

The Effect of Recording Industry Lawsuits on the Market for Recorded Music

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The origination and rapid growth in popularity of file sharing technology at the end of the twentieth century created the potential for a fundamental market shift for any private good that is reduced to information. Through a new exploration of this recent phenomenon within the context of peer-to-peer file sharing technology for music downloads, this article examines the relative importance of various economic factors in determining the national level of file sharing. After employing basic theoretical models and econometric methods, the author finds that file sharing behavior is most responsive to the number of lawsuits brought against consumers, the relative value and amount of leisure time for consumers, household disposable income, and the prevalence of computer virus threats among file-sharing program users. These new findings are discussed in the context of microeconomic expectations that predict a different set of empirical trends in file sharing technology.

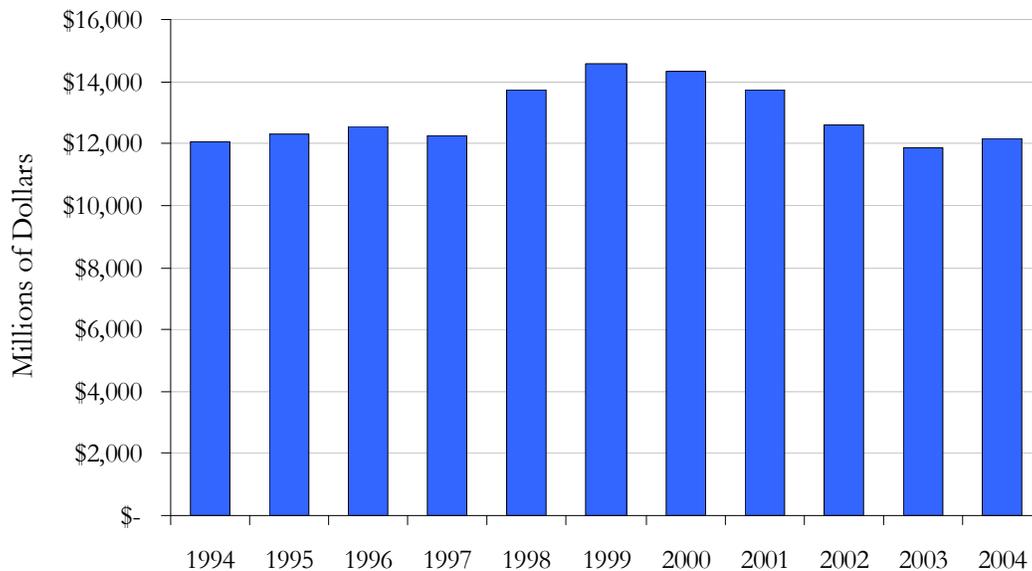
I. Introduction

The simultaneous appearance of widely used peer-to-peer (P2P) file sharing servers and the drastic decline in gross sales for the recorded music industry at the turn of the millennium has been the source for much controversy and debate. Networks such as FastTrack/KaZaA, WinMX, and their many variations – which together have created a file sharing population of approximately 60 million Americans – allow for MP3 music files to be freely shared in large quantities over the Internet.¹ The result is that recorded music, always formerly resembling a pure private good, now exhibits the characteristics of non-rivalry and non-excludability found in public goods. Like a typical public good, MP3 files of recorded music are non-excludable to a very high degree because current technology allows no way for producers to directly prevent consumers from sharing files without paying. Furthermore, the same music files appear non-rivalrous because, as information goods, they may be readily duplicated such that their consumption by one user does not preclude that of another. Such a fundamental shift in the nature of the recorded music presents a good case study for the recurring economic problems of the proper provision of public goods and the protection of intellectual property rights. Moreover, the context of this market shift seems particularly relevant as the burgeoning capacity of the Internet makes similar market changes possible for any other goods which may be reduced to information.

Music industry executives claim that file sharing is the primary cause for the decline in sales since the total value of yearly record sales peaked at over \$14.5 billion in 1999. They argue intuitively that consumers are substituting freely downloaded music files for compact disc purchases and that such behavior constitutes a breach of the artists' intellectual property rights. While the total value of recorded music units shipped fell by approximately seven percent per year from 2001-2003,

¹ Eric Garland, "Internet Piracy: Recording Industry Lawsuits," *Washington Post*, January 22, 2004.

Figure 1. Total Value of Record Sales, 1994-2004



industry leaders desperately tried to support legal and technological measures that would curb downloading and restore market demand.

