Netflix as a Piracy Disruptor? A Cross-Sectional Test of Accessibility and Affordability on Interest in Piracy

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Abstract

With the increase in digital media streaming outlets, consumers are faced with a multitude of options as well as potentially increased costs to watch digital media. The traditional methods of studying digital media piracy have failed to adequately capture long-term trends or reveal potential methodologies for understanding this behavior. Using Internet search query data for the period of 2004-2018 and purchasing power parity indexes as a measure of standard of living, we examine the relationships between legal and illicit sources of digital media and how economic factors affect their usage on a global scale. In certain contexts, the introduction of Netflix to a country has a disrupting influence on interest in piracy. However, this influence is not universal, nor of the same magnitude. A multitude of factors, including the availability of legal alternatives, affect piracy globally.

Keywords: Piracy; Cyber-Crime; Cross-Sectional Analysis; Netflix; Google Trends.

Introduction

Estimates of media piracy range widely, though estimates place the cost to the global economy at billions of dollars (Al-Rafee & Cronan, 2006; Aversa, Hervas-Drane, & Evenou, 2019; D'souza, 2017; Higgins, 2007) and while these estimates remain heavily debated (Aversa et al., 2019; D'souza, 2017; Navarro, Marcum, Higgins, & Ricketts, 2014; Smith & Telang, 2012; Waldfogel, 2017), there is no discounting that media piracy remains a concern for entertainment companies. The ease in which media piracy occurs (Bernat & Makin, 2014; Danaher, Dhanasobhon, Smith, & Telang, 2010; Smith & Telang, 2012), its increasing normalization within society (Higgins, Fell, & Wilson, 2007; Navarro et al., 2014), and the limited efficacy associated with punitive measures reducing media piracy (Higgins, Wilson, & Fell, 2005; Van Rooij, Fine, Zhang, & Wu, 2017;

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Zhang, Smith, & McDowell, 2009) have led to a state of research that seemingly is unable to provide practical answers to what works to reduce media piracy (Downing, 2010; Higgins, 2006, 2007; Higgins & Makin, 2004).

Understanding what works to reduce media piracy necessitates understanding what drives media piracy. Across the wide body of research associated with media piracy there are two dominant perspectives: 1) access and 2) affordability (Holt & Copes, 2010; Marx, 2013; Morris & Higgins, 2009; Yar, 2005; Yu, 2003). Access advocates suggest that piracy will decrease as access to legal alternatives emerge, though importantly a caveat to access is when those alternatives provide a *comparable user experience* (Appleyard, 2015; Danaher et al., 2010). Affordability advocates offer that decreasing costs of media will decrease piracy. Notably, while the cost of piracy may be zero – that is no price is paid for the content, affordability concerns the price point to which a user is willing to pay to obtain access to content, which is both a market calculation and individual assessment of worth. Taken together, increasing access to *quality* media, while decreasing the associated cost of access are most often touted as a strategy to reduce media piracy.

Across this wide body of research, much of the work testing these assumptions relies upon convenience samples testing to what extent factors *would* contribute to a respondent's likelihood of engaging in media piracy. Few studies have documented to what extent affordability and access result in decreases in media piracy. Contributing to this lack of research are challenges to collect cross-sectional data associated with media piracy and representative measures associated with affordability and access.

Here we argue the global expansion of the streaming service Netflix represents a unique measure to ascertain to what extent Netflix disrupts interest in piracy (*access*) and using Purchasing Power Parity (PPP), we examine how economic improvements disrupt interest in piracy (*affordability*). Using global measures of interest from 2010-2017, associated with the websites the PirateBay, Kickass Torrents, and uTorrent, we estimate to what extent affordability and accessibility disrupt interest in piracy.

Digital Media Piracy is Easy

As Cronan and Al-Rafee (2007) offer piracy is easy. The increasingly normalization of the behavior and to a lesser extent its neutralization (Bernat & Makin, 2014) has resulted in a reality in that media piracy could not be easier (Ibosiola et al., 2018). Websites and services associated with piracy offer the latest new releases and increasingly so, older catalogs of media, providing users with a nearly inexhaustible media library. Importantly, those providing access to these vast libraries are increasingly designing websites and interfaces that are seemingly indistinguishable from legitimate websites. However, despite the growth of these alternative websites, several websites are synonymous with media piracy, including *The PirateBay and KickassTorrents.*

The PirateBay is an international file-sharing website that has been the subject of numerous lawsuits and yet maintains substantial daily internet traffic rates (Aversa et al., 2019; Karaganis (Ed.), 2011). In fact, in September of 2019, the website was ranked #173 in global internet engagement. It operates as a torrent-indexing website allowing visitors to search, upload, and download torrent files, though crucially it does not host any copyrighted material, allowing it to exist in a legal grey area. While laws vary by nation, this state of legal ambiguity has provided the website, and its owners, with longevity, still existing fifteen years after its creation (Carrier, 2010; Poort, Leenheer, van der Ham, & Dumitru, 2014) and in spite of multiple attempts to close the website or delist it from

search engine results. From an accessibility perspective, the PirateBay has a simple interface allowing users to find copyrighted material with no cost and little effort.

