

The Impact of Illegal Peer-to-Peer File Sharing on the Media Industry

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The Internet has become a major source of music and video content over the past decade. This has been facilitated by the creation of digital formats for inexpensive media storage and distribution, wide availability of computers and high-speed Internet connections, and the evolution of peer-to-peer (P2P) file-sharing networks. P2P networks enable computers to connect directly to each other and utilize specialized software (such as eDonkey and Kazaa) to locate and trade a variety of digital files, including music, movies, video games, and computer programs.

The U.S. music industry enjoyed healthy growth during the 1990s. Shipments increased from \$7.5 billion in 1990 to a high of \$14.6 billion in 1999, dropping thereafter to \$8.5 billion in 2008.¹ The decline in overall music sales coincided with a large increase in swapping of digital music files over the Internet, beginning with the introduction of Napster in 1999. A large majority of these exchanges occurred over P2P file-sharing networks and were illegal, i.e., copyright-protected material was reproduced and transmitted without payment to artists and music labels.² The music industry holds P2P file-sharing systems responsible for a 25% decline in music sales after 1999, and it has identified unauthorized file sharing over the Internet as a major threat to its long-term survival with large negative effects on the broader economy as well. While revenues for the motion picture industry have not experienced similar declines and incidence of downloading of movies over P2P networks has been much lower, video piracy is increasing with greater availability of high-speed Internet connections and more efficient software for sharing larger files. This activity directly affects the market for home videos, now the largest source of revenues for the motion picture industry.³

While the media industry blames Internet file sharing for large economic losses, there is little consensus in prior research on its impact on industry

revenues.⁴ Some studies attribute the downturn in music sales almost entirely to piracy,⁵ while others find that the economic impact of illegal file downloads on media sales is negligible.⁶ In the latter case, the drop in sales may be triggered by a decline in quality of new music or change in the way people listen to music (e.g., more streaming and fewer CD purchases).⁷ Another stream of research indicates that listeners' ability to sample files for free on P2P networks may *increase* music sales.⁸

The media industry has responded to unauthorized file sharing by lobbying (through its trade associations, RIAA and MPAA)⁹ for stricter laws and by prosecuting Internet providers as well as the most active file-sharers, while maintaining high product margins and adding encryption software that restricts duplication and playback (Digital Rights Management). These measures have failed to check widespread file sharing over P2P networks and have antagonized many influential industry constituents (e.g., students, college faculty, technology developers, legal scholars, and present and potential customers), who view this as a futile effort by the industry to resist change, stifle creativity, and prolong the use of an unsustainable business model.¹⁰

In view of this controversy, we conducted empirical tests to ascertain whether the financial market perceives the industry's efforts to tighten and enforce copyright legislation as having positive consequences for the long-term profitability and survival of member firms. Our tests used stock price as a measure of the aggregate views of sophisticated investors on the media industry's expected future cash flows. We documented positive stock price reactions for a broad sample of media stocks to the passage of copyright legislation and news of enforcement action against copyright violators, which suggests that the market believes that legal measures taken by the industry to safeguard its intellectual capital will enhance its future cash flows.

Hence, we regard future business strategies based on charging for artistic works as viable, even in the face of current availability of free substitutes over P2P networks.

There are several business strategies to check Internet piracy and utilize new technology to cater to evolving customer tastes. These include educating the public about the need to pay for copyright-protected works in addition to tighter copyright laws and stricter enforcement, simplifying the process of obtaining copyright permissions to encourage legal use of artistic works, and adoption of new business models that move the industry away from sale of CDs and DVDs and towards monetizing access to music and movies that may be experienced at any time. This can be done through a variety of devices and as part of a larger experience, which includes social networking, playing music in games such as *Guitar Hero* and *Rock Band*, and creative generation of new content through remixes.

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Theory and Background

Economic theory defines public goods as those whose consumption by one person does not reduce their availability to others, and where it is impossible to prevent anyone from using these goods. Traditionally, it has been possible to restrict access to music and video works (available through concerts and theaters as well as CDs and DVDs) and hence impose a charge on them. However, virtually costless search, duplication, and swapping of digital media files over the Internet enabled by P2P networks imbues these products with properties of public goods. Consequently, the media industry is exposed to a “free-rider problem” where non-commercial users have little economic incentive to pay for artistic works that are costly to produce in the private sector but available for free. This may lead to under-production and market failure.

One way to compensate media firms and artists (and hence ensure sufficient production) is through general tax revenues or specific levies on products that benefit from artistic works such as audio and video players,¹¹ or to bundle media products with those not subject to a free-rider problem, e.g., cellular phones. An alternative solution to the free rider problem is through legislation to enforce property rights. Copyrights enable producers to capture revenues from their creative works by making it illegal for purchasers to duplicate and distribute their work over a specific time period without prior permission, for which they may charge royalties.

The major players in the media industry have so far focused on a strategy of lobbying for greater copyright protection and deterrence by selectively prosecuting large-scale violators and publicizing these cases. However, it is hard to curb file sharing of copyright-protected material through legal means for several reasons. One, copyright violators are millions of individuals who are distributed across many national boundaries and legal jurisdictions. Listeners have historically preferred unauthorized downloading from P2P networks to purchasing from legal sites (such as Apple’s iTunes) because: it is free; there is greater variety; it is easier to locate a particular song using an Internet search; and the downloaded file may be shared with others because it is free of Digital Rights Management (DRM) restrictions.¹² Two, Internet culture is largely creative and anti-establishment, and Internet file-swappers appear to have no moral compunction in infringing copyrights.¹³ Three, a majority of these individuals are present or potential customers. According to the RIAA, more than half of U.S. college students frequently download music and movies illegally from P2P networks. Punishing such violators generates negative publicity and alienates the customer base. Four, culpability is distributed over those who provide the tools to share files (e.g., P2P networks and Internet service providers), those who download files, and those who make copies of files available on networks. Lastly, technology to prevent unauthorized copying (DRM) has been ineffective so far as hackers have quickly cracked the protection codes or found other ways to circumvent it.

Although the media industry perceives unauthorized file sharing as a major threat to its survival, it may not be detrimental to society as a whole.

For instance, a majority of those who download media files may be unwilling or unable to purchase them. Preventing free downloads by such users results in lower social benefits without any increase in revenue for media providers.¹⁴ Further, large media companies may historically have stifled creativity by having excessive influence on deciding what types of works get produced and marketed¹⁵ as well as maintained artificially high prices—e.g., by paying radio stations to play certain numbers, selling more expensive albums rather than the single tracks desired by music fans, and promoting more popular artists at the cost of those with niche followings (and smaller potential profits). Lower search, promotion, and distribution costs associated with the Internet may loosen the stranglehold of large companies and promote creativity while providing works that better cater to diverse consumer tastes at competitive prices. Because Internet piracy may increase public welfare in the short term, the media industry has a primary role in ensuring an environment where artists are adequately compensated so that they continue to supply an appropriate volume of creative work.¹⁶

Unauthorized downloading of music files over P2P networks may actually *increase* sales of legitimate products. This is because these are “experience” goods, i.e., potential customers need to try them to reliably assess their value. P2P networks provide listeners with a convenient means of sampling music, and they may increase their total purchases by discovering items or artists they may otherwise be unaware of.¹⁷ The practice of payola, where music labels pay radio stations to play new music to boost CD sales, reflects this phenomenon. Selling digital media files over the Internet permits firms to customize their products to meet individual tastes and instantly gratify customers, besides providing them with the opportunity to use music and video in creative ways (e.g., through remixes). Thus, selling digital files over the Internet has the potential to increase flexibility, reduce distribution costs, increase industry profits, and offer consumers more choices. However, media companies have been slow to embrace emerging technologies and are struggling to find a viable business model, likely because of lack of requisite technical knowledge and expertise.

Media Industry Structure

The media industry is dominated by large conglomerates that finance the development of new music and movies, maintain extensive libraries of media products, and often own broadcast and cable television as well as retail outlets to distribute their content. Major record labels and film studios have long been very concentrated and have developed diverse portfolios of stars and product brands under a variety of labels.

Producing a motion picture usually involves a distributor, a production company, and a number of artists and technical personnel. The distributor typically rents movies to theaters and sells videos to retailers for home viewing. Movie theaters typically keep half of the receipts from ticket sales, and the remainder is paid to distributors as rental fees. Major players in this diverse,