The most important of these measures has been a wave of lawsuits brought by the Recording Industry of America (RIAA)² against individuals who share large quantities of music files and the servers that facilitate these networks.³ The stated purposes of the lawsuits are to raise the cost of engaging in online file sharing and persuade the general public that downloading music without monetary compensation violates copyright law and ethical standards. On the other hand, a different measure for recapturing the demand for recorded music has been the creation and growth of legitimate servers that sell individual music files for a small price. Servers such as the iTunes Music Store, the renovated Napster, and Rhapsody capitalize on the convenience of cyberspace as a means for selling recorded music and have experienced rapid growth in online sales. A final measure for consumer deterrence, the flooding of peer-to-peer servers with fragmented or looped tracks of popular downloaded music, intends to frustrate users seeking particular songs by confronting them with unacceptable substitutes to their searches.

The empirical relationship between plummeting sales and the fundamental shift of the recorded music market – from excludable, rival goods in the form of compact discs or cassette tapes to digital music files which greatly resemble pure public goods to any individual – has so far been inconclusive. Figure 1 illustrates the recent trend in record sales, excluding digital download sales, within the United States. Although recorded music sales have been falling steadily since the September 1999 launch of the first peer-to-peer server of its kind, Napster, multiple studies have failed to confirm the causal relationship. In fact, Oberholzer-Gee and Strumpf (2004) assert that file sharing has actually had a statistically negligible effect on sales. An extremely large and well-matched

² The RIAA is an American trade group that represents the vast majority of record labels in the United States. Members of the RIAA create, manufacture and distribute approximately ninety-percent of all legitimate sound recordings produced and sold in the United States.

³ As information about the exact number of files shared by those file sharers sued by the RIAA is not publicly accessible, one must estimate the average number of files shared using mass media reports. While these numbers could potentially exhibit bias, the wide range of reports that sued file sharers average slightly over one-thousand files shared will suffice for the preliminary estimates in this line of analysis.

data set makes their study persuasive, and while their least squared coefficients are not statistically significant, the coefficients suggest a positive relationship between downloading and record sales.

This conclusion is not uniformly reached throughout the literature. The most notable contract is provided by Liebowitz (2004), who argues that other potential causes for the drop in sales - such as growth of popularity of entertainment substitutes, the macro-economic recession, and changes in distribution methods - are not significant enough to prevent file sharing from being considered a major cause. While Liebowitz (2004) provides a thorough analysis, there are considerable weaknesses within the direct assumptions of proof and methodological decisions relative to Oberholzer-Gee and Strumpf (2004). Overall, these weaknesses suggest the academic literature offers the greatest support for Oberholzer-Gee and Strumpf's (2004) finding of a negligible market effect for file-sharing software in the commercial market for recorded music.

The theoretical problem in the economic literature is that online file-sharing has an ambiguous effect on sales. While consumers may switch to downloading free music, thus causing sales to decline (this is often called the "substitution effect"), they may also gain greater exposure to albums they would like to buy through the relatively low cost practice of Internet sampling (the "sampling effect") and thus choose to buy more carefully selected music. The hypothesized net effect on commercial music sales is therefore ambiguous.

If file sharing is not the culprit for the music industry's drastic decline in sales, it becomes necessary to ask the question of what ends the RIAA lawsuits are truly achieving. Several proponents of peer-to-peer systems have argued that the lawsuits may discourage potential legitimate consumers from discovering new music through the Internet and becoming loyal customers in record stores. If the sampling effect is truly larger than the substitution effect, as a few notable academic studies have claimed, then any measure that effectively curbs file sharing should in turn also detract from recorded music sales.⁴ Not surprisingly, the perceived aggression of the RIAA lawsuits has created some level of dangerous public hostility against the major record labels. This backlash has created the environment for the creation and growth of boycotting groups, such as the Stop RIAA Lawsuits Coalition and downhillbattle.org. Such organizations encourage consumers to shift their purchasing habits away from bands signed with the major record labels, which play a large role in RIAA decision-making, and towards the musical artists of smaller, independent labels.⁵ Both the creation of activist organizations and the potential deterrence through the sampling effect suggest that the lawsuits may be alienating segments of their targeted market.