KickassTorrents was frequently the most popular torrent site on the internet, with over a million visitors per day during 2015. The site was created by the originators of the torrent protocol and is still currently active. However, since its creation it has moved domains, host countries, and changed names in order to both combat and avoid legal battles (Beyer & McKelvey, 2015). KickassTorrents operates similarly to the PirateBay, allowing users to search for and download copyrighted digital content for free.

Digital Piracy is Disrupting

According to industry representatives and independent research, piracy has a substantial impact on the legitimate media market, which ranges from billions of dollars in lost revenue to a disinclination to create new media and the loss of media-related jobs (Al-Rafee & Cronan, 2006). The most up to date research suggests that in a single year, piracy costs the United States market over $2 billion dollars (D'souza, 2017), and over $200 billion globally, with an expectation that by 2020 it will be over $800 billion (Aversa et al., 2019).The scale of the lost revenue affecting the legitimate market has brought digital piracy back into the spotlight, with hundreds of thousands of movies being downloaded every single day (Al-Rafee & Cronan, 2006). While these estimates suggest that piracy is a market disrupter, measuring the extent that piracy acts to disrupt the industry is more challenging.

In a series of seminal papers, Rob and Waldfogel (2006, 2007) argue the importance of revaluating how researchers study disruption caused by piracy. According to the researchers, displacement (disruption) is best understood and should be measured on a scale from zero to one, wherein zero is no displacement and one is a lost sale. The foundation of the argument is that for displacement to occur, and for the industry to lose a sale, the user would have, in absence of piracy, engaged in a purchase. A consumer who engages in piracy, and who would not have legally purchased the product, should not be included as a *complete* lost sale. It is for this reason that acts of piracy can vary in the degree to which they displace the market. For example, a user with *legal* access to content, may choose to engage in piracy. However, should such a user be considered a "pirate"? According to Bernat and Makin (2014) such a behavior should not be considered an act of displacement. Rather, researchers must seek to understand the factors driving users to these methods despite having *legal* access to the content.

Despite these concerns for how best to measure the market disruption caused by piracy, it is important to acknowledge a body of research suggesting that piracy, while disruptive, may contribute to the market in positive ways. In one of the earliest studies, Bounie and colleagues (2005) found that for a specific subset of consumers, piracy introduces users to new interests, which in the context of the study translated to increased consumption of music CDs. Problematic to this body of research has been an overreliance on convenience samples at the individual-level: in the study conducted by Bounie and colleagues (2005), the researchers used a sample of 456 graduate and PhD students.

Studies attempting to overcome these limitations, transitioned the unit of analysis away from the individual, through an analysis of internet traffic and accounts – with an emphasis on participation in file sharing networks. Results of this body of research demonstrates that piracy, measured by both internet traffic and active user accounts, acts to disrupt the industry by diverting users from purchases (Danaher & Smith, 2014; Danaher,

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Dhanasobhon, Smith, & Telang, 2010). However, equally important across this body of research are those studies examining the factors disrupting piracy.

Disrupting Digital Piracy

Disrupting piracy networks has become increasingly more challenging. As these networks have become more de-centralized, users are better able to mask their identity using privacy enhancing technologies (PETs), and the piracy ecosystem has evolved (Ibosiola, et al, 2018). Today, consumers have access to a myriad of different websites, newsgroups, and technologies enabling on-demand access to a nearly inexhaustible catalog of content. Attempts to disrupt the market have resulted in limited success. Danaher and Smith (2014) document how the seizure of Megaupload, while shifting users to other websites, did cause an increase in digital revenue. However, changes of content availability on the licit market can be disrupting. For example, when NBC removed a substantial volume of content from iTunes in 2007, piracy associated with NBC content, increased by 11.4% (see Danaher, Dhanasobhon, Smith, & Telang, 2010). What is particularly important about this study is that while changes to accessibility, increased piracy, the reintroduction of the content to the platform was not associated with a statistically significant decrease.

