

**WHERE THE HITS HAVE NO NAME: HOW LEADING INCUMBENT FIRMS
SUCCESSFULLY REACT TO DIGITIZATION IN THE MUSIC BUSINESS**

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**Where the hits have no name:
How leading incumbent firms successfully react to digitization in the music business**

ABSTRACT

By devaluing physical distribution, digitization poses a challenge to adaptation for leading incumbents. Focusing on supply and demand in the music industry, we explore how digitization affects leading incumbents' innovations. Examining the 2012 introduction of streaming sales in the U.S. *Billboard* singles chart, we find that, in the streaming channel, demand is more heterogeneous and fewer leading incumbents enter the charts. Analyzing then data on 8,184 releases, we find that leading companies' innovation strategies change depending on information the chart provides and that these firms can sustain sales by (1) leveraging innovations related to emergent artists and (2) diversifying into more genres. These findings shed light on effective strategies when facing a change that fosters more exploration in the market.

INTRODUCTION

Incumbent firms can encounter many problems in adapting their strategies to technological change (Christensen & Bower, 1996; Danneels, Verona, & Provera, 2018; Eggers & Park, 2018; Henderson & Clark, 1990; Leonard Barton, 1992; Tripsas & Gavetti, 2000). In several industries, digitization has devalued complementary assets of leading incumbents (i.e., control over physical distribution), thus posing a threat to their market power and survival (Benner & Waldfogel, 2016; Tripsas, 1997).

Complementary assets not only allow firms to appropriate rents generated by innovations but also influence investment decisions for innovation (Wu, Wan, & Levinthal, 2014). The digital change has led to more market uncertainty and deprived leading incumbents of revenues, potentially undermining their ability to invest in new products (Waldfogel, 2018). Nonetheless, evidence suggests that in many cases, such as music, these firms have unexpectedly showed staying power (Cozzolino & Rothaermel, 2018). Thus, the recent wave of digital transformation is creating an unusual technological discontinuity in most markets that calls for further understanding of the phenomenon to shed more light on how some incumbents have survived and adapted their strategies (Eggers & Park, 2018). To this end, we investigate the following research question: how does digital change affect leading incumbents' innovation strategies?

To answer this question, we embrace a demand perspective and rely on various streams of literature to complement insights from technological change and complementary assets research streams. Our main argument builds on the idea that a sudden market information change (Anand & Peterson, 2000) on demand in the digital distribution channel can make digitization more important, and leading incumbents can use this knowledge to reconfigure resources and adapt their strategies. In particular, we rely first on research in strategy (e.g. Cozzolino, Verona, & Rothaermel, 2018) and social influence (e.g. Salganik, Dodds, & Watts 2006) to argue that by destroying physical retail, digitization, on the one hand, makes it easier for unsated demand to access more diverse new

products and, on the other hand, boosts social influence, thus leading to an increased heterogeneity at the market level. Second, we leverage insights from studies on demand (e.g., Adner, 2002; Priem, 2007) and exploration (e.g. March 1991, O'Reilly & Tushman, 2016) to argue that leading incumbents, owing to their ability to focus on both mainstream and niche markets (Eggers, 2012), are better positioned than niche players to reconfigure their resources and adapt their innovation strategies. Specifically, they can leverage their experience to pursue more exploration to meet the increased market heterogeneity. Consequently, the effect will be a greater variety of the innovations introduced in the marketplace.

We test our hypotheses in the music industry, in which two types of incumbents exist: major and independent record companies. We rely on two unique types of data and focus on streaming as the most recent form of digitization. First, we use a market information change from U.S. *Billboard* magazine, which began to include streaming sales in its Hot 100 chart in 2012. We find that after the change, demand rewarded greater variety, in that independent companies were more likely to enter the chart; however, major companies' emergent artists in a niche genre experienced an increase in their positions as well. We therefore analyze the innovations implemented by major companies immediately after the change, using a data set consisting of 8,184 new product releases for two years before and after 2012. We find that the major firms changed their strategy after the *Billboard* change. We also find that, after 2012, leading firms that increased especially the number of releases by emergent artists and that differentiated into more genres were more successful.

This study contributes to literature on technological change and incumbents' adaptation by highlighting two main effects of digitization on demand and supply. First, demand changes and rewards more heterogeneity. Thus, by exploiting a change in how market activity is reported, our study sheds more light on the effects of digitization on consumption of new products of different incumbents and on how firms can then use this fine-grained information to adjust their innovation

strategies (Adner & Snow, 2010b; Cozzolino & Rothaermel, 2018; Priem, 2007). Second, despite the initial threat, leading incumbents displayed the ability to explore segments distant from their core business, which had subsequent positive effects on performance. We thus show how leading incumbents can successfully adapt to a technological change such as digitization by exploring more, thereby providing a better understanding on the relationship among complementary asset discontinuities, innovation, and adaptation strategies (Eggers, 2012; Eggers & Park, 2018; Kapoor & Kleuter, 2015; Taylor & Helfat, 2009; Tripsas, 1997; Wu *et al.*, 2014).

The rest of this paper proceeds as follows: the next section identifies the main research areas that shed light on the effects of digitization on both demand and supply. Then, after we introduce the empirical setting and discuss the results of the analyses, we revisit the themes of incumbents' adaptation and technological change.

THEORY AND HYPOTHESES DEVELOPMENT

Incumbents present several inertial forces when facing technological changes, including architectural impediments (Henderson & Clark, 1990), core rigidities (Leonard Barton, 1992), and market shortsightedness (Christensen & Bower, 1996). Complementary assets, such as physical retail for consumer goods companies, create frictions in the flow of goods and information in the market, and these frictions favor leading incumbent organizations. Complementary assets allow firms to appropriate the rent of innovation and to survive technological discontinuities that threaten to destroy their core competences (Rothaermel, 2001; Teece, 1988; Tripsas, 1997). Consequently, complementary assets affect how firms view technological changes, influencing both the magnitude of resources that should be invested and the trajectory to which these resources should be directed (Wu *et al.*, 2014). In many industries, digital change has affected leading incumbents by devaluing the physical distribution channel, a complementary asset, challenging their survival and market leadership (Taylor & Helfat, 2009; Tripsas, 1997). Thus, it has become easier for niche producers to

access the market. In the entertainment business, for example, with the advent of the Internet and digital distribution, leading producers of television content no longer control the market's access to products. The publishing industry experienced a similar change (Cozzolino *et al.*, 2018): digitization deprived many firms of revenues, thus potentially undermining their ability to invest in new products and increasing market uncertainty. The digital challenge is likely to have a profound impact, especially in industries such as music and publishing, which are characterized by rapidly changing style preferences of consumers and in which firms gain a key strategic advantage by controlling the products to which the market has access (Anand & Peterson, 2000; Peterson & Berger, 1971). In summary, in many industries, digitization affects innovation strategies and poses a problem of adaptation.

At the same time, however, anecdotal evidence shows that, in many cases, leading producers have been able to adapt and innovate so as to still dominate the market (e.g., Cozzolino & Rothaermel, 2018; *The Economist* 2017a). We aim to shed more light on this phenomenon by arguing that when consumers have greater access to supply, their consumption consists of a greater variety of products in the digital channel and that a change in market information about this access can then stimulate a greater variety of product innovations introduced by leading incumbents.

