Before the
UNITED STATES COPYRIGHT ROYALTY JUDGES
The Library of Congress

In the Matter of	)	**Docket No. 16–CRB–0003–PR (2018–2022)**
	)	
	)	
DETERMINATION OF RATES AND	)	
TERMS FOR MAKING AND	)	
DISTRIBUTING PHONORECORDS	)	
(PHONORECORDS III)	)	
	)	

WRITTEN DIRECT TESTIMONY OF LESLIE M. MARX, PHD
(On behalf of Spotify USA Inc.)

NOVEMBER 1, 2016

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I. Qualifications

(1)   I am the Robert A. Bandeen Professor of Economics at the Fuqua School of Business at Duke University. In addition, I am a Partner at Bates White, LLC, a professional services firm that performs economic and statistical analysis in a variety of industries and forums. I specialize in microeconomics, particularly the fields of industrial organization and applied game theory. I received my PhD in Economics from Northwestern University and my BS in Mathematics from Duke University, where I graduated summa cum laude and was the valedictorian.

(2)   Prior to joining the faculty at Duke, I was an Associate Professor of Economics and Management at the W.E. Simon Graduate School of Business Administration at the University of Rochester. I have taught PhD-level courses in game theory and industrial organization, and MBA courses on managerial decision analysis, managerial economics, managerial game theory, and environmental economics.

(3)   From 2005 to 2006, I was the Chief Economist for the Federal Communications Commission (FCC). Among other things, a focus of my work was competition issues in media markets and markets for multichannel video programming distribution.

(4)   *In re Petition of Pandora Media, Inc.*, I served as a testifying expert on behalf of Pandora Media, Inc., in its litigation with the American Society of Composers, Authors, and Publishers (ASCAP). I provided an opinion regarding reasonable royalty terms for Pandora's blanket license for the ASCAP repertory based on an analysis of the extent to which relevant benchmarks reflected competitive fair market value. The court ultimately adopted key aspects of my analysis and set a rate within the range of rates that I proposed.

(5)   Throughout my career, I have pursued a research program focusing on auctions, procurement, cartels, and collusive behavior. My research incorporates my training in economic theory and econometrics. I have authored papers in many areas relevant to antitrust analysis, including papers examining the conduct of the vitamins cartel, papers related to collusion at auctions, and papers on coordinated effects related to merger analysis. These and other of my professional papers have been published in peer-reviewed publications, as shown in my attached curriculum vitae. I am the coauthor of a recent book published by MIT Press titled *The Economics of Collusion: Cartels and Bidding Rings*.[1]

(6)   In addition to my teaching responsibilities at Duke University, I have been involved in the education of federal judges on antitrust economics. I have twice been paired with another economist to teach the

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[1]   Robert C. Marshall and Leslie M. Marx, *The Economics of Collusion: Cartels and Bidding Rings* (Cambridge, MA: MIT Press, 2012).

sessions on "Cartels" and "Agreement and Facilitation Practices" at the Antitrust Law & Economics Institute for Judges, cosponsored by the American Bar Association Section of Antitrust Law and the Law & Economics Center at George Mason University School of Law. I have also taught sessions on the economics of cartels and the economics of mergers to participants in the ABA's Antitrust Master's Program.

(7)   Additional information about my previous testifying experience and my professional experience as an economist, including publications and affiliations, is included in my curriculum vitae, attached as Appendix A.

II. Scope of charge

(8)   I was retained by Spotify USA Inc. ("Spotify") to help determine the reasonable terms and rates for interactive streaming royalty payments under Section 115 of the Copyright Act. Section 115 grants a compulsory license that allows for the making and distributing of physical and digital phonorecords of a songwriter's work, once a phonorecord of that work has been distributed to the public with the permission of that artist. Songwriters are due "mechanical royalties" under this license. Mechanical royalties are a component, along with performance royalties, of the royalties currently paid by interactive streaming services to holders of musical works rights.[2]

(9)   In making my determination, I was advised that the reasonable terms and rates for interactive streaming mechanical royalty payments should achieve the following statutory objectives, known as the four 801(b) factors:[3]

   A.   To maximize the availability of creative works to the public.

   B.   To afford the copyright owner a fair return for his or her creative work and the copyright user a fair income under existing economic conditions.

