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The Effects of Pirated Music on Individual Musicians

Mysha Didi

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### **Introduction**

What kind of effect does pirated music have on musicians? Illegal music file sharing has become a huge problem over the last 15 years for the music industry. While it claims to have lost billions of dollars because of the problem, it is unclear what kind of effects piracy has on an individual musician.

One of the main reasons for the increase in pirated music is due to the introduction of Napster in 1999. Napster was one of the first file sharing softwares that focused on audio file sharing. Although piracy existed to a small extent prior to 1999, Napster made it more readily available and simpler for people to share music illegally. This company faced many legal challenges as musicians accused the company of hurting record sales, and ultimately their overall profit. Although Napster ultimately shutdown in 2001, many file sharing softwares and websites emerged, with BitTorrent being the most popular file sharing company today. Data from Nielsen Soundscan shows evidence of album sales plummeting starting from 1999. Many musicians blame peer-to-peer file sharing for this.

The Recording Industry Association of America plays a huge role in protecting the intellectual property of the music industry. RIAA have made multiple efforts to stop people from pirating, most notably their lawsuits beginning in 2003. While major companies like Napster had been sued prior for illegal file sharing, 2003 saw the start of individuals being targeted. The Recording Industry Association of America's (RIAA) lawsuits beginning in 2003 (EFF, 2008) have influenced many of the papers such as that of Gayer & Shy (2006), to argue against the negative effects of music piracy. Although piracy had become a big issue around 1999 and 2000 when Napster, the first major illegal file sharing software, was introduced, no individuals had been targeted for it up until 2003. Close to 300 Americans

were sued in 2003 for using peer-to-peer (P2P) file sharing for music files. RIAA continued to sue 30,000 additional individuals in the subsequent years, as an attempt to prevent people from illegal downloading (EFF, 2008). However, RIAA's efforts have been ineffective as P2P file sharing remains to be one of the most popular forms of illegal downloading to date. For example, BBC recently reported (Kleinman, 2016) Kanye West's newly released album *The Life of Pablo* to have been illegally pirated through P2P networks over 500,000 times in less than a week since its release. As piracy is difficult to prevent, it could be beneficial to help musician's to increase the demand for their music. This increase in demand for music can help musicians increase their revenue from the additional sources previously mentioned such as live shows, brand endorsements and merchandizing, as a form of compensation for lost profits through piracy.

It is unclear whether music piracy truly has an overall negative affect on the producers: singers and songwriters. Musicians generate revenue from a number of different sources. Aside from album sales, this includes merchandize, movie and TV licensing, live shows, streaming services and many forms of royalties. Although it was once true that physical album sales were the main source of income for a musician, this has vastly changed with today's increasing use of digitalized music.

Arguably, the decrease in album sales may have no direct effects on revenue for the individual musician due to the number of alternative sources of income. Touring and brand sponsorships are both important and large parts of promoting for a musician. Revenues generated from these avenues could very well act as a substitute for music piracy and its declining affects on album sales. For this reason, it is important to understand the effects of

piracy on the individual artist, and to what extent the creator's profit is changed. This will ultimately help formulate appropriate policies regarding illegal music file sharing.

### **Literature Review**

Literature on this topic is relatively scarce. As piracy is something that is difficult to quantify, it has been challenging for scholars to research and come to a conclusion they all agree on. As a result, different papers show conflicting results. While there are many sources claiming that music piracy has a negative effect on the music industry such as Liebowitz (2008) and Waldfogel (2010), there are others who disagree. Many of the scholars who disagree on piracy being totally negative like Gayer & Shy (2006) and Piollatto & Schuett (2012) have further researched into the effects of music piracy on individuals involved in the music industry, such as publishers, consumers and musicians rather than the industry as a whole. It is important to learn more about the effects of piracy on musicians directly, in order to formulate policies to maximize their profits and sustain a long career. This literature review aims to get a better understanding of the current literature on the effects of piracy on individual entities in the music industry. This will aid with the research of the paper, which is to investigate the effects of music piracy on a musician's success, regarding the level of their demand by consumers, and their net worth.

Before delving into the literature review, it is important to understand how those involved in the music industry earn their income. Sales from a physical CDs can go towards the performer, the record label, publisher, artist managers, producers, and lawyers depending if the artist has one or not (Passman, 2009). Sales from digital stores go to all the listed entities as well. However, the percentage they receive is lower as the digital store receives

some of the revenue. Aside from mechanical royalties, publishers are also entitled to performance royalties where they receive royalties each time one of their songs is performed or played in a public setting (Passman, 2009). The performer has other sources of income, which are merchandize, tours, and brand deals and sponsorships. This is one of the reasons why many of the scholars arguing for music piracy claim that piracy could be beneficial for musicians.

Two papers that illustrate the beneficial effects of music piracy are by Gayer & Shy (2006) and Piolatto & Schuett (2012). Gayer & Shy (2006) were influenced by the RIAA lawsuits to argue that pirated music can have complementing affects on legal copies of music. Piolatto & Schuett (2012) dive deeper into the research done by Gayer & Shy's (2006), by arguing that alternative revenues will increase for musicians with the increase in availability and ease of illegally downloading their music. While Gayer & Shy (2006) claim that all musicians will benefit from piracy, Piolatto & Schuett (2012) argue that only the more successful musicians will, due to the fact that their music is more readily available legally and illegally.

One of the biggest issues in Gayer & Shy's (2006) paper is the exclusion of digital music in their research. The model created for musicians in this paper consists purely of music distributed physically, which includes CDs, DVDs and cassettes. This can easily create a bias in the final result as digital music, including digital music stores and streaming services, are considered to be the largest sources of record sales as reported by the International Federation of the Phonographic Industry (IFPI, 2015). The utility function created for the consumer assumes that the consumer prefers physical legal copies of albums to a physical pirated copy. This may still hold true as limited edition versions of physical

albums may contain additional features the consumer may want. However, it is not uncommon to see digitalized versions of these features today.