Digitization and demand

The advent of digitization introduced two main changes for consumers: first, they began to have access to more information about products. Before digitization, consumers could only attain information about new products through channels controlled by incumbents, and by determining the information available to consumers, incumbents were able to shape consumer preferences (Anderson, 2004; Dowd, 2004). After digitization, incumbents were much less able to influence consumer preferences because they had less control, if any, over the channels that consumers used to discover new content. For example, in the predigitization music industry, radio was the only

medium consumers could use to discover new music before purchase. Digitization brought a greater variety of media to consumers to discover new music (e.g., YouTube, Spotify). Thus, after digitization we would expect higher demand heterogeneity because the increase in information available to consumers granted them greater freedom to develop their own tastes (e.g., Datta, Knox, & Bronnenberg 2017).

Eliminating frictions and creating direct access to products not only enhanced heterogeneity of consumption and provided a stimulus to assess product innovation but also increased the influence of social networks relative to producers. According to studies on the influence of micro social networks, consumers seek and use a wide range of information as signals of the quality and value of innovation (Keuschnigg, 2015), such as peer preferences and related social influence dynamics (e.g., Lizardo, 2006; Salganik, Dodds, & Watts, 2006). Moreover, success is only partly determined by quality, and increasing the strength of social influence can increase both inequality and unpredictability of success (Salganik *et al.*, 2006; Salganik & Watts, 2008, 2009). This finding suggests that with digitization, a firm can fail to predict success because, when individual decisions are subject to social influence, markets do not simply aggregate preexisting individual preferences. This increased market uncertainty can make it more difficult for leading incumbents to understand demand in the digital channel and, thus, how they should adapt their strategies. In many industries characterized by volatility in demand taste, industry players rely on a market information regime about sales to make sense of market and competition dynamics (Anand & Peterson, 2000). Thus, a sudden change in the regime itself that includes information on sales from the digital channel is likely to reveal the increased variety of consumption. In summary, we hypothesize the following:

Hypothesis 1. *A market information change to include sales related to a new digital distribution channel reveals more diversified consumer preferences.*

Digitization and supply

Looser control over consumer preferences and offerings can make it more difficult for leading incumbents to understand consumer demand than in the past and, thus, adapt their strategies. In industries characterized by volatility in demand taste and in which industry players rely on market information about sales, a change in the information regime that includes information about digital sales could enable incumbents to better observe consumer preferences and their greater heterogeneity (Priem, 2007). Namely, a new information regime allows managers to fully observe the extent of consumer taste heterogeneity. Revealed demand heterogeneity can thus contribute to firm heterogeneity through managers' differing judgments about, and decisions in response to, consumer heterogeneity (e.g., Adner, 2002; Adner & Snow, 2010a, 2010b). When the consequences of digitization become fully visible to managers after the information shift, new product characteristics and optimal differentiation become more important in explaining success (Askin & Mauskapf, 2017). Thus, information about sales that includes digital or streaming sales can potentially further stimulate innovation of leading incumbents. For this reason, we propose the following:

Hypothesis 2. *After a market information change revealing more diversified consumer preferences, leading firms will explore more than before the change.*

Studies on incumbents facing technological changes have highlighted different ways they can achieve adaptation (Eggers & Park, 2018). A greater exploration orientation is deemed to be at the heart of a firm's adaptive ability because it generates internal variety, allowing the firm to adapt to shifts in markets, technologies, and competition through innovation (March, 1991, McGrath, 2001). Increases in internal variety generate new information and knowledge, which in turn promote innovation because organizations can improve on what they know and solve problems in new ways (March, 1991, Utterback, 1994). Specifically, access to new market information and more in-depth knowledge on demand, while revealing more variety in terms of consumption, can also stimulate exploration for leading incumbent organizations, either with radical new products or in distant

segments (Benner & Tushman, 2003). Past experience in entering new product categories helps explain the ability of leading incumbents to adapt (e.g., Bayus & Agarwal, 2007; Chen, Williams, & Agarwal, 2012; Eggers, 2012). Indeed, not only does experience in previous markets increase the probability of a firm entering a new market (King & Tucci, 2002), but firms with greater past experience in entering new product categories can also produce higher-quality products when they enter subsequent new categories (Eggers, 2012). The ability to reconfigure resources to better match market variety can help firms avoid rigidity and identify new opportunities (e.g., Gavetti & Levinthal, 2000; Kapoor & Kleuter, 2015), thus benefiting performance. Exploration is likely to be beneficial especially in the case of large, infrequently occurring structural shocks such as digitization (Stieglitz, Knudsen, & Becker, 2016). Anecdotal evidence suggests that digitization tends to reduce organizational inertia and to make leading incumbents more prone to exploration and new value creation strategies (*The Economist*, 2017b). Access to new, direct information on consumption helps leading incumbents pursue this strategy by increasing the number of new products and diversifying more into different niches. And this adaptation is likely to have a positive impact on success. For all these reasons, we hypothesize that:

Hypothesis 3. *After a market information change revealing more diversified consumer preferences, leading firms that (a) release more new products and (b) diversify more their portfolio of new products are more successful in the market.*

EMPIRICAL SETTING

Many sectors, such as the book, music, and movie industries, have been deeply affected by the advent of digitization. To test our hypotheses, we decided to use the music industry for two main reasons. First, music was one of the first industries to experience the dramatic effects of digital technologies, thus making it a suitable context to investigate the impact of digitization on industry players (Greenstein, Lerner, & Stern, 2013). Digitization has taken place through two waves—namely, downloading and streaming—which have had different effects on industry players. With the

advent of downloading in 2000, digitization moved music consumption from physical to digital distribution. New distribution players, such as iTunes by Apple, displaced physical stores. In downloading stores, consumers could spend less by buying a \$0.99 single song rather than a \$15 album (Busch, 2012). This change, combined with illegal file sharing on the Internet, dramatically reduced revenues of music producers, the record companies (International Federation of the Phonographic Industry [IFPI], 2015). More important to our study, for the incumbent record companies that formerly controlled access through physical distribution, this change implied the loss of a key complementary asset. However, despite increasing information and access for consumers, these leading incumbents did not embrace a new business model.

Streaming platforms like Spotify began to appear some years later, bringing another, deeper change to the industry. Streaming affected the logic behind music production and, ultimately, promotion and distribution (Busch, 2012): consumption actually shifted from ownership to access. Consumers did not buy and own music anymore; they gained access to music stored online. Music is an experience good, meaning that preferences are revealed only after consumption has occurred. Consumption through access particularly lowered the perceived psychological risk related to niche products: online retailers could now carry niche products with limited appeal because the cost of stocking an additional album or single on the Internet is virtually zero and online retailers could aggregate demand by finding audiences across the globe. The “long-tail” argument suggests that niche products, such as remote genres or music from lesser-known artists, can find an audience and earn similar margins to a hit product (Anderson, 2004; Brynjolfsson, Hu, & Simester, 2011; Brynjolfsson, Hu, & Smith, 2006; Elberse & Oberholzer-Gee, 2007). Michael Nash, executive president of digital strategy, Universal Music Group, said:

But the move from downloading to streaming means consumers have access to millions of tracks. This means everything we are doing now around establishing artist brands, driving preference and marketing, is different (IFPI, 2016, p. 15).