Additionally, it is not immediately clear that the recent lawsuits should have a significant deterrent effect in file sharing activity. Although the lawsuits increase the expected variable costs involved in retaining shared files on peer-to-peer servers, the sheer magnitude of the file sharing population may be too large to make sporadic lawsuits as significant a cost consideration to the average file-sharer as other variable costs. A preliminary method of measuring the effect of the lawsuits on the volume of shared files is to consider the average cost of each file shared due to lawsuits. A conservative estimate of the total number of files shared is approximately one billion per month, and there were nearly 8,000 lawsuits brought against file-sharers from September 2003 to January 2005.⁶ If we assume that the final settlement for all of these suits is approximately \$3,000 based on the average sum of settlements so far, and that the additional costs of legal fees and the general risk aversion of consumers from being sued amounts to \$7,000, the total cost faced by an

⁴ Both Oberholzer and Gee (2004) and Boorstin (2004) conclude that file sharing has a statistically positive net effect on recorded music sales.

⁵ The "Big Four" record labels - Universal, EMI, Warner, and Sony BMG Music - control over eighty-percent of all the musical titles produced in the United States.

⁶ Garland, 2004. In his interview, Eric Garland of BigChampagne, an Internet audience measurement service, stated that "conservatively" there were approximately one billion files shared per month within the United States. Because this period is near the center of the litigation period, it may serve as a reliable point estimate for this analysis.

individual defendant is approximately \$10,000.⁷ Then, if we assume that the total number of files shared per month fluctuated around one billion files during the litigation period of interest, the calculation for average cost for the entire population of consumers is as follows:

$$\text{Average Cost Per File} = \frac{(8,000 \text{ lawsuits}) \times (\$10,000 \text{ settlement costs})}{(1,000,000,000 \text{ files per month}) \times (17 \text{ months})} = \$0.0047$$

Since the average cost due to the lawsuits of each shared file is less than one-half a cent, it initially appears that the RIAA lawsuits ought not to be an extremely important economic deterrent to the phenomenon of file sharing as a whole.

In order to better understand the role that the RIAA lawsuits play in the decision-making and behavior of potential file sharers, this article will establish a regression model that weighs the relative importance of the various acquisition costs encountered by file-sharing consumers. There is a common misconception fueled in part by the recording industry's rhetoric that music acquired via file sharing is "free". Although this may be true from a direct financial standpoint, it surely is not from an economic perspective.

At the most basic level, the fixed costs of consumers include the purchase and installation of proper hardware. One of the most notable variable costs exists in spending the free time necessary to find, download, and organize quality files. Another variable cost originates from internet connection fees. Because a slower Internet connection increases the amount of time needed to acquire the same files, those file sharers may spend more time to download the same quantity of music. A third variable cost comes from the time-consuming and expensive risk of computer viruses, spyware, and pop-ups. As many consumers have found these files as attachments to shared music files on P2P servers, increased file sharing will increase the likelihood of contracting such unwanted programs. Finally, the potential for an expensive settlement resulting from a RIAA lawsuit has created the risk of yet another variable cost for file sharers to take into consideration.

The method of this paper is as follows: Section II presents additional theoretical models for understanding the extent to which different variables, including the RIAA lawsuits, may effect file sharing behavior. Section III then uses econometric tools to analyze the actual effects these variables have shown to have on file sharing over time. Finally, Section V makes conclusions and recommendations based upon the results in the paper.

II. Theoretical Analysis

The current economic literature appears to support the conclusion that file sharing does not have a strong effect on record sales (Oberholzer and Strumpf 2004; Boorstin 2004). In simpler terms, any actions taken to change the level of file sharing should have a minimal effect – if any – on record sales. The RIAA lawsuits ought thus not to have any exogenous effects on the market for recorded music. Disjoined from the recorded music market as such, the market for file sharing exists as a separate phenomenon that may or may not be affected by these lawsuits. Even though the RIAA lawsuits do not appear capable of achieving their intended goal of decreasing the volume of file sharing in order to increase record sales, the lawsuits could still possibly affect the file sharing 'market' itself. This section will explore different theoretical approaches to understand how the lawsuits may be affecting file sharing behavior.

⁷ While data is not available as to the actual legal fees to settle these civil actions out of court, this estimate should serve our purposes, particularly because most consumers do not base their behaviors on factual numbers but on expectations. An expectation of paying \$5,000 for legal fees, while allowing \$2,000 for risk aversion, provides a high-end estimate and thus presents the lawsuits with the greatest possible effect.

