *Sony Corp. of America v. Universal City Studios, Inc. (1984)* and the more recent *A&M Records, Inc. v. Napster, Inc. (2001)* summarize the problem of copyright and the film industry neatly. The central trade-off at the heart of the problem is one between the protection of intellectual property fostering creativity by providing authors the temporary monopoly to the distribution of their works, and the fostering of innovation and new technologies, which could be used for both legal and illegal practices.

This paper focusses on two cases in American law, where it has been decided that the protection of intellectual property is more important than the technological development of peer-2-peer networks. The American government has chosen for a supply-sided tackling of this issue by shutting down suppliers of digital content (e.g. peer-2-peer network like Napster, or streaming websites like Megaupload).

However, this approach does not seem to be all too effective; where Napster got shut down other p-2-p networks took its place. This illustrates the problem of this approach; Technological changes and possibilities move much quicker than the legal apparatus trying to shut down infringers.

There is, however, an alternative approach to the issue. In Germany it is illegal to download copyrighted materials, and it is not the supplier of the copyrighted material that can face trials, it is the downloader. This demand sided approach makes individuals personally responsible for the content they download, thus avoiding the endless legal battles with new suppliers. However this approach also comes with downsides. While preserving the possibility of legally transferring files over a peer-2-peer transfer, this policy is said to harm privacy, and could also cause other economic damages. The former because it became obligatory for internet providers to supply the identities of the users of all IP-addresses (to be able to track who downloads what), and the latter because free and open WIFI has become disincentivized; owners are now legally responsible for the data being downloaded over their networks, putting them at risk of someone downloading copyrighted materials over their network.

Interestingly, like in the case with the video tape recorders the industry is now also embracing the new technology; making online versions of series and films available via subscription services like Netflix, HBO GO³, or Hulu. Here the studies by Welter (2012) and McKenzie & Walls (2013) seem to be of great relevance. Welter (2012) provides statistical evidence that the introduction of a blockbuster film onto Netflix, the leader in legal video streaming, decreases the rate at which the film is pirated. McKenzie and Walls conclude that the release gap between the U.S. market and the Australian market is a key contributor to piracy in the early life of a film, indicating that there is a significant group of people who wants to pay for their content, but sometimes is only able to download illegally and for free.

It seems fair to say that technology advances and business models and (copyright) law try to keep up. This shows that this crossover field of economics and law is an exciting area of study, and provides many opportunities for future research. Further study into the effectiveness of a supply-sides tackling of this issue, e.g. analysing the effect of the conviction of *the Pirate Bay*, would be helpful for the discussion of policy. However, at this point in time it seems the industry is moving forward already. This would make a study into the cross-elasticity between illegal downloading and legal alternatives such as Netflix very interesting, and helpful to the copyright policy debate. The latter study would be especially helpful because it looks ahead, anticipating changes in technology. This thesis started with a quote that showed us how we should not be fearful of new technologies. Instead we should anticipate such changes in technology, study them, and use this knowledge to find the best policies.

³ Interestingly, HBO's streaming service HBO GO was introduced in Australia three years after a private website: "*HBO Take My Money*", was set up. Via this website people asked HBO to provide an easy and legal streaming service to be introduced. (Laporte, 2015)

9. Conclusion

This thesis aims to provide an extensive account of the issues of copyright concerning the film industry. By approaching this subject from both the legal and economic perspective this thesis hopes to add an interdisciplinary and overarching work to the existing literature, in order to facilitate further policy discussion.

The first section of this thesis focussed on the economic empirics of downloading in order to determine the effect of digital piracy on the film-industry. The existing literature was conflicted about the sign of the effect of piracy on film-industry revenues. DeVany & Walls (2007) use confidential studio data, combined with gathered data on the number of websites providing free downloads of a specific film, to estimate the effect an increase in pirate-supply has on the rate of decline in box-office revenues. They find that pirate-supply has a strengthening effect on the decline in revenues, which accounts for an average loss of 40 million USD per film.

However, other studies report positive effects of movie piracy. Peukert, Claussen, and Kretschmer use the shutdown of Megaupload, a large supplier of digital content, as a natural experiment. They conclude that blockbuster films are affected negatively by piracy, but they also find that the large mid-section of films actually benefit from downloading. They explain this by means of positive network effects. They argue that downloading increases the number of people who see a specific film, and that this increases the stream of information about the film, which results in more word-of-mouth advertisement, and eventually to more people paying to see the film.