Therefore, whereas downloading primarily influenced physical distribution, streaming had a subsequent impact in terms of development and marketing, ranging from understanding and exploiting big data for new product development to managing social interactions with fans for marketing purposes. Digital distribution channels, and especially streaming platforms, have made it possible to reach global audiences faster and more easily. Consumers' modes of music discovery, previously dominated by local radio, now include global streaming platforms, social sharing, and recommendation engines (e.g., Dewan & Ramaprasad, 2012; Hendricks & Sorensen, 2009). Over time, consumers have increasingly moved away from physical to digital and from downloading to streaming. Digital music has gained increasing relevance in terms of sales, and in 2010, digital sales surpassed physical sales in the U.S. market. More important, streaming has become the dominant form of music consumption, and in 2017, it generated 65 percent of total music revenues in the United States (*Billboard Bulletin*, 2018). Thus, herein we focus on this form of digitization because streaming has become the dominant channel in music and has had a profound impact on the industry.

The second reason the music industry provides a suitable setting to analyze digitization is related to the industry structure and its neat classification of incumbent firms (Eggers & Park, 2018): we can exploit incumbents' heterogeneity by distinguishing between major and independent record companies. With regard to age, tenure, and survival of transitions in the industry (Chen *et al.*, 2012), major record companies are the dominant established incumbents of this industry (Benner & Waldfogel, 2016). Today, three firms are considered major: Universal, Warner, and Sony. Although they pursue exploration and exploitation strategies in terms of type of artists and type of music genres, they have historically targeted the mainstream segment (Hull, Hutchison, & Strasser, 2011). The music market is dominated by the mainstream genre, which is the most popular genre and tends

to change every 10 years.¹ Since approximately 2007, in the United States and several other markets this genre has been pop music. All the other music genres (e.g., indie folk, country, neo soul) are consumed by small segments of the market and thus are more niche oriented (King, 2012). Starting from the 1970s, the major record companies' power was built by branch distribution and the ability to create or buy other music companies (Hull, Hutchison, & Strasser, 2011). By controlling access to physical distribution, they experienced a complementary asset discontinuity with digitization.

Independent record companies, by contrast, accomplish two functions in the industry: they explore a diverse music repertoire that major companies neglect because of the small amount of sales generated and provide a source of new talent and music direction for major companies (Hull *et al.*, 2011). They occupy a different, niche-oriented strategic positioning than major firms and are historically focused on nonmainstream music genres (Benner & Waldfogel, 2016). Independent companies are potentially better positioned to meet the demand needs when a discontinuity such as digitization favors shifting from a mass market to micro markets in which “customers demand to have it their way” (Spellman, 2006, p. 3).

Pioneering studies analyzing digital change in the music industry (e.g., Aguiar & Waldfogel, 2015; Smith & Telang, 2011; Waldfogel, 2012a, 2012b, 2015; Zentner, 2006) have focused on various impacts of digitization on music—for example, observing its effect on pricing strategies (Danaher *et al.*, 2014) and estimating sales displacement induced by downloading (Rob & Waldfogel, 2006). Bhattacharjee *et al.* (2007) show that peer-to-peer technologies do not hurt the survival of top-ranking albums but have a negative impact on low-ranking albums. Other studies deal more specifically with copyright protection and incentives to bring forth new products (e.g., Zhang, 2016). For example, empirical evidence suggests that there was no reduction in the quality of music released after the birth of illegal file sharing (Waldfogel, 2011, 2012a). Results also show an increase

¹ <http://everynoise.com/retromatic.html>.

in new album releases in the U.S. market, driven by independent labels and accompanied by a reduction in the concentration of top album sales (Waldfoegel, 2012b). That research, however, has not explored questions at the organization level—that is, the strategy implications for organizations faced with these technological changes and their ability to adapt. Recently, Benner and Waldfoegel (2016) explored the effect of downloading on the strategic positioning of major and independent labels over the period 1990–2010, finding that major companies increasingly choose artists who have been previously successful, thus increasing the share of their releases that achieve commercial success.

Empirical strategy

Given their relevance for performance in contexts such as music (Seabrook, 2015; Trust, 2015), we conducted our analyses on song charts to test Hypothesis 1. In the music context, the only profitable products are those that become hits and reach the top positions in the charts; in the entire industry, 90 percent of the revenues come from just 10 percent of the songs (Seabrook, 2015). Therefore, getting a song in the top-100 singles chart is a critical strategic issue. Rankings of the most popular singles are self-reinforcing, leading to more consumption of the successful products on top of the chart (Anand & Peterson, 2000; *The Economist*, 2017a).

Because major and independent record companies began using streaming as a distribution channel at different times, we decided to exploit *Billboard's* decision to include streaming sales into the song charts as a proxy to understand the effect of the streaming distribution channel from the demand side. *Billboard* is the leading music trade magazine in the United States, and its weekly Hot 100 chart² lists the most popular songs in terms of physical sales, digital sales, streams, and radio

² Although *Billboard* also provides a chart on album sales, we decided to focus on the singles' Hot 100 for two reasons. First, the Hot 100 is the most famous chart, thus more effectively capturing consumer music tastes from the demand point of view. Second, the Hot 100 allows us to better understand the effects of music digitization because digitization, especially streaming, provides incentives for consumption of single songs rather than entire albums (*Billboard Bulletin*, 2015). We therefore believe that focusing the analysis on the singles Hot 100 best serves the purpose of our paper.

airplays (Anand & Peterson, 2000; Bhattacharjee *et al.*, 2007). To reflect digital changes in the market, *Billboard* began to include streams (March 24, 2012)³ in its Hot 100 chart computation rule. We use this decision as an exogenous change for the analyses, in line with previous research: Anand and Peterson (2000) leverage *Billboard's* 1991 change in methodology to compile the weekly charts to explore how organizational fields are constituted. This strategy allows us to test Hypothesis 1 by shedding light on what happens to record companies' and artists' performance in the chart when information on sales from a new distribution channel (i.e., streaming) is included. We can also determine whether this change reveals that consumers reward a greater variety of products. Consequently, we can understand the implications of digitization from the demand point of view. Then, building on these results, the second part of the analyses focuses on the supply side by determining whether leading firms adjusted their strategies according to this information change and how this adjustment may have affected performance. By using data on new products, we can better explore the link between a complementary asset discontinuity and innovation strategies. This exploration serves to test Hypothesis 2 and 3.

Data and sample

We use two main data sources for this study. The first is the *Billboard* Hot 100 chart, which provides information on singles appearing in the top-100 sales positions in the U.S market. The second is MusicBrainz, one of the most comprehensive sources of information on new music released by record companies. The following subsections describe the two data sources in detail.

Billboard data on sales. For the first part of the analyses, our data cover music singles sold in the 48 weeks before and after the change in *Billboard's* sales computation rule for the Hot 100 chart. The final sample consists of 9,600 observations. This sample consists of 231 record companies and 322

³ <http://www.billboard.com/articles/news/502020/hot-100-impacted-by-new-on-demand-songs-chart>, accessed November 25, 2015.

artists. We classified each song in the chart according to the type of record company (also called “imprint”) that produced it.⁴ To compile the data, we first consulted the official websites of the record companies and then relied on other sources (e.g., *Billboard*, Wikipedia, the American Association of Independent Music, Discogs, MTV, news websites) to cross-check the information collected (e.g., type of company, foundation year, acquisitions). We classified record companies as either major (hereinafter, *majors*) or independent (hereinafter, *indies*). Of the 231 record companies in the sample, 109 companies are indies and 122 are majors.

MusicBrainz data on new product releases. The other source of data, MusicBrainz, captures the supply side, which we used for the second part of the analyses. First, we collected data on new releases from the website MusicBrainz, a user-built database containing information on new music produced and released by record companies.⁵ We downloaded 8,184 new product releases by majors (i.e., either the major parent company or a company that belongs to a major conglomerate) from 2010 up to the first months of 2014. We chose this time window to compare two years before the change in *Billboard* with two years after it. This allows us to check for firms’ strategy adjustments to the market information change related to the streaming distribution channel. In addition, by including sales performance measures, it allows us to test whether these changes in firms’ strategies have an impact on performance in the two years following *Billboard*’s change.