Another common strategy used to disrupt piracy is leveraging the legal system. For example, when Sweden implemented a tough file sharing law in April 2009, internet traffic decreased by 40-percent (Adermon & Lang, 2010). However, while tougher laws may reduce the likelihood that some users engage in piracy, as Wingrove, Korpas, and Weisz (2011) introduce, deterrence is unlikely to curb all users. Rather, decreasing piracy may benefit from employing a harm reduction strategy, accepting that piracy will continue, and the goal is to convert pirates into consumers by increasing accessibility and affordability of content. Aggressive litigation of prolific pirates has been used to disrupt levels of file sharing, but a small group remained undeterred by possible legal action against them, further demonstrating that not all pirates can be deterred (Bhattacharjee, Gopal, Lertwachara, & Marsden, 2006).

Affordability as Disruption: The Case of Purchasing Power Parity

Existing research into piracy and economic factors demonstrates that as personal wealth increases a natural decline in rates of piracy occurs (Husted, 2000; Moores, 2003). Typically, the research has shown that countries with a higher standard of living legitimately purchase digital media as opposed to pirating content. The popular explanation is that as people have more discretionary funds, with which to purchase or stream digital media through legitimate outlets, piracy decreases. However, some countries do not fit this pattern, suggesting that within some markets, piracy still thrives even when the standard of living is high. Both economic and non-economic factors influence piracy ideation, though research clearly shows that economic prosperity, political freedom, and internet costs can mitigate piracy to different extents (Goel & Nelson, 2009). However, greater economic freedom can have the reverse effect and increase piracy under given circumstances, demonstrating that the relationship between economic factors and piracy is fundamentally complex. In countries with greater political freedom it has been shown that piracy rates are reduced, but in countries with greater economic freedom piracy increases, possibly due to less government resources dedicated to anti-pirating efforts; components

such as these demonstrate inconsistent factors that affect interest in piracy (Goel & Nelson, 2009).

Research that explored the role that pricing plays in decisions to pirate digital media has demonstrated that competitively priced legitimate sources can reduce piracy, and efforts to disrupt piracy excessively can actually increase piracy (Danaher et al., 2010). When the now infamous piracy website Megaupload was shut down by the US government, legitimate digital revenues increased, suggesting that consumers will turn to legal means when illicit means are unavailable, but also that illegal filesharing does displace legitimate sales. However, the legitimate sales increase was minor and only a particular type of pirate has been shown to choose legal means when illicit means are unavailable. For legitimate outlets, finding a price that encourages potential pirates to utilize their services instead of turning to piracy seems to be instrumental to reducing overall rates of piracy ideation. Pirates balance the cost of learning the skills to pirate with the actual monetary cost of purchasing legitimate content in order to decide whether or not to engage.

Accessibility as Disruption: The Case of Netflix

While affordability is an important disrupting factor, curtailing piracy necessitates content availability that meets the demands of users. As market forces drive the creation of content, so to do market forces drive the curation of pirated content. Increasing accessibility requires careful consideration as to what the market wants, which is to say understanding what pirates want. In fact, Netflix has gone on record stating how piracy informed content decisions for the company (Renee, 2013).

This relationship between illegitimate and legitimate content availability works in both directions. As previously stated, Netflix monitors popular content on illicit sites, as a means of determining content purchased for their service. In the United Kingdom, previously unavailable content that was only accessible through illegitimate means was made available to consumers through a legitimate and established outlet (Netflix) making the content legitimately and more easily available for consumers.

In summary, a wealth of research suggests that improving affordability and accessibility are key factors associated with decreases in piracy. However, across this body of research, there remains a gap concerning to what extent these factors are universally true. To test these assumptions, this research models how the expansion of Netflix in a nation acts to disrupt interest in piracy. Operating under the theoretical expectations associated with both factors, this research produces the following testable hypotheses.

- *Hypothesis 1:* The expansion of Netflix within a nation is associated with decreases in interest associated with the website the Piratebay.
- *Hypothesis 2*: Increases in the Purchasing Power Parity (PPP) is associated with decreases in interest in websites associated with piracy and technology necessary to engage in piracy.

