

THE RELATIVE EFFECTIVENESS OF GLOBAL ANTI-PIRACY POLICIES

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ABSTRACT. In recent decades, the problem of illegal downloading of copyrighted material has emerged as a major concern for governments across the globe. Many countries have implemented policies to limit the impact of online piracy on revenues of creative industries. These policies, while important for a broad range of industries, have been particularly lobbied for and supported by the motion pictures industry. Film production and distribution companies have repeatedly asserted that effective anti-piracy policy is crucial to their continued success. This paper seeks to evaluate whether the anti-piracy regimes in OECD countries have been effective. It also seeks to determine whether there are patterns to the types of policies that have been especially effective or ineffective.

1. INTRODUCTION

The study of online piracy in the film industry largely evolved from prior economic research on the importance of copyright and intellectual property regimes. Varian (2005) focuses on the importance of un-enforceable copyright in the evolution of piracy. McKenzie's (2012) review of the economic literature on the motion pictures industry discusses factors that make the film industry susceptible to online piracy, and the difficulty of addressing these concerns, are addressed in.

The impact of piracy on the film industry has not always been easy to establish. Early work relied on survey data to determine whether individuals who had pirated films were more or less likely to attend paid screenings of films in theaters. Bounie, Bourreau and Waelbroeck (2006) used data from French university students. They found that students who had downloaded films illegally were more likely to pay to rent or buy films in the future. They also found evidence that those in the same social circle as illegal downloaders were more likely to pay to see films. DeVany and Walls (2007) found contradictory evidence. Their study utilized data on the number of available download links for various films. Results of this study show that, controlling for film characteristics, films that were more readily available online also have lower average boxoffice revenues. McKenzie and

Walls (2014) find further evidence that there is a substitution effect between films and online downloads. Their results, based on file sharing and revenue data from Australia, show that films that are shared more online also have lower average revenues. Their results do show that the substitution is not one for one. That is, each additional download does not lead to a one-person reduction in film attendance, but rather a much smaller reduction in revenues.

The film industry, led by its lobbying group, the Motion Pictures Association of America (MPAA) has argued that its revenues are severely hampered by the presence of online piracy. Based on lobbying by the MPAA, and similar groups in other creative industries, governments across the globe have implemented a number of policies that seek to limit the number of illegal downloads of films and other copyrighted material. Despite the increasing prevalence of these policies, and their presumed importance to the film industry, little economic research has been devoted to evaluating their effectiveness.

Several studies have evaluated the ability of individual policies to influence the revenues of creative industries in their home countries. Ranaivoson and Lorrain (2012) combined legal and economics approaches to evaluate the controversial French law HADOPI that threatened to remove access to the internet of repeat copyright offenders. They found that while the policy may have led to an increase in the number of purchases of legal files, the law is far from as effective as it could have been. They also found that the structure of the law may put additional stress on the French copyright system as a whole by putting more power in the hands of internet service providers (ISPs). Heneghan (2002), argues that the US NET Act was unable to have a meaningful impact on those intending to download copyrighted materials. Numerous other authors have studied individual laws across the globe and all have found similar results: these policies tend to have some impact on the ability for individuals to avoid paying for copyrighted materials, but the impacts are relatively limited.

Very little research has compared the effectiveness of policies, or attempted to determine whether certain categories of policies are especially effective. An exception is Orme

(2014), who provides an analysis of the effectiveness of many policies in the same country. That study utilized an intervention analysis approach to evaluate the effectiveness of six major anti-piracy policies in the US. The results show that only one policy (the NET Act) had a positive impact on the revenues of the film industry. Website shutdowns had no statistically significant effect, while other policies were associated with decreases in the average revenues of the film industry. This comparison of policies allows for an evaluation of what works, and what does not, but the results may be largely driven by the characteristics of the US market, and not by generalizable trends.

This paper seeks to expand on this work by including major anti-piracy legislation across all OECD countries. The goals of this analysis are threefold: to categorize the anti-piracy policies of the developed world, to evaluate which policies have been effective at increasing the revenues of the film industry, and to determine whether certain types of policies have been particularly effective across countries. This analysis will not only provide a starting point for future comparative policy research, but could provide evidence as to which types of policies should be embraced by governments in the future.