Measurement and analysis

⁴ We defined a song as independent if it is produced by an indie or by partnership between/among indies. We defined a song as major if it is produced by a major or by a partnership between/among majors. Finally, we defined a song as a partnership if it is produced by a partnership between/among an indie and a major (or one owned by a major). An indirect measure of the accuracy of our classification is given by the percentage of market shares between major and independent songs: at the time of the change, the market share for indies was approximately 30 percent, and we observed a similar share not only at the market level but also in the Top 200 albums chart (Hull, Hutchison, & Strasser, 2011). In addition, after our classification of the songs in the chart, we obtained similar percentages in the Hot 100.

⁵ Although we acknowledge that this database cannot provide the full picture on every new release (be it a single or album) by every company, it can nonetheless be considered the sample closest to reality in terms of completeness.

To ensure consistency across analyses, we use the same classification criteria for both databases. The following subsections describe the variables and in which cases they are used.

Dependent variables. To understand the effect of the inclusion of streams in the chart, we use two dependent variables to measure song performance, *week position* and *peak position*,⁶ which the Hot 100 chart reports for every song each week. When analyzing new releases in the two years following the 2012 change in the *Billboard* chart, we use the same dependent variables to measure success at the company level.⁷

Independent variables. For the analyses using the *Billboard* change, *streaming* identifies the change in the *Billboard* chart and is a dummy that takes the value of 1 following the introduction of streams in the sales computation rule of the chart and 0 otherwise. *Indie* and *major*⁸ are dummies for the classification of songs according to the company that produced them. *Emergent artist* is a variable identifying an artist according to career stage at the time of interest⁹ and thus capturing exploration (Dowd, 2004). Of the 322 artists appearing in the time window between 2011 and 2013, we classified 104 as emergent and 218 as established.

For the analyses using MusicBrainz data, we classify every company and artist following the same classification that we use for the *Billboard* data. As independent variables, we captured the level of exploration of majors' innovation strategies in a more nuanced way (Anand & Peterson, 2000; Dowd, 2004; Benner & Waldfogel, 2016). First, we used the number of *Total releases* by week, and

⁶ The week position is the current chart position in a specific week, and the peak position is the highest position the song has reached until that time.

⁷ We considered every company's singles that appeared by week in the chart. If the company entered the chart with just one single, we used the single's week and peak position. If the company entered the chart with two or more singles, we computed the average of the week and peak position out of the singles of all the company's singles. For the companies that did not make the chart in a specific week, we left the week and peak positions as missing.

⁸ We do not consider songs produced by partnerships between indies and majors in the analyses.

⁹ To determine whether an artist appearing in the selected time window is emergent, we adopted *Billboard's* classification: an artist is considered emergent if (s)he has not had a single appearing in the Top 50 Hot 100 chart or an album in the Top 50 *Billboard* 200 chart before the date of interest. If one of these two requirements is not met, we classify the artist as established.

computed the variable *Emergent artists* (ratio of the number of releases by an emergent artist to the total number of releases by week) to capture exploration in terms of artistic career. Second, to capture exploration in terms of music genres,¹⁰ we computed *Niches* as the ratio of the number of new releases in a niche genre to the total number of releases by week, as well as the *Blau* index¹¹ (which measures diversity in terms of genres spanned by a record company in a week).

Controls. We added a set of controls for events that might affect music sales and their position in the chart (e.g., Hampp, 2013), such as *Christmas* (a dummy that takes the value 1 in the three weeks preceding Christmas and the one following it and 0 otherwise) and the most important national music awards in the United States (Nielsen, 2014), during which sales of music products tend to increase¹² (the American Music Awards, held in November; the Grammy Awards, held in February; the MTV Video Music Awards, held in late August or mid-September; and the *Billboard* Music Awards, held in December until 2007 and then in May since 2011, when they returned after a period of dormancy). To accommodate the different segments that record companies target, we then classified genres (mainstream vs. niche) according to the same classification for the independent variable described above and used the control variable *mainstream*. We also controlled for the *age* of the company that produced the song.

When performing the analyses at the artist level, we added controls for *artist age* (calculated using the year of the release of the debut album as a proxy for the professional birth of the artist), *artist type* (if performing the song as a solo artist, duo, or group and if featuring another artist or not),

¹⁰We relied on the classification provided by the music website Discogs and cross-checked the evolution of genres over time on the website <http://everynoise.com/retromatic.html>.

¹¹ Previous research has used the Blau Index (Blau, 1977) to measure heterogeneity of categorical variables (e.g., Jiang, Tao, & Santoro, 2010). In our case, $D = 1 - \sum p_i^2$, where D represents degree of diversity, p represents the proportion belonging to a given genre, and i is the number of different genres. The variables range from 0 (perfectly homogeneous) to 1 (perfectly heterogeneous). Thus, a record company that has released new music spanning into different genres within one week will have a D closer to 1.

¹² <http://www.billboard.com/biz/articles/news/5793130/maximum-exposure-2013-grammys-bump-more-than-sales>, Accessed November 18, 2015; <http://www.billboard.com/articles/columns/chart-beat/6236464/2014-vmas-early-sales-gains>, accessed November 18, 2015.

and *artist gender* (male, female, or mixed in case of a duo or group with both male and female performers), plus whether the emergent artist is *spurious*¹³ or *acquired*.¹⁴ To classify artists, we adopted a strategy similar to that used for collecting information on record companies by cross-checking different sources. Table 1 provides descriptive statistics for the data used for the first stage of analyses.

Insert Table 1 about here

To collect information on music genres for the second database, we integrated information from the MusicBrainz website with other two sources of information, Wikipedia and Discogs, because not every new release on MusicBrainz presents music genre information. To perform the regression, we grouped data about releases at the firm level. We then controlled for factors that could affect position in the chart: the *Releases with a featuring artist* and the number of *Reissues* (i.e., the release of an album or single that has been released at least once before). We also controlled for the *Parent company* of each single record company to account for possible differences among majors that could affect releases' position in the chart. We provide descriptive statistics for all the variables used in the second part of the analyses in Table 2.

Insert Table 2 about here

Identification strategy for *Billboard* charts and regression methods

¹³ In a few cases, the artist meets the requirements to be classified as emergent but has some singles or albums that entered the charts at a position lower than the Top 50. This means that his or her career is slightly different from an artist who never had a single or album entering these charts (i.e., a pure emergent artist, which represents the majority in our database). Therefore, we classify these few artists as “spurious” and add the variable *Emergent artist spurious* in the regression equation to control for careers that cannot be considered purely emerging at the time of the analysis.

¹⁴ To ensure that the artists were developed by the current company releasing them, and not externally acquired from another company, we tracked the possible changes of ownership in an artist's career among different record companies. We then built the dummy variable *Artist acquired* to control for the artists releasing under a different company than the one that initially developed them.