   C.   To reflect the relative roles of the copyright owner and the copyright user in the product made available to the public with respect to relative creative contribution, technological contribution, capital investment, cost, risk, and contribution to the opening of new markets for creative expression and media for their communication.

   D.   To minimize any disruptive impact on the structure of the industries involved and on generally prevailing industry practices.

(10)   In forming my opinion, I reviewed documents and data from Spotify and those made available through discovery, as well as publicly available documents. All documents cited in this report are listed in Appendix C. I reserve the right to incorporate into my analysis any new information or data that may become available.

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[2]   In this report, I sometimes refer to the holders of musical works rights collectively as "publishers."

[3]   17 U.S.C. § 801(b)(1).

III. Summary of opinions

(11)   The 801(b) factors indicate that reasonable terms and rates for royalty payments should maximize the availability of creative works to the public (factor A), divide profits from supplying those works in a way that gives copyright owners and copyright users each a "fair return" according to their relative contributions (factors B and C), and minimize the disruptive impact on current industry structure and practices (factor D).

(12)   The interpretation of each of these factors can be informed by economics. For factor D, current interactive streaming and permanent digital download (PDD) mechanical royalty rates provide a benchmark for future rates based on current industry practices. An economic interpretation of factor A is that the royalty structure should "maximize the pie" of total producer and consumer surplus, and take into account consumer benefits as well as transfers between copyright holders and copyright users. An economic interpretation of factors B and C points to a commonly used economic approach, the Shapley value, which provides an algorithm for dividing the profits generated by an agreement among the relevant parties based on their relative contributions. This operationalizes the concept of fair return based on relative contributions.

(13)   Benchmarking exercises indicate a reasonable mechanical royalty rate would yield a total musical works percentage of revenue royalty rate for interactive streaming services of ▮▮▮▮▮▮▮ implying an effective mechanical royalty rate of ▮▮▮▮▮▮▮ in the case of Spotify. This represents a reduction in the current mechanical royalty rates, but not a dramatic change from current practice.

(14)   Economic theory indicates that the most favorable rate *structure* for maximizing the efficiency of music distribution is a fee determined by a percentage of revenue rather than the number of subscribers or the number of streams. Although the current rate structure has a headline rate based on a percentage of revenue, the formula used to determine royalty rates for paid subscribers includes a $0.50 per-subscriber minimum, which can supersede the percentage-of-revenue calculation.[4] A high per-subscriber rate structure discourages interactive streaming services from expanding the market to consumer groups, such as students, with a higher elasticity of demand for streaming. Alternative per-unit rate structures, such as per-stream royalty fees, can similarly distort the incentives of interactive streamers, particularly at high levels. In addition, flat per-subscriber or per-stream royalties can penalize free-to-user ad-supported services in particular. Those services provide an efficient avenue for expanding listening and generating profits from consumers with low willingness-to-pay ("WTP").

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[4]   There is also an $0.80 per-subscriber minimum that currently provides some protection to interactive streaming services from a potentially higher royalty fee based on sound recording payments. It serves the useful purpose of preventing a potentially dramatic increase in rates above what the 801(b) factors would call for, but that protection would better come through a closer tie to the headline percentage-of-revenue rate of 10.5% than through a per-subscriber minimum.

Therefore, I conclude that the mechanical royalty rate should be set as a percentage of revenue and not determined by the number of subscribers or number of streams. In cases where revenue is difficult to attribute to a particular service, per-subscriber or per-stream minimums can serve a useful purpose, but in that case they should be set to approximate an appropriate percentage-of-revenue rate rather than supersede it.

(15)   Finally, an approach that allocates returns to an agreement based on relative contributions can address the "fair return" provisions of 801(b). The Shapley value provides such an approach. Implementing the Shapley value in this context involves developing a model of the industry where the costs and contributions of upstream rights holders and downstream distribution channels are used to determine "fair" royalty rates.[5] The baseline model that I implement, along with variations, indicates that the royalty rates paid by interactive streaming services are currently too high under a range of reasonable parameter values. This corroborates my benchmark analysis, which indicates that interactive streaming mechanical royalty rates should decrease.