Piolatto & Schuett (2012) improves on this weakness, as their research focuses on peer-to-peer (P2P) file sharing, the most popular form of piracy today. The files distributed through P2P file sharing are commonly known as 'torrents'. The authors essentially argue that more popular musicians will have more seeds on their torrent, as compared to those that of less popular artists. Seeds on a torrent refer to the number of machines uploading data for peers to download. Thus, the more seeds a torrent has, the quicker the download will be. Albums or songs that generate more revenue through legal means usually generate a larger number of seeds. Therefore it can be much more time consuming for the consumer to find illegal copies of a lesser known artist due to the lack of legal copies being uploaded and available for illegal copying. The consumer's costs for illegally downloading decreases as more originals are sold. This is because the time taken to find this copy and download it becomes smaller. It is also likely that there is virtually no difference in quality between the original and the copy. Due to a decrease in the consumer's costs, the musician's alternative revenues will increase. This is due to the fact that consumers value an artist they know. Thus they are willing to spend money on live tours, merchandize and related brands.

Both papers conclude that piracy is beneficial to musicians. Gayer & Shy (2006) claim that if live shows and recorded music are true complements, copyright laws should be more lenient. This is because the musician will benefit from the effects of it. By allowing consumers to have access to their music both legally and illegally, the musician reaches a much larger audience. If they were to cut out the consumers who are downloading illegally, those consumers are less likely to purchase live show tickets, merchandize or other goods

related to the musician. This is because those consumers are unable to grow to like the musician by listening to them, and consequently put a value on the musician. It is likely that some illegal users may convert to legal users. The authors argue that this audience will not be as big as an audience that is able to get music at little to no cost.

Piolatto & Schuett (2012), on the other hand discuss both the short and long term effects of piracy. They state that consumers always have a positive surplus as they gain access to a good at a small price. This means that there are positive social welfare effects for consumers due to piracy, even though the artist's profits decline. This may be an issue for artists in the long run as they may not have as much of an incentive to keep creating. Decreasing profits in recorded music sales may result in higher costs of writing, recording and mixing a song for the artist. At the same time, however, piracy allows a musician to become better known without having to lower prices of their records. A less popular musician will therefore need to set low prices in order to discourage consumers from pirating. This is because their side revenues will not be enough compensation for lost profits on record sales.

While these two studies provide evidence that piracy can have beneficial effects, many studies argue otherwise. Among those who agree with the RIAA that the music industry does not experience any gains from music piracy include Liebowitz (2008) and Waldfogel (2010). Both authors attempt to find the impact of piracy on album sales. Illegal downloading is portrayed as a substitute for buying an album. Both Waldfogel (2010) and Liebowitz (2008) argue that the substitution affect is most likely to have negative impacts on the recording industry in terms of their profits and finance.

It is important to note that Liebowitz (2008) uses Internet penetration data as a proxy for piracy data. He highlights the limitations of doing so, as this data is not a true reflection of the total number of downloads of a record. Internet penetration data can, however, be of help for this study as a city with high Internet penetration is likely to have high usage of file sharing, although this relationship is not necessarily causal. Liebowitz (2008) also attempts to find the effects of the Internet on the music industry, as the Internet can be seen as a substitute form of entertainment for many consumers.

Another issue in Liebowitz's (2008) data is the time frame chosen. He collects data between 1998 and 2003 for the 100 largest cities in the United States. While the introduction of Napster in 1999 did have a large impact on the music industry, the paper does not take into consideration of the effects of the introduction of iTunes, one of the largest digital music stores. Although this paper was written in 2008, iTunes and many other digital stores and streaming services were an important and large source of revenue for the music industry. Thus, the exclusion of this data is very likely to have conflicting results.

An improvement on the issue in Liebowitz's data is seen in Waldfogel's (2010) work as he includes the influence of iTunes, in his empirical research. He highlights many of the other literatures' lack of focus on the legal digital means of purchasing and listening to music. iTunes, for example, is considered to be one of the largest digital stores. It allows for consumers to choose to buy individual songs, rather than having to spend more money on buying an entire physical album with songs they may not want. Waldfogel (2010) attempts to find whether having digital stores, specifically iTunes, has any effect on piracy.

Waldfogel (2010) follows this with a brief history of digital music stores and streaming services. There were many such legal services available after the introduction of

Napster, such as MusicNet and Pressplay, in order to prevent consumers from downloading illegal copies. However, these services provided less flexibility than current existing streaming services such as Spotify and Pandora do. For this reason, consumers were not convinced that it was a better option than obtaining a free copy, which they could listen to wherever and whenever they wanted. iTunes was an exception to this, as it allowed consumers to transfer the music they bought to their portable devices like the iPod. This allowed more flexibility, which consequently helped bring in more sales as compared to MusicNet and Pressplay.

Waldfoegel (2010) states that the music market can be “represented by a downwards-sloping demand curve”. If a consumer places a higher value or price on a song or album than the actual price, they are then more likely to purchase the record rather than download an illegal copy. However, if the consumer places a value lower than the actual price, they are more likely to download illegally. It is also possible that consumers who download illegally will eventually buy a legal copy.