To evaluate the effect of streaming on sales performance, we faced a fundamental inference problem. For a given song, for which streaming sales are added, we cannot observe the counterfactual—namely, the changes on sales performance if streaming sales are not added. We thus developed an empirical strategy that takes advantage of several features of our institutional setting to isolate the impact of including streaming sales on sales performance in the chart according to the type of record company that produced the song. We exploited *Billboard's* decision to include streams in 2012 employing a difference-in-differences strategy,¹⁵ in which we compared chart positions of different types of incumbent record companies (i.e., majors vs. indies), before and after the change in the chart. Our first main estimating equation is as follows:

$$\text{DEP. VAR.}_{it} = \alpha + \beta_1 \times \text{MAJOR} + \beta_2 \times \text{CHANGE} + \beta_3 \times \text{MAJOR} \times \text{CHANGE} + \beta_4 \times \text{CONTROLS}_{it} + \epsilon_{it}, (1)$$

where the dependent variables measure song performances in the chart. To test the effect of the change, we regress the dependent variable for company *i* in week *t* on (1) the dummy *major*, (2) whether the company is *streaming* after the change, and (3) the interaction term between *major* and the change. The interaction term shows the effect of the change on the majors.¹⁶ We ran the regression at the company level. In addition to using the control variables described in the “Controls” section, we used the variable *New entrant* to control for new entrants in the years of our time window, so that we could focus on the effect of the change on incumbents only.

Next, we focused on the innovation strategies of majors at the artist level to better understand the changes that resulted from these strategies. In addition to leveraging from a portfolio of existing products (i.e., established artists releasing new music), record companies pursue their

¹⁵ To interpret our coefficients as an average treatment effect, our identification strategy assumes that the timing of *Billboard's* change is uncorrelated with factors that determine the outcomes of interest, conditional on the baseline control. We assume this because *Billboard's* decision to include streaming in the chart is not correlated with the sales of any particular song in the chart before inclusion of streaming.

¹⁶ We clustered robust standard errors by company to reduce the potential for overstating statistical significance as a result of serial correlation within companies (Bertrand, Duflo, & Mullainathan, 2004).

innovation strategies by scouting and investing in new artists. We therefore analyzed songs' performance in terms of artistic career by dividing artists of majors into *emergent* (which captures exploration strategies) and *established*. When releasing new songs by an established artist, a record company builds on existing resources and knowledge. By contrast, releasing the repertoire of a new artist means that the company is relying, at least partly, on a new type of knowledge. We regressed the dependent variables for artist i in week t on (1) the dummy *emergent artist*, (2) whether the artist is *streaming* after the change, and (3) the interaction term between the emergent artist dummy and the change. We ran the regression at the artist level and clustered standard errors by artist:

$$\text{DEP. VAR.}_{it} = \alpha + \beta_1 \times \text{EMERGENT-ARTIST} + \beta_2 \times \text{CHANGE} + \beta_3 \times \text{EMERGENT-ARTIST} \\ \times \text{CHANGE} + \beta_4 \times \text{CONTROLS}_{it} + \epsilon_{it}. \quad (2)$$

We analyzed our panel data on new releases for 100 major record companies over 100 weeks using random-effects models, controlling for week effects.¹⁷ We decided not to use a fixed-effects model because we included in the regression model a variable on the parent company that describes an intrinsic, time-invariant property of record companies. Using a fixed-effects model would not capture these time-invariant effects, as the fixed-effects transformation would eliminate the impact of variables with a constant value over time (e.g., Wang, Wijent, & Heugens, 2018).

RESULTS

In the following sections, we begin by estimating the impact of including streaming sales in the chart, thus focusing on the supply side, and then investigate whether incumbents were able to address the effect of the streaming change by adjusting their innovation strategies and how these strategies affected then success. We conclude by describing our robustness tests.

Sales and the demand side

¹⁷ Not all 100 record companies have new releases, nor do they enter the chart, in every week, which results in some missing values. The total number of observations for which the dependent variables have no missing values is 2,282.

The first analysis we perform is a t-test of the means to determine whether the number of companies in the chart changed after the inclusion of streaming sales. Our results (see Table 3) show that after the change, on average, almost three more indies ($p = 0.015$) and 10 fewer majors appeared in the chart ($p = 0.000$). This result suggests that, as a consequence of how the market consumes through the streaming channel, more indies have broken into the top most successful products, thus increasing music variety.

Insert Table 3 about here

Previous studies (e.g., Waldfogel, 2012a) suggest that this finding indicates more experimentation at the market level because digitization allows consumers to find and buy more niche products (either albums or singles). In other words, postdigitization products that are less promising *ex ante* are not only brought to market more often but also generate more commercial success than their predigitization counterparts (Goldfarb, Greenstein, & Tucker, 2015).

Therefore, we next investigate whether we will observe this positive change in the chart for independent incumbents in terms of position. In other words, in addition to entering the top 100 more frequently, do these companies perform better than majors? We plotted the average week position in the chart for majors and indies in our time window (see Figure 1). We aggregated the average chart position at the month level. The plot shows that before the *Billboard* change, over time the chart position for majors tends to stay the same if not decrease, whereas for indies, it increases. After the change, however, this trend reverses: we observe a decrease in the average chart position for indies but an increase for majors.

Insert Figure 1 about here

The plot in Figure 1 suggests that after introducing streaming sales to the charts, indies and majors' positions in the chart were affected quite differently. In particular, we observe a positive effect for

majors. We confirmed this effect by analyzing sales performance for majors (vs. indies) through a regression. For the dependent variable *week position* (Table 4, column 1), the interaction term has a negative¹⁸ coefficient ($b = -4.121, p = 0.011$), suggesting that, on average, the introduction of streaming sales led to a gain of four positions in the chart for majors. The interaction coefficient is also negative for the peak position ($b = -2.871, p = 0.086$) in column 2, showing that the introduction of streaming improved majors' performance in the chart.

Insert Table 4 about here

These findings provide first insight into the product dynamics—namely, that more niche products coexist with mainstream best-selling products performing better than before. We interpret this evidence as a signal that, overall, the market awards greater variety, providing initial support to Hypothesis 1. To shed more light on what drives this main effect for leading incumbents, in the next step we focus on the innovation strategies related to innovations majors use. We compared the performance of majors' artists—namely, emergent versus established. We again plotted the average chart position (aggregated at the month level) to understand whether any type of change occurred after the inclusion of streaming sales. As Figure 2 shows, the pretrend is constant for established artists, and it remains the same after the introduction of streaming sales. By contrast, for emergent artists, we observe a steady increase in the average chart position after the change.

Insert Figure 2 about here

The regression confirms that the performance of emergent artists of a major is positively and strongly affected by the introduction of streaming sales, compared with established artists'

¹⁸ For the coefficients for the dependent variables *week position* and *peak position*, the substantive meaning of the coefficient is the opposite of its sign (i.e., lower position implies better performance).

performance produced by a major company (see Table 5). However, leading record companies are usually positioned in mainstream music genres, though they also explore niche segments. In addition to requiring specific economic investments, music genres signal a specific and distinct market identity (Montauti & Wezel, 2016). Therefore, we can measure whether exploration of new artists positioned in niche genres distant from majors' typical genres is greater than that of new artists in mainstream genres. In the regression, we thus controlled for the music genre in which an artist is positioned through the dummy variable *mainstream*. We find that, post digitization, an emergent artist in a niche genre observes his or her week position in the chart increase by 13 positions on average ($p = 0.016$), also reaching a peak position much higher than predigitization ($b = -19.517, p = 0.001$), which suggests that including streaming sales has a positive effect on major companies' exploration. These findings provide additional support for Hypothesis 1.

Insert Table 5 about here

New product releases and the supply side

Next, we investigate whether, upon observing this change in the chart from the streaming distribution channel, major record companies adjusted their innovation strategies accordingly and whether this adaptation affected sales performance. This analysis allows us to understand whether major record companies adjusted to the change by pursuing new ways of value creation that meet preference heterogeneity and how this impacted success, thus testing Hypothesis 2 and 3.