(16)   The remainder of this report explains these conclusions in more detail.

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[5]   Throughout this report, I use "upstream" to refer to owners of musical works and sound recording copyrights, and "downstream" to refer to music distribution channels such as interactive streaming.

IV. Music distribution and its evolution

(17)   Consumers today have more options than ever before to access recorded music—from terrestrial and satellite radio to Internet streaming, PDDs, and CDs. Even vinyl records are making a comeback.[6] Technology has facilitated new patterns in music listening and new business models, as discrete albums have given way to, for example, user-created playlists and custom "stations" tied to particular musical genres. Technology has also facilitated piracy, presenting a challenge to the music industry. In addition to recorded music, live music performances continue to be an important source of revenue for performers and an important way to access music.

IV.A. Current recorded music distribution channels

(18)   Figure 1 summarizes share of revenue from the main recorded music distribution channels for the first half of 2016.[7]

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[6]   Neil Shah, "The Biggest Music Comeback of 2014: Vinyl Records," *Wall Street Journal*, Dec. 11, 2014, *available at* http://www.wsj.com/articles/the-biggest-music-comeback-of-2014-vinyl-records-1418323133.

[7]   With the exception of SoundExchange distributions, this revenue represents an estimate of what downstream consumers pay to access music content. For SoundExchange distributions, the revenue represents the royalties that are collected upstream, and thus understates downstream revenue. Terrestrial radio is not included.

Figure 1: 2016H1 Music industry recorded music revenue by distribution channel
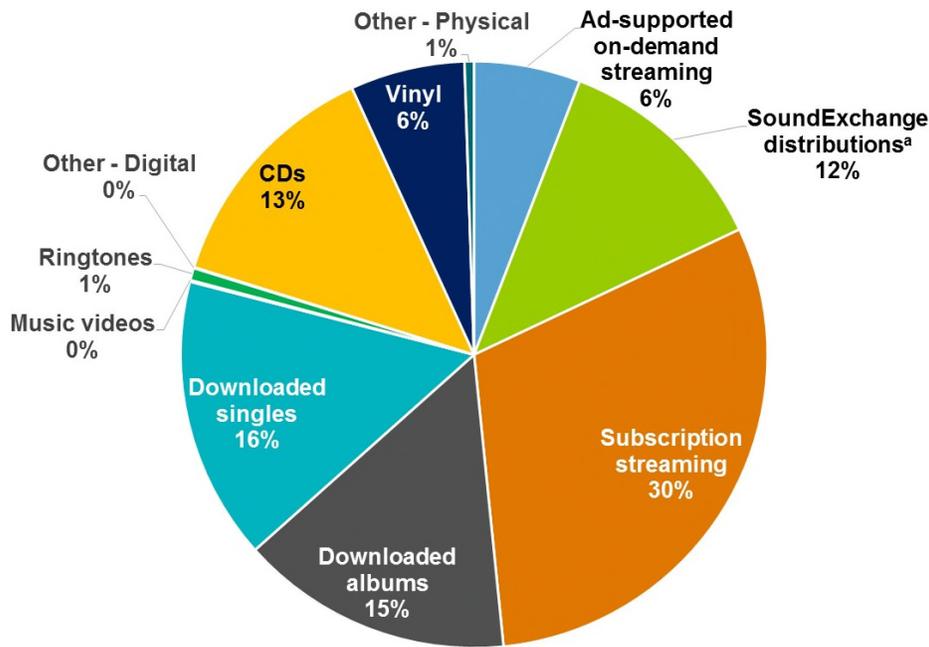
Source: RIAA 2016 Mid-Year Shipments Memo.
a. "SoundExchange distributions" includes non-interactive streaming, satellite radio, and Cable TV music services.

IV.A.1. Streaming services

(19)   Interactive streaming services made up roughly 36% of industry revenue in the first half of 2016. Non-interactive streaming services made up less than 12% of industry revenue for the same time period.[8,9] This distribution channel includes, among others, Spotify, Pandora, and YouTube, which has become a popular online channel for audio content.[10]

(20)   Interactive streaming services enable users to receive a transmission of a sound recording selected by or on behalf of the listener.[11] Non-interactive streaming offers a service in which users cannot choose

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[8]   This arises from ambiguity in how the RIAA reports revenue for SoundExchange distributions.