The paper is organized as follows: Section 2 describes the data, Section 3 outlines the methodology that is used to evaluate the effectiveness of the included policies, Section 4 reports the results, and Section 5 concludes.

2. DATA

To evaluate the ability of anti-piracy legislation to influence the revenues of film studios, this paper uses aggregate weekend boxoffice revenue data from the website boxoffice-mojo.com. While the issue of anti-piracy policy is relevant worldwide, Karaganis (2011) provides a compelling argument for why the developing world is unable to utilize policy to achieve the same goals as the developed world. As a result, this paper only considers policy effectiveness in the developed world, and thus uses weekend boxoffice numbers from OECD members only.

While having data for the revenues of an entire week would be ideal, utilizing weekend data (the only timeframe available for many countries) does not limit the results of the

paper dramatically. Since new films premier at the beginning of the weekend, and the majority of the revenues of the film industry are gained over the weekend, we are observing the majority of the revenues.¹ Further, weekend revenues are considered extremely important to the overall health of the industry, so the available data represents a timeframe that the industry focuses on.

Data are available for most weekends in most OECD countries starting at the present and going back as little as six years for some countries and as much as 14 years for others. In an effort to fully evaluate the effectiveness of each country's policies this paper will utilize all of the available data for each country. Of the 34 OECD countries, four are not tracked by boxofficemojo.com with the regularity or specificity necessary to conduct our analysis: Estonia, Slovenia and Switzerland are not included in boxofficemojo.com's data, while Israel is tracked, but with limited data available.² Six other countries are grouped into pairs. That is, data for individual countries are not available, but the aggregate of two or more countries are combined into a single list of revenues by boxofficemojo.com. The grouped pairs are the UK and Ireland, Luxembourg and Belgium, and the US and Canada.

Finally, the US/Canada data are removed from consideration. These two countries account for 40-50% of global film revenues in most weeks, so there may be concerns that their response to anti-piracy policy is significantly different from those of countries whose film-going behavior is different. Further, since the US is the home of all of the major developed-world film studios, it is possible that their laws are enforced more stringently or applied differently than in the rest of the world. To avoid biasing the results of this paper, the US and Canada are thus removed from the quantitative analysis of the paper. Canada's policies, however, will still be qualitatively evaluated for the completeness of the

¹The only potential bias introduced would be if anti-piracy policy were to have an asymmetrical effect with regard to weekend and weekday revenues. There seems to be no logical reason why this would be the case. Further, since weekday revenues are strongly correlated with the preceding weekend's revenue there should be no problems introduced by only using weekend figures.

²The data on Israel only include a limited number of wide-release American-produced films. It is therefore excluded from the dataset to avoid introducing undue bias, since all other countries evaluate the impact of policies on the revenues of all films, American and domestically produced.

results. For a further analysis of US anti-piracy policy, see Orme (2014), who applies a similar methodology to the one employed in this paper.

Of the 34 OECD countries, 28 are represented in the dataset, with 26 sets of revenue series. These series range from 334 data points, covering approximately 6.4 years (Slovakia), to 710 data points for 13.6 years (Australia and the UK/Ireland). In total, 14,182 data points are considered across all countries. The size of the data sets vary dramatically, but predictably. The smaller data sets tend to be for countries that have lower revenues, lower per capita GDPs, and less prominent film industries internationally. Controlling for these factors in any grouped regressions should address the potential bias arising from the amount of data varying by country.

Of greater concern is the inconsistency in data availability. Nearly all countries have missing revenue figures for at least some weeks. The magnitude of the missing data ranges from negligible (most countries are missing less than 1% of their total data) to problematic. Three countries (Chile, Denmark and Slovakia) are missing more than 5% of their data. In total, 1.8% of the observations are missing. The missing values are likely a result of data entry or other clerical error on the part of either boxofficemojo.com, or the reports from which it gets its information. In only one case (a major political protest in Chile) is there any reason to assume that the missing data are correlated in any way with factors that would impact film revenues. This data irregularity is accounted for using a dummy variable in the case of the Chilean protests, but in all other cases, once the missing values are imputed no additional adjustments are required to account for the lack of information in some time periods.