Table 1. File Sharing Participation by Household

Number of Music Files Shared	Percent of US Households	Percent of Total Inventory
0 – 100	56%	5%
101 – 500	28%	21%
501 – 999	8%	18%
1000 and Greater	8%	56%

Source: NPD Group, “Internet File-Sharing” in *Video Business*, September 15, 2003.

‘market’ itself. This section will explore different theoretical approaches to understand how the lawsuits may be affecting file sharing behavior.

The first approach for understanding the extent to which the RIAA lawsuits should be affecting the level of file sharing is an elaboration of the account of average cost proposed in this paper’s introduction. Assuming that average costs are constant across the entire population of file sharing consumers, the average cost of sharing each file due only to the RIAA lawsuits is slightly less than half a cent. One could expect to acquire approximately 3,400 song files before surpassing the \$16 cost of a typical album holding about ten songs under this model. While this calculation excludes other costs of file sharing, it would intuitively appear that such lawsuits would not provide much discouragement for file sharers. Even if records are rightly not understood as substitutes for shared files, the minimal average cost added to such a large quantity of files should not affect the behavior of electronic consumers.

This assumption of constant average costs, however, is not completely accurate. In reality, there are at least two distinct populations of file sharers: those who share less than one thousand files and face no expected costs from the lawsuits; and those who share over one thousand files and have the potential of being sued by the RIAA.⁸ Under this model, a file sharer faces average costs equal to zero from the lawsuits for each file up until approximately the one thousandth file. Files shared by this population hence have a total cost of zero from the lawsuits. After having shared one thousand files, though, the consumer enters into the target population for the lawsuits and faces his share of the total costs of the lawsuits. In order to calculate the costs faced by consumers, one must determine both the number of these consumers and the quantity of files they share.

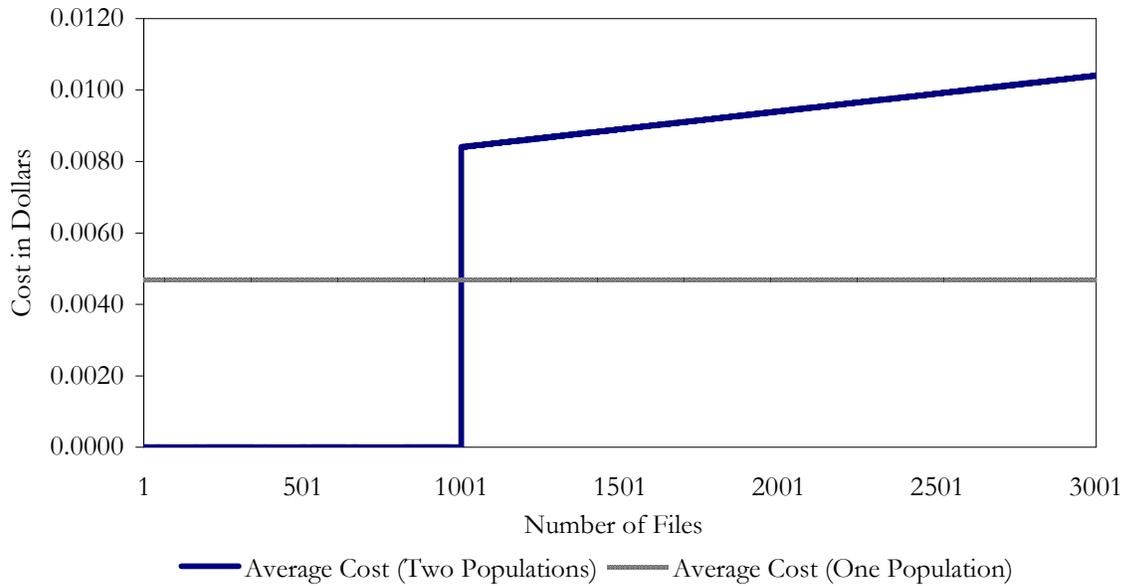
A recent collection of survey results found in Table 1 provides the background statistics on file sharing by quantity. An important finding in the survey is that approximately eight percent of households are within the target population. In reference to the initial estimates, this market share is transferring about 560,000,000 files per month in the aggregate and nearly eight thousand of these consumers have been sued since September 2003. Thus, the proper calculation for the average cost per file of files shared within the target population for litigation is:

$$\text{Average Cost Per File in Target Population} = \frac{(8,000 \text{ lawsuits}) \times (\$10,000 \text{ settlement costs})}{(560,000,000 \text{ files per month}) \times (17 \text{ months})} = \$0.0084$$

This calculation, which includes only the files of those consumers who will likely be sued, raises the average cost per file from the half a cent of the earlier calculation to a little less than one cent. An average consumer sharing files at the minimum level of this target population (1000 files) would hence face costs of \$8.40 from the lawsuits. Obviously, even when focusing only on the

⁸ Although there have recently been a handful of lawsuits against consumers sharing slightly less than one thousand files, the overall likelihood of being sued seems less a function of the total number of files shared and more a characteristic of having shared at least one thousand files.