Data and Analysis

Affordability. Concerning our affordability measure, we use the economic variable Purchasing Power Parity (PPP). The Purchasing Power Parity doctrine represents relative purchasing power in any given country compared to a standardized value of an international dollar - effectively creating a measure that is a constant equilibrium not affected by exchange rate fluctuations (Balassa, 1964; Jiang, Bahmani-Oskooee, & Chang,

2015). As exchange rates can distort the value of a dollar between countries, PPP is used to compare economic wealth and well-being with an empirical backing (Yang, Sonmez, Bosworth, & Fryxell, 2009). This measure is then compared to interest in the PirateBay, KickAss Torrent, and uTorrent. Google Trends provides these data and unlike prior studies using interest measures associated with a specific query, these data represent interest in the specified website. Given the notoriety of the PirateBay, using this feature allows for a more robust measure, increasing confidence that our interest measures are associated with the specific websites and not queries entered for news information about the website. These data represent interest or 'popularity' measures associated with each website, across the specified period, which for the purposes of this research are 2010-2017. Importantly, these data represent yearly measures, across the period. Unfortunately, Google does not provide raw search volume. Rather, measures of interest exist on a normalized scale ranging from 0-100, with a score of 100 representing the highest interest and 0 being the lowest level of interest. Importantly, a score of 0 should not be interpreted as no interest in the website. Rather, a score of 0 represents search volume not meeting a score of 1. For the purposes of this methodology, we collect interest measures over an eight-year period and across all nations and dependent territories tracked by Google (n=225). Taken together there are 1,800 measures of interest collected for analysis. Table 1 displays the descriptive statistics associated with each measure.

Table 1: Descriptive Statistics (n=225)				
Year	The Piratebay	Kickass Torrents	uTorrent	Purchase Price Parity (PPP)
2010	18.47	23.45	19.67	332.53
2011	21.44	15.86	20.88	358.56
2012	20.28	17.64	21.87	378.76
2013	19.46	12.84	22.24	388.60
2014	14.75	16.30	25.51	427.68
2015	17.56	18.41	29.07	487.65
2016	14.39	19.44	24.39	531.85
2017	15.66	20.33	9.44	566.67

Analytical Strategy. Given the cross-sectional nature of our data, our first modeling decision was to use feasible generalized least squares regression via the command xtgls within Stata 16. During assumption testing, it was determined that these data experience many of the known limitations of this type of data. Specifically, panel-data may experience autocorrelation, cross-sectional dependence (Bowen and Wiersema, 1999), and return biased estimates in the standard errors because of heteroskedasticity. Specifically, these data experience cross-sectional dependence, failing the Pesaran (2015) test, and autocorrelation, failing the Wooldridge test for autocorrelation.

Correcting for these issues relied upon a method developed by Hoechle (2007). Using the command xtscc – written by Hoechle (2007), we estimate a pooled OLS regression

model with Driscoll and Kraay standard errors. Briefly, Hoechle's method considers cross-sectional dependence and multiple autocorrelation lag structures within the estimation procedure. Additionally, the estimator is also able to handle unbalanced panels with missing data. Given these data experience significant heteroscedasticity and cross-sectional and temporal dependence, the Driscoll–Kraay standard errors allows for estimations that are less biased to the aforementioned issues often experienced within panel data (p.283). We use the updated xtscc command published to Boston College Statistical Software Components (SSC) in 2017.

Accessibility. Testing accessibility is inherently more complicated than our measure of affordability because the global expansion of Netflix did not occur at one time point, nor was the launching equal. Specifically, the amount of content varied considerably, with some countries having less than ten percent of the catalog available in the United States. Given the heterogeneity associated with the launching of Netflix, we use interrupted time series models to document to what extent Netflix disrupted interest in the Piratebay. We perform these analyses on a sample of nations associated with the various global expansion initiatives (2010, 2011, 2012, 2013, 2014, and 2015). Using the specific month of Netflix launching in the nation, we can document if Netflix disrupted interest and the magnitude of the disruption. These models are estimated using a single group interrupted time series analysis (ITSA). Developed by Linden (2015), ITSA relies on ordinary least squares (OLS) regression and is contained with the ITSA package in Stata.

Briefly, Linden (2015) defines the single group interrupted time-series analysis regression series model as:

$$Y_t = \beta_0 + \beta_1 T_1 + \beta_2 X_t + \beta_3 X_t T_t$$

Y_t is the outcome variable and is measured monthly (t). X_t represents the intervention, which for the purposes of the study is the month Netflix launched within the nation, and $X_t T_t$ signifies the interaction between the time measurement and the intervention. β_0 represents the intercept, or starting point, which is January 2004. β_1 assesses represents the slope between the intercept and the implementation of body-worn cameras. β_2 indicates the effect of the immediate effects of the implementation, β_3 while represents the difference immediately following the intervention. For ease of interpretation, there are three primary variables of interest _t (trend prior to implementation), _x (direct effect of the implementation), and _xt (post intervention trends).