[9]   Joshua P. Friedlander, "News and Notes on 2016 Mid-Year RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Oct. 19, 2016, 3, http://www.riaa.com/wp-content/uploads/2016/09/RIAA_Midyear_2016Final.pdf.

[10]   Rethink Music, "Fair Music: Transparency and Payment Flows in the Music Industry—Recommendations to Increase Transparency, Reduce Friction, and Promote Fairness in the Music Industry," Berklee Institute for Creative Entrepreneurship, Jul. 3, 2015, 19, *available at* https://www.berklee.edu/sites/default/files/Fair%20Music%20-%20Transparency%20and%20Payment%20Flows%20in%20the%20Music%20Industry.pdf.

[11]   17 U.S.C. § 114(j)(7).

a specific track or artist, but are provided a pre-programmed or algorithmically-determined combination of tracks.[12]

(21) The type of user engagement promoted by interactive streaming services is sometimes called "lean forward" or "active" listening, in contrast to non-interactive services promoting "lean back" or "passive" listening.[13] Interactive streaming services such as Spotify provide a number of features that are more characteristic of passive listening, however. For example, curated playlists and radio-like features are often a part of an interactive streaming service alongside the on-demand streaming component.[14] In the other direction, non-interactive streaming services such as Pandora do offer users a measure of control over listening that one-way terrestrial and satellite radio do not offer, such as the ability to seed a station with a favored artist or song and the ability to skip songs fairly frequently.[15]

(22) Interactive streaming services tend to have larger catalogs of songs and relatively more paid subscribers than non-interactive streaming services, which rely more heavily on an ad-supported model.[16] Some interactive streaming services, including Spotify, have both an ad-supported, free-to-user product as well as a paid subscription service.

IV.A.2. Purchased music

(23) Physical and digital purchases made up approximately 52% of industry revenue in the first half of 2016, including about 20% for physical purchases and 32% for digital purchases.[17] Physical purchases tend to bundle an album of songs onto one CD or record, whereas digital purchases allow the option of per-song purchasing. According to data from the Recording Industry Association of

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[12] SoundExchange, "Licensing 101," accessed Aug. 24, 2016, http://www.soundexchange.com/service-provider/licensing-101/.

[13] In a *Business Insider* article, for example, Ajay Kalia, a Spotify employee, refers to "lean back" listening. Alex Heath, "How Spotify is getting so good at picking the right music," *Business Insider*, Sep. 5, 2015, *available at* http://www.businessinsider.com.au/INSIDE-SPOTIFY-AND-THE-FUTURE-OF-MUSIC-STREAMING-2015-9#COMMENTS.

[14] SNL Kagan, "Economics of Internet Music & Radio," *S&P Global Market Intelligence*, Apr. 2016, at 14–24. *See also*, Spotify's ad-supported service limits the number of skips to six per hour on mobile devices Spotify, "Spotify Free," accessed Oct. 31, 2016, *available at* https://support.spotify.com/us/account_payment_help/subscription_options/spotify-free-on-your-mobile-phone/.

[15] Pandora, for example, allows multiple skips per hour for its ad-supported service, and unlimited skips per hour for its premium service. Micah Singleton, "Pandora Launches Pandora Plus, an Improved Version of its $5 Subscription Service," *The Verge*, Sep. 15, 2016, *available at* http://www.theverge.com/2016/9/15/12924910/pandora-plus-improved-subscription-service.

[16] SNL Kagan, "Economics of Internet Music & Radio," S&P Global Market Intelligence, Apr. 2016, at 14–24. *See also* Pandora Media Inc., Annual Report (Form 10-K) (Feb. 18, 2016), at 5.

[17] This calculation excludes synchronization royalties. Joshua P. Friedlander, "News and Notes on 2016 Mid-Year RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Oct. 19, 2016, 3, http://www.riaa.com/wp-content/uploads/2016/09/RIAA_Midyear_2016Final.pdf.