Missing data points are replaced using a Markov chain Monte Carlo (MCMC) version of multiple imputation. This procedure, developed and then expanded by Rubin (1996), replaces missing values in the data with plausible, but arbitrary values. The (now complete) data are then used to estimate more accurate values for the missing data points. This procedure is then repeated for each country until convergence is achieved and the new imputed values are both stable and reasonable. This technique has been shown to

be effective even in instances with significantly more missing data than the 1.8% in the present dataset (Schafer, 1999).

Once the data are complete, seasonal effects, linear or quadratic trend (differs by country based on goodness of fit measures) and inflation (measured using US CPI) are removed. Boxofficemojo.com reports all revenues in US dollars, so currency conversion is not necessary. Finally, the log of these revenues are taken. The variable of interest in the regressions is thus $\log(\text{inflation-adjusted revenue})$.

In addition to revenues, data are also needed about the policies themselves. Whenever possible the dates of policy implementation have been taken directly from the text of the policy in question. In some cases this is not possible, either because the text is not available or because it is not readily translated into English. In these cases, dates of implementation are found from various international news sources.

During the time frame considered for each country (based on data availability) most OECD countries implemented at least one major change in their anti-piracy policy. Most often these changes came in the form of new laws, though occasionally major court cases had the effect of shifting policy without legislative action. The only countries without a documented major policy (Greece, Mexico, and Turkey) all were undergoing major political or economic upheaval during the time frame that this paper evaluates. It is unsurprising that with more pressing issues (e.g. an economic collapse) on the table, copyright policy would fall to the wayside. As a result of the lack of policy implementation individual country regressions are unnecessary for these countries.

Additionally, three countries (Finland, Luxembourg, and Poland) have updated their policies during the time frame covered by this paper, but revenue data are not available for these countries early enough to evaluate their policies. These countries are evaluated in the qualitative policy analysis. Further, all three of these countries are members of cultural areas and agree to abide by the copyright standards of nearby countries within their region. These countries are thus included to test whether their revenues were impacted by the policies of their neighbors. For example, Poland is culturally similar to Germany, and the two countries abide by each other's copyright laws. Further, in Poland the film

industry routinely distributes the German language version of films, as well as a Polish subtitled version. Because of this similarity it is likely that a change in the number of German language films available online would influence the revenues of the Polish film industry. Poland's revenues are regressed in an equation including the policy variables for Germany's new policies to determine whether they influenced film revenues in Poland.

3. METHODOLOGY

The primary goal of this paper is to determine whether government policies have been able to influence the profitability of the film industry by increasing their revenue streams. This paper also seeks to evaluate whether there are systematic patterns in which policies are effective. To accomplish this goal, the paper will qualitatively compare the policies, analyze the effectiveness of policies at an individual country level, and compare effectiveness based on the qualitative characteristics.

With data on 26 countries or country pairs over time, a panel analysis would seem to be the most straightforward approach. However, the structure of the data makes this difficult. The differing lengths of the data series generate an extremely unbalanced panel. Further, many of the policies were implemented at similar times, or even in some cases on the same day.³ This would make it difficult, if not impossible, to isolate each policy's individual effectiveness. For these reasons, this paper utilizes individual country regressions, rather than panel analysis, to evaluate the effectiveness of policies.

To determine whether policies were effective or not, individual country time series analyses are performed. For each country a dummy variable is generated for each policy. This variable is 0 when the policy is not in place, and is 1 when the policy is implemented. In most cases this means that the variable takes a value of 0 before policy passage and 1 after passage. In some cases (e.g. France's HADOPI) policies were repealed during the time frame that this paper analyzes. In these cases the value of the dummy variable would go

³In most cases laws passed on the same day are a result of countries meeting treaty obligations simultaneously, not simple happenstance. The fact that this overlap is based on an exogenous factor further complicates the process of performing a panel analysis without biasing the results.

back to 0 following the repeal of the policy. The coefficient of this policy variable is thus the primary variable of interest.