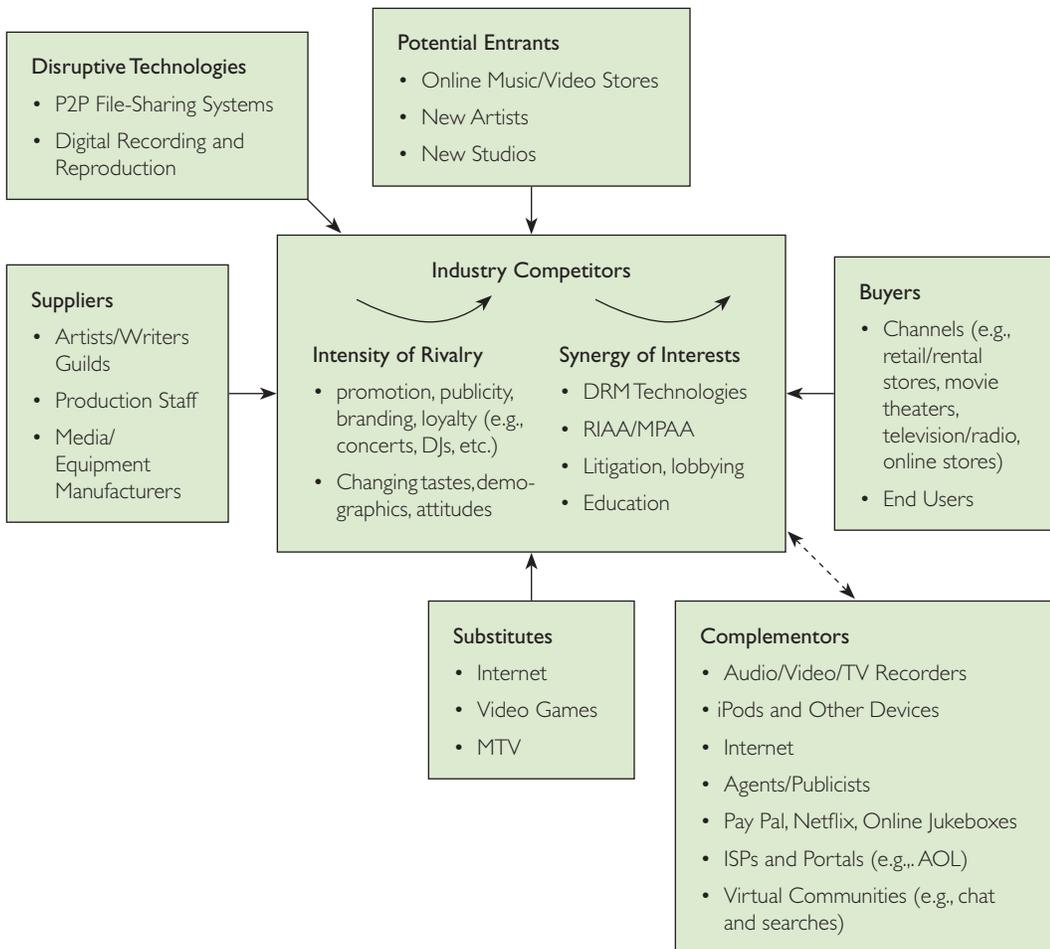
global industry (movie studios they control are within parentheses) are Time Warner (Warner Brothers), Viacom (Paramount Pictures), Sony (Columbia Pictures), GE (Universal Pictures), News Corp (Twentieth Century Fox), and Disney (Buena Vista). The six largest film studios normally account for more than 70 percent of box office sales in North America. Distributors segment the market by releasing films first to theaters, and then (in turn) to home video, pay-per-view/video-on-demand, and cable/broadcast TV markets, charging successively lower prices. Other firms involved in distribution include Carmike and Regal cinemas, Blockbuster, and Hollywood Entertainment. Revenue streams from video sales and rentals are now twice as large as those from theater ticket sales.

In the music industry, between three and six companies have dominated the industry globally over the past century.¹⁸ Currently, four major distributors account for approximately 80% of retail recording sales: Universal Studios Group (controlled by Vivendi), Sony Music Group (until recently a joint venture with Germany's Bertelsmann Music Group), Warner Music Group, and Britain's EMI. Artists are generally under contract to record for a single label and company for a number of years. They are paid an upfront fee for recording an album, and additional amounts (royalties on sales) are paid only after the recording company has recovered its costs.

An analysis of the media industry based on Porter's Five Forces model is presented in Figure 1.¹⁹ The five forces are: rivalry among existing competitors; bargaining power of buyers; bargaining power of suppliers; threat of new entrants; and threat of substitute products or services. We include complementors²⁰ and disruptive technologies²¹ in the figure to facilitate our discussion, as these represent strong forces in the transformation of the media industry. Key success factors in the media industry include protecting and exploiting intellectual capital, developing brands, access to capital, creative promotion, and maintaining artist relationships. New entrants have traditionally faced significant entry barriers due to industry concentration, where entrenched major players control the bulk of their value chain from production to distribution, and their size and cash flow from older products provides risk diversification and easy access to financing for risky projects.

While competition for market share between major industry players has historically been strong, they have relied on trade associations (RIAA and MPAA) to look out for their collective interests. This has permitted them to maintain high product margins by avoiding channel conflict and cannibalization. Recently, big-box discount chains such as Wal-Mart and Best Buy have increased their market share at the cost of conventional record stores, and forced music companies to standardize and lower prices. CD/DVD players and personal computers, online services that facilitate transactions, and virtual communities fuel industry sales but can also create new competition by offering music and video products online. Conversely, while substitutes such as video games, cable television, and music and video sharing websites can compete for market share with traditional media products, they may also be used as complementors to earn royalties and increase sales by providing increased exposure to artistic works.

FIGURE I. Competitive Analysis of the Media Industry



Historically, the media industry has required high investments upstream in developing stars and producing music and motion pictures, but incurred low marginal costs and generated large margins downstream providing economies of scale and risk minimization for large and balanced portfolios. With recent development of digital files that can be easily reproduced and transmitted over the Internet, control over downstream activities has weakened because of low barriers to entry, low investment needs, and relatively lucrative returns. The new technology has greatly increased the power of individual consumers who, in the absence of significant switching costs, can download singles (as opposed to expensive albums favored by music labels) for free (albeit illegally) over the Internet or listen to music over social networks or sites that stream music on demand, and of artists who can record quality music without the need for elaborate studio facilities and distribute it over the Internet. The industry's

distribution is shifting from physical CDs and DVDs in brick-and-mortar stores to the Internet from where digital music and videos can be downloaded on to a variety of devices. Product promotion, publicity, branding, and loyalty are similarly shifting from concerts and radio disk jockeys to online communities and user chat groups.

Tech-savvy startup firms able to leverage technological innovations to create an efficient distribution system are potential new entrants that may threaten current industry players.²² In the motion picture industry, the greatest threat comes from unauthorized recording of films in theaters and copies of DVDs that are sometimes made available for download or sale on P2P networks prior to their official release.²³ Pre-release piracy has a large negative effect on box office receipts as well as revenues from video sales and rentals.²⁴

A Note on P2P File-Sharing Systems

Perhaps the greatest threat to the media industry's current business model comes from unauthorized file sharing over Peer-to-Peer networks. The purpose of this section is to provide a primer on the design and structure of P2P file-sharing networks, especially as they pertain to the ability of the media industry to argue its legal cases and assess culpability of P2P software developers and users. In a pure P2P model, all the participants (peers) store resources and directly communicate with each other without relying on a central server or gatekeeper. While in the conventional client-server systems the address of the server is fixed, a search mechanism is provided in P2P systems to locate the appropriate node in real-time. Several architectures for P2P systems have evolved that differ primarily in their approach to search and storage.

Napster, the first of a new generation of P2P file-sharing networks, used a centralized directory to store and search for files on the network. In the Napster model, peers connect to a central database where they publish information about the content they wish to share. A user seeking specific content queries this database, obtains IP-addresses of the nodes where the resource is located, and downloads the resource directly from one of the identified nodes. It is easy to identify the location of all the files in such a centralized system and trace those supplying and downloading files, which increases exposure of developers to litigation.

To partly address issues of anonymity and accountability in Napster, Gnutella was created as a decentralized P2P system where each node maintains a list of only its own files. To search for a file, the user sends a query to its immediate neighbors who in turn transmit the query to their neighbors until the resource is obtained. Since the query traverses from peer to peer without maintaining a record, this network makes it difficult to track user activity. Additionally, since the resources are distributed across the network and their access is controlled by users, the culpability of developers in abetting copyright infringement is greatly reduced, albeit at the expense of increased exposure of users.

Freenet enhances anonymity of users by obfuscating their identity and encrypts provider information. Each peer in the network is assigned a randomly generated identification number and each file stored in the network is assigned an ID based on its name or content. Files are stored on nodes whose IDs most closely match file IDs. A file request is directed to the node with an ID most similar to the ID of the requested file, and the routing table is dynamically updated. Due to randomly assigned IDs for both users and files, it is hard to track the activity of any user or provider. Exposure to litigation is low for both users and developers under this architecture.

Since files are stored on network nodes independent of network capacity in distributed P2P systems such as Gnutella and Freenet, downloads can be slow. Several P2P networks have been developed to make routing and downloading more efficient. Kazaa uses a hierarchical approach with preferred storage on nodes with high network capacity, making downloads faster. BitTorrent software was developed to transmit larger files quickly by splitting files into segments and storing them on different nodes. Portions of a file are concurrently downloaded from different nodes and then assembled on the user's computer. Since BitTorrent directly connects to peers while downloads are in progress, anonymity of file sharers is not well protected.

Network architecture is a key factor in copyright infringement cases involving P2P networks. Prosecution is especially difficult when files are fragmented and stored on several computers that cannot be easily identified and/or users have no knowledge of which files are stored on their disks.

Public Policy

In order to counteract the threat of unauthorized copying and distribution of media files over P2P networks, the media industry has sought protection from copyright laws, which are designed to foster creation and dissemination of knowledge. Traditionally, copyright laws have shown a preference for authors' rights (over those of distributors and the public) in order to provide sufficient economic incentive for creating artistic works. Copyright laws initially focused on print media and subsequently evolved to cover audio and video recordings. Legislation evolved piecemeal as sharing of copyright-protected music and video files over the Internet became widespread. Each new law has added to the level of complexity, creating a legal quagmire that hinders both the ability of authors to be compensated for their creative works and their wide dissemination to the public.²⁵ Several media distribution firms that adhered to copyright laws were unable to survive as the copyright owners were inflexible in pricing royalties and creating alternative revenue generation models.²⁶ While the media industry has successfully lobbied Congress for increased legal protection and higher penalties for infringement, some legal scholars have questioned the need for copyright protection in an industry where search and distribution costs are low and users are prepared to bear them.²⁷

Legislative Acts

The Copyright Act of 1976 extended automatic protection to all creative work when reduced to tangible form (such as a drawing, sheet music, photograph, or movie script) without the need for registration. The Act made it legal for copyright owners to file civil lawsuits and for the government to file criminal charges against infringers. The Communications Act of 1984 and later amendments provided copyright protection for material on cable TV and satellite services as well. Copyright law was amended in 1989 to remove the requirement that a formal notice of copyright be attached to the work. This was followed by the Audio Home Recording Act (AHRA) of 1992, which prevents creation of serial copies of digital audiotapes and also shields manufacturers of audio recording equipment meant for non-commercial use from litigation.