Both authors find that piracy is ultimately detrimental to the industry as a whole. Liebowitz (2008) claims that piracy harms the music industry much more than the decline in CD sales does. However, he also states that the level of confidence for this claim is low, as well as keeping in mind the data limitations. Waldfoegel (2010) reiterates Liebowitz’s (2008) concluding statements as he finds that consumers who downloaded music illegally are less likely to have ever bought this music, even if it was not available for illegal download. He also finds that the number of files shared is much larger than the number of purchased music. Most college students he surveyed have more illegal copies of music than legal copies, despite the availability of digital music stores such as iTunes. The introduction of Napster

has dramatically changed the consumer's views on illegally downloading and purchasing albums. Since a free copy is easily available, consumers are now less willing to spend money. As a result, producers lose profits. However, this might not be a totally fair assumption. Previously mentioned literature by Piollato & Schuett (2012) and Gayer & Shy (2006) have shown that alternative revenues can be enough compensation for the decreasing demand for legal recorded music. One thing that all four studies agree on is that the consumers always benefit from piracy.

While these conclusions are conflicting, it is important to mention that there is numerical evidence for the decline of physical album sales, at an average rate of 8 percent annually. However, it is very likely that many consumers, who once bought physical albums, now buy music through other means like digital music stores or stream them on-demand. Therefore the negative correlation between the album sales and piracy does not necessarily mean that one causes the other.

Koh, Murthi & Raghunathan (2010) attempt to combat this in their research by testing causality between these variables. Firstly, they make note of the fact that music consumers can be legal users without necessarily having to pay for it. This can be either through using Internet radio such as Pandora, or streaming services such as YouTube and Spotify. These consumers are more likely to be willing to pay for music, as they would value the musician more than those who only consume pirated music. The authors also note that it is likely that digital music stores such as iTunes are more likely to have reduced piracy than increase piracy. The reason for this is due to the fact that consumers are now able to buy individual songs rather than albums, giving them more flexibility and choice. Thus, it is also likely that many illegal users have converted to legal users after 2003 when iTunes was introduced. This

further adds to the argument of legal digital music being an important factor when discussing music piracy.

An econometric technique known as Granger causality is used to determine whether illegal downloading of music files has any causal effects on the decreasing physical album sales. While the main focus for the studies mentioned in this literature review focus on the United States, Koh, Murthi & Raghunathan (2010) focus their study on South Korea. Their monthly data is obtained over a time period of 2003 - 2007. One flaw in this data is that the authors project the monthly data using annual data. This would make the results of the test to only be approximate figures, rather than exact. Sales of digital music are estimated from the sales of wireless carriers. Due to the fact that 90% of digital music sales in South Korea occur on cellular networks, the authors felt the sales of wireless carriers would be reflective of the digital music market in South Korea. Similar to Liebowitz (2008), Koh, Murthi & Raghunathan also use Internet penetration data as a proxy for piracy data.

The authors find a causal relationship between online music piracy and physical album sales when they include data prior to 2003. They find that there is no causal relationship between the two variables when the data prior to 2003 is excluded. There may, however, be a relationship if we were to add in even more variables such as streaming services like Spotify. The Granger causality test is further used to test the relationship between physical album sales and digital music in 13 other countries. The results showed that in the majority of the countries tested, the causal impact of digital music on physical album sales was more statistically significant than that of music piracy on physical album sales.

This particular paper helps fill out a research gap evident in the works of Gayer & Shy (2006) and Liebowitz (2008), where digital music was not factored into their research.

However, it is important to highlight that all of the mentioned literature did not have access to any form of direct measure of piracy. While Internet penetration data may be a sufficient proxy, it does not necessarily help give solid and exact evidence as to what kind of effects music piracy has.

Furthermore, as Koh, Murthu & Raghunathan (2010) state, the correlation between declining sales of physical album sales and increasing use of pirated music does not necessarily mean they cause each other. The inclusion of digital record sales as well as streaming services is therefore important when reaching a conclusion. While most of the studies focused on the effects of piracy on the music industry as a whole claim that piracy is harmful, the studies focusing on the effects of piracy on individuals claim otherwise. For this reason, it is worthwhile researching further into how piracy influences musicians, in terms of their profits as well as their social welfare, to really help formulate relevant policies. One other theme to further research into could be the effects of the availability of legal avenues for music (such as Spotify, iTunes, Pandora, YouTube) on music piracy. Additionally, whether limiting the availability of your own music, such as Kanye West limiting his newly released album to just the streaming service Tidal (Kleinman, 2016), has any effects on the musician's net worth and piracy rates. As more piracy data is being collected, these effects will become clearer. For now, however, these papers provide a good starting point through their theoretical models, to understand music piracy, and for further research.

### **Theoretical Model**

Based off of the literature, a number of different theories drive this research. Firstly, the consumer theory of complements (Figure 1) could show that an increase in the ease of piracy results in an increase in alternative sources of income for musicians, namely tour revenue. The theory of complements suggests that an increase in demand for piracy will lead to an increase in demand for live shows.

There has also been a decrease in album sales since the introduction of illegal digital music. Thus, we could say that pirated music and album sales are substitutes. As the ease of pirating music increases, consumers are less likely to spend money on purchasing an album. Therefore, the demand for albums can decrease. If this were to be true, there may still be long-term concerns with supply of music as (Piolatto & Schuett, 2012) suggest, with the producer's motivation to create decreasing.

While the microeconomic consumer theory helps illustrate relationships between two goods, behavioral economic theories will help understand and explain these relationships better. Rational choice theory can illustrate why people choose to download music illegally as opposed to paying for it. Although copyright laws exist, most people who download illegally are not prosecuted. The cost of buying music is higher than getting it for free making the consumer's utility higher when downloading illegally (Gayer & Shy, 2006). Self-interest may drive the consumer to illegally download music, since consumers as individuals are mainly concerned with their own satisfaction rather than that of the musician. This self-interest model shows that there is a lack of fairness and reciprocity towards the musician, which would lead to negative outcomes from the musician. As a creator of a good, musicians

expect some sort of 'reward' as a form of reciprocity for their music. Therefore, piracy may lead to some negative welfare effects for musicians.