Using a dataset combining data from four different, publically accessible data sources this paper adds to the empiric literature a statistical analysis of the role of video quality and leak timing in the effect of downloading on movie revenues. At a first glance the results of this thesis seemed to confirm the positive effect described by Peuker, Claussen, and Kretschmer; as a positive association between an early leak and higher box-office revenues was found. The data suggested that leaking a film one day earlier, is associated with an average increase in box-office revenues of 2.4 million dollars.

However the positive network-interpretation provided by Peuker, Claussen, and Kretschmer (2007) conflicted with the results of this thesis' second data analysis into the role video quality plays in the relation between downloading and box-office revenues. This thesis found that a change in the video quality of the first leak from low to high is associated with a -77,3% decrease in a film's total lifetime revenues. Because of this the positive network-interpretation was rejected. Instead this paper puts forward a reverse-causality argument to explain the positive effect of an early leak. This explanation draws from the literature establishing the intrinsic motivation of a small community of file-sharers for leaking films (Becker & Clement, 2006). This thesis argues that it is because films with high budgets and high expected revenues are highly anticipated by audiences that there is an increased incentive for the people behind these leaks to leak the film. Leaking a highly anticipated film early earns a leaker more prestige within the community, and it is because of this that films with higher revenues tend to be leaked earlier.

In the second part of this thesis two cases from US copyright law were discussed. Firstly *Sony Corp. of America v. Universal City Studios, Inc. (1984)*, one of the first landmark legal cases in US copyright law is discussed. In this case Sony Corporation of America was not held liable for contributing to infringement by producing video tape recorders.

Secondly, the case of *A&M Records, Inc. v. Napster, Inc. (2001)* is discussed. This was the first instance of a peer-2-peer network, to this day the most popular way of downloading films (DeVany 2004), was shut down because it was held liable for infringement. This established the jurisprudence for other cases of peer-2-peer network cases, and sparked a discussion amongst legal scholars of copyright.

These two cases summarize the problem of copyright and the film industry. The central trade-off when dealing with this issue is one between the protection of intellectual property and fostering innovation and new technologies. The United States has taken a supply-sided approach for dealing with this issue, choosing to confront the suppliers of copyrighted materials with legal sanctions. However, as described in the previous chapter this approach does not seem to be very effective. Where peer-2-peer networks like Napster got shut down, others took its place.

In Germany a different approach was taken, by prosecuting the owners of an internet connection that was used to download copyrighted materials. This circumvents the trade-off between technological innovation and the protection of vested interests, but does come with several other downsides including privacy issues, and a decline in the availability of public internet access.

Lastly this thesis notes one last similarity between the VTR copyright cases in the 80-ies and the current cases regarding P-2-P networks. Lack of quick and effective legal measures has forced the film industry to adapt to the new form of competition the new technology poses. Again, the industry seems to adapt to the new technology to their benefits, this time by setting up easy and legal subscription based streaming services. This seems the most interesting area of study for future researchers. This combination of economics and law has to move very quickly, because so does technology. This makes this is an important and challenging area of study, which can help policy makers all over the world; firstly by studying the effects of technological changes; secondly by showing how these changes are linked to current legal policies and current economic interests; and lastly by constructing a discussion on what the best policy response to these changes are.

10. Tables

Table 1

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Box Office period one	87	\$98.057	\$532.463.980	\$85.469.952	\$101.097.123	4,432	,511
Box Office period two	87	\$150.915	\$148.239.351	\$16.995.759	\$19.644.949	22,817	,511
Box Office period three	87	0,-	\$49.559.853	\$4.976.504	\$8.260.586	17,001	,511
US Release to first leak (L _t)	86	-65	118	26,38	35,749	,043	,514
Valid N	86						

Table 2

Model 1, Period Lifetime Revenues

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
	(Constant)	16,377	,838				19,553
Ru	,053	,015	,442	3,455	,001	,487	2,054
Rc	-,027	,011	-,328	-2,543	,013	,480	2,083
Wo	,137	,101	,127	1,361	,177	,920	1,087
Lf	-,019	,004	-,462	-5,124	,000	,983	1,017

Dependent Variable: Log US total lifetime revenues

Table 3

Model 1, Period 1 Revenues

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
	(Constant)	16,496	1,061				15,555
Ru	,052	,019	,344	2,681	,009	,487	2,054
Rc	-,032	,014	-,302	-2,335	,022	,480	2,083
Wo	,030	,128	,022	,231	,818	,920	1,087
Lf	-,026	,005	-,521	-5,775	,000	,983	1,017