Figure 2. Cost of File Sharing as a Result of RIAA Lawsuits



population which may potentially face RIAA lawsuits, the average cost per file does not appear large enough to significantly alter file sharing behavior within this population.

Using the above information, one may compute the average cost curves file sharing consumers face due to RIAA lawsuits under the two models used. In the first, less viable model, average cost is calculated by dividing the total cost of RIAA lawsuit settlements by the total number of files shared during the lawsuits period to date. This model assumes one population of consumers and hence constant average costs. The second model takes into account the observation that the RIAA lawsuits predominantly target file sharers who have shared at least one thousand files, and thus assumes two distinct populations in the eyes of the RIAA. More specifically, this curve shown in Figure 2 is discontinuous at one thousand files and then increases somewhat in the limit, since consumers who share an extremely large quantity of files may be somewhat more likely to be sued. Regardless of which model is used, however, it appears that the average cost per file shared due to the RIAA lawsuits should constitute a minimal economic disincentive for file sharing behavior.

A second means for understanding the extent to which the RIAA lawsuits should affect file sharing behavior is to approach the issue from the standpoint of marginal cost. In economic theory, one way to decrease the consumption of the good is to increase the marginal cost required to consume each additional unit of that good. Using the single population model presented in the section on average cost, the marginal cost associated with file sharing due to the lawsuits is constant at zero, as the additional cost of obtaining another music file is zero. Under the dual-population model, however, the marginal cost of file sharing is not constant. Although it is still zero between 0 and 999 files shared and at greater than 1000 files shared (except in the limit, where some unknowable marginal cost exists), the marginal cost is not zero for every file shared. Rather, the file that places the consumer in the target population creates a positive marginal cost. The cost of acquiring that marginal file is the expected value of a RIAA lawsuit on the individual consumer, for example, a female consumer. Before acquiring this marginal file, she is part of a population that may

reasonably expect not to face any costs from the lawsuits. As a part of this population, her expected cost from the lawsuits is therefore zero. Further, her marginal cost from the lawsuits for each file that does not move her into the target population is zero as well. Once she obtains the marginal file that moves her into the second population, however, she invokes the expected value cost faced by each consumer in this target population.

This expected value cost of entering the target population represents the average, or expected, cost upon which a rational consumer ought to base behavioral decisions. It is calculated by dividing the total value of the lawsuits on the target population by the quantity of people in this population. If we assume that eight percent of American households share one thousand or more files, and assuming one hundred five million households within the United States⁹, one may calculate the expected value cost of the lawsuits faced by a household in the target population:

$$E(\text{Lawsuits})_{1000+} = \frac{(8,000 \text{ lawsuits}) \times (\$10,000 \text{ settlement costs})}{(105,000,000 \text{ American households}) \times (8\% \text{ share of } 1000+ \text{ files})} = \$9.52$$

Thus, the expected value of the RIAA lawsuits to any single household within the target population is slightly less than ten dollars. This final sum is accordingly also the value of the marginal cost of the file that brings the consumer into the target population:

$$\text{Marginal Cost (file} \sim 1000) = E(\text{Lawsuits})_{1000+} = \$9.52$$

Another means for understanding the likely effects of the RIAA lawsuits is a model which examines the importance of the lawsuits in determining file sharing behavior while also including other significant explanatory variables. In addition to the potential for RIAA lawsuits, file sharers face the costs of expending valuable free time, paying for faster Internet connections, and contracting destructive programs onto their computers. As presented in the introduction, these costs prevent file sharing from being ‘free’ – even without the lawsuits – and may be major determinants of both file sharing behavior and the total level of file sharing. By allowing for a better appreciation of the roles of these other costs, this model attempts to create the most appropriate context for understanding the effects of the RIAA lawsuits. In order to refine and test the validity of such a model, this project will now use both an empirical analysis of file sharing.