The use of a dummy variable in time series contexts has the potential to create serious bias if two concerns are not addressed. First, models of this type require that the dummy variable be exogenous. This assumption seems to be met in the policy context. While there may be concerns that when revenues are low, there will be an increase in the incentive for new policies, it is important to note that the lag from draft of a law to passage is long and variable. It is unlikely that film studios can influence governments so dramatically that copyright and anti-piracy policy would directly depend on the revenues of the film industry. Further, since many of the policies in the dataset are a result of legal rulings or international treaties it is unlikely that the timing of these policies would depend on the revenues of the film industry, further mitigating the possibility of endogeneity.

Second, models of this type must ensure that there are no other major causes of changes in the dependent variable. If there are multiple shocks occurring at the same time, models utilizing a dummy variable to stand in for a policy may be susceptible to spurious correlations. It is unlikely that this is a major concern in the context of this paper. The film industry, during the time frame analyzed, has been remarkably stable internationally. The number and relative size of the major Hollywood studios have remained constant, no major international film production firms have grown to global prominence, and no key demographic shifts in film consumption have occurred (other than the increase in film piracy, which this paper addresses directly). As an additional hedge against the possibility of spurious results, this paper will utilize a number of control variables in the country-level equations. Data on unemployment will be utilized, where appropriate, to control for possible demand side changes which could bias the results. In addition to these demand side factors there are a number of country-specific variables that are time invariant, but that may help explain the relative effectiveness of policies across countries. These, while useful for explaining the effectiveness of policies, are not useful in a time series context.

One particular variable of interest might be the real exchange rate between the country evaluated and the US. Since revenues are already converted to US dollars there is the

possibility that a shift in exchange rates caused boxoffice numbers to either overstate or understate the revenues of the film industry. In general this should not be problematic, but if a large shift in exchange rates coincided with a government policy there is the possibility that this model would over/understate the policy impact. Since exchange rates are unlikely to be correlated with the timing of anti-piracy policies it is unlikely that this bias in our estimates would systematically occur across countries.

The primary time series equations will thus be estimated, for each country, with an equation of the form

$$y_t = a_0 + A(L)y_{t-1} + B(L)z_t + C(L)\varepsilon_t \quad (1)$$

where y_t is the dependent variable (film revenues), z_t is the policy dummy variable, ε_t is a normally distributed error term and $A(L)$, $B(L)$ and $C(L)$ are vectors of coefficients multiplied by lag functions. If the lag orders are known, this equation can be written in more familiar autoregressive moving average (ARMA) notation. For example, if the equation is to be estimated using an ARMA(2,2) form with 1 lag of the dummy variable the equation could be re-written as

$$y_t = a_0 + a_1y_{t-1} + a_2y_{t-2} + b_0z_t + b_1z_{t-1} + c_1\varepsilon_{t-1} + c_2\varepsilon_{t-2} + \varepsilon_t \quad (2)$$

One additional control variable (unemployment rate) will also be included in the estimating equation. Once the model has been estimated, the b variables will be of primary interest. Results can be compared across countries, comparing the value of different policy coefficients with the characteristics of the countries and laws that generate them.

4. RESULTS

To provide context for the country-specific analysis, each country's policies are characterized in Table 1. Policies have been categorized based on five characteristics. A country is given a "yes" for a column if its new policy added or enhanced the characteristic described in the column heading. This means that countries that already had a characteristic

would receive a “no” in this column unless policies either enhanced or repealed the characteristic.⁴

“ISP liability” categorizes countries that allow suits to be brought against internet service providers (ISP) for downloads taking place on their networks. If a country newly allows either federal entities or copyright holders to file suit against ISPs for providing access to copyrighted content, the country would receive a “yes” in the ISP liability column. ISP liability is generally considered a method of reducing the cost of prosecuting copyright violations because suits can be brought against a single entity (the ISP) rather than against thousands of individuals violating copyright.

The “Penalties” column describes whether the policies of a country added additional penalties for either uploading or downloading content. Additional penalties for providing access to content would not be categorized here, and would instead be considered a form of putting liability on ISPs. These penalties are generally designed to discourage copyrighted material from appearing online.