Under ideal conditions, the use of ITSA would involve multiple groups. However, as aforementioned, except for a few nations, Netflix has achieved its global expansion. Notably, China is one of the remaining nations where Netflix has not expanded. However, given the prevalence of government censorship associated with the use of Google (Dann & Haddow, 2008; Yeo, 2016), China is not a suitable control. While we recognize the importance of a control group for testing the counterfactual (Linden, 2017), the use of sampling across different intervention periods helps improve the confidence in the results. Additionally, as Bernal, Cummins, and Gasparrini (2019) offer, while there are limitations to the single-group ITSA, when properly executed it should still be regarded as an intermediate methodology for detecting and measuring intervention effects.

Results

Table 2 depicts the results of our models estimating the disruptive impact of Netflix on piracy. The launch of Netflix in some countries coincides with a noticeable change in

interest in these sites. For evidence on trends in interest in piracy rates, we present our results both visually and in table form. Given the number of nations where Netflix exists, we frame our analysis around different periods associated with the introduction of Netflix.

Table 2. Interrupted Time Series of Interest in the PirateBay (2004 –2018)				
Nation	Date of Netflix Expansion	Pre-Netflix Trend	Effect of Netflix	Post-Netflix Trend	Adjusted R²
Canada	9-2010	.90★★★ (.57-1.23)	7.58 (-2.97-18.14)	-1.35★★★ (-1.80- -.90)	.24
Brazil	9-2011	.91★ (.12-1.68)	3.49 (-7.12-14.12)	-1.31★ (-2.41- -.22)	.08
United Kingdom	1-2012	.87★★★ (.56-.-1.18)	-9.44† (-19.33-.44)	-1.73★★★ (-2.24- -1.22)	.29
Ireland	1-2012	.83★★★ (.42-1.24)	-6.27 (-17.75-5.20)	-1.64★★★ (-2.31- -.98)	.12
Finland	10-2012	-.72 (-1.76-.32)	-4.15 (-14.92-6.61)	.05 (-1.41-1.52)	.15
Norway	10-2012	.34★★ (.11-.56)	-11.09 (-26.12-3.93)	-1.25★★★ (-1.69- -.82)	.29
Sweden	10-2012	.14 (-.14-.43)	-.66 (-15.89-14.55)	-.93★★ (-1.49- -.37)	.15
Netherlands	9-2013	.05 (-.82-.94)	-1.33 (-13.45-10.77)	-.61 (-2.11-.88)	.10
India	9-2014	.33 (-.47-1.13)	-9.17★ (-19.58-1.23)	-.99 (-2.47-.49)	.01
Australia	3-2015	.62★★★ (.44-.81)	-12.23★ (-22.35- -2.10)	-1.97★★★ (-2.61- -1.33)	.29
New Zealand	3-2015	.69★★★ (.61-.77)	-20.92★★★ (-30.49- -11.34)	-1.66★★★ (-2.02- -1.31)	.65
Japan	9-2015	-.18 (-.84-.46)	-.26 (-12.59-12.05)	-.33 (-2.04-1.38)	.04
Italy	10-2015	-.14 (-.55-.26)	-1.68 (-14.48-11.11)	-.08 (-1.48-1.30)	.04
Spain	10-2015	.38★ (.00-.75)	-5.01 (-15.79-5.76)	-1.61★★ (-2.84- -.39)	.13

†p<.1, ★p <.05, ★★p<.01, ★★★p<.001, Adjusted for Seasonality

Canada. As depicted in Figure 1, prior to the introduction of Netflix in Canada, the rate of interest in piracy was increasing. At the time of the introduction of Netflix there was no significant change in the rate of interest in piracy, though post expansion, interest

in piracy decreased. Results of the ITSA, Table 3, confirm the visual trends, indicating the expansion of Netflix into Canada was associated with a decrease in interest in the Piratebay (–1.35, p< .001).

Table 3: Pooled OLS Regression Analysis with Driscoll–Kraay Standard Errors Examining Purchase Price Parity (PPP)

	Constant	Coef.	Drisc/Kraay Std.Err.	t	R^2
The Pirate Bay (n=1,720)	24.08				
Purchase Price Parity (PPP)		–1.55★★★	.10	–15.10	.06
Kickass Torrents (n=1,668)	31.93				
Purchase Price Parity (PPP)		–2.20★★★	.37	–5.88	.11
uTorrent	24.40				
Purchase Price Parity (PPP)		–1.24★★★	.19	–6.46	.12