### **Data Sources & Variables**

In order to understand consumer choices for my research, I have collected survey data from the Pew Internet & American Life Project. This data will come from a number of different surveys conducted by the Research Center.

The first survey I looked into is conducted between March and May in 2003, with 2,515 participants over the age of 18. While there aren't many music related questions in this specific survey, there are a few related important questions it asks the consumer. It asks whether or not the consumer cares about illegal copyrighted music being in their possession. As this survey was conducted in 2003, when RIAA began making the consequences of piracy more evident, the results of this particular question is important. The survey additionally asks how many of the respondents consider themselves as artist and whether they earn any income as an artist. This gives a better sense of the type of consumer.

Another similar survey is conducted to a total number of 2,013 adults over 18 in November 2003. This specific survey asks whether consumers have downloaded as well as shared music online. In addition, those surveyed are asked whether the actions taken by RIAA have influenced their decision to illegally download. One section asks about the topic of copyright laws relating to music. This gives a good sense of how well informed consumers are on copyright laws, and whether or not they agree with existing copyright laws. Further surveys conducted in November 2010 and August 2007 ask adults over 18 on their choices as consumers.

These surveys give a good idea of how the consumers react to copyright laws related to music, and whether they have any sort of incentives to purchase music over downloading them illegally. They will also aid with relating to the behavioral economic models of fairness and reciprocity, self-interest, and rational choice theory.

In order to relate these theories to the musician, an Artist Callback Survey is also collected through Pew Internet & American Life Project. This interview was conducted between November and December of 2003 to 809 artists. While this includes all types of artists such as writers, painters, dancers, etc, at least 50 percent of the respondents considered themselves to be musicians. The respondents are separated into non-elite artists and paid elite artists. This gives a better idea of what a more successful artist might respond as opposed to a lesser-known artist.

In addition, I conducted a phone interview with Dar Williams, a successful, folk singer-songwriter, who has been working in the music industry for over 20 years. She was able to provide some insight as to what it was like for a professional musician before piracy became a huge problem, and what it is like now with increasing piracy.

To understand what kind of effects piracy has on musicians, two econometric models will be created. Piracy data is collected through SeatSmart. SeatSmart provides data on the number of illegal downloads in 2015 for 83 different albums. These albums range from mainstream albums such as that of Drake, and Taylor Swift, to lesser-known albums in various genres. Daily average download is also provided for each album. Since this data is for albums released in 2015 and late 2014, it is likely that most of the musician's album sales income will be from the albums listed in the data by SeatSmart.

The musicians' net worth data for the year 2015 is collected from Forbes and the Richest. Tour Revenue is collected from PollStar and SongKick for North American headlining tours in 2015. Headlining tours are chosen as this is where the musicians will earn the most revenue as opposed to shows they perform as supporting acts. Brand deals and endorsement sponsors are gathered from numerous sources such as Forbes and MoneyNation. The data for the number of years each musician has been professionally active is calculated by looking at the release year of their first ever EP or Album (whichever came first). A dummy variable will aim to understand whether an artist limiting the availability of their music affects the artist's income and piracy levels. This will include Spotify, Apple Music and Tidal. While Pandora has a larger number of users than most of these platforms, musicians currently do not have the power to stop their music from being played on Pandora. Therefore, it will not be included in the dummy variable.

Symbols used for the final econometric model will be as follows:

*Pirated<sub>i</sub>*: Total number of illegal downloads of album

*NetWorth<sub>i</sub>*: Musician's net worth

*TourRevenue<sub>i</sub>*: Headline tour revenue

*Sponsors<sub>i</sub>*: Brand deals and endorsement values

*YearsActive<sub>i</sub>*: The number of years the artist has been professionally active

*Album<sub>i</sub>*: The total number of legal copies of their album sold (includes physical album sales, digital album sales and track equivalent album sales)

*d<sub>i</sub>*: Available on Spotify, Apple Music and Tidal or not

For the dummy variable when:

$d = 1$  the musician is available across all of the three streaming platforms

$d = 0$  the musician is not available across on one or more of the streaming platforms

The second model aims to understand whether the major source of income as determined by the previous econometric model and literature, tour revenue, has complementing or substitution affects on piracy with respect to legal album sales. This model will have tour revenue as the dependent variable. The independent variables will be piracy and number of legal albums sold. The symbols used for the final econometric model will be as follows:

*TourRevenue<sub>i</sub>* = Headline tour revenues

*Album<sub>i</sub>* = The total number of legal copies of their album sold (includes physical album sales, digital album sales and track equivalent album sales)

*Pirated<sub>i</sub>*: Total number of illegal downloads of album

### The Final Econometric Models

#### Econometric Model 1

The population regression function estimated for the first model is:

$$NetWorth_i = \beta_0 + \beta_1 Pirated_i + \beta_2 TourRevenue_i + \beta_3 Sponsors_i + \beta_4 Years.Active_i + \beta_5 Album_i + \beta_6 d_1 + \varepsilon_i$$

The hypotheses are as follows:

$H_0$  = A musician's net worth increases as piracy decreases, with respect to other sources of his or her income

$H_A$  = not  $H_0$

The linear function is chosen to explain the variables with the following OLS estimate:

$$networth = b_0 + b_1Pirated_i + b_2TourRevenue_i + b_3Sponsors_i + b_4YearsActive_i + b_5Album_i + b_6d_i$$

$$e = Y_i - y_i = Y_i - b_0 - b_1Pirated_i - b_2TourRevenue_i - b_3Sponsors_i - b_4YearsActive_i - b_5Album_i - b_6d_i$$

The Gauss Markov theorem states that these OLS estimates are blue if they meet the classical assumption. A test for multicollinearity is conducted on STATA to determine this. The

Variance Inflation Factors are not <5 for *TourRevenue<sub>i</sub>* and *Sponsors<sub>i</sub>*, as table 2 shows.