We first test whether there is a difference pre-post Billboard change in the innovation strategies. As reported in Table 6, the differences for variables *Emergent artist* ratio and *Blau* index are positive and statistically significant. There is no statistical significance instead for the *Number of releases* and the *Niche* ratio. This suggests that majors tended to explore more, but only in some specific directions. They increased the number of releases by emergent artists after the Billboard

change and spanned more into different genres, but they did not make significant changes in relation to the total number of releases by week nor the number of releases in a niche genre. We take this evidence as supporting our Hypothesis 2.

Insert Table 6 about here

As a last step, we tested whether these innovation strategies had an impact on success. Table 7a and 7b present results of the regressions on the two dependent variables. In both tables, we added the independent variables one by one. Model 4 presents the results with all the independent variables included in the regression. First, we note that an increase in the number of total releases by week is positively associated with an increase in the week ($b=-1.619, p=0.001$) and peak position ($b=-1.755, p=0.001$), in support of Hypothesis 3a. Second, we also note that the coefficient of the number of releases by emergent artists is negative and significant both for week and peak positions ($p = 0.029$ and $p = 0.039$, respectively), which means that, on average, if a company increases by 50 percent the number of new releases by emergent artists over the total number of releases, it would observe an increase by 2.3 positions in both week and peak positions, in support of Hypothesis 3b. If we consider the other measures related to music genres, the coefficients suggest a notable result. The *Blau* index for the week and peak positions has negative and significant coefficients of, respectively, $b = -9.916$ ($p = 0.019$) and $b = -8.931$ ($p = 0.039$); in other words, the more diverse in terms of genres the new product portfolio is, the higher is the performance in the chart, in further support of Hypothesis 3b. The variable *Niche* has the opposite effect: the coefficients are significant but positive ($b = 5.036, p = 0.016$ and $b = 4.747, p = 0.025$, respectively), meaning that improvement in the chart performance comes from spanning as many genres as possible and not from increasing the number of releases positioned in a niche genre. In other words, the market rewards diversifying more in terms of quality, thus covering a broader spectrum of genres.

Insert Tables 7a and 7b about here

Robustness test. We corroborated our findings with a series of both quantitative and anecdotal evidence. In unreported regressions, we performed two robustness checks to remove possible confounding factors affecting our results for the *Billboard* change. First, we replicated our main analyses in a shorter time window, using 24¹⁹ weeks pre- and post-digitization. Because we use nearly one year before and after the change, a concern is that factors we cannot control for, other than the *Billboard* rule change, might affect singles in the chart. Second, we test whether our results would hold in a time window previous to 2011–2013. As previously mentioned, digitization began appearing in the music industry through downloading, and *Billboard* introduced downloads into the Hot 100 chart in 2005. We thus conducted the same analyses in a different time window (2004–2006), again using *Billboard*'s decision as a change. In both cases (shorter time window and different time window), our results are qualitatively unchanged.

To corroborate our findings on the positive effect of the two innovation strategies on sales performance, we estimated a probit model predicting major artists' entry into the most successful part of the chart—namely, the top 10. In unreported regressions, we used two dependent variables: a dummy that takes the value of 1 if the company had at least one single in the top 10 positions for the week position and 0 otherwise and another dummy that takes the value of 1 if the company had at least one single in the top 10 for the peak position and 0 otherwise. Results remained qualitatively the same.

We also provided an additional test for Hypothesis 3 with a before-and-after model (Benner & Waldfogel, 2016) using the same time window of the analyses for the *Billboard* change

¹⁹ We chose a six-month window to address the possible stagnation of streamed singles in the chart and to avoid cutting the time frame too early. Songs by new, emergent artists tend to take more time to reach the peak position in the chart than singles by established artists (<https://blog.nextbigsound.com/streaming-charts-pandora-50b87783a6ab>).

(Table 8). We ran first a regression adding an interaction between each independent variable and the dummy “Post” (which takes value 1 for those weeks after the 2012 change). Overall, results for the coefficients of the interaction terms are consistent with the main results previously discussed. While the number of total releases and the *Niche* ratio are not significant, in fact, the *Emergent artists* ratio strongly and positively impacts both dependent variables, and the *Blau* index positively impact the week position. Moreover, the coefficients of these two independent variables without the interaction have an opposite effect on success. We take this as further evidence supporting the intuition that it is only after the change that these innovation strategies have a positive impact on success.

Insert Table 8 about here

The change we use for the analysis—namely, *Billboard*’s decision to include streaming in the chart’s sales computation rule—seems consistent with what happened at the market level around the same time. Value data²⁰ for streams in the U.S. market for the time window between 2010 and 2014 in Figure 3 shows that, around the time of the digitization change (i.e., 2012), streams (both subscription based and ad supported) experienced a sudden increase in the general trend of growth relative to this sales channel. This evidence suggests that the *Billboard* change affected consumption by making streaming more relevant.

Insert Figure 3 about here

Of note, around the same time in 2012, downloads experienced a change similar to the streams shown in Figure 3, though in the opposite direction. Figure 4 shows that downloads for single tracks and albums began experiencing a decrease in the year of the digitization change. We thus interpret

²⁰ We obtained value data on streams and downloads from the IFPI (2015) Recording Industry in Numbers annual report on music industry sales and revenues.

this information from aggregated sales data as additional evidence of the robustness of the change we employed in the empirical analysis.

Insert Figure 4 about here

DISCUSSION

This study sheds more light on how digitization has affected leading incumbent firms and how they adapted their innovation strategies to meet the increased variety at the market level. In particular, we adopt a demand lens to understand the impact of digitization, and more specifically streaming, on supply as a complementary-asset discontinuity that devalues physical distribution (see, e.g., Cozzolino & Rothaermel, 2018; Cozzolino *et al.*, 2018; Eggers & Park, 2018).

By exploiting a change in market information regime and analyzing the inclusion of streaming sales in the music charts we find that majors, despite the initial negative impact of digitization on complementary assets, experienced an increase in chart position due to specific types of artists. We then find that these companies reacted accordingly to what the market information change in the chart revealed and adjusted their innovation strategies. Namely, they did not release more new music, but they just pursued more exploration in terms of emergent artists and spanning more music genres. We then investigated how these strategies affect performance in the chart and found that the impact is positive when leading firms rely on emergent artists' releases and a more diverse new product portfolio by spanning different music genres, thus targeting segments of the market more distant from their core (mainstream) target.

Overall, our findings are consistent with anecdotal evidence on music industry evolution. First, IFPI reports that 4,000 artists worldwide were signed to major record companies in 2009; however, four years later the number almost doubled to 7,500, and the industry shows an ever-increasing frequency of signing new artists (IFPI 2010, 2014; *Billboard Bulletin*, 2017). Digital

platforms help foster majors' discovery of new talents. For example, the rock-soul singer James Bay had just begun playing open mic nights when a video posted by a fan on YouTube caught Republic Records' (owned by Universal) attention. The firm immediately signed him and released his first album (Vincent, 2014). Streaming platforms have also increased the interest of major record companies for niche music genres (*The Economist*, 2017a). For example, niche Latin music has experienced a steady growth in non-Spanish-speaking markets, and it captures 8 percent of streams in the United States (*The Economist*, 2017a). Indeed, Universal's most significant achievement in 2016 was breaking through with new Latin artists around the world, including the two Grammy best new artist nominees, Colombian folk-pop band Morat and Chilean singer-songwriter Mon Laferte (*Billboard Bulletin*, 2016). In addition, trap music artists such as Migos (signed to one of Warner's labels) are more likely to enter the *Billboard* Hot 100 chart, pushed by sales from the streaming channel (McIntyre, 2017). As a final point, our findings are also consistent with what happened to majors' revenue in the years following our analysis. For example, in 2016 Universal Music's streaming growth offset the decline in both digital download and physical sales (Flanagan, 2016). In 2015, streaming became the main source of revenues for Warner Music (Bond, 2015; Peoples, 2016). Therefore, we believe that our findings in the U.S. market can be taken, at least partially, as predictors of what will happen at the industry level worldwide.