Several major pieces of legislation provide copyright protection specifically to digital media. The No Electronic Theft (NET) Act was enacted by Congress in 1997 to facilitate prosecution of copyright violators on the Internet. This act makes it a federal crime to reproduce, distribute, or share copies of electronic copyrighted works such as songs, movies, games, or software programs, regardless of whether the person copying or distributing the material receives a financial benefit. Through the NET Act, the maximum penalty for copyright infringement was increased to three years in prison and a \$250,000 fine. The NET Act was superseded by the Digital Millennium Copyright Act (DMCA) in 1998, which makes it a crime to circumvent anti-piracy measures built into most commercial software and outlaws the manufacture, sale, or distribution of code-cracking devices used to illegally copy software. It limits liability for Internet Service Providers (ISPs) from copyright infringement, but holds them responsible for stopping illegal sharing of copyrighted materials over their networks once the copyright holder informs them of an infraction. It also limits liability of nonprofit institutions of higher learning for copyright infringement by faculty members or students who utilize Internet services for educational purposes. The World Intellectual Property Organization (WIPO) Copyright Act (included in the DMCA) amends Federal copyright law to grant copyright protection to sound recordings that were first produced in parties to specified international copyright and other agreements. The Family Entertainment and Copyright Act signed in 2005 makes it a federal felony to use a camcorder in a theater.

Several bills to further strengthen digital copyright legislation are under consideration by Congress. The Protecting Intellectual Rights Against Theft and Expropriation Act of 2004 (the Pirate Act) stipulates commencement of civil action against anyone who engages in copyright infringement. It also provides a directive to develop a program to ensure effective implementation and for civil enforcement of copyright laws, and establishes new penalties for pirating works prior to their commercial release. The Digital Media Consumers' Rights Act bill (initially introduced in 2003) assures that consumers who purchase digital media can enjoy a broad range of non-commercial uses. This bill directly challenges portions of the DMCA and would intensify Federal Trade Commission efforts to mandate proper labeling for copy-protected CDs to ensure consumer protection

from deceptive labeling practices. Another pending bill is the Inducing Infringement of Copyrights Act that seeks to put technology creators and users on notice that they may face liability even if they do not intend to cause copyright infringement or know about actual infringement. It is written broadly enough to alert those who invest in such technologies that they might also face liability.

Legal Battles

At the current juncture, digital copyright legislation is still a work in process. Several landmark cases have provided clarification on digital copyright protection. In the pioneering *Betamax* case, Universal Studios and Walt Disney Productions through the Motion Picture Association of America argued that the ability of Sony's *Betamax* to copy programming off the air constituted a copyright infringement.²⁸ Sony countered that a consumer has the right to record programs at home for private use, drawing analogy to the audiocassette recorder in use since the 1960s. The U.S. District Court ruled in favor of Sony, stating that taping off the airwaves for entertainment or time shifting constituted fair use and plaintiffs did not prove that use of VCRs caused economic harm to the motion picture industry. This ruling was used as a precedent for subsequent cases filed by media companies against P2P developers.

One of the first battles in the file-sharing industry occurred when the RIAA accused Napster of copyright infringement through illegal distribution of its members' music.²⁹ Relying on the 1984 *Betamax* case, Napster argued it was not committing a copyright violation because it did not reproduce copyrighted works and file sharing by its users constituted "fair use" under the Copyright Act because they did not derive any economic benefit from it. After a protracted legal battle, Napster was found guilty and ordered to stop allowing sharing of copyright-protected material without adequate compensation to owners. Napster lost the case largely because it used a central server that provided transparency to its operations and the ability to control the flow of music.³⁰

In another landmark case, 28 entertainment companies sued Streamcast Networks—which distributes *Morpheus* and *Grokster*—for copyright infringement.³¹ Here, the 9th U.S. Circuit Court of Appeals in San Francisco ruled that file-sharing services are not liable for the illegal activity of their users, citing the 1984 *Betamax* case as precedent. The ruling noted that file-sharing systems have significant legal uses, not unlike videocassette recorders, such as allowing consumers to make copies of copyright-protected works for the purpose of time-shifting. Also, developers of *Grokster* had no way of knowing and controlling the actions of its users. It was, however, subsequently ruled that *Grokster* could be sued for inducing copyright infringement for actions taken in the course of marketing file-sharing software. Eventually, *Grokster* settled for \$50 million and shut down its music sharing service.

Since passage of the DMCA, the RIAA has been instrumental in issuing subpoenas to identify people suspected of illegally distributing music. Verizon was sued when it refused to comply with subpoenas against Verizon Internet Services. In 2003, the RIAA won a landmark case against Verizon that would

have forced the company to release the names of subscribers suspected of copyright infringement under the provisions of the DMCA. Verizon appealed the judgment, arguing that the RIAA subpoena did not fall within the scope of the extraordinary subpoena authority created by the DMCA. In December 2003, the U.S. Court of Appeals for the District of Columbia Circuit sided with Verizon. The court ruled that copyright music owners could not issue subpoenas under the DMCA that would identify users engaged in illegal P2P file sharing. After Verizon's victory, the RIAA shifted its efforts to identifying and pursuing users who maintain large repositories of pirated files rather than pursuing developers of file-sharing technology or the ISPs over which files are illegally transferred.

It is evident from the above that the media industry has been fairly successful in lobbying for legislation to protect its intellectual property rights and in lawsuits against P2P file-sharing networks, forcing many to shut down.

Empirical Evidence

We investigated the impact of the media industry's efforts to protect its intellectual capital by curbing unauthorized file sharing over P2P networks through legal initiatives on the future prospects of its members. Our tests used event study methodology to document informed public opinion on this issue. The efficient markets hypothesis (in its most widely-accepted form) states that all publicly available information is reflected in stock prices quickly and in an unbiased manner.³² Event studies use stock price changes in a small window of time around an event as a summary measure to assess the impact of the event on the expected future cash flows of affected firms.³³ This methodology is especially powerful for large groups of similar events and affected firms, where these events are staggered in calendar time and where the period during which news of the event reaches the financial market can be determined with reasonable precision. If a strategy of protecting copyrights through legislative and legal action is regarded as dysfunctional for media firms in the long run, their stock price will fall on average around these events.³⁴

Our sample was a basket of stocks representing the media industry listed on the New York and American stock exchanges and on NASDAQ. These companies, identified using the Standard and Poor's industry survey for Movies and Home Entertainment,³⁵ included both media providers (e.g., Vivendi, Disney) and distributors (e.g., Blockbuster, Carmike Cinemas). The events we considered were passage of copyright legislation related to the media industry and lawsuits filed against individuals and companies that facilitate illegal file sharing. These events occurred the period 1991-2006.³⁶ We obtained filing dates of lawsuits from public sources and confirmed them with the courts where they were filed. The enactment dates of legislation were collected from government and other sites on the Internet and other literature. Data on stock prices is from the *Center for Research in Security Prices* (CRSP) daily stock returns file compiled at the University of Chicago.

TABLE I. Abnormal Stock Price Changes around Filing Dates of Lawsuits and Enactment of Copyright Legislation by Media Companies

Event Window	Mean CAR	T1-statistic	Generalized sign Z-statistic
Panel A: Market Model			
(-5,-1)	0.07%	0.49	1.72
(0,0)	0.24%	3.66**	3.31**
(+1,+5)	-0.04%	-0.27	-0.11
Panel B: Market Adjusted Returns			
(-5,-1)	-0.13%	-0.94	-0.60
(0,0)	0.23%	3.47**	3.23**
(+1,+5)	-0.35%	-2.49*	-1.82

* significant at $p < .01$ (1-tail test)

** significant at $p < .001$ (1-tail test)

Note: The above computations are based on 1,037 firm-year events. Day 0 is the trading day that follows the filing date of each lawsuit or enactment date of legislation. CAR denotes the cumulative abnormal stock return over the specified period, measured in trading days around an event. The T1-statistic pertains to a test of the hypothesis that mean CAR during the specified period equals zero. The generalized sign Z-statistic tests the hypothesis that the percentage of positive CARs in a period equals the percentage of positive CARs in a 255-trading day (approximately 1 calendar year) estimation interval prior to the event date.

We examined abnormal stock price changes for 22 publicly traded firms in the entertainment industry around the dates of 59 events for a total sample of 1,298 firm-events (59 events x 22 firms).³⁷ We used two standard measures of abnormal stock returns from the finance literature: market-adjusted returns, and market- and risk-adjusted returns (the latter are computed using a market model to estimate normal returns).³⁸ Definitions of terms and computational details are provided in the Appendix.³⁹

Table 1 shows the results of our analysis. News of the filing of a lawsuit or enactment of legislation probably affects stock prices on the trading day after the filing/enactment, when it appears in the financial press. We label this trading day as the event date (day 0) and examine stock price changes on this day and in the surrounding two-week period.⁴⁰ We also examined stock price changes in the pre-announcement window (-5, -1) and post-announcement window (+1, +5) around each event. In case our event date does not accurately reflect the day that information on the lawsuit first reaches financial markets, a portion of the price response can be captured in these windows. We conducted both parametric and non-parametric tests to assess whether stock price changes in the event windows were abnormal. The T1 statistic is a skewness-adjusted t-statistic associated with a test of the hypothesis that the mean cumulative abnormal return (CAR) during the event window is zero.⁴¹ The generalized sign Z-statistic⁴² is associated with a nonparametric test of the hypothesis that the ratio of positive abnormal

returns is the same in the event window being examined as in a 255-trading day estimation period (approximately one year) that precedes the event period.