The “Exemptions” column designates whether a country’s policies provide exceptions for what copyright infringing materials can be prosecuted. For nearly every country with a yes in this column it indicates that their penalties exempt those who copy material for private, but not commercial, use. That is, if someone downloads copyrighted material for their own use and does not intend to make profit from this material they cannot be prosecuted. A country with a yes in this and other columns introduced a policy that applied new stricter rules for copyrights, but made exceptions for personal use. Some countries have a yes in the exemptions column and a no in all others. These countries (Canada, Portugal and Switzerland) introduced additional exceptions to their existing laws, without adding new penalties. Unlike the other columns, a yes in exemptions actually demonstrates a weakening in anti-piracy policy, as more downloads are allowed without possibility of prosecution.

⁴This is done to ensure that policies are correctly compared. For example, some countries had already implemented ISP liability prior to the time frame for which data is available. These countries receive a No in the ISP liability column unless ISP liability were either repealed or enhanced by other policies. While the pre-existence of ISP liability may be interesting when comparing countries it is time invariant, and thus is not useful in determining or comparing the effects of policies within the time frame considered.

Table 1: Changes in Policy Characteristics by Country

Country	ISP Liability	Penalties	Exemptions	Graduated Response	Shutdowns
Australia	Repealed	No	No	No	No
Austria	No	Yes	No	No	Yes
Belgium	No	Yes	No	No	No
Canada	No	No	Yes	No	No
Chile	Yes	Yes	Yes	No	No
Czech Republic	No	Yes	No	No	No
Denmark	No	No	No	Repealed	No
Estonia	No	Yes	No	No	No
Finland	No	Yes	No	No	No
France	Yes	Yes	No	Yes*	No
Germany	No	Yes	Repealed	No	No
Greece	No	No	No	No	No
Hungary	Yes	Yes	No	No	No
Iceland	Yes	No	Yes	No	No
Ireland	Yes	Yes	No	Yes	Yes
Israel	No	Yes	No	No	No
Italy	No	Yes	No	No	Yes
Japan	No	Yes	Yes	No	No
South Korea	No	No	No	Yes	Yes
Luxembourg	No	No	No	No	No
Mexico	No	No	No	No	No
Netherlands	No	No	No	No	No
New Zealand	Yes	No	No	Yes	No
Norway	Yes	No	No	No	Yes
Poland	No	No	No	No	No
Portugal	No	No	Yes	No	No
Slovakia	No	Yes	No	No	No
Slovenia	No	No	No	No	No
Spain	Yes	Yes	No	Yes	Yes
Sweden	Yes	Yes	Yes	No	No
Switzerland	No	No	Yes	No	No
UK	Yes	No	No	No	No
US	Yes	Yes	No	Yes	Yes

* = France's Graduated Response law was both passed and repealed during the time frame of the study

“Graduated response” is a recent development in anti-piracy policy. As technology has improved in tracking downloads, governments have begun creating policies that monitor the number of downloads a person makes. The most common form of this policy is a “three strikes” policy. Generally, under graduated response, when a download is detected, the downloader receives a notice. A second download triggers a second notice. A third download results in either large penalties or the shutoff of internet service for a set time period. Graduated response, a policy supported by the European Union, should theoretically decrease the number of downloads, while not providing penalties for first-time offenders.

Finally, the “Shutdowns” column indicates whether a country’s policies involve either blocking or seizing the servers of a website that hosted copyrighted materials. Website shutdowns, like the 2001 US shutdown of Napster, are designed to remove options for illegal downloads. These policies directly reduce the number of available download links, and so have the potential to decrease the amount of copyright-infringing activities.

Countries that do not receive any yes values in Table 1 did not pass a policy, with one exception. The Netherlands has a policy of allowing most downloads, with the exceptions of knowingly unlawful downloads that are sold for direct profit. The Netherlands, instead of preventing downloads, seeks to provide remittances to copyright holders. These funds are gathered through the use of a media levy, whereby citizens of the Netherlands pay a small tax on all blank materials that downloaded content could be saved on (e.g. iPods, blank CDs, hard drives, etc.) The Netherlands’ policy during the study was a large expansion of the media levy, including an expansion of which devices are taxed. Other European countries utilize a media levy, but theirs are significantly smaller than the Netherlands’, and did not undergo as large of a change. With all of the country’s policies categorized, this paper utilizes time series methods to determine whether the policies of each country were effective at increasing the revenues of the motion-pictures industry.