Dependent Variable: Log First Period Revenues

Table 4
Model 1, Period 2 Revenues

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	13,969	,805		17,353	,000		
Ru	,044	,015	,413	2,970	,004	,487	2,054
Rc	-,013	,010	-,177	-1,266	,209	,480	2,083
Wo	,152	,097	,159	1,572	,120	,920	1,087
Lf	-,011	,003	-,300	-3,071	,003	,983	1,017

Dependent Variable: Log Second Period Revenues

Table 5
Model 1, Period 3 Revenues

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	12,215	,938		13,017	,000		
Ru	,040	,017	,329	2,384	,020	,518	1,932
Rc	-,008	,012	-,095	-,674	,503	,496	2,017
Wo	,329	,106	,320	3,097	,003	,922	1,085
Lf	-,005	,004	-,129	-1,263	,210	,945	1,058

Dependent Variable: Log Third Period Revenues

Table 6*Model 2, Accounting for Quality: Lifetime Revenues*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	16,968	,729		23,273	,000		
Ru	,043	,013	,362	3,256	,002	,478	2,092
Rc	-,020	,009	-,236	-2,105	,038	,469	2,132
Wo	,054	,088	,050	,617	,539	,892	1,121
Lf	-,007	,004	-,179	-1,915	,059	,677	1,477
Lq	-1,482	,274	-,519	-5,417	,000	,645	1,551

Dependent Variable: Log US Total Lifetime Revenue

Table 7*Model 2, Accounting for Quality: First Period Revenues*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	17,330	,881		19,673	,000		
Ru	,039	,016	,254	2,390	,019	,478	2,092
Rc	-,021	,011	-,199	-1,857	,067	,469	2,132
Wo	-,087	,107	-,064	-,821	,414	,892	1,121
Lf	-,010	,005	-,206	-2,300	,024	,677	1,477
Lq	-2,092	,330	-,580	-6,331	,000	,645	1,551

Dependent Variable: Log First Period Revenue

Table 8
Model 2, Accounting for Quality: Second Period Revenues

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	14,315	,777		18,420	,000		
Ru	,038	,014	,359	2,685	,009	,478	2,092
Rc	-,009	,010	-,116	-,862	,391	,469	2,132
Wo	,104	,094	,108	1,105	,273	,892	1,121
Lf	-,004	,004	-,113	-1,005	,318	,677	1,477
Lq	-,869	,292	-,343	-2,981	,004	,645	1,551

Dependent Variable: Log Second Period Revenue

Table 9
Model 2, Accounting for Quality: Third Period Revenues

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	12,414	,934		13,295	,000		
Ru	,036	,017	,296	2,151	,035	,508	1,970
Rc	-,005	,012	-,054	-,382	,704	,482	2,076
Wo	,297	,107	,289	2,782	,007	,893	1,120
Lf	-,001	,005	-,024	-,203	,840	,693	1,443
Lq	-,572	,331	-,208	-1,730	,088	,668	1,498

Dependent Variable: Log Third Period Revenue

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12. Appendix

- A. An overview of terminology indicating the quality of downloads.

A-1. Cam

The most basic form of downloadable illegal films. The content is filmed with a handheld camera in a theater. Generally the worst quality one can find, and increasingly uncommon.

Quality variable L_Q indication = 0

A-2. Telesync

Usually a cam-quality video with better audio, often pirated from the headphone jacks in theater seats intended as hearing aids.

Quality variable L_Q indication = 0

A-3. Screener

Great quality, usually intended for media or competition review, but can leak at any point in the distribution chain, often with watermarks intact.

Quality variable L_Q indication = 1

A-4. Telecine, R5, PPV, Webrip, and HDRips.

The terminology and sourcing's changed through the years, but these are all high-quality rips with solid audio and video. (Generally speaking, Telecines were ripped from original prints distributed to theaters, R5 from "Region 5" DVDs sent to other regions to combat piracy, PPV from advanced pay-per-view sources, Webrip from early online releases like iTunes, and HDRip from a variety of sources, but typically from HDTV.)

Quality variable L_Q indication = 1

A-5. Retail

A rip from the official retail release, best quality possible, usually undistinguishable from a legal hardcopy.

Quality variable L_Q indication = 1