Our results show a positive, abnormal stock price change on the event date on average. This price change is statistically significant for both parametric and nonparametric tests as well as for both methods of computing abnormal returns.⁴³ Mean CAR on the event date, although statistically significant, is small in magnitude (approximately one quarter of 1%) probably because the potential benefits of each lawsuit may not accrue to all of our sample firms, and because several sample firms (e.g., GE) have major operations in lines of business outside of media. The price changes are generally insignificant in the pre- and post-announcement windows.⁴⁴ Separate tests conducted over the three types of events (lawsuits filed against individuals and firms, and enactment of legislation) suggest that the stock price reaction to each type of event is of similar magnitude, i.e., of the order of a quarter percent.⁴⁵ These results are consistent with the contention that current and past efforts by the media industry to check illegal file sharing over P2P networks through stricter copyright laws and lawsuits against violators have a significant positive impact on expected long-term profitability and economic viability of major media firms. Further, they suggest that future scenarios where the media industry successfully protects its intellectual capital and charges for content are considered viable by sophisticated investors.

Business Strategies and Models

A successful future business strategy for media firms would focus on an integrated approach to monetizing access to musical and video works (as opposed to only selling CDs or DVDs) coupled with combating infringement of copyright violations through tightening legislation, better enforcement strategies, and initiating programs to increase public awareness of the necessity of copyright protection and damage caused by unauthorized file sharing over P2P networks. An effective business model in most future scenarios would aim to capture all possible cash flows from artistic works through promotion of brands, sponsorship, advertising, syndication, royalties (e.g., from ringtones, games, and public performances), and development of portals for distribution and networking. Following are several approaches the media industry may consider to fight piracy over P2P networks and benefit from recent technological advances—legislation, enforcement, education, and business models. These approaches are not mutually exclusive; on the contrary, they represent distinct elements of an overall strategy.

Legislation

The legal strategy of the media industry has so far consisted of seeking stronger copyright laws with wider coverage. Piecemeal evolution of digital copyright law has resulted in an overly complex system that arguably benefits neither media creators nor users. For instance, user rights are currently distributed across multiple industry players requiring complex negotiations for

legal use with each player demanding a royalty. This increases transaction costs unduly in an environment where obtaining and sharing digital files illegally is easy.

The industry will benefit from an overhaul of the Copyright Act of 1976 with a focus on simplification and removing obstacles to rapid dissemination of artistic works. This comprehensive reform should include one-stop shopping for copyright permissions. Doing so will require undoing the present system of multiple layers of copyright ownership (ending the compulsory mechanical license for musical works provides a suitable starting point) and setting up an alternative system to ensure that all involved in the process are suitably compensated.⁴⁶ We also recommend that the scope of copyright protection should be limited for non-commercial activities, e.g., the use of music and video clips to enhance videos made for personal use, or for sharing among friends, should be exempt. Additional simplification involves replacing the current system of protecting all artistic work upon creation with one that requires renewals after an initial term of automatic protection.⁴⁷ This system would clearly identify ownership rights and restrict need for copyright permissions to works with significant commercial value.

Further, the media industry should take new initiatives in capturing revenues from industries that use its products without payment. For example, the corporate radio industry in the U.S. (which includes firms such as Clear Channel and Radio One) earns its revenues largely by playing recorded music, but pays no royalties to the artists and labels providing the content. This is surprising, as property rights to artistic creations are otherwise well respected in the U.S.⁴⁸ Given that the U.S. is the world's largest music market, media companies should lobby Congress to reform the law.

Enforcement

As previously mentioned, the media industry's enforcement efforts have so far been directed at dissuading unauthorized file sharing through lawsuits against P2P software creators and users together with restricting copying and playback through DRM technology. While the industry has been successful in shutting down several P2P networks, its strategy has been largely unsuccessful in deterring illegal file sharing.

An alternative to prosecuting individual downloaders is to enlist the assistance of ISPs in curbing exchange of copyright-protected files. ISPs may be able to identify pirated files using filtering software already in place—e.g., deep packet inspections that ISPs engage in for security reasons and to locate habitually large consumers of bandwidth may also help in detection of potentially illegal music and video files. ISPs may assist in blocking access to illegal websites, identifying and warning users responsible for the bulk of piracy, and discontinuing (or slowing) Internet access if the illegal behavior continues despite warnings. We consider limiting Internet connectivity to be a better approach than criminal prosecution in deterring online piracy. While laws in most countries (including the U.S.) already require ISPs to curb illegal activity by users, the role

of government in facilitating agreements between the media industry and ISPs is critical.⁴⁹

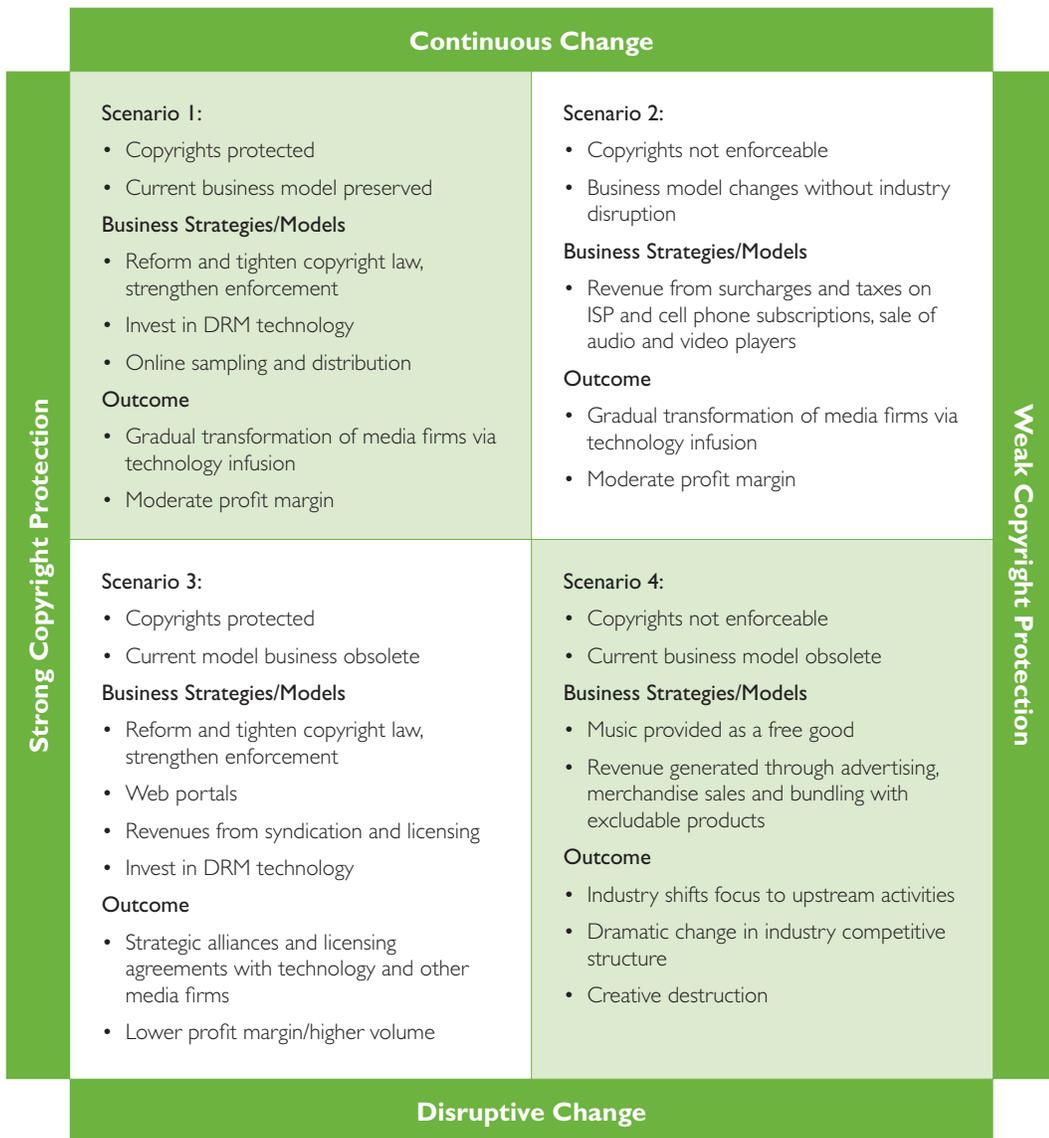
Education

Millions of people share files illegally over P2P networks. However, a majority do not view this activity as criminal or one that stifles creation of artistic works. This is due to two reasons. One, file-sharers have grown up in an environment where recording of movies (on VCRs and DVRs) and music (on cassette players) was legal, items downloaded from the Internet for personal use were free, and a majority of their peers engaged in swapping files over the Internet. Consequently, they view file sharing over the Internet as morally permissible.⁵⁰ Two, typical copyright violators tend to believe in the free flow of information and are suspicious of regulations and bureaucracies. They consider downloading of media files as a protest against media companies whom they regard as monopolies that charge unduly high prices and restrict market access by emerging artists.⁵¹ Many do not realize that in illegally downloading media files, they also prevent artists and technicians from getting fair compensation for their work and ultimately inhibit the creation of artistic content. Furthermore, given that unauthorized file sharing is widespread, risk of prosecution does not provide sufficient deterrence as individual downloaders perceive this risk to be low.⁵² Hence, apart from tightening copyright laws and enforcing them more effectively, the media industry must educate consumers about why swapping copyright-protected files over P2P networks is illegal and why they need to pay for them in order to change current social norms in the Internet community. Media firms through their trade associations must enlist the support of government, parents, and teachers, as well as artists and other opinion leaders, to expand their current efforts worldwide in educating the public on intellectual property rights through such activities as developing curriculum materials, television advertising, and documentary production as well as dissemination of information on legal download sites.