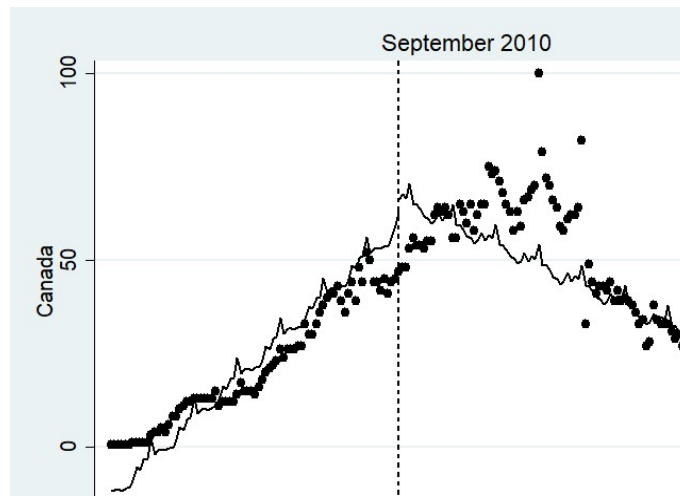★ p < .05., ★★ p < .01., ★★★ p < .001. Adjusted for Seasonality

Figure.1 Canada

Brazil. Results of the ITSA regression indicate that, like Canada, prior to the introduction of Netflix in Brazil, the rate of interest in piracy was increasing (.91, p<.001). and while the launch was not associated with an immediate effect, the post-intervention period indicates a decrease in interest (–1.31, p<.05).

United Kingdom. Launched a few months after Canada and Brazil, and as depicted in Figure 2, interest in Piracy was increasing in the United Kingdom. In fact, prior to the launch of Netflix, interest in piracy had reached an all-time high. The ITSA results confirm this trend, as significant, and further identify that the expansion of Netflix within the nation contributed to the decrease in interest (–1.73, p<.001) explaining 29-percent of the variance in interest.

Ireland. Prior to the introduction of Netflix in Ireland, the rate of interest in piracy was increasing (.83, p<.001). Like the results of the U.K., the expansion of Netflix in Ireland is associated with a decrease in interest in piracy (-1.64, p< .001).
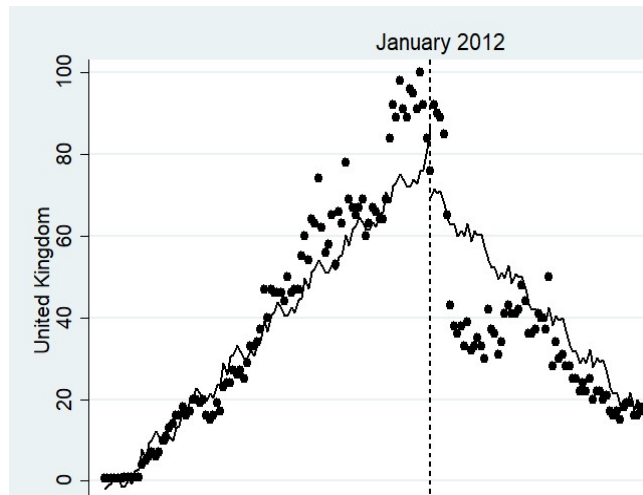

Figure.2 United Kingdom

Finland. Prior to the introduction of Netflix in Finland, the rate of interest in piracy was decreasing (-.72). The introduction of Netflix to the Finnish market did not significantly change the interest in piracy.

Norway. Netflix was introduced to Norway at the same time as both Sweden and Finland, at which time the rate of interest in piracy was increasing significantly (.34, p< .001). After introduction, interest in piracy did not change significantly.
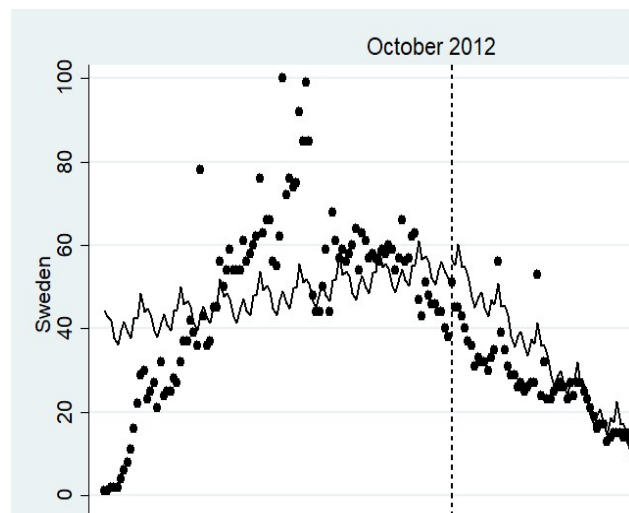

Figure.3 Sweden

Sweden. As depicted in Figure 3, the rate of interest in piracy in Sweden was increasing (.14), even after the introduction of a new law in 2009. The introduction of Netflix in 2012 was followed by a significant decrease in interest in piracy (–.93, p<.01)

Netherlands. Interest in piracy was increasing before the introduction of Netflix but not significantly (.05) and after the introduction in 2013 interest decreased but not significantly (–.61).