III. Empirical Analysis

This project uses data from comScore Media Metrix, a major Internet audience measurement service that reports statistics on the volume of file sharing within the United States, as the dependent variable for regression analysis. ComScore’s data reports “the number of unique users for P2P servers” on a monthly basis, which serves as the dependent variable. The explanatory variables that would appear to be most important are: (1) people with access to high speed Internet; (2) the percentage of users that contract a computer virus; (3) the probability of a RIAA lawsuit; (4) the amount and value of the free time of consumers; and (5) the disposable income of consumers. While the reasons for including the first two variables are self-explanatory, the unfortunate lack of available data prevents their inclusion in a multivariate regression against monthly file sharing data.

⁹ Department of Commerce, *Statistical Abstract of the United States*, 2002.

The third variable for the presence of litigation is denoted by a binary variable. The value is one in all months after the RIAA lawsuits were first announced, and a zero otherwise. Such a variable will measure if the lawsuits have exhibited structural change on the behaviors of file sharers. More specifically, this coding of the lawsuits makes the assumption that consumers are familiar with the RIAA lawsuit but do not need to have anything close to full information – such as the number each month or total number – about the lawsuits. We would expect that the coefficient for the lawsuits should be negative if the lawsuits indeed have a negative effect on downloading.

The fourth important explanatory variable, the value of the free time of consumers, presents an interesting obstacle for economic analysis. The value and quantity of consumer free time ought to affect the volume of file sharing because file sharing is a relatively money-cheap but time-expensive means for procuring one's music. Many factors make downloading music a tedious process. In fact, many studies have found that about one half of audio transfer attempts result in an interrupted transfer – a failure of the music file to be successfully downloaded.¹⁰ Due to the combination of such interruptions, the abundance of looped or incomplete music files on file-sharing networks, the misnaming of music files, and the time required to organize files and transfer them onto other transportable media, producing one full album of music through an illegal file-sharing system should take significantly longer than purchasing the same album at the record store. Consumers for whom this added time is more valuable than the monetary cost should rationally opt out of downloading music. The regression coefficient for the free time variable ought to be positive, as marginal increases in free time provide for greater availability and motivation for increased downloading.

Although it clearly makes sense in economic terms to quantify free time, there is not an obvious method of doing so without extensive survey results. Accordingly, this study attempts to quantify the aggregate value of consumer free time by using national unemployment statistics. Such an initially unconventional approach may be better understood through the logic of opportunity costs. If a larger volume of consumers is employed, then consumers have both less free time and more valuable free time, as they could likely choose to be working during that time instead. The average opportunity cost of free time is relatively high. Additionally, consumers have relatively less free time, so they are more constrained in the face of all the things they would like to do during such time. If unemployment is high and a smaller volume of consumers is employed, then consumers have both more free time and less valuable free time. The opportunity cost of their time is relatively low, and they have more time to do things other than work, such as file sharing. By this logic, a positive increase in national unemployment signifies an increase in the aggregate quantity of free time in the nation, as well as a decrease in the aggregate value of free time. Thus, as a means for conveying the relative value and total quantity of the aggregate free time of consumers, various unemployment statistics were considered as explanatory variables for this model.

The fifth important explanatory variable for the file sharing empirical model is disposable income. Following similar logic that file sharing is time-expensive and money-cheap relative to purchasing records, consumers ought to increase store purchases and decrease timely downloading when they have more disposable income. As their budget constraints expand and they are able to purchase more goods, some consumers may choose to buy the records that they would have otherwise downloaded, thereby decreasing the total volume of file sharing. Thus, we would expect to see a negative sign on the coefficient for disposable income.

The final results of a time-series regression of music industry lawsuits, unemployment statistics, and disposable income against monthly downloading data are found in Table 2. As shown in statistically-significant coefficient estimates with the expected sign values for all three explanatory variables, the empirical results closely match the theoretical expectations. In terms of model fit, a

¹⁰ For example, Oberholzer and Strumpf's (2004) data set of 549,870 file transfers documents nearly half as interrupted and incomplete.