Business Models

While media firms may fight the threat from Internet piracy through new legislation, better enforcement, and public education, they also need to consider new business models to benefit from emerging technology and cater to changing customer tastes. In order to structure our discussion, we identify four alternative future scenarios and discuss business models appropriate to each in the context of the overall business strategy under that scenario. The business models are not mutually exclusive. On the contrary, most media firms would build a flexible, integrated strategy incorporating several business models that could be successfully implemented for different operating segments in a variety of scenarios. An individual company's strategy choice will depend on its forecast of the future, ability to influence the environment, core competencies, risk propensity, and ability and willingness to change, among other factors.

FIGURE 2. Scenario Analysis



The scenario analysis is illustrated in Figure 2. The horizontal axis is Public Policy. The two left-hand quadrants reflect scenarios where the industry is successful in protecting its intellectual capital among non-commercial users, whereas it is unable to curb widespread unauthorized file sharing in the two right-hand quadrants.⁵³ The vertical axis is labeled Technological Change. The

upper quadrants reflect situations where there is little immediate change in the basic industry model (“continuous change”), whereas in the lower quadrants, technological change dramatically transforms the business model and resources needed to succeed in the industry.⁵⁴ Our earlier analysis of stock price changes of a sample of industry members around dates of legislative and legal events indicates that sophisticated investors regard quadrants 1 and 3 as viable, at least for the near future. We describe each scenario in more detail below.

Scenario #1

This is our base scenario, where the media industry is successful in protecting its intellectual capital, which enables it to essentially maintain its current business model. We do not necessarily assume that Internet piracy is fully controlled. Rather, we posit that the industry is able to retain its high-value customers through a combination of activities designed to increase the cost of illegal file sharing, such as tightening legislation and enforcement as well as incorporating technology into digital files that degrades copies and makes duplication harder. The bulk of industry revenues under this scenario continue to accrue from the sale of CDs and DVDs demanded by customers who like to listen to high-quality music and view movies in their home on their CD and DVD players (especially when packaged with lyrics, information on artists, and other complementary material), and who avoid engaging in illegal activity as well as the risk of downloading viruses and poor-quality products.⁵⁵ Any losses from online piracy in this situation are made up by lower distribution costs and higher volume through sales of niche products and sampling enabled by the new technology. In this situation, the industry would continue its price differentiation strategy, charging progressively lower amounts for deluxe albums, CDs, online downloads, and streaming (for music) and theater tickets, video sales/rentals, and cable/broadcast TV for movies.

Evolutionary changes currently occurring in the motion picture industry that may enhance the viability of its current business model include improving the theatrical experience (e.g., through crisper 3-dimensional technology, advanced sound systems, and fancier restaurants at movie theaters), increasing the selection at video distribution outlets through kiosks that burn DVDs from large repositories of digital files stored on hard disc, and selling movies on SD cards and USB devices that may be viewed on a variety of devices such as computers, cellular phones, DVD players, and television sets.

In this scenario, the media industry will continue its efforts towards reforming and enforcing copyright laws, invest in DRM and watermarking technologies, educate the public on copyright law and build support for anti-piracy measures, develop portals that facilitate free sampling and online distribution, and tap new revenue streams that become viable with lower distribution costs, all while maintaining control of both production and distribution of artistic content.

Scenario #2

Here, copyright protection for non-commercial purposes is effectively lost due to availability of free music and video files over the Internet, and they become “public goods”—i.e., while artists and media companies expend resources in producing music and motion pictures, there is no market mechanism to obtain fair payment from individual customers given their ability to copy and distribute digital files worldwide, virtually without cost. In this situation, payment to content providers must come from general government revenues and/or levies on users and beneficiaries. A viable model here is to impose a surcharge on subscriptions to ISPs in exchange for the right to download and share music and video files over the Internet on a non-commercial basis.⁵⁶ A similar surcharge may also be imposed on cellular phone subscriptions and the sale of digital audio and video players, blank CDs, computer hardware, and P2P software and services. Such a tax is justifiable on the grounds that since these items facilitate file sharing and demand for them is enhanced by copying and sharing copyright-protected works, losses to copyright owners should be recouped by taxes on them.⁵⁷ The proceeds from these taxes and surcharges would be remitted as royalties to media companies in proportion to usage, as measured by digital tracking and sampling technologies. This strategy would decriminalize file-sharing activity while providing a mechanism for paying content producers and owners in a manner that causes minimal disruption in the media industry.

Scenario #3

Under this scenario, the industry retains its ability to charge non-commercial end-users (as in Scenario #1),⁵⁸ but its current business model must change dramatically to cater to new public tastes in accessing and using media products. The new business model must permit customers to locate, sample, and share music online and play it at any time on any device, and it must also provide fans with the ability to access information on artists and musical compositions and share their preferences and opinions with peers. This may be achieved by establishing proprietary portals that facilitate selection and streaming/downloading of their products or, alternatively, by licensing distribution to intermediaries who pay royalties to the music labels.⁵⁹ In the former case, the music sites should be linked to popular search engines (such as Google) and social networking sites, and must themselves provide community features consistent with evolving preferences. This includes providing music fans with the ability to interact with artists and with each other; share their opinions, reviews, and playlists; remix music and share their creative work; and furnish information on artists, their songs and concerts, polls and rankings, as well as permit access to profiles of other fans.

Several business models are viable in this scenario. In the “subscription model,” consumers pay a monthly fee to stream and/or download a certain (or unlimited) number of music singles, while there is a charge for each play/download in the “a la carte” model. The downloads may or may not come with limitations on reproduction and playback (DRM). Apple’s iTunes Store, an example of

the à la carte model, permits download of music from all four major labels using a 3-tier price structure. Anti-copying restrictions were removed in early 2009, so the downloaded music may be played on iPhones, computers, and a variety of digital players. Current examples of music sites based on the subscription model are Rhapsody, which permits unlimited streaming, and Kazaa, which permits unlimited downloads. Both sites charge fixed monthly fees.

With regard to motion pictures, consumer tastes are evolving away from DVDs viewed on TV sets and towards on-demand viewing over a variety of devices that include computers and smartphones. The biggest impediments to online distribution of motion pictures are the inability of devices other than computers to access and play movies off Internet sites, limited availability of disk space on these devices, and restricted bandwidth. Technology has now become available to stream movies directly to DVD players and television sets. Media firms may consider working with consumer electronics companies to develop a standard format for streaming movies directly from their portals. This will make a wide selection of motion pictures available for easy viewing compared to the limited selections currently available via video-on-demand, while avoiding the risk of piracy associated with purchased digital files.⁶⁰ Another business model that may be considered in this regard is provided by Keychest, currently under development by Disney.⁶¹ This technology enables a user to purchase viewing rights to a movie online from a number of vendors and then play it over any licensed device via streaming from a server belonging to an ISP or a phone or cable company. “Watch with a friend” functionality is also becoming available on television channels for group viewing.⁶²

Moving from current distribution channels to online distribution involves significant investments in software, hardware, and infrastructure. In order to compete effectively against P2P networks, legal online sites must offer simple and secure payment, quick downloads, superior file quality, a reasonable price, free sampling, and the opportunity to interact with peers.⁶³ Most importantly, these sites should be easier to use—e.g., they must be better integrated with players (such as iTunes with the iPod) and permit easier file naming and tagging.⁶⁴ Under this scenario, the music industry would continue to invest in better DRM technologies to prevent illegal copying and distribution and watermarking to identify sources of illegal copies as well as its efforts to reform copy-right law and strengthen enforcement.

Scenario #4

In this quadrant, there is no effective mechanism for charging individual end-users due to ready availability of media files over the Internet, and media companies need to change their business model quickly and dramatically because government subsidies of the type discussed in Scenario #2 are not available. It is critical for the industry to maintain its core competencies in discovering and promoting artists; arranging for the necessary repertoire of musicians, writers, and actors; and providing high-quality production facilities. It must continue to control these choke points in upstream primary activities that are hard

for others to enter. At the same time, the industry needs to forge relationships with complementors and other parties in competitive downstream activities. The industry may consider several business models here.

Advertising on sites that permit free streaming may be used to generate royalties for media companies. Current examples are Deezer, Spotify, and We7, which operate in Europe. Advertising-supported sites that offer pre-selected programming such as Pandora also follow this model. Advertising may be made more effective by incorporating technology that restricts skipping of advertisements and tailoring advertising based on data gathered from past purchases or surfing behavior of users. A variation of the advertising model is one where music is used to promote merchandise such as concert tickets and t-shirts—i.e., while the music is free, revenues from associated merchandise sales are used to pay royalties to the music labels and artists.⁶⁵ An example of this business model is MySpace Music, a joint venture between MySpace, a social networking site owned by News Corp and the four major music labels. Launched in September 2008, MySpace Music permits free on-demand music streaming and allows MySpace users to add music to their profile pages after viewing what their friends and peers are adding. Further, users can conveniently access information on their favorite artists; view their concert schedules as well buy concert tickets, T-shirts, and so on; and they are directed to Amazon.com to purchase DRM-free singles. This provides a revenue stream to the music labels from advertising, merchandise sales, and concert tickets while imposing no charge on listeners. Similarly, Hulu's video-streaming portal provides a selection of motion pictures and television episodes supported by advertising revenues. Music labels may directly access revenues from sponsorship, merchandising, concert tickets and brand management through expanded "360-degree" deals with artists. Further, the media industry may consider establishing premium subscription sites that are free of advertising.