For each country an ARMA order is estimated. Orders are selected based primarily on information criteria (both AIC and BIC). In addition, visual inspection of the autocorrelation function (ACF) and partial autocorrelation function (PACF) are used to determine

whether additional AR or MA terms are necessary. Finally, a Ljung-Box test is utilized to confirm the visual inspections. ARMA orders for each country are included, along with full results for each regression in the Appendix.

Once ARMA orders are selected, each country's time series regression is performed using a formula of the form of equation (1). Results of these regressions are included in the Appendix, with results for countries with two policies estimated jointly (the second coefficient is given in the column "Policy 2"). Since the dependent variable is logged, and independent variables are not, the results can be interpreted as percent changes. Of primary interest are the coefficients of the policy variables. If the policy coefficient is .1629 (as in Belgium's policy) this would indicate that, upon the passage of the policy, film revenues in that country increased by 16.29%. Since the change in the independent variable is large (a shift from 0 to 1) these percent changes are approximate.

However, due to the interaction of the policy variable with the *AR* terms in the regression model, this coefficient only provides the short-run impact of the law. Because revenues follow an autoregressive process the revenues of a film one week influence the revenues in the following week. This means that policy effects can be magnified over time, as the policy change effects not only each week individually, but also partially carry over from previous weeks. Long-run effects of policies can be calculated by

$$LR = \frac{SR}{1 - AR} \quad (3)$$

where *LR* is the long-run effect of the policy, *SR* is the short run-policy coefficient and *AR* is the sum of the autoregressive terms for all lags included in the regression.

Of the 23 countries with policies, 19 did not have any statistically significant effect for their policies. This is not unsurprising, given the results of other studies that show either no impact of policies, or minimal effectiveness. The countries with policies correlated with changes in film revenues, Belgium/Luxembourg, the Czech Republic, the Netherlands, and the UK/Ireland, showed statistically significant results, but they were not necessarily beneficial for the film industry. One policy, the UK's Digital Economy Act, was correlated

with a decrease in film revenues. The measured impact of these country's policies are listed in Table 2.

Table 2: Policy impacts

Country	UK	Netherlands	Belgium	Czech Republic
Short-run impact	-11.79%	1.77%	16.29%	16.29%
Long-run impact	-18.08%	9.8%	42.5%	125.2%

Belgium's Act on the Punishment of Counterfeiting and Piracy of Intellectual Property Rights, passed in May 2007, was designed primarily to update and streamline existing copyright law. The law consolidated and updated prior copyright statutes while bringing them into line with modern technology. These changes were fairly small in practice and primarily clarified existing policy. The major change associated with this law is the implementation of higher penalties for distribution or acquisition of copyrighted material online. The higher punishments went into effect immediately upon passage, and are likely the primary cause of the shift in film revenues.

The Czech Republic's Act No. 121/2000 on Copyright and Rights Related to Copyright similarly served to modernize and update existing copyright laws while adding additional penalties for online copyright violations. This law clarified how intellectual property law could and could not be applied to the internet. The goal of the law was to bring the Czech Republic's copyright enforcement into line with the European standard. Primarily this amounts to shifts in wording and particulars (e.g. the law changed how works published under pseudonyms are handled) that have little impact on the enforcement of existing laws. Like Belgium's law, the primary impact of this law was an increase in the size of penalties for violating copyright law. The size of the long-run impact of this law seems to result from the highly autoregressive nature of the revenue function for the Czech Republic, rather than from a large short-run impact of the policy. Little research has been devoted to the reasons for the autoregressive nature of film revenues, so the reasons for this country-level difference are not clear. It is possible however that due to limited release options for

Hollywood films that the carryover from week to week could be larger since films stay in theaters for a longer period of time.

The United Kingdom's Digital Economy Act was the most comprehensive of the laws in our study to have a statistically significant impact. First, this law enacted a system of Internet Service Provider liability. When peer-to-peer copyright violations are recorded the Internet Service Provider who enabled the transfer is notified. These ISPs are then required to keep a list of their subscribers who are termed as "repeat offenders". Copyright holders are then able to obtain a court order to obtain personal details about these repeat offenders. Those ISPs that either fail to release this information or that fail to punish repeat offenders if requested by copyright holders are in violation of the law and can be punished. Second, this law required that ISPs would be required to limit internet access of individuals who maintain their repeat offender status despite initial punishment. Third, the law increased the penalties associated with violating copyright. The law also includes a number of additional regulations surrounding the use of TV and radio service, updating rules for video recordings of copyrighted materials, and audiobook and ebook distribution by public libraries.