Table 2. Determinants of File Sharing in the United States

<i>Independent Variables</i>	Coefficient (Standard Error)	<i>t-Statistic</i>
RIAA Lawsuits, Binary Shift	-4822.177 (-1070.568)	-4.504
National Unemployment	5.951 (-1.237)	4.811
Disposable Income	-16.165 (-3.707)	-4.360
Constant	125373.636 (-31274.621)	4.009
Adjusted R ²	0.945	
Significance F	8.4531E-08	
Observations	15	

high adjusted R-square of 0.945 further suggests exceptional model performance and conformity to the data considered in this line of analysis.

In general, the results of a time-series regression may be biased by the existence of a trend, autocorrelation, and seasonality. The results of all three types of statistical bias tests are presented in Table 3. An independent variable modeled for the trend was found to be significant, but it exhibited a high level of multicollinearity with disposable income and was hence taken out to improve model performance. While a Durbin-Watson test for autocorrelation was inconclusive, the Lagrange-Multiplier test could not reject the null hypothesis that no autocorrelation is present in the final model. We may reasonably conclude there is no autocorrelation exhibited in this model. Finally, the lack of significance for three binary variables that were included to measure seasonality suggests this model appears to withstand the methodological challenges in time-series regression.

IV. Conclusion

The economics of the sharing of information facilitated by the Internet is a relatively new discipline, and a more refined understanding of the factors that motivate information sharers is becoming increasingly important as Internet access throughout the world increases, broadband becomes faster and more efficient, and improving technology increases the scope of valuable goods that may be reduced to information. The file sharing of music within the United States, due to its high prevalence, serves as a good point of study for the greater phenomenon of information sharing.

Although the data for file sharing is also in its early stages, a few preliminary conclusions may be reached, with hopes of corroboration from more complete data sets as they emerge in the future. First, while financial disincentives in the form of sporadic lawsuits prove to be a statistically significant, negative determinate of file sharing, such disincentives are not efficacious enough to change the overall direction of such a vast phenomenon. Secondly, a major determinate for engaging in file sharing is the amount of free time available to consumers. Unless the process of going from downloading a musical file to putting an entire album on a compact disc becomes significantly quicker, easier, and more efficient, consumers will be limited in their desire to share files in a large part by their free time. Finally, there initial evidence to suggest that increasing prevalence of computer viruses should decrease the incentive of consumers to participate in illegal file-sharing

Table 3. Diagnostic Tests for Statistical Bias in Time Series Regression

Potential Bias	Test Performed	Sample Value	Critical Value	Result
Simple Trend	Regression w/ Trend	N/A	N/A	Removed
Autocorrelation	Durbin-Watson	1.378	dL = 0.814 dU = 1.75	Inconclusive
Autocorrelation	Lagrange-Multiplier	2.158	2.706	No autocorrelation
Seasonal Effects (independently)	Run Regression with Seasonal Binaries	0.122 (Winter) 0.228 (Spring) -0.941 (Summer)	2.145 2.145 2.145	Winter insignificant Spring insignificant Summer insignificant
Seasonal Effects (taken jointly)	F-Test for Linear Restriction	1.119	3.862	Joint seasonal effects are insignificant.

networks.¹¹ Though not projecting the same cost on consumers per occurrence as lawsuits, viruses afflict a much greater proportion of the downloading population and thereby gain significance.

From the perspective of the RIAA, the determining factors of national employment and the level of computer viruses are out of their control, but it appears that their lawsuits are creating a significant, although slight, effect. However, the recording industry ought to place more confidence in the findings of the academic community and acknowledge that file sharing, although an interesting phenomenon that may have important future consequences throughout all sectors of business, does not appear to be directly related to serendipitous decline in sales that marked the early twenty-first century. If this is truly the case, then the lawsuits, while effective in their immediate goal of discouraging file sharing, are cost-ineffective since they should not lead to substantially increased revenues through record sales. Until the relationship between file sharing and record sales is determinately discovered, however, it would seem prudent for the recording industry to adapt to and discover the benefits intrinsic to this new technology, not attack it.

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¹¹ A survey concerning file sharing behavior was conducted on students in an introductory economic statistics course at Vanderbilt University in February 2005. Although potentially non-representative of the file-sharing population as a whole, the survey gives evidence to suggest that the potential for contracting a computer virus is as important a determinate in the decision to stop using P2P as the threat of receiving an RIAA lawsuit. Respondents (n=50) were asked to rank several potential factors in order of their importance to decide to quit P2P. From a corresponding pivot table, a chi-square test statistic could not reject the null hypothesis that viruses and lawsuits have a statistically indistinguishable level of influence on the decision to stop downloading.