Licensing music and films for video games provides additional revenue opportunities. The games industry in the U.S. was worth \$48 billion in 2008 and is expected to grow to \$68 billion in 2012,⁶⁶ and music and films drive a significant portion of its demand. Music games such as *Guitar Hero* and *Rock Band* permit premium downloads of both music and movies through their Xbox consoles, and these can provide significant revenue streams. Sale of ringtones and royalties from Internet and satellite radio continue to provide revenue in this scenario. Linking music to brands (for use in advertising) and using branded merchandise in films also provide potential revenue sources for media firms.

Yet another way to generate revenues in this scenario is by bundling music with subscriptions to cellular phone networks and ISPs. Recent examples are the Comes With Music service introduced by Nokia in the UK and PlayNow Plus launched in Sweden. The Nokia service provides unlimited music downloads to the handset over the mobile network for a year, after which customers can keep all the downloaded tracks and purchase additional music from the Nokia Music Store. Similarly, Sony Ericsson permits unlimited access over the mobile network. The handset comes preloaded with 1,000 popular songs, and

after 6-18 months customers can retain 300 of the most played tracks. These arrangements attract new customers and provide them with the opportunity to familiarize themselves with the technology to download music at reasonable cost without significantly cannibalizing current high-end customers, and also permits industries with high churn rates to retain customers.⁶⁷

While media firms have mainly focused on maintaining their current business models, some have experimented with the models described above. Success has been mixed at best. Revenues for the media industry from subscription sites such as iTunes have been below expectations, and free, advertising-funded sites are struggling to become commercially viable.⁶⁸ In our opinion, many media companies do not possess the resources to quickly identify and execute business strategies suited to the current technological environment, nor is it practical to purchase the necessary technologies or hire new talent to implement innovative business strategies within a short time. We suggest that such firms enter into alliances with management consulting firms and collaborate with technology companies that have a thorough understanding of the digital marketplace to identify their future business models and organize towards capturing new business opportunities arising from emerging technologies. Only those that can successfully do this will likely survive.

Summary and Conclusions

The development of compressed digital formats for music and video files coupled with the widespread availability of high-speed Internet connections and the evolution of P2P file-sharing networks has thrown the media industry into turmoil. On the one hand, these technologies have enabled Internet users to duplicate and transmit high-quality media files worldwide without payment to music companies and movie studios. The media industry claims billions of dollars in lost sales and reports that its survival is at stake. On the other hand, the new technology has the potential to expand demand by enabling users to access media products anywhere on a variety of devices, sample new products, and use them creatively and as part of a broader social experience. The media industry needs to develop new business models to capture hitherto untapped revenue streams arising from new technology and to better cater to changing customer tastes.

The primary response of the media industry so far has been to protect its present business model by asserting intellectual property rights through stricter copyright laws and filing numerous lawsuits against both individuals and P2P software providers who infringe copyrights. These actions have not checked illegal file sharing over P2P networks, while alienating many influential constituents. Some have observed that the recent fall in music sales may be due to reasons other than illegal file sharing, and the industry may be exaggerating its losses on this account. Others have commented that the legal strategy followed by media firms through their trade associations is counter-productive because it is directed at preserving an obsolete business model. We examined the efficacy

of the media industry's legal strategy by analyzing abnormal stock price changes of publicly traded media firms on dates of major legislation and lawsuit filings. Our tests show a significant increase in stock prices on average that is consistent with the proposition that sophisticated investors believe that the industry's current strategy of protecting its revenues through tighter laws and stronger enforcement is associated with an expectation of higher future cash flows.

Our empirical analysis suggests that the media industry should continue its current legal strategy to deter unauthorized file sharing. Additionally, the industry must discover new ways to monetize its products and create value. We presented several business strategies that permit media firms to fight unauthorized file sharing over P2P networks and that utilize recent technological advances to cater to changing customer tastes. These include changing social norms in the Internet community (which currently regards the sharing of copyright-protected material over P2P networks as morally permissible) through educational campaigns, simplifying the process of obtaining copyright permission to encourage legal use of copyright-protected artistic works, and adopting new business models to monetize access to artistic works in a changing business environment. We identified four future scenarios and discussed business strategies and models appropriate to each. At the present juncture, we consider that a broad strategy involving experimentation with several business models has the best chance of success.

APPENDIX

Definitions of Variables and Description of Statistical Tests

The return on common stock for firm j on day t (R_{jt}) is the percent change in stock price from the previous day:

$$R_{jt} = \frac{P_{j,t}}{P_{j,t-1}} - 1$$

where $P_{j,t}$ is the last sale price of security j on day t . R_{jt} is adjusted for dividend payments and stock splits. The abnormal return (AR_{jt}) is a measure of the return on security j over and above the expected return. We compute AR_{jt} using two alternative methods: market adjusted return and the market model.

Market Adjusted Return

In the market adjusted return method, AR_{jt} is the return on security j after controlling for the average market return for day t . It reflects the change in stock price of firm j due to information flowing into the market on day t about firm j , i.e., after filtering out information that affects prices of all stocks. The market adjusted return is computed by subtracting the market index on day t (R_{mt}) from firm j 's security return:

$$AR_{jt} = R_{jt} - R_{mt}$$

We used the return on an equally weighted portfolio of securities listed on the NYSE, AMEX, and NASDAQ as the market index (R_{mt}) on day t .

Market Model

This model computes the abnormal return for firm j 's stock after considering its systematic risk in addition to market-wide stock price movements. We first estimate parameters α_j and β_j of the following model for each event by regressing R_{jt} on R_{mt} over a 255 trading day period (approximately 1 calendar year) ending on day -46 relative to each event, following standard event-study methodology:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_{jt}$$

In this model, β_j measures the sensitivity of firm j 's stock return to the market index (its 'beta' or systematic risk). The abnormal stock return for firm j on day t (AR_{jt}) within each time window is then computed as:

$$AR_{jt} = R_{jt} - (\alpha_j + \beta_j R_{mt})$$

Cumulative Abnormal Return

The average abnormal return AAR_t for a portfolio of N securities on day t is defined as

$$AAR_t = \frac{\sum_{j=1}^N AR_{jt}}{N}$$

The Cumulative Abnormal Return for a portfolio of N securities over the period (T_1, T_2) relative to an event (day 0) is defined as

$$CAR_{T_1, T_2} = \frac{1}{N} \sum_{j=1}^N \sum_{t=T_1}^{T_2} AR_{jt}$$

CAR_{T_1, T_2} represents the average abnormal change in security price for an equally weighted portfolio of N firms over the period (T_1, T_2) .

The test statistics above apply to the analysis of a single event. We, however, tested for abnormal returns over a group of 59 events. This adds another level of aggregation to the above test statistics. For example, in our multiple-event environment, the average abnormal return (AAR_t) for a portfolio of N securities on day t relative to the event date for E_1 events was computed as:

$$AAR_t = \frac{\sum_{e=1}^{E_1} \sum_{j=1}^N AR_{ejt}}{E_1 N}$$

Similarly, the average portfolio CAR in a multiple-event situation is

$$CAR_{T_1, T_2} = \frac{1}{E_1 N} \sum_{e=1}^{E_1} \sum_{j=1}^N \sum_{t=T_1}^{T_2} AR_{ejt}$$

Sample Selection Details

Our initial sample consisted of 1298 firm-years (59 events x 22 firms). We deleted any firms-years with less than 30 available returns within the 255-day estimation period and those with unavailable event-day returns. We dropped a total of 261 firm-events due to non-availability of data, leaving 1037 firm-events for analysis.

Notes

1. Sales figures are from annual surveys conducted by the Recording Industry Association of America (RIAA), the trade association for the music industry.
2. During 2008, U.S. music sales through digital downloads grew 30% relative to 2007 (to \$1.6 billion) whereas shipments of physical products (CDs and music videos) fell 28% to \$5.8 billion. In a study covering 16 countries, the International Federation of the Phonographic Industry estimates that over 40 billion music files were illegally downloaded on file-sharing networks in 2008, representing a digital piracy rate of about 95%. *IFPI Digital Music Report 2009: New Business Models for a Changing Environment*, International Federation of the Phonographic Industry, January 2009.
3. Recent studies commissioned by the trade associations have estimated that the U.S. economy loses \$12.5 billion in output annually and 71,060 jobs due to pirated music, and it loses \$21.5 billion annually and 141,030 U.S. jobs due to motion picture piracy. These numbers are likely upward biased, as they are used to support the industry's anti-piracy initiatives. S.E. Siwek, *The True Cost of Sound Recording Piracy to the U.S. Economy*, Institute of Policy Innovation, Lewisville, TX, Policy Report No. 188, 2007; S.E. Siwek, *The True Cost of Motion Picture Piracy in the U.S. Economy*, Institute of Policy Innovation, Lewisville, TX, Policy Report No. 186, 2006. Both reports are available at <www.ipi.com>.
4. We use "media" as a generic term to include music and motion pictures. Print and television media are excluded from our discussion.
5. For example, S.J. Liebowitz, "File-Sharing: Creative Destruction or Just Plain Destruction?" *Journal of Law and Economics*, 49/1 (April 2006): 1-28; A. Zentner, "Measuring the Effect of File-Sharing on Music Purchases," *Journal of Law and Economics*, 49/1 (April 2006): 63-90.
6. For example, F. Oberholzer-Gee and K. Strumpf, "The Effect of File-Sharing on Record Sales: An Empirical Analysis," *Journal of Political Economy*, 115/1 (February 2007): 1-42.
7. Consistent with this, a recent market survey documents an increase in music listening accompanied by a decline in CD sales. The survey attributes the sales decline to a "lack of excitement among teens to the music available" and sharp increases in listening to music online and on satellite radio and social networks. *Digital Music Study*, The NPD Group, Port Washington, NY, January 2009.
8. For example, see M. Peitz and P. Waelbroeck, "Why the Music Industry May Gain from Free Downloading—The Role of Sampling," *International Journal of Industrial Organization*, 24/5 (September 2006): 907-913. Also see N. Hu, L. Liu, I. Bose, and J. Shen, "Does Sampling Influence Customers in Online Retailing of Digital Music?" *Information Systems and E-Business Management*, published online April 28, 2009.
9. The Motion Picture Association of America (MPAA) is the trade association for the motion picture industry.
10. See, for example, S. Knopper, *Appetite for Self-Destruction: The Spectacular Crash of the Record Industry in the Digital Age* (New York, NY: Free Press, 2009).
11. O. Bomsel and A. Geffroy, "DRMs, Innovation and Creation," *Communications and Strategies*, 62/2 (April 2006): 35-47.
12. J. Lee, "Peer-to-Peer File-Sharing Systems: What Matters to the End Users?" Working Paper No. 217, MIT Sloan School of Management, Center for Coordination Science, 2004. DRM restrictions were removed from music files sold through iTunes in early 2009.
13. P.K. Yu, "The Copyright Divide," *Cardozo Law Review*, 25/1 (November 2003): 331-446.
14. Refer to Rob and Waldfogel for survey evidence that: the free download of one music album displaces sales of only one-tenth of an album; downloaded albums are valued by customers at a third to half less than purchased albums; and while a downloaded music file results in revenue loss for the industry of \$25 per customer, it raises customer surplus by \$70 on average. These results are consistent with the view that: illegal file sharing over the Internet reduces industry sales; a majority of downloaded files are those that customers would not otherwise pay for; and a significant portion of free downloading may be beneficial to society as a whole. R.R. Rob and J.W. Waldfogel, "Piracy on the High C's: Music Downloading, Sales Displacement, and Social Welfare in a Sample of College Students," *Journal of Law and Economics*, 49/1 (April 2006): 29-62.
15. S. Vaidhyanathan, *Copyrights and Copywrongs: The Rise of Intellectual Property and How it Threatens Creativity* (New York, NY: New York University Press, 2001).
16. Unauthorized file sharing, if left unchecked, will likely lead to under-production and market failure in the long run, which lowers public welfare. The media industry is the group best