India. The interest in piracy prior to the introduction of Netflix in India in 2014 was increasing (.33) and at the point of introduction there was a significant decline in the rate of interest (–9.17, p<.05). However, after this initial decrease the interest in piracy did not change significantly.

Australia. Interest in piracy in Australia was increasing significantly (.62, p<.001) before the introduction of Netflix in 2015. At the time of introduction there was significant decrease (–12.23, p<.05) but after introduction the decrease became even more significant (–1.97, p<.001).

New Zealand. As with Australia, interest in piracy in New Zealand was increasing significantly (.69, p<.001) prior to the introduction of Netflix. Similarly, there was a significant decrease at both the time of intervention (–20.92, p<.001) and subsequently afterwards (–1.66, p<.001).

Japan. In Japan, interest in piracy was not significantly decreasing (–.18) prior to the introduction of Netflix. This non–significant decrease in interest was also observed at the point of intervention (–.26) and in the period following (–.33).

Italy. Netflix was introduced to Italy in 2015, at a time when interest in piracy was decreasing but not significantly (–.14). This trend continued at both the point of intervention (–1.68) and subsequently (–0.8).
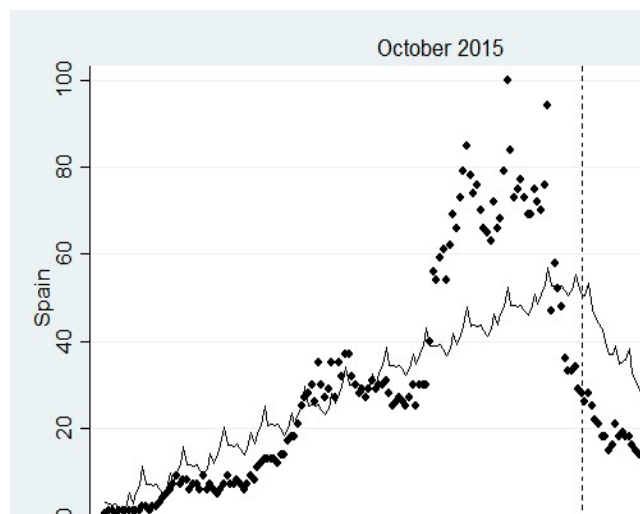

Figure.4. Spain

Spain. As depicted in Figure 4, interest in piracy in Spain was increasing significantly (.38, p<.05) prior to the introduction of Netflix. The decrease in interest at intervention was not significant (–5.01) but the subsequent decline in interest was (–1.61, p<.01).

Affordability. As depicted in Table 3, increases in purchasing power parity (PPP) is associated with a statistically significant decrease in the interest measures associated with

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both the Piratebay and Kickass Torrents (websites providing access to content) and uTorrent (the website providing access to the technology).

Discussion

Results of the time series analysis demonstrates the introduction of Netflix to a country can disrupt interest in piracy. For most countries being examined, the introduction of Netflix led to a decline in interest in piracy, although as discussed earlier other factors could be instrumental in disrupting interest in piracy. The decline in interest in piracy, after the introduction of a legal alternative, reinforces the concept that content availability is a motivating factor towards piracy, and when legal alternatives are available the interest in piracy is lessened. The data seems to suggest that for countries with significantly increasing interest in piracy, the introduction of a legal alternative (Netflix) is likely to yield a decrease in interest in piracy.

The impact of this legal alternative is particularly salient in combatting piracy when placed within the context of deterrence-based strategies. As aforementioned, Sweden, introduced a strict law aimed at disrupting file-sharing and piracy in 2009. As depicted in Figure 3, while the visual trend would seem to indicate stabilization – that is interest is not increasing or decreasing, a decrease in interest does not occur until after Netflix expanded in the nation – several years later.

While these results are encouraging, and would suggest that Netflix disrupts interest in piracy, these results demonstrate this effect is not universal. In fact, several of the nations sampled show no impact. This inconsistency is likely to be due to several factors, such as the specific content available, both legitimately and illegitimately, as well as the relationship between purchasing power parity within a given country and their relative interest in piracy. One of the most prominent themes of this data collection is that there is no universal response to the introduction of a legal alternative in terms of interest in piracy.