Therefore these two variables will be combined to get the following econometric model:

$$NetWorth_i = \beta_0 + \beta_1Pirated_i + \beta_2TourAndSponsor_i + \beta_3YearsActive_i + \beta_4Album_i + \beta_5d_i + \varepsilon_i$$

A test for heteroskedasticity is also conducted as shown in Table 4 and below

$$H_0 = \text{Constant variance}$$

$$H_A = \text{not } H_0$$

As the p-value is above the 5% level, we fail to reject the null hypothesis. This means that there is no heteroskedasticity present.

All OLS estimates are now BLUE (Table 3).

### **Econometric Model 2**

The population regression function estimated for the second model is:

$$TourRevenue_i = \beta_0 + \beta_1Pirated_i + \beta_2Album_i + \varepsilon_i$$

The hypotheses for this model are as follows:

$$H_0 = \text{Increase in piracy will decrease tour revenues}$$

$$H_A = \text{not } H_0$$

The linear function is chosen to explain the variables with the following OLS estimates:

$$tourrevenue_i = b_0 + b_1Pirated_i + b_2Album_i$$

$$e_i = Y_i - y_i = Y_i - b_0 - b_1 \text{Pirated}_i - b_2 \text{Album}_i$$

The Gauss Markov theorem states that these OLS estimates are BLUE if they meet the classical assumption. A test for multicollinearity is conducted on STATA to determine this. As the Variation Inflation Factors for all variables are  $< 5$ , there is no multicollinearity present.

A test for heteroskedasticity is conducted next as shown in Table 5 and below:

$$H_0 = \text{Constant variance}$$

$$H_A = \text{not } H_0$$

As the p-value is below the 5% level, we reject the null hypothesis, meaning there is heteroskedasticity present. A double log form is taken in order to correct this (Table 6). The final econometric model is therefore:

$$\ln \text{TourRevenue}_i = \beta_0 + \beta_1 \ln \text{Pirated}_i + \beta_2 \ln \text{Album}_i + \varepsilon_i$$

A test for multicollinearity is conducted on STATA to determine this. The Variance Inflation Factors are  $< 5$  (Table 7). All OLS estimates are now BLUE.

## Results

### Sample Regression Model 1

The sample regression function is (Table 8):

$$\text{NetWorth}_i = 9.816 + .0000153 \text{Pirated}_i + 0.807 \text{TourAndSponsor}_i + 0.805 \text{YearsActive}_i - 6.708 \text{Album}_i - 4.4625d_1$$

The sample regression function for  $d = 0$  is:

$$\text{NetWorth}_i = 9.816 + .0000153 \text{Pirated}_i + 0.807 \text{TourAndSponsor}_i + 0.805 \text{YearsActive}_i - 6.708 \text{Album}_i$$

The sample regression function for  $d = 1$  is:

$$\text{NetWorth}_i = 5.3561 + .0000153 \text{Pirated}_i + 0.807 \text{TourAndSponsor}_i + 0.805 \text{YearsActive}_i - 6.708 \text{Album}_i$$

As expected, piracy has a positive coefficient, suggesting that it has a positive effect on a musician's net worth. In addition, headline tour revenues and brand deal values are major contributing factors to a musician's overall net worth as well. One unexpected result is the album sales coefficient. A high R-squared value of 0.7784 suggests that there is a strong correlation between the dependent variable and the independent variables. While all of the independent variables apart from *TourAndSponsor<sub>i</sub>* are not statistically significant at the 5% level, the model as a whole is shown to be statistically significant. As all these variables are an important part of a musician's net worth, each variable may not be significant on its own. Therefore we can reject the null hypothesis.

### Sample Regression Model 2

The sample regression function is (Table 8):

$$\ln TourRevenue_i = 3.6151 - 0.1265 \ln Pirated_i + 1.1134 \ln Album_i$$

A positive coefficient was expected for the piracy variable from the alternative hypothesis. However, an increase in album sales seems to increase tour revenue, whereas an increase in piracy seems to decrease tour revenue. This might suggest that those who choose to download illegally may not be able to afford to spend money on music or live shows. While the piracy variable is statistically insignificant, we can make the interpretation that those who attend tours convert into 'legal' users and purchase the artist's music. A positive coefficient for *Album<sub>i</sub>* suggest that it complements tour revenues, as the musician's work is often sold at such events. In addition, this might also suggest that consumers now are more likely to be listening to music digitally and through on-demand stream services, rather than pirate this music. While the model as a whole is statistically significant at the 5% level, R

squared is relatively low at 0.3156. There is a positive correlation, however, it is not strong enough to conclude that they are perfect complements to each other.

### **Survey Results**

As literature suggest, correlation does not necessarily mean causation. Thus the econometric regression analyses alone do not explain the issue of piracy. Surveys conducted by the Pew Internet & American Life Project give a sense of consumer choices and why a musician's net worth is affected negatively or positively by piracy. A survey conducted between March and May 2003 reveal that 67 percent of those who download music do not care whether the file is copyrighted or not. This was a 5 percent increase from 2000.

A similar survey was conducted in November 2003. By this time of the year, the Recording Industry Association of America had begun suing individuals for illegal downloading. While this had caused many to become aware of copyright laws regarding music, 78 percent of the survey respondents claimed that they were unaffected by RIAA's actions stating that they did not download any less than they normally did. In addition 56 percent claimed to be either not too familiar or not familiar with copyright laws and regulations. This was, however, contradicted with 48 percent agreeing that existing copyright laws are sufficient to protect an artist's rights. 41 percent disagreed that copyright laws limited access to an artist's work.