- organized to take steps to ensure that artists and technicians get paid for their efforts, in view of this externality.
17. Consistent with this, Bounie, Bourreau, and Waelbroeck document evidence that 90 percent of French university students they surveyed discovered new artists over file-sharing networks, and of these, 70 percent stated that they consequently purchased additional music CDs. D. Bounie, M. Bourreau, and P. Waelbroeck, "Pirates or Explorers? Analysis of Music Consumption in French Graduate Schools," Working Paper No. EC-05-01, Telecom Paris, 2005. Further, Andersen and Frenz report that P2P file sharing is associated with larger music purchases in Canada. B. Andersen and M. Frenz, "The Impact of Music Downloads and P2P File-Sharing on the Purchase of Music: A Study for Industry Canada," Working Paper, University of London, 2007. Peitz and Waelbroeck [op. cit.] provide additional empirical evidence.
 18. M.E. Porter, "The Five Competitive Forces that Shape Strategy," *Harvard Business Review*, 86/1 (January 2008): 79-93.
 19. M.E. Porter, *Competitive Strategy* (New York, NY: Free Press, 1980).
 20. See A.M. Brandenburger and B.J. Nalebuff, "The Right Game: Use Game Theory to Shape Strategy," *Harvard Business Review*, 73/4 (July/August 1995): 57-71.
 21. Joseph L. Boner and Clayton M. Christensen, "Disruptive Technologies: Catching the Wave," *Harvard Business Review*, 73/1 (January/February 1995): 43-53.
 22. Three of the four music labels withheld permission until 2009 for Apple's iTunes Store to sell DRM-free music tracks (while granting permission to rivals such as Amazon's MP3 store) to weaken iTunes, which they regarded as an emerging threat to their current business model.
 23. For example, Universal's "The Hulk" was available on the Internet two weeks prior to the film's release in 2003. In March 2009, an early version of "X-Men Origins: Wolverines" was uploaded on the Internet a month before its official release. More than a million viewers downloaded the digital file within a week.
 24. Movies are normally seen only once, and sampling benefits in spurring purchases are much lower. Bounie, Bourreau, and Waelbroeck report a significant impact of movie file sharing on video rentals and sales (but no effect on theater attendance) in a sample of French students. D. Bounie, M. Bourreau, and P. Waelbroeck, "Piracy and Demands for Films: Analysis of Piracy Behavior in French Universities," *Review of Economic Research on Copyright Issues*, 3/2 (December 2006): 15-27. De Vany and Walls estimate that box office receipts for one major motion picture were reduced by \$40 million due to pre-release piracy and subsequent file sharing on P2P networks. A.S. De Vany and W.D. Walls, "The Effects of Movie Piracy at the Box Office," *Review of Industrial Organization*, 30/4 (June 2007): 291-301.
 25. Currently, copyright law (17 U.S.C. Section 106) defines several different usage rights, e.g., reproduction, modification, distribution, display, and public performance. In the music industry, a user typically needs permission from multiple industry players and negotiates a royalty with each.
 26. Before a music file is copied or distributed, separate authorizations are needed from the music creator ("musical work copyright") and from recording artists, musicians, and sound engineers ("sound recording copyright"). This generally involves agencies such as the Harry Fox Agency, a collective rights organization, and members of the RIAA. Negotiating these rights is nontrivial, as each party wants appropriate compensation. Further, laws differ with the purpose of the download. For a detailed description of the licensing process in the music industry, see L.P. Loren, "Untangling the Web of Music Copyrights," *Case Western Reserve Law Review*, 53/3 (Spring 2003): 673-722.
 27. For example, see T.W. Bell, "Escape from Copyright: Market Success vs. Statutory Failure in the Protection of Expressive Works," *University of Cincinnati Law Review*, 69 (Spring 2001): 741. Also see R. Ku, "The Creative Destruction of Copyright: Napster and the New Economics of Digital Technology," *The University of Chicago Law Review*, 69/1 (Winter 2002): 263-324.
 28. *Sony Corp. v. Universal City Studios*, 1984, <www.oyez.org/cases/1980-1989/1982/1982_81_1687/>, accessed July 13, 2009.
 29. Napster. *RIAA*, 2000, No. C 99-5183 MHP, No. C 00-0074 MHP United State District Court for the Northern District of California 114 F. Supp. 2d 896; 2000 U.S. Dist. LEXIS 11862; 55 U.S.P.Q.2D (BNA) 1780; Copy. L. Rep. (CCH) P28, 126.
 30. Subsequently, Napster tried to develop a partnership with the music industry for distributing copyright-protected music but ran into legal problems. Since 2007, Napster has been a licensed service that sells music over the Internet using a flat fee for unlimited access.

31. *Metro-Goldwyn-Mayer Studios v. Grokster*, argument transcripts, 2005, <www.supremecourt.us.gov/oral_arguments/argument_transcripts/04-480.pdf>, accessed on July 13, 2009.
32. E. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance*, 25/2 (May 1970): 383-417.
33. Event studies are widely used in finance, accounting, and economics research to assess the impact of economic events on firm valuation. See, for example, S. Armitage, "Event Study Methods and Evidence on their Performance," *Journal of Economic Surveys*, 9/1 (March 1995): 25-52; A.C. MacKinlay, "Event Studies in Economics and Finance," *Journal of Economic Literature*, 35/1 (March 1997): 13-39; A. McWilliams, and D. Siegel, "Event Studies in Management Research: Theoretical and Empirical Issues," *Academy of Management Journal*, 40/3 (June 1997): 626-657.
34. This may occur if: file sharing does not decrease contemporaneous media sales; the current business model is obsolete, and media firms need to move to (say) a model supported by advertising or tax levies; and/or it is impractical to significantly reduce unauthorized file sharing by legal means in the long run. Several studies have previously examined the first issue using archival data and report mixed results. See S. Bhattacharjee, R.D. Gopal, K. Lertwachara, and J.R. Marsden, "Impact of Legal Threats on Online Music Sharing Activity: An Analysis of Music Industry Legal Actions," *Journal of Law and Economics*, 49/1 (April 2006): 91-114; D. Blackburn, "Online Piracy and Recorded Music Sales," working paper, Harvard University, December 2004; R.D. Gopal, S. Bhattacharjee, and G.L. Sanders, "Do Artists Benefit from Online Music Sharing?" *Journal of Business*, 79/3 (May 2006): 1503-1533; Liebowitz, op. cit.; Zentner, op. cit. None of these studies examine our research question directly or use stock price data. Our research design has several advantages: a large sample increases the power of our tests; use of short event windows dispersed in calendar time reduces effects of confounding events; and the market price is a better measure of the impact of information on expected future cash flows of a firm than any other measure we are aware of.
35. *Standard and Poor's Industry Surveys: Movies and Home Entertainment* (New York, NY: McGraw Hill, September 2007).
36. Copyright legislation included in our sample is the Audio Home Recording Act, the No Electronic Theft Act, Digital Millennium Copyright Act, WIPO Copyright Act, Online Copyright Infringement Liability Limitation, PIRATE Act, Inducing Infringement of Copyrights Act, and Digital Media Consumers' Rights Act. These are described in the section on *Legislative Acts*. Also included in the sample are lawsuits filed by RIAA against Napster and by MGM Studios and other entertainment companies against Grokster, both described in the section on *Legal Battles*. We do not provide detailed lists of sample firms and events for brevity. These lists are available from the authors.
37. The events consist of 8 introductions of copyright legislation, 14 cases filed against companies facilitating file sharing, and 37 cases filed against file-sharers over P2P networks. Our empirical tests are based on 1,037 firm-events because we dropped firm-events for which sufficient stock price data were unavailable (e.g., due to a merger).
38. We use standard event study methodology, similar to W.H. Mikkelson and M.M. Partch, "Withdrawn Security Offerings," *Journal of Financial and Quantitative Analysis*, 23/2 (June 1988): 119-133.
39. This description is adapted from A.R. Cowan, *Eventus 7 User's Guide* (Ames, IA: Cowan Research, March 2002).
40. We also replicated our tests over the two-day trading window (-1, 0). The results are qualitatively similar to those reported in Table 1 for day 0. Days within event windows are trading (not calendar) days. Weekends and holidays are non-trading days.
41. P. Hall, "On the Removal of Skewness by Transformation," *Journal of the Royal Statistical Society, Series B (Methodological)*, 54/1 (1992): 221-228.
42. Details of this statistical test are provided in A. Cowan, "Nonparametric Event Study," *Review of Quantitative Finance and Accounting*, 2/4 (1992): 343-358.
43. Mean raw stock return (i.e., unadjusted for market-wide returns) on the event date (day 0) is 0.49%, which is significantly different from zero at $p < .001$ (T1-statistic=7.52, generalized sign Z-statistic=4.49). We also examined the abnormal return separately for day -1. This return is statistically insignificant for all tests.
44. CAR over the post-announcement window is significantly negative per the parametric test when the market adjusted return is used to measure abnormal return. We do not consider this as evidence of a price reversal as this result is not robust to the non-parametric test