The final significant law was the Netherland's 2013 increase in their media levy. The Netherlands has only limited restrictions on online downloads, so long as those downloads are not for commercial purposes. Downloading content for private use is generally not prosecutable. To help compensate copyright holders they have a blank media levy, a tax on blank media (blank cds, hard drives, sd cards etc.). The funds raised by this levy are then distributed to copyright holders. In 2013 the Netherlands dramatically increased the size and scope of their levy. In addition to the standard levies on blank CDs and DVDs, in 2013 tablets, smartphones, USB drives, and computers were added to the list of products subject to a levy, depending on the size of the storage available on the device. Additionally, the levy on blank media were increased by a significant amount (a near doubling of levies in many cases).

The countries with significant policies do have some similarities. All of the policies, other than those enacted in the Netherlands, increased the penalties of pre-existing policies. In

fact, both Belgium/Luxembourg and the Czech Republic only increased their penalties, without implementing new standards or requirements. The UK enhanced the penalties on its existing policies, but also implemented ISP liability.

The Netherlands is obviously a unique case. Its increase in media levies did have a statistically significant impact on the boxoffice revenues of the film industry, but it was by far the smallest of the significant effects. Revenues of the film industry only rose by 1.7% in the Netherlands and the short run, and less than 10% even in the long run. However, this is significantly better than the many countries that had no impact from their policies. Because the Netherlands is the only country in the data set to exclusively utilize a media levy, it is unclear whether the measured benefits of the policy was a result of cultural factors in the Netherlands, a lack of other policies, or the size of the media levy itself.

It is also important to note that with the exception of the UK (which had a policy with negative impact) all of the countries with significant policies are relatively small in terms of population and land area. It may be that enforcement costs are lower, or that small countries are in some ways more prone to effective policies. When comparing the results of time-series regressions it is important to be cautious about the conclusions. I am not able to control for country specific variables, which may be influencing who has successful policies.

5. DISCUSSION AND CONCLUSION

The results of our regressions indicate that governments struggle to implement anti-piracy policy in a way that benefits boxoffice revenues. The results show that only four countries were able to implement policies that had a significant impact on the boxoffice revenues of the industry, and of these one policy actually harmed the industry. From our data the reason for this inability to influence revenues is not clear. It could be that policies are able to reduce the amount of downloads, but this is not having an impact on the revenues of the industry. It is also possible that they are not having a significant impact on the number of downloads of copyrighted material. Future research should focus

on the ability of government policies to influence the number of downloads so it can be determined what is making policy's effects insignificant.

The characteristics of the successful policies are also interesting to note. Three main styles of policies were significant in at least one country: increases in penalties, increases in media levies, and large omnibus bills including many policy changes at once. Policies that exclusively blocked websites or established liability for ISPs did not seem to be effective in any country. This fits with prior results, and may indicate that downloaders are able to use other websites or methods of downloading when their preferred method either is taken offline or is placed under monitoring by their ISP. Future research could clarify why these policies were more effective than others by determining how consumers of copyrighted material respond to various forms of government policy.

In addition, while data are not available to evaluate laws passed pre-1990, these laws are likely crucial in determining whether modern anti-piracy policy has a significant impact. Two countries, Czech Republic and Belgium, passed laws that only enhanced the penalties of earlier laws. Despite the simplicity of this approach, these were the two largest impacts in the dataset. Understanding why these two policies were effective likely hinges on understanding the prior copyright laws in these countries.

The countries with significant policies are also in some ways similar. Other than the UK, no country with a large population was able to implement an impactful anti-piracy policy. Future research should investigate the connection between enforcement costs, population, and policymaking to determine whether small countries are inherently more able to police anti-piracy policies. Similarly, other demographic similarities between these countries should be investigated to determine whether there is something unique to the successful countries that makes their populations more susceptible to anti-piracy policies.