A survey conducted in November 2010 illustrated the demographic of those who are willing to pay for music. 67 percent of the total respondents claim to have never paid to access music. Over 40 percent of those who did pay for music had an annual income of

\$75,000 and above. Furthermore, people of ages between 30 and 49 are more likely to pay for music than any other age group.

An additional survey conducted in August 2007 looks into consumer choices and preferences. While it is illegal to make copies of music files, regardless of whether it is for personal use or not, over 65 percent of respondents believed that it should be legal to make copies for themselves or for a friend. 68 percent of the respondents also claimed that they end up supporting artists in other ways if they have downloaded their work for free. This survey further shows that the majority of those who hear about music they want to purchase are convinced when listening to free samples of a song or by visiting a digital music store. This also allows for consumers to hear about new artists that they may not have heard of before. 77 percent of those who purchased music share the music with people they know through word of mouth, while 47 percent also go to the artist's live shows.

It is important to note one limitation present in all of them; the years each of the surveys are conducted. While it is plausible that some of the survey results regarding digital music may have changed over the last few years with the popularization and affordability of streaming services such as Spotify and Apple Music, many of the results are still relevant. The surveys conducted in 2003 are especially important due to the fact that the RIAA was very public with their stance on music piracy at this time, similar to the Stop Piracy Online Act (SOPA) in 2012.

The survey conducted in November 2003 illustrates the idea of individual consumers making rational choices to maximize their own satisfaction. Illegally downloading decreases the cost of obtaining music for the consumer as opposed to spending their own money purchasing music. This is further evident as RIAA's efforts did not seem to be effective with

the majority of the survey respondents claiming to be unaffected in terms of their purchasing decisions. As close to half of the respondents agreed that existing copyright laws do not limit public access to a musician's work, the ease of access to free copies and the low chances of facing huge consequences make pirating more attractive to the consumer.

It is not totally fair to say that music is not an important form of entertainment as many consumers stated they listened to music everyday, if not several times days of the week. Thus, the reason why majority of the consumers who pay for music having an income of \$75,000 and above may be due to the fact that consumers have a preference of spending their money on other forms of entertainment, such as going to concerts, which are not always available for free. This also further suggests that those who receive a lower income do not necessarily have the luxury of spending on both goods. This will be further analyzed with the help of my regression analysis.

While the survey conducted in August 2007 does not directly touch on music piracy, the results suggest that the demand for a musician could increase if more people had access to their music – whether it is free or not. This is because the consumers who initially obtain the music are likely to share it with others.

A report by Nielson Music (2015) also provides a more updated survey on consumer preferences than those gathered from Pew Internet & American Life Project. The report suggests that consumers are looking for cheaper alternatives to purchasing music, as most people tend to either buy individual songs or stream them on-demand. One interesting observation made from this report is that the top 10 on-demand streamed audio music were fairly different from the top 10 digital songs sold. The number 1 digital song, "Uptown Funk!" by Mark Ronson featuring Bruno Mars sold 5,529,000 copies. The number 1 on-

demand streamed audio “Trap Queen” by Fetty Wap was streamed 214,842,000 times. However it is important to note that musicians make a considerably lower amount through streams as compared to actual album or song sales.

This report further shows, 91% of Americans listen to music about 24 hours a week on average, with 75% of them listening to music online. In addition there has been an increase in the number of people discovering music through radio and through live events such as concerts and other performances. 64% of those who are considered ‘millennials’ (ages 18-34) that spend money on music spend on live events such as music festivals and concerts.

46% of those who were surveyed also added that their reason for not subscribing to a streaming service is due to the fact that they are too expensive. While Spotify offers ‘Premium’ service for \$9.99 a month, other services like Tidal charge as much as \$19.99 a month. Although these are cheaper alternatives to buying music, consumers are still not willing to pay for such services, as there are alternative free sources. It is evident from this report that a musician’s main source of income is through live performances, which is further evident from my preliminary regression analysis.

In addition, there has also been a 30% increase in LP/Vinyl sales since 2014, while both CD and digital music sales have fallen by over 10%. This may be one way that musicians can combat physical piracy, as Vinyls are much harder to pirate than CDs. However, it would not be viable for a musician to release their music solely through this mode, as on-demand music streaming is the most popular form of legally accessing music.

A survey conducted by Pew Internet & American Life in November 2003 will also further add to the artist’s perspective on music piracy. Majority of the artists, including those

who were considered paid elite artists, considered themselves to be at least somewhat familiar with the existing copyright laws and regulations. In addition, they felt that they needed to have complete copyright control over their own work. While most of them felt that copyright laws did a good job of protecting the artist's rights, 48 percent felt that distributors benefited from these regulations rather than the artist. When it comes to sharing music with others, 48 percent of artists felt that it should be illegal to share with friends or family, while 69 percent agreed that sharing over the Internet for people to download for free should be illegal. However, they are not as opposed to consumers making copies for personal use with 73 percent agreeing it should be legal to do so.

When it comes to the affects of piracy, 43 percent of artists felt that it was a minor threat, as it essentially helps promote the artist. Furthermore, they agree that it allows for their work to be reached to a larger audience. 47 percent, however, still felt that it is wrong for the artist to not receive any direct compensation. Furthermore, 55 percent of artists did not want copies of their files to be made without permission. 86 percent of the artists who stated they download music files claimed that they eventually end up supporting the artist in some other form (such as live concerts).

The survey also touches on RIAA's lawsuits targeted towards individuals. Over 60 percent of the artists agreed that the companies that were providing a platform for free audio files to be uploaded should be facing prosecution rather than individuals who share or download music.