While our data do not contain the specific amount of content available in each nation, prior research does document the extent content availability influences rates of piracy. Consider the results of India, showing a substantial decrease in interest the month Netflix expanded in the nation, and then no post-expansion impact. A salient critique of Netflix's expansion in India was the lack of culturally relevant content, which were available on other streaming services, that were coincidentally substantially cheaper than Netflix. It has also been suggested that cultural and familial factors in India could be responsible for the lack of uptake for the streaming service. The lack of India-specific content and high price point (compared to comparable services) suggest that Netflix is only aimed at a particular demographic in India. Japan is another interesting case study. Our results demonstrate Netflix had no influence on interest in the Piratebay. While Japan has one of the largest Netflix libraries in the world, most people do not use any of the streaming services available in the country, which would explain why the introduction of an additional legal alternative such as Netflix had no influence on interest in piracy.

Limitations and Future Research

While we are confident in our results and association between the expansion of Netflix and decreases in interest associated with piracy, we would be remiss by ignoring the limitations of this study. First, this data only focuses on the relationship between the implementation of a legal alternative (Netflix) and how rates of interest in piracy change

before and after said implementation. A lack of controls limits the ability to determine whether the introduction of legal offerings was responsible for the increase/decrease in interest in these websites, or whether other factors played integral roles in affecting the interest in piracy. While we intentionally selected diverse nations with different expansion dates, it is possible other factors contributed to the decrease in interest.

Second, using Google trend data means that rates and subsequent conclusions are limited to users of the Google search engine and prior research seems to indicate that pirates use search engines other than Google (Pace, 2017). Since there are a multitude of alternative search engines (Bing, Firefox, etc.) this study is limited by the data drawn solely from Google. However, as of 2018 more than 90% of all internet searches go through Google (Desjardins, 2018). Additionally, the use of Google Trends, particularly collecting measures associated with interest in each specific website, provides insight into what new users are searching for, as opposed to users already using these websites. In the context of this research, interest measures are more likely indicative of new users of these sites and less likely recurring users.

Third, this research does not capture interest in streaming cyberlockers, websites that specialize in distributing pirated content, made available by indexing third-party content directories (Ibosiola et al., 2018). This method is increasingly used to access pirated content, as it does not require specialized software or skillsets, and as such is accessible to most web users. Existing research does speak to the ease of diffusion of content on these websites. Specifically, the reality that websites link to a group of third-party content hosts, making it more complicated to both track and litigate against (Ibosiola et al., 2018).

Across the limitations of the present study, we believe the third is the most salient. As Ibosiola and colleagues (2018) document, "cyberstreamers" are the next iteration of media piracy. It is entirely possible, a cultural shift is taking place, with less emphasis on torrenting websites. While our results document interventions across multiple years, and nations, it is entirely possible the diffusion of these illicit alternatives is contributing to these results.

Conclusion

The results of this research demonstrate that while Netflix being introduced to a country often coincides with a notable change in rates of interest in piracy, there are a multitude of other factors that seem to influence piracy ideation globally. Local factors including legal changes, cultural components, media libraries, market options, could all affect rates of interest in piracy in any given country, leading to significant increases or decreases. The use of the Pirate Bay as the de facto measurement for interest in piracy is a factor that could be relevant when examining the results, especially given the current trend of many websites utilizing a handful of cyberlockers making it harder to both track and prevent piracy. However, the Pirate Bay is a website synonymous with digital media piracy and should be considered to be an accurate benchmark of interest in piracy on a global scale – across our period of analysis.

It is important to consider that regardless of the methods used to disrupt piracy, from aggressive litigation to legal alternatives, a particular cadre of pirates will consistently engage. Deterrence, specific or otherwise, can only be effective on certain types of pirates. This is demonstrated by the now common cease and desist letters sent out to pirates by their internet service providers, which can be effective deterrents for some pirates, but for others they merely act to make the pirates change methodology or utilize virtual private

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networks (VPN) (Makin & Ireland, 2020). The underlying factors that encourage a person to engage in piracy, be they cultural, financial, ethical, or otherwise, are undeniably complex so the concept that piracy disruption could be simple is inherently problematic. This research demonstrates that in certain locales and under specific and often contradictory circumstances, the introduction of a legal alternative can disrupt interest in piracy. However, more research into the specific local factors that influence piracy ideation is required in order to better understand it conceptually, and ultimately to better counteract it.

This study has demonstrated that there are many ancillary factors that are relevant to disrupting digital media piracy. Extant research demonstrates that ease of access and content availability are key factors that can influence a person's decision to pirate, and this study reaffirms that there is more to piracy ideation than legal alternatives. In addition to this, the cost of legal alternatives within a country is intrinsically linked to piracy ideation, especially in countries like India where the monthly cost of a service like Netflix is beyond the economic reach of a large proportion of the population. While a more thorough understanding of the current state of the legitimate digital media market helps frame efforts to prevent piracy, a more detailed exploration of other types of digital media piracy in future research could help better understand how to limit it even further.

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