This study makes important contributions to prior research. First, by showing that demand rewards more heterogeneity, we contribute to studies on technological change (e.g., Benner & Waldfoegel, 2016; Tripsas, 1997; Tripsas & Gavetti, 2000) by shedding more light on the effects of the digital change on demand of new products and how firms can then use more granular information on demand behavior to adjust their innovation strategies (Adner & Snow, 2010b; Cozzolino & Rothaermel, 2018; Priem, 2007). This finding lends additional evidence to extant

research that, by expanding the scope of innovations consumed by the market, digitization allows democratization in the marketplace (Waldfoegel, 2018).

Second, by focusing on different producers, we are able to better understand how technological discontinuity on distribution can have different implications for different incumbents (Eggers & Park, 2018). According to traditional theories of technological change, established firms encounter many problems in adapting to the new technological base, especially if they lose control of key complementary assets (Taylor & Helfat, 2009; Tripsas, 1997) and thus lose market leadership during these periods of change (Ansari & Krop, 2012). However, most research has focused on the survival prospects of incumbents relative to new entrants, and little is yet known about how market leaders might be able to resist this fate (Ansari & Krop, 2012). By leveraging heterogeneity among incumbents and highlighting the ability of leading incumbents to adapt according to a market information change, we contribute to build a more fine-grained view on theories on technological change, incumbency, and the role of complementary assets (e.g., Benner & Tripsas, 2012; Benner & Waldfoegel, 2016; Eggers & Park, 2018; Roy & Cohen, 2017; Tripsas, 1997; Wu *et al.*, 2014). We provide evidence that digitization offers an opportunity to leading incumbents to reconsider their strategies in an industry with respect to other incumbents (Cozzolino & Rothaermel, 2018).

Third, by showing that leading incumbents can use a change related to market information to reduce uncertainty and adapt their innovation strategies to explore more, our findings contribute to literature on renewal and dynamic capabilities (e.g., Teece, 2007; Teece, Pisano & Shuen, 1997) by revealing that leading incumbents can produce innovations consistent with the new ecosystem. Scholars suggest several factors that can lead to adaptation (Gawer & Cusumano, 2008; Sosa, 2011). Our study adds to this stream by demonstrating that it is possible for leading incumbents to adapt by exploring new, distant segments through strategies usually pursued by niche incumbents (e.g., Eggers, 2012; O'Reilly & Tushman, 2016). That is, rather than simply focusing on the mainstream

segment, majors can use their past experience entering niches to gain a better position than solely niche-focused competitors in targeting the increased variety at the market level. Overall, our findings can also enrich the discussion of which innovation strategies are more effective in making adaptation possible (Gavetti & Porac, 2018). In this way, by building on insights from strategy studies on demand (Adner, 2002; Priem, 2007), social influence (e.g., Salganik *et al.*, 2006), and exploration (e.g., March 1991; O'Reilly & Tushman, 2016), we follow Makadok, Burton, and Barney's (2018) suggestion to build new theoretical contributions.

Last, this study also helps explain the recent evolution of a crucial and important creative sector and sheds light on the implications of a technological change on incumbents' strategies at the industry level. Our findings can have important implications for other sectors that are experiencing similar changes brought by digitization (e.g., the book, movie, and educational industries). Moreover, from a methodological standpoint, we provide an important contribution: in contrast with other technological change studies that are based on case studies of single organizations (e.g., Tripsas & Gavetti, 2000) or data from a small number of incumbent firms (e.g., Benner, 2010; Tripsas, 1997), our findings rely on large samples and longitudinal design.

Limitations and future research directions

Our study presents some limitations that mostly pertain to the empirical context and data we used. The first pertains to the type of change used in the empirical strategy. The *Billboard* change is not related to the actual emergence and adoption of the new distribution channel by the firms involved in the study; rather, it merely captures the inclusion of the sales data from this channel into the sales ranking. Thus, we cannot draw conclusions on the effects of digitization on sales outside the charts' context. Moreover, our data do not capture the direct, immediate effect of the discontinuity (digitization) on complementary assets; rather, we observe the impact with some time lag.

The second limitation comes from the type of sales data we use to measure performance. Top sales charts stop at the first 100 songs that sell the most and do not allow us to observe what happens in positions 101 and below. Although the top 100 are the most relevant for record companies, the sales performance we capture is nonetheless not complete. Thus, regarding new product releases, we acknowledge that the observed effect in terms of innovation strategies changes might also be affected, at least in part, by other factors or firms' decisions that we are not able to capture.

Another limitation is the type of technological change we study. Digitization had a main direct effect on distribution, which implies that our findings should be interpreted according to this specific boundary condition. Future studies could test our hypotheses with a technological change with an initial direct effect on production, for example. It would also be useful to examine the effects of digitization on demand and competition in the long run. Last, our empirical context analyzes a creative industry; future research could replicate our findings in a different industry influenced by digitization.

CONCLUSIONS

Our results suggest how, in the case of a complementary-asset discontinuity that implies a change in demand behavior, leading incumbents can sustain their performance. When considered together with the demand side, they suggest that the effect of a technological change on suppliers is more complex than what previous literature indicates. Contrary to what is predicted by theories of discontinuities and competence destroying change, our findings show that leading incumbents are not always disadvantaged compared with new competitors or small, nonleading incumbents focused on niche markets when a technological change happens. Our study identifies some of the potential mechanisms through which these incumbents can achieve success.

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TABLE 1. Summary statistics (*Billboard* data)

Variable	Mean	SD	Min	Max
Indie	0.274	0.446	0	1
Major	0.597	0.490	0	1
Week position	50.5	28.867	1	100
Peak position	39.130	29.896	1	100
Streaming	0.5	0.500	0	1
Christmas	0.083	0.276	0	1
American Music Awards	0.042	0.199	0	1
Grammy Awards	0.031	0.174	0	1
MTV Awards	0.042	0.199	0	1
<i>Billboard</i> Awards	0.042	0.199	0	1
Company age	25.680	28.791	0	126
Emergent artist	0.309	0.462	0	1
Emergent artist spurious	0.043	0.203	0	1
Artist age	6.165	5.433	0	59
Artist type	2.296	1.695	1	6
Artist gender	1.383	0.623	1	3
Mainstream genre	0.247	0.431	0	1
Artist acquired	0.556	0.497	0	1

TABLE 2. Summary statistics (*MusicBrainz* data)

Variable	Mean	Std. Dev.	Min	Max
Week position	54.221	25.098	1	100
Peak position	44.225	26.230	1	100
Blau index	0.024	0.113	0	0.836
Niches ratio	0.080	0.255	0	1
Emergent artists ratio	0.075	0.247	0	1
Total releases by week	0.335	1.129	0	21
Releases with featuring	0.013	0.122	0	4
Reissues	0.001	0.043	0	3
Parent company	2.056	0.697	1	3

TABLE 3. T-test of the means for number of companies

	Mean before	SD	Mean after	SD	Difference before/after
Indie companies	24.501	61.746	27.294	63.729	-2.793**
Major companies	52.593	81.248	42.196	70.971	10.397***

Note: ***p < 0.01; **p < 0.05; *p < 0.1.