The Netherlands, in particular, merits attention for future research. While the impact of their policy was quite small, increasing media levies in the country seemed to benefit the boxoffice revenues of the film industry. In addition, the funds raised by these levies, at least in part, are given to film distributors and producers. Future research should evaluate how individuals respond to media levies and whether they are able to discourage downloads or

sharing of copyrighted files. Further, work should evaluate whether the subsidies provided using levy funds are able to overcome the incentive issues created by copyright theft.

Finally, while this paper focuses exclusively on the boxoffice revenues of the film industry there are numerous other revenue streams and industries that could be impacted by these anti-piracy policies. It may be that the policies that are considered ineffective in this analysis are actually benefitting the software industry, the recording industry, or even the film industry through changes in legal downloads or DVD/Blu Ray sales.

This paper utilizes boxoffice revenue data from OECD countries to evaluate anti-piracy policies implemented by these countries. ARMA models with exogenous policy variables indicate that most countries are not able to influence the revenues of the film industry by decreasing illegal downloads. Only three countries successfully raised the revenues of the film industry. Results indicate that increased penalties may be more effective than shutting down websites or creating complex rules designed to discourage downloading.

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Appendix: Full regression results

Country	Observ.	ARMA	Policy 1	Policy 2	AR1	AR2	AR3	MA1	MA2	Intercept	Unempl.	BIC
Australia	710	2,0,1	0.0489		1.1571	-0.175		-0.8603		0.2192	-0.0471	-131.94
Austria	405	1,0,1	-0.0073	-0.1547	0.6818			-0.3458		-0.4032	0.0843	73.64
Belgium/ Luxembourg	413	1,0,1	.1629**		0.6168			-0.3183		0.3053	-0.0257	10.34
Chile	395	1,0,1	-0.0021		0.7794			-0.5635		0.0774	-0.0103	112.77
Czech	512	1,0,2	.1417*		0.8868			-0.5033	-0.1152	0.1421	-0.0397	167.72
Denmark	403	1,0,1	-0.0046		0.6866			-0.4141		-0.0564	0.094	352.79
Finland (2)	383	3,0,2	-0.0107	-0.0557	-0.0648	0.8498	-0.0732	0.298	-0.6656	-0.323	0.0473	263.4
France	649	1,0,1	0.0738		0.6494			-0.2445		0.3572	-0.0422	-63.24
Germany (2)	655	1,0,1	-0.0822	0.0535	0.8188			-0.4456		0.1368	-0.0113	170.4
Hungary	345	1,0,1	0.0386		0.8436			-0.6476		0.2196	-0.0256	47.04
Iceland (2)	357	1,0,2	-0.1946	-0.0534	0.841			-0.5819	0.0367	0.2224	0.0003	101.07
Italy (2)	550	1,0,1	-0.0786	0.0991	0.6376			-0.2724		0.0636	-0.0184	113.58
Japan	656	2,0,2	0.0188		-0.2581	0.6414		0.629	-0.2849	-0.432	0.0945	35.25
Korea	438	1,0,2	-0.0509		0.9547			-0.5447	-0.1797	0.0457	-0.002	-193.19
Netherlands	671	1,0,1	.0177*		0.8192			-0.4242		0.0089	-0.0025	8.74
New Zealand	497	1,0,1	-0.0427		0.7802			-0.4884		0.026		-82.66
Norway	521	3,0,2	-0.0982		-0.454	0.5951	0.0645	0.7189	-0.2421	0.2278	-0.065	323.31
Poland	625	1,1,1	0.2984	-0.1668	0.2694			-0.9587			-0.029	580.99
Portugal	424	2,0,2	-0.0857		0.5885	0.188		-0.2996	-0.2846	-0.084	0.0085	-40.62
Slovakia	332	1,0,0	-0.0162		0.4017					-0.3279	0.0251	289.73
Spain	656	2,0,1	-0.1206		1.1374	-0.2057		-0.7399		-0.0541	0.0047	-210.65
Sweden	445	1,0,1	0.0371		0.6818			-0.4372		0.1754	-0.0265	225.91
UK/Ireland	710	2,0,2	-0.086	-0.1179***	0.1627	0.1854		0.0618	-0.099	0.0901	-0.0231	223.83

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