- (i.e., it is likely driven by a small number of extreme observations) and it disappears when returns are adjusted for firm-specific systematic risk (beta) in the market model tests.
45. For example, the mean abnormal stock returns on day 0 using the market model are 0.24%, 0.22%, and 0.25%, respectively, for lawsuits filed against individuals, lawsuits against firms, and enactment of legislation.
 46. Loren [op. cit.] provides a detailed discussion.
 47. Automatic copyright protection for 14 years followed by optional registration and renewal for another 14 years is suggested by L. Lessig, *Remix: Making Art and Commerce Thrive in a Hybrid Economy* (New York, NY: Penguin Group, 2008).
 48. Besides the U.S., China is the only major country where no royalties are paid to copyright owners for radio broadcasts. Iran, North Korea, and Rwanda are the others, according to the *IFPI Digital Music Report 2009: New Business Models for a Changing Environment*, op. cit.
 49. Governments in France and the UK are currently in the process of introducing legislation that requires ISPs to control unauthorized file sharing on their networks. The French “three strikes” proposal penalizes offenders who ignore two prior warnings with disconnection of their Internet connection, a fine, or imprisonment. The British proposal charges a government regulator (Ofcom) with creating a legal and regulatory framework to combat digital piracy, to be achieved mainly by requiring ISPs to send warning letters to illegal file sharers, slow broadband connections of repeat violators and/or block their access to P2P networks and pirate websites, besides providing their names to media companies for civil action. See *Digital Britain*, UK Government White Paper issued on June 16, 2009, available at <www.culture.gov.uk/images/publications/digitalbritain-finalreport-jun09.pdf>.
 50. Knowledge of (and appreciation for) the letter and spirit of copyright laws is not widespread among Internet users. Education is needed to develop moral compunctions against illegal sharing of copyrighted material. See A. Bartow, “Electrifying Copyright Norms and Making Cyberspace More Like a Book,” *Villanova Law Review*, 48/1 (2003): 13-127.
 51. Yu, op. cit.
 52. Supporting evidence is provided by F. Rochelandet and F. Le Guel, “P2P Music-Sharing Networks: Why Legal Fight Against Copiers May be Inefficient?” *Review of Economic Research on Copyright Issues*, 2/2 (2002): 69-82. After studying the file-sharing behavior of 2,500 French households, Rochelandet and Le Guel conclude that, on average, file sharers are very concerned about the interests of artists and with ethical issues. Illegal file sharing over P2P networks is strongly embedded in peer behavior and declines with greater education, while it is unaffected by perceived risk of prosecution.
 53. We label users as noncommercial if they do not benefit financially from the downloaded files (e.g., by selling them). We assume that media firms can enforce copyright protection on commercial users in all four quadrants.
 54. We do not imply that the media industry has no power to affect future outcomes. On the contrary, we assume that the industry will work (through legal and other means) to minimize disruptions to its revenue streams. The scenario that finally prevails will be a function of both the effectiveness of the industry’s efforts and environmental factors beyond its control.
 55. A recent survey by *The Leading Question*, a research firm, finds that 73 percent of British music fans (including 66 percent of those in the 14-18 years age group) prefer buying CDs to downloading. Those who pay for a digital music subscription or listen to streamed music every day spend more than average on buying CDs. This evidence suggests that a majority of consumers presently use the Internet to sample music rather than as a substitute to purchasing, and is inconsistent with the quick demise of the CD. Press release on July 16, 2009, by *The Leading Question* and *Music Ally*, available at <www.theleadingquestion.com>.
 56. Consistent with this approach, the Songwriters Association of Canada has proposed a plan that permits unlimited downloading of copyrighted media files from P2P networks for a small monthly fee payable to the ISP to be split among artists and content owners. Such plans are also under discussion in France, Britain, and Germany. A detailed description of a system of levies to compensate copyright owners for revenue losses through P2P file sharing is provided in N.W. Netanel, “Impose a Noncommercial Use Levy to Allow Free Peer-to-Peer File-Sharing,” *Harvard Journal of Law & Technology*, 17/1 (Fall 2003): 1-84. Netanel estimates that a levy of 4 percent on goods and services benefited by file-sharing activity would provide sufficient compensation. Fisher argues that compensation to media firms through income taxes would be fairer, albeit less politically feasible. W.W. Fisher, *Promises to*

Keep: Technology, Law, and the Future of Entertainment (Palo Alto, CA: Stanford University Press, 2004).

57. Such a tax may be considered unfair, though, by those who use the Internet and the devices mentioned above for engaging in transactions that do not violate copyright laws.
58. We consider this a reasonable assumption given the results of our empirical analysis of the industry's legal initiatives.
59. A recent survey by *The Leading Question* and *Music Ally* finds a marked reduction in illegal file sharing over P2P networks in Britain. Regular file sharing dropped by about a quarter (from 22 percent in December 2007 to 17 percent in January 2009), with the largest drop occurring among 14-18 year-olds. The survey attributes the reduction to the increased availability of convenient legal sites. While some of these offer free streaming (but still pay royalties to music companies), the ratio of pirated tracks to legally purchased tracks has declined from 4:1 to 2:1 over the same period. Press release on July 13, 2009, available at <<http://musically.com>>.
60. Netflix currently offers an unlimited movie streaming service to its members, but this has a limited selection and involves either a cumbersome connection to a computer or purchase of a Roku set-top box for movies to be viewed on a television set. Blockbuster introduced its own set-top box in late 2008 which permits digital movie downloads. Best Buy has recently entered into strategic partnerships to stream movies from Netflix's library directly to its generic-brand Blu-ray disc players and from Blockbuster's library to TiVo DVRs and Samsung high-definition television sets and Blue-ray players. Refer to Steve Lohr, "Best Buy Prepares for the Post-DVD Era," *The New York Times*, November 3, 2009. These technologies provide novel ways to rent and buy movies over the Internet, which is becoming more viable with increased availability of superfast Internet connections.
61. A similar system (Digital Entertainment Content Ecosystem) is under development by Sony and a consortium of five major film studios, retailers, service providers, and consumer electronics and information technology companies. The consortium excludes Disney and Apple, so DECE-licensed movies will likely not be sold through iTunes or be compatible with Apple devices such as iPhones.
62. Using this technology, EPIX (a movie channel owned by Viacom, MGM Studios, and Lionsgate) permits Verizon FiOS subscribers to watch a movie with up to five non-subscriber "friends." This premium channel includes extras such as interviews and behind-the-scene specials for each movie as well as the capability to pause and restart the movie.
63. Gopal, *op. cit.*, shows that lowering the price of music encourages more consumers to buy through online sources rather than download through P2P sites. They also contend that sampling music online helps level the playing field for less well-known artists. This strategy is attractive to listeners because it permits purchases better tailored to their tastes.
64. R. Casadesus-Masanell and A. Hervas-Drane, "Peer-to-Peer File-Sharing and the Market for Digital Information Goods," working paper, Harvard Business School, May 2007.
65. Revenue streams from concerts are large. Connolly and Krueger document evidence that concerts provide more income to musical performers than record sales or licensing, based on 2002 data. The top thirty-five bands in that year earned seven and a half times as much from live performances as they did from selling records, while income from publishing royalties was slightly lower than recording income. M. Connolly and A.B. Krueger, "Rockonomics: The Economics of Popular Music," in V.A. Ginsburgh and D. Throsby, eds., *Handbook of the Economics of Art and Culture, Volume 1* (Amsterdam, the Netherlands: New Holland, 2006), pp. 667-720.
66. *Global Entertainment and Media Outlook: 2009-2013*, PricewaterhouseCoopers, 2009, available at <www.pwc.com/gx/en/global-entertainment-media-outlook/index.jhtml>.
67. TDC, an Internet service provider in Denmark, bundles a music subscription service with its broadband and telephone packages, which provides free access for both mobile and broadband customers. The churn rate for TDC has fallen by 30-40 percent for mobile customers and 60 percent for broadband since the launch of the music subscription service, according to the *IFPI Digital Music Report 2009: New Business Models for a Changing Environment*, *op. cit.*
68. One reason for the lack of commercial success of free and subscription Internet sites is that the media industry has withheld its full support (e.g., by charging high royalties and limiting available selections) based on the belief that new revenues from these channels would not fully compensate for revenue losses from existing high-margin distribution channels.