TABLE 4. Regression for *majors* (vs indies)

Dependent variable	(1) Week position	(2) Peak position
Major	1.698 (1.955)	1.277 (2.280)
Streaming	1.135 (1.304)	1.508 (1.389)
Major × streaming	-4.121** (1.617)	-2.871* (1.671)
Constant	59.258 (1.106)	47.995*** (1.195)
Observations	5,398	5,398
R ²	0.004	0.007
Controls	yes	yes

Note: Standard errors (reported in parentheses) are clustered at the company level
 ***p < 0.01; **p < 0.05; *p < 0.1

TABLE 5. Regression for *emergent artists* of majors (vs. established artists of majors) controlling for mainstream music genre

Dependent variable	(1) Week position	(2) Peak position
Emergent artist	26.225*** (4.355)	35.359*** (4.536)
Streaming	-1.543* (0.899)	-0.324 (0.892)
Emergent artist × streaming	-13.344** (5.540)	-19.517*** (5.688)
Constant	51.238*** (1.656)	40.031*** (1.687)
Observations	5,296	5,296
R ²	0.073	0.094
Controls	yes	yes

Note: Standard errors (reported in parentheses) are clustered at the artist level
 ***p < 0.01; **p < 0.05; *p < 0.1

TABLE 6. T-test of the means for majors exploration strategies (2010-2014)

	Mean before 2012	Std. Err.	Mean after 2012	Std. Err.	Difference after-before
Total releases	0.337	0.009	0.332	0.011	-0.005
Emergent artists ratio	0.073	0.002	0.077	0.002	0.004*
Niche ratio	0.078	0.002	0.081	0.002	-0.003
Blau index	0.020	0.008	0.028	0.001	0.008***

Note: ***p < 0.01; **p < 0.05; *p < 0.1

TABLE 7a. Regression model for majors' new releases post 2012, D.V. Week position

Dependent variable	(1) Week position	(2) Week position	(3) Week position	(4) Week position
Total releases	-2.374*** (0.353)	-2.002*** (0.403)	-2.262*** (0.426)	-1.619*** (0.506)
Emergent artists ratio		-3.888* (2.033)	-5.122** (2.135)	-4.682** (2.141)
Niches ratio			3.789* (2.014)	5.036*** (2.081)
Blau index				-9.916** (4.235)
Releases with featuring	-1.156 (2.452)	-1.257 (2.451)	-1.189 (2.450)	-0.917 (2.450)
Ressues	12.222* (2.397)	11.738* (6.398)	11.874* (6.395)	11.614* (6.389)
Parent company 2 (Universal)	-9.889*** (1.427)	-9.975*** (1.427)	-10.055*** (1.427)	-10.258*** (1.428)
Parent company 3 (Warner)	-6.525*** (1.626)	-6.597*** (1.625)	-6.683*** (1.626)	-6.787*** (1.624)
Constant	67.533*** (6.001)	68.296*** (6.016)	68.411*** (6.013)	68.392*** (1.624)
Week dummies	Yes	Yes	Yes	Yes
Wald Chi square	147.65	151.49	155.21	161.01
Observations	2,282	2,282	2,282	2,282

Note: standard errors are reported in parentheses

***p < 0.01; **p < 0.05; *p < 0.1

TABLE 7b. Regression model for majors' new releases post 2012, D.V. Peak position

Dependent variable	(1) Peak position	(2) Peak position	(3) Peak position	(4) Peak position
Total releases	-2.442*** (0.359)	-2.085*** (0.411)	-2.334*** (0.434)	-1.755*** (0.516)
Emergent artists ratio		-3.728* (2.072)	-4.908** (2.177)	-4.513** (2.184)
Niches ratio			3.624* (2.053)	4.747** (2.122)
Blau index				-8.931** (4.318)
Releases with featuring	-1.269 (2.499)	-1.366 (2.498)	-1.301 (2.497)	-1.056 (2.498)
Ressues	16.374** (6.520)	15.909** (6.522)	16.040** (6.519)	15.805** (6.515)
Parent company 2 (Universal)	-6.982*** (1.454)	-7.065*** (1.454)	-7.140*** (1.455)	-7.323*** (1.456)
Parent company 3 (Warner)	-5.547*** (1.657)	-5.616*** (1.659)	-5.698*** (1.656)	-5.791*** (1.656)
Constant	52.248*** (6.121)	52.980*** (6.132)	53.090*** (6.129)	53.073*** (6.125)
Week dummies	Yes	Yes	Yes	Yes
Wald Chi square	118.34	121.70	124.93	129.40
Observations	2,282	2,282	2,282	2,282

Note: standard errors are reported in parentheses

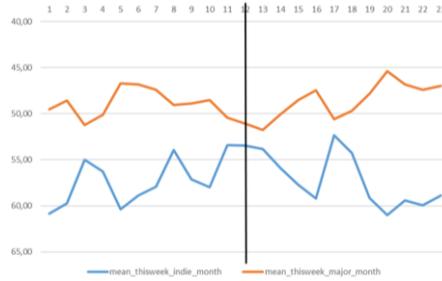
***p < 0.01; **p < 0.05; *p < 0.1

TABLE 8. Pre-post regression model for majors' new releases (2011-2013)

Dependent variable	(1) Week position	(2) Peak position
Total new releases	-0.699 (0.688)	-0.935 (0.730)
Emergent artists ratio	9.126*** (2.956)	7.099** (3.302)
Niches ratio	10.218*** (2.749)	7.692*** (2.867)
Blau index	7.131 (7.347)	2.991 (7.133)
Post	2.567** 1.220	3.944*** (1.292)
Total new releases*Post	-0.663 (0.893)	-0.684 (0.435)
Emergent artists ratio*Post	-15.731*** (4.023)	-13.083*** (4.356)
Niches ratio*Post	-4.946 (3.879)	-3.623 (4.034)
Blau index*Post	-19.174** (9.013)	-13.921 (8.719)
Constant	53.360*** (1.146)	42.674*** (1.157)
Controls	Yes	Yes
R-Squared	0.046	0.037
Observations	2,133	2,133

Note: standard errors are reported in parentheses
 ***p < 0.01; **p < 0.05; *p < 0.1

FIGURE 1. Average chart position (aggregated at the month level) for majors (orange line) and indies (blue line)



Note: *Billboard's* change occurred in March 2012, month 12 in the graph

FIGURE 2. Average chart position (aggregated at the month level) for established artists (orange line) and emergent artists (blue line) developed by majors



FIGURE 3. Value data (in dollars) on streams' sales in the U.S. market (2010–2014)

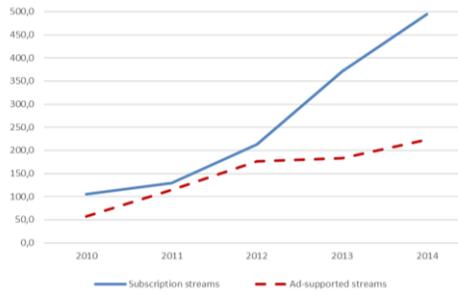


FIGURE 4. Value data (in dollars) on downloads' sales in the U.S. market (2010–2014)

