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Purchase, pirate, publicize: Private-network music sharing and market album sales

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ABSTRACT

I quantify the effects of private-network music sharing on aggregate album sales in the BitTorrent era using a panel of US sales and private-network downloads for 2109 albums during 2008. Exogenous shocks to the network's sharing constraints address the simultaneity problem. In theory, private-network activity could crowd out sales by building aggregate file sharing capacity or increase sales through word of mouth. I find evidence that private-network sharing results in decreased album sales for top-tier artists, though the economic impact is quite modest. However, private-network activity seems to help mid-tier artists. The results are consistent with claims that word of mouth is stronger for lesser-known artists and that digital sales are more vulnerable to increases in file sharing capacity. I discuss policy implications and alternatives to costly legal efforts to shut down private file sharing networks.

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1. Introduction

The relationship between media production and media piracy is not as straightforward as each side of the debate might claim. To copyright holders, every illicit transaction represents the loss of a legitimate purchase that might otherwise have happened. However, many pirates would never have purchased at the price the producer had set, and these new illicit consumers may increase exposure of the product. Such exposure may induce new transactions that might otherwise have never happened, and these transactions may accrue to the copyright holders themselves. How the tension resolves is thus an empirical question. Does the substitution of piracy for purchasing overwhelm the possibilities of a larger audience, or do new consumers outnumber the forgone sales to pirates?

This paper addresses that empirical question in the market for recorded music and its file sharing counterpart. Drawing from data

on US album sales and on activity within a private file sharing network, I follow 2109 albums over 27 weeks in 2008 to estimate the effect of an exogenous change in private-network file sharing activity on album sales. I find that the file sharing elasticity of sales is -0.02 for physical sales, -0.04 for digital sales, and -0.02 overall. I interpret these results as evidence that private-network piracy leads to a crowding out of legitimate sales and that this crowd-out is more significant in the market for digital music, but that the practical extent of these effects is quite small. The results are less clear-cut when controlling for artist popularity; effects are negative for top-tier artists but positive for mid-tier artists. I take these results as evidence that private-network activity leads to a crowding out of sales for artists with an established reputation but can act as a channel through which word-of-mouth increases exposure (and sales) of music by less-established artists. Again, the economic magnitudes of these effects are fairly small.

It is crucial to understand exactly what these results measure, especially when considering their implications for copyright policy. The data measure music piracy at a single private sharing network and measure sales for the entire US market; I cannot and do not attempt to quantify individual consumers' elasticities of demand in this paper. Instead, I measure the impact of a single file sharing network on the whole music market, which is the relevant measure when law enforcement organizations are deciding whether to take action against a single file sharing network. This would be

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¹ This paper is a major revision of a previous project entitled "Private Filesharing Markets and Album Sales" (Lee, 2009). I am grateful to faculty and colleagues at Queen's University and Vanderbilt University, attendees of the American Law and Economics Association 2016 Annual Meeting, Stan Liebowitz, and anonymous referees for helpful comments and discussion. I am especially indebted to the John Deutch Institute, whose financial support enabled my use of the Nielsen SoundScan data. All errors are my own.

a nonsensical effect to try and measure in conventional markets (“What is the effect of increased car theft in Honolulu on car sales for the US as a whole?”), but the social nature of sharing networks and the fact that the goods shared on them are infinitely replicable mean that activity in one corner of the market can spill over into and magnify activity in the rest of the market. The results in this paper, interpreted in the context of previous evidence on the relationship between sales and all piracy, are consistent with a private piracy elasticity of aggregate piracy of 0.15; that is, a 10% increase in private-network music sharing will spill over and manifest as a 1.5% increase in piracy overall.

In equilibrium, sales and piracy are simultaneously determined: the unobserved effects of album popularity, media exposure, and other variables that impact music consumption will influence sales and downloads alike. Thus identification of the effect of piracy on sales requires an exogenous covariate. Fortunately, the file sharing data that I use include such covariates. The file sharing network under study requires that a user’s ratio of lifetime uploading to downloading must exceed a certain threshold, or the user will be banned from the network. In other words, users must give back in some proportion to what they receive. It follows that the more slack this constraint is for a user, the more that user can download. There are events during the sample period where users are credited for uploading, but not for downloading, known as freeleeches. These freeleech periods alter the slackness of the user’s ratio constraint, which elicits exogenous variation in file sharing on the entire network. I use an assortment of freeleech measures and ratio slackness measures as instrumental variables, and I provide robust support for instrument suitability in first-stage results as well as in post-estimation testing.

