



Music piracy: Bad for record sales but good for the iPod?



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ABSTRACT

Music piracy is a double-edged sword for the music industry. On the one hand, it hurts record sales. On the other hand, it increases sales of its complements. To quantify the effect of music piracy, I construct a unique survey data set and use a Bayesian method to estimate the demand for music and iPods, and find three things. First, music piracy decreases music sales by 24% to 42%. Second, music piracy contributes 12% to iPod sales. Finally, counterfactual experiments show that, if music were free, the increase in Apple's profits from iPod can more than compensate the loss of musicians. The last result implies that a Pareto improving iPod tax is possible.

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1. Introduction

In 1999, record sales started to decline after more than a decade of steady growth. The very same year, Napster, the first peer-to-peer (P2P) software used for pirating music, began operations. While there are other factors that might lead to a decline in record sales,¹ there is almost a consensus in the economics literature that music piracy has led to the decline (see Blackburn (2004), Liebowitz (2006), Peitz and Waelbroeck (2004), Rob and Waldfogel (2006), Waldfogel (2010), and Zentner (2006). Smith and Telang (2012) provide a more recent review of the literature.)²

Although, as noted, many economists argue that music piracy hurts record sales, Oberholzer-Gee and Strumpf (2010) argue that it can increase revenue from music complements such as concerts. When music piracy drives the effective price of an album down to nearly zero, more

consumers become familiar with the artist's music, thus driving up demand for concerts. Mortimer et al. (2012) show empirically that music piracy has a significant effect on concert demand, particularly for small artists. Concerts are not the only music complements to benefit from music piracy. Fig. 1 shows that the revenue of iPod, the most popular MP3 player by far, has increased considerably when music piracy becomes more widespread. Although record sales have declined by more than 25% since Napster was launched, Apple has seen exponential growth in iPod sales since the device was introduced in 2001. Revenue from iPod sales grew from \$344 million in 2003 to \$7.6 billion in 2006.

Netanel (2003) and Fisher (2004) argue, if there is strong complementarity between music piracy and iPod sales, it might be welfare-improving to have a regime in which music piracy is legal and a government-financed fund (financed by a tax on music complements such as iPods) compensates music producers according to the download rates of their records. In fact a similar system, private copying levy, which is a surcharge on the price of media capable of making copies and is supposed to be redistributed to copyright holders, is enforced in many countries, including the U.S., Canada and many other European countries. The goal of such levies is to offset

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¹ For example, as a referee pointed out, the availability of internet radio might lead to a decrease in demand for music records.

² Oberholzer-Gee and Strumpf (2007) disagree, however, arguing that music piracy "allows users to learn about music they would not otherwise be exposed to" and thus may actually boost record sales.

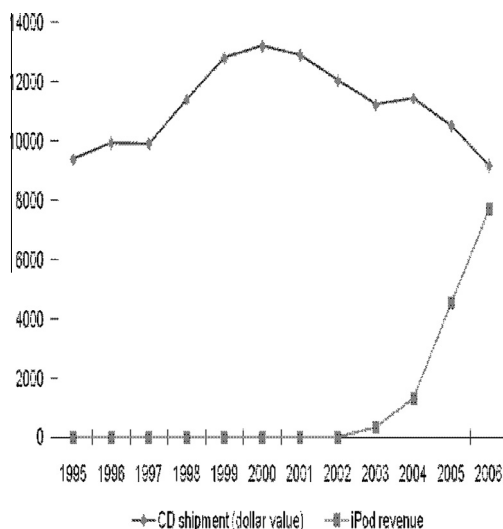


Fig. 1. RIAA and Apple: CDs revenue decreasing, iPods revenue growing in the U.S. (\$ millions).

the loss resulted from lawful copies made for private consumer use.³ While most countries' private copying levy is imposed on media such as blank CD-Rs, some European countries such as Belgium, Finland, and Switzerland have imposed private copying levy on MP3 players including iPods.

This paper attempts to answer two questions: (1) how much does music piracy hurt record sales; (2) how much does music piracy benefits iPod sales, and whether an iPod tax is welfare improving? To answer these two empirical questions, I constructed a unique conjoint data set derived from a survey of 884 University of Minnesota undergraduates. The students were first asked to report their demographic information and their recent consumption of both music and iPods. Then, in the conjoint survey, they were asked to make choices about music (from both legal and illegal sources) and iPods in 12 hypothetical situations.

My empirical analysis consists of three parts. First, I set up a demand system with three types of music: CDs, legally purchased songs from iTunes, and pirated songs from P2P websites. I estimate this system of three simultaneous equations using the three-stage least-squares method. My results corroborates with the majority of the literature that music piracy hurts record sales. Second, I use the estimates from the first part to establish a random-coefficient discrete-demand model for iPods. I follow Rossi et al. (2005) in setting up a hierarchical Bayesian discrete-demand model. These estimates indicate that music piracy boosts demand for and sales of iPods. Third, I use the estimates from the first and second parts of the analysis to conduct counterfactuals to predict the changes in demand for music and iPods in different regimes. The results show that approximately 12% of Apple's revenue comes from music

³ Note that the private copying levy is different from the system proposed by Netanel (2003) and Fisher (2004) in the sense that the former system does not legalize music piracy.

piracy, which translates into \$1.1 billion using 2008 revenue figures. Also a Pareto improving iPod tax is possible.

The remainder of the paper is organized as follows. Section 2 discusses the conjoint survey data set. Sections 3 and 4 describe the set-up of the demand estimates for music and iPods, respectively, and discuss the estimation results. Section 5 reports the results of counterfactual experiments using the results from Sections 3 and 4. Section 6 concludes the paper.

2. Data collection and description

There has been a consensus that music piracy hurts record sales. Fig. 1 in the Introduction shows that the decline of record sales started in 1999, the year in which the first P2P software, Napster, was introduced. At the same time, the sales of iPod, a complement of music, has seen exponential growth since it was introduced in 2001.

In order to jointly investigate the impact of music piracy on the both the music demand and iPod demand, I build a discrete choice demand model for iPod in which consumers consider their (continuous) music and (discrete) iPod consumption jointly in Sections 3 and 4. In the model, an agent can attain a higher utility by consuming both music and iPod than by consuming only one of them. Because a data set encompassing the consumption of illegal downloads, legal music, and iPods is hard to come by, I use a different approach from that of previous researches.

I collected conjoint survey data from college students, who generally have a lower income and greater exposure to the Internet than other age groups. As Table 1 shows, college students also tend to download or pirate more music than other age groups. There is concern that the sample is not representative of the U.S. market. However, according to AdMob, a Google subsidiary and one of the world's largest mobile advertising platform, 78% of iPod touch users were 24 years old or younger in 2010 (Admob (2010)).

2.1. Conjoint survey

I conducted the survey in Fall 2007 (September and October) and Spring 2008 (January and February) among seven undergraduate classes.⁴ Of the approximately 1800 students registered for these classes, approximately 900 attended class on the day of the survey and 884 turned in completed surveys.

Table 2 shows that Apple enjoys more than 70% share of the MP3 market. Sandisk, its closest competitor of Apple, sells only one-eighth of what Apple does.⁵ Therefore the survey focuses on one dominant brand of MP3 player, the Apple iPod.

The survey comprised of two parts. The first asked students to report demographic information and give details concerning their Internet access and music and iPod consumption preferences. The second was the conjoint survey.

⁴ All of them were Principles of Microeconomics.

⁵ The respondents also showed a distinct preference for iPods in a trial run of the survey that included other brands of MP3 players.

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