Unlike consumers, artists are more aware of existing copyright laws. Furthermore, as the fairness and reciprocity theory suggests, artists expect some sort of compensation for their work from those who use it. They do not feel that is fair for consumers to share their

work freely as this means that the artist is not receiving any sort of ‘reward’ or in this case, an income, for the work they create. This has the potential of hurting the supply of products and services in the music industry. Dar Williams, a successful folk singer-songwriter stated in an interview I conducted with her, that while piracy does not affect her incentives or motivation to create music, direct effects of it could be seen for other musicians with increasing barriers to entry for newer musicians.

### **Conclusion & Policy Recommendations**

It is important to understand the issue of music piracy through the consumer’s perspective when forming policies. The decision to pirate may not necessarily be purely an economic choice, but rather the attachment or value the consumer has on the musician. This leads to the behavioral theory of fairness and reciprocity, where the artist is receiving a ‘reward’ for creating and providing music to their audience. Many consumers claim to attend live performances over purchasing albums. This may be what they feel is a sufficient enough ‘reward’ to the artist for their music. For this reason, it would be beneficial for musicians to focus on the promotion of their music through live performances rather than by selling copies of their albums or songs. Having more live performance opportunities may also allow for smaller musicians to expose themselves to larger audiences. For example, musicians often go on tour with another band or artist that would open their show. More and more consumers are also attending small live music sessions where lesser known musicians perform.

Nielson Music (2015) has also provided concrete evidence of CDs and digital album sales declining, while LP/Vinyl sales have increased. Musicians could aim to substitute CDs with LPs/Vinyls as they have become more popular in the recent years. While not all

consumers may be able to afford LPs/Vinyls, they may prefer purchasing it as opposed to CDs for their novelty. They are also much more difficult to pirate as they are analog rather than digital.

On the other hand, on-demand streaming services have been thriving in the last few years. The introduction of affordable on-demand streaming services have allowed for musicians to expose themselves to audiences they could not before. One issue that many musicians have voiced about such services is the limited amount of royalty they receive from the companies that provide such services. These streaming services do not pay per stream, but rather with regards to the popularity of the musician. While this may not be an issue for independent artist, it would be for a smaller musician under a record label where there are numerous rights holders and sources where the royalty would be distributed. It is important that these services stay affordable as they reach a very large audience. These consumers are likely to attend a live performance. As my regression analysis shows, it is likely that those who attend live performances will purchase albums.

While the music industry claims to lose billions of dollars due to piracy, the regression analyses suggest that it is not as big of a contributing factor to the musician's income as many suggest. There are less illegal copies made for those who are available on streaming services, whereas those who are not available on streaming services have more pirated copies. While those who are unavailable on streaming services have a higher net worth, these might be musicians who are more successful musicians that are able to limit the availability of their music and control the price of their music. One such example in the data would be Taylor Swift, who is currently unavailable on Spotify but made close to \$200 million in just tour revenue in the year 2015. In order to prevent pirating for smaller

musicians, however, it would be beneficial for their music to be legally available through such streaming services.

It may also be beneficial for musicians to incorporate peer-to-peer file sharing into promoting their music for consumers in countries where legal streaming services are unavailable. RIAA's efforts at preventing piracy have not been widely successful. More recently in 2012, SOPA, a copyright bill introduced in the US, was met with huge backlash by not just individual consumers, but also major Internet companies such as Google. One of the reasons is because copyright violation is easy but it is difficult to exactly pinpoint who is responsible for sharing music files. This is especially true to torrents, as a single file can be downloaded from a number of different 'seeds' or computers. While there are many platforms to legally stream music for free today, consumers may have more of an incentive to purchase music and increase their valuation of an artist if they were to release some music as a free sample of their work. This will allow for them to market to a larger number of people and potentially increase their audience. This would also be more evident if my regression analysis shows that other sources of income such as live shows and brand deals act as complements to pirated music.

## References

- EFF. (2008). *RIAA v. the people: Five years later*. Electronic Frontier Foundation.
- Forbes. (2016). Forbes 400. Retrieved from <http://www.forbes.com/forbes-400/list/>
- Gayer, A., & Shy, O. (2006). Publishers, artists, and copyright enforcement. *Information Economics & Policy*, 18(4), 374-384. doi:10.1016/j.infoecopol.2006.03.003
- IFPI. (2015). *IFPI digital music report 2015: Charting the path to sustainable growth*. International Federation of the Phonographic Industry.
- Kleinman, Z. (2016, 16th February). *Kanye West album 'pirated 500,000 times' already*. British Broadcasting Corporation.
- Koh, B., Murthi, B. P. S., & Raghunathan, S. (2010). Shifting demand: Online music piracy, physical music sales, and digital music sales. *Journal of Organizational Computing & Electronic Commerce*, 24(4), 366-387. doi:10.1080/10919392.2014.956592
- Liebowitz, S. J. (2008). Testing file sharing's impact on music album sales in cities. *Management Science*, 54(4), 852-859. doi:10.1287/mnsc.1070.0833
- MoneyNation. (2016). Moneynation. Retrieved from <http://moneynation.com/>
- Nielsen. (2016). *2015 nielsen music US report*. ().The Nielsen Company.
- Passman, D. S., (Author). (2009). *All you need to know about the music business*. New York: Simon & Schuster.