The results are of both academic and practical interest. The relationships between physical, digital, and illicit markets is illuminating in its own right, and the interaction of conventional markets with diffuse digital markets is of broad interest to economists. But the results can also inform business and policy decisions in the market for music and for other media as well. Trade groups such as the Recording Industry Association of America (RIAA) and the International Federation of the Phonographic Industry (IFPI), alongside national and international law enforcement agencies, spend considerable effort and resources to deter piracy and shut down file sharing networks like the one studied in this paper. If these networks have only a small effect on sales, these efforts may be better allocated elsewhere.² I discuss alternative policies that include a more focused anti-piracy effort that concentrates only on top-tier artists’ music, facilitating legitimate digital consumption, and varying licensing royalties to amplify file sharing’s benefits and mitigating its costs. The paper’s results should help to inform policy and business strategies by trade groups, law enforcement agencies, and policymakers.

1.1. Review of existing literature

Researchers have spent considerable time studying the effect of file sharing on the music market. A clear picture has not emerged, but research does focus on two main arguments. The “traditional” view argues that piracy simply substitutes away from legitimate sales, which is tantamount to theft in the short run and degrades the incentives to create music in the long run. Therefore, strong protection of intellectual property is needed to inhibit piracy and provide adequate incentives to create new music. The other view argues that even if substitution does occur, it is certainly not at a one-to-one rate, and that file sharing is a highly effective distribution method which allows sampling, spreads information about

music quality, and gives smaller artists easy and direct access to listeners. These channels can create new consumers who would never have purchased the music otherwise. Theoretical and empirical work has investigated both arguments, and consensus is elusive.

Numerous surveys and meta-analyses of existing research have been carried out to determine which of the two arguments is more relevant. Depending on the study, authors conclude that consensus has not been reached (Connolly and Krueger, 2006), that the effect is negligible (Oberholzer-Gee and Strumpf, 2010), or that the effect is positive (Dejean, 2009). Other studies examine the evidence and conclude that the effect is decidedly negative (Liebowitz, 2005a, 2005b, 2006a, 2006b). I provide a short overview of the literature below, but the interested reader should consult these reviews for a more thorough consideration.

Theorists have argued for the possibility of a “sampling” effect, wherein file sharing allows users to try before they buy, and concluded that empirical testing is needed to determine whether the sampling effect actually outweighs the conventional substitution effect (Peitz and Waelbroeck, 2006a, 2006b; Gopal et al., 2006). I interpret the current paper’s findings in the context of a word-of-mouth effect which is similar to the sampling effect, but incorporates social network structure.

Since the effect of file sharing is fundamentally an empirical question, many studies have been carried out to determine the effect’s direction and importance. The majority of these studies find a negative effect, whether using survey data (Waldfoegel, 2010; Zentner, 2006; Rob and Waldfoegel, 2006; Leung, 2008), macro-level data with proxies for file sharing such as broadband access (Peitz and Waelbroeck, 2004; Danaher et al., 2014; Hui and Png, 2003; Liebowitz, 2008), or the emergence of file sharing as a natural experiment (Mortimer et al., 2012; Hong, 2013). Other studies find no statistically significant effect in survey data (Andersen and Frenz, 2010) or on long-run trends in music quantity (Waldfoegel, 2011) and music quality (Waldfoegel, 2012). However, none of these studies observes both sales and piracy at the album level; they instead rely on survey-based, proxied, or aggregated measures of file sharing activity.

Only a few studies exist that observe sales and file sharing at the album level. Oberholzer-Gee and Strumpf (2007) find no evidence of a statistically significant effect of file sharing on album sales, using German school vacations as a source of exogenous variation in available files. Blackburn (2006) estimates the effect of album-level file sharing supply on sales, using RIAA legal action as an exogenous file sharing risk shock. The author concludes that sales for less popular artists benefit from file sharing, sales for more popular artists suffer, and that these effects zero out on net.

This paper uses a similar data structure to the above album-level studies but nevertheless makes novel contributions. I collect a unique dataset of album-level file sharing transactions from a technologically modern environment with a longer and wider panel of albums than other similar datasets. The size of the dataset facilitates the distinction between physical and digital sales, as well as a finer gradation of artist popularity. The exogenous variation used is a product of the file sharing network itself, not of user behavior, inherent characteristics of an album, or macro-level trends, and is unique in that quality. The findings of the paper thus shed new light on aspects of the sales-piracy relationship, whether these aspects have been studied extensively (e.g., elasticities) or have received less attention (e.g., physical-digital and popularity distinctions).

Further, this paper makes entirely new contributions to the policy debate surrounding piracy. The research noted above aims either does not disaggregate (focusing on piracy as a whole) or disaggregates by characteristics of the good in question (e.g., by album, genre, or popularity). This paper disaggregates by character-

² See BBC News (2007) and Fisher (2007) for an example of this point.

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