Pew Internet & American Life Project. (2016). Pew research center: Internet science & tech.  
Retrieved from <http://www.pewinternet.org/>

Piolatto, A., & Schuett, F. (2012). Music piracy: A case of 'the rich get richer and the poor get poorer'. *Information Economics and Policy*, 24(1), 30-39.  
doi:<http://www.sciencedirect.com.lib2.skidmore.edu:2048/science/journal/01676245>

Waldfoegel, J. (2010). Music file sharing and sales displacement in the iTunes era. *Information Economics & Policy*, 22(4), 306-314. doi:10.1016/j.infoecopol.2010.02.002

## Appendices

### List of Graphs

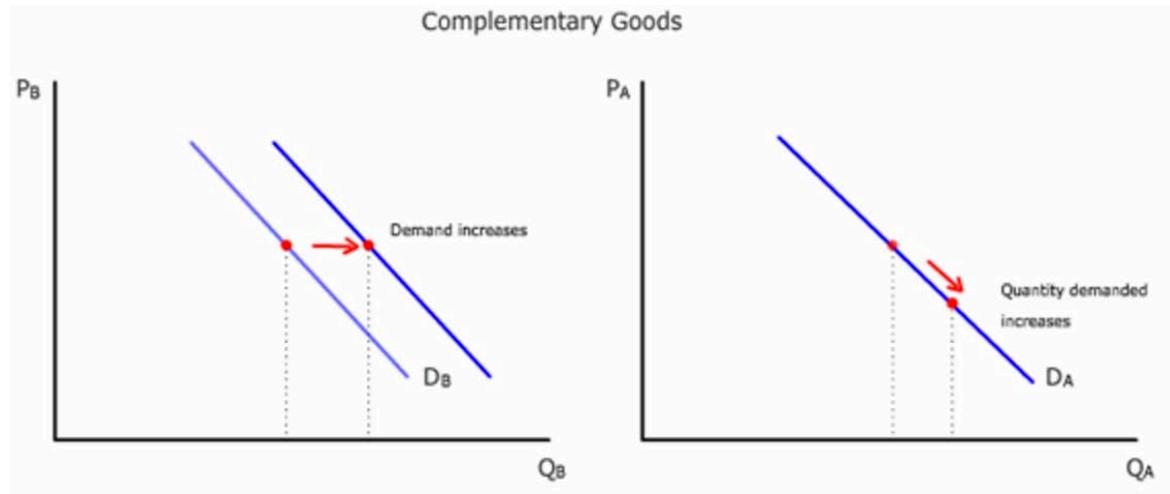


Figure 1 Complementary Goods

Source: <http://livingeconomics.org/glossary.asp>

### List of Tables

Table 1 Descriptive Statistics Table

Variables	N	Mean	Median	Std. Error	Variance
Total Samples (n= 39)					
Headline Tour Revenue (in million USD\$)	39	12.461	4.6	5.1709	1042.791
No. of Albums sold (in million units)	39	0.47	0.33	0.0691	0.186
Dummy variable	39	1	0.949	1	0.25806452
Pirated Music (in million units)	39	20837	10892	7044.95	1935623936

Years Active	39	2	12.307	1.6017	100.06
Net Worth (in million USD\$)	39	26.1487	10	7.092	1961.895
Brand Deal Value	39	0.01	4.05	2.9183	332.163

Table 2 VIF for the econometric model 1

Variable	VIF	1/VIF
Headline Tour	13.67	0.073177
Brand Deal Value	13.43	0.074487
Pirated downloads	2.20	0.454032
Album downloads	2.01	0.498054
Years Active	1.10	0.906036
Dummy variable	1.23	0.814854
<b>Mean VIF</b>	<b>5.61</b>	

Table 3 VIF adjusted for the econometric model 1

Variable	VIF	1/VIF
Headline Tour + Brand Deals	1.72	0.582794
Pirated downloads	1.14	0.878813
Album downloads	1.98	0.505770
Years Active	1.10	0.911411
Dummy variable	1.01	0.986991

<b>Mean VIF</b>	<b>1.39</b>	
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**Table 4 Breusch-Pagan/Cook-Weisberg test for heteroskedasticity**

Ho: Constant variance

Variables: fitted values of NetWorth

Chi2(1)	0.14
Prob > chi2	0.7089

**Table 5 Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (second model)**

Ho: Constant variance

Variables: fitted values of HeadlineTour

Chi2(1)	112.46
Prob > chi2	0.0000

**Table 6 Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (adjusted for second model)**

Ho: Constant variance

Variables: fitted values of log(headlinetour)

Chi2(1)	0.22
Prob>chi2	0.6355

Table 7 VIF for econometric model 2

Variable	VIF	1/VIF
Log(album)	1.31	0.764773
Log(pirated)	1.31	0.764773
<b>Mean VIF</b>	1.31	

Table 8 Sample Estimates

Model 1:

$$NetWorth_i = 9.816 + .0000153Pirated_i + 0.807TourAndSponsor_i + 0.805YearsActive_i - 6.708Album_i - 4.4625d_i$$

Model 2:

$$\ln TourRevenue_i = 3.6151 - 0.1265 \ln Pirated_i + 1.1134 \ln Album_i$$

	Model 1	Model 2
Dependent Variable	<i>NetWorth<sub>i</sub></i>	<i>ln HeadlineTour<sub>i</sub></i>
Const.	9.8163 (16.95311)	3.6151** (1.596369)
<i>Pirated<sub>i</sub></i>	0.0000153 (0.000088)	
<i>TourAndSponsor<sub>i</sub></i>	0.8071** (0.096035)	
<i>YearsActive<sub>i</sub></i>	0.804659** (0.38006)	
<i>Album<sub>i</sub></i>	-6.70767 (11.83)	
<i>ln Album<sub>i</sub></i>		1.1134** (0.2375)
<i>ln Pirated<sub>i</sub></i>		-0.1265 (0.1605)
<i>d<sub>i</sub></i>	-4.462534	
<i>R</i> <sup>2</sup>	0.7784	0.4083

$\bar{R}^2$	0.7449	0.3755
N	39	39

All standard errors are in parenthesis

\*\* Indicates significance at 5% level