America (RIAA) for 2015, the average digital per song price is $1.10.[18] Unlike in the case of streaming, purchased music conveys a permanent ownership right.

IV.A.3. Satellite and terrestrial radio services

(24)   Satellite radio offers consumers largely ad-free music, among other content. SiriusXM, the only satellite radio service in the United States, has an inventory of more than 175 channels, over 70 of which are music channels.[19] SiriusXM's primary source of revenue is subscription fees.[20] As with terrestrial radio, listeners have no control over which songs they listen to on satellite radio, beyond picking a station.

(25)   Although terrestrial radio is not included in the above revenue breakdown, it continues to be a major source of music for listeners. As of June 2016, there were 6,714 commercial FM radio stations in the United States.[21] According to one survey, Americans spend more than half of their listening time listening to terrestrial radio.[22]

IV.A.4. Blurring of distinctions between channels

(26)   Although these discrete distribution channels are subject to varying statutory (and non-statutory) royalty rates, there has been some migration of features across channels, so that the distinctions between channels are in some cases blurring. For example, Spotify, the largest interactive streaming service, pays the statutory interactive streaming rates for its streaming services, but also offers its subscribers radio and playlist services that are more akin to non-interactive streaming services such as those offered by Pandora. Also, terrestrial stations have, in recent years, begun offering their content via online streaming.

IV.B. Piracy

(27)   While technology has created new music distribution channels, it has also facilitated the piracy of musical works. Piracy can be defined as the unauthorized copying of copyrighted material, and it is against the law.[23] Music piracy is a *de facto* distribution channel that does not contribute to music

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[18]   *Id.* at 2.

[19]   SiriusXM, "What is SiriusXM?" accessed Aug. 24, 2016, *available at* http://www.siriusxm.com/whatissiriusxm?hpid=02010022. Sirius XM Holdings Inc., Annual Report (Form 10-K) (Feb. 2, 2016), at 2.

[20]   Sirius XM Holdings Inc., Annual Report (Form 10-K) (Feb. 2, 2016), at 22.

[21]   Federal Communications Commission, "Broadcast Station Totals as of June 30, 2016," news release, July 8, 2016, *available at* https://apps.fcc.gov/edocs_public/attachmatch/DOC-340211A1.pdf.

[22]   Edison Research, "Share of Ear: Americans' Share of Time Spent Listening to Audio Sources Q4 2015," Feb. 2, 2016, at 3, *available at* http://www.slideshare.net/westwoodone/share-of-ear-q4-2015.

[23]   Recording Industry Association of America, "Resources & Learning: About Piracy," accessed Sep. 20, 2016, http://www.riaa.com/resources-learning/about-piracy/.

revenue but instead decreases revenue generated by other channels. Common forms of piracy include downloading music from a file-sharing site, peer-to-peer file sharing, and using stream-ripping software or mobile apps to copy music.[24] While file-sharing sites remain the most popular method of accessing pirated music, followed by peer-to-peer file sharing sites, the practice of ripping music from YouTube and from web-based music sites is on the rise.[25]

(28)   Piracy has had a substantial impact on music industry revenue. As seen in Figure 2, the original launch of the file-sharing service Napster in 1999, which facilitated a rise in piracy, coincided with a sharp decline in recorded music industry revenue, widely attributed to piracy. This rapid decline ceased alongside the entry of Spotify and the rise of streaming services. By 2016, industry revenue had grown for two years in a row for the first time since their peak in the late 1990s. This growth has been attributed in part to streaming services.[26]

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[24] *Id.*

[25] Paul Resnikoff, "How Music Piracy Is Completely Changing in 2016," *Digital Music News*, May 5, 2016, *available at* http://www.digitalmusicnews.com/2016/05/05/what-music-piracy-really-looks-like/.

[26] Lucas Shaw, "The Music Industry Is Finally Making Money on Streaming," *Bloomberg*, Sep. 20, 2016, *available at* http://www.bloomberg.com/news/articles/2016-09-20/spotify-apple-drive-u-s-music-industry-s-8-first-half-growth.

Figure 2: US Music industry revenue by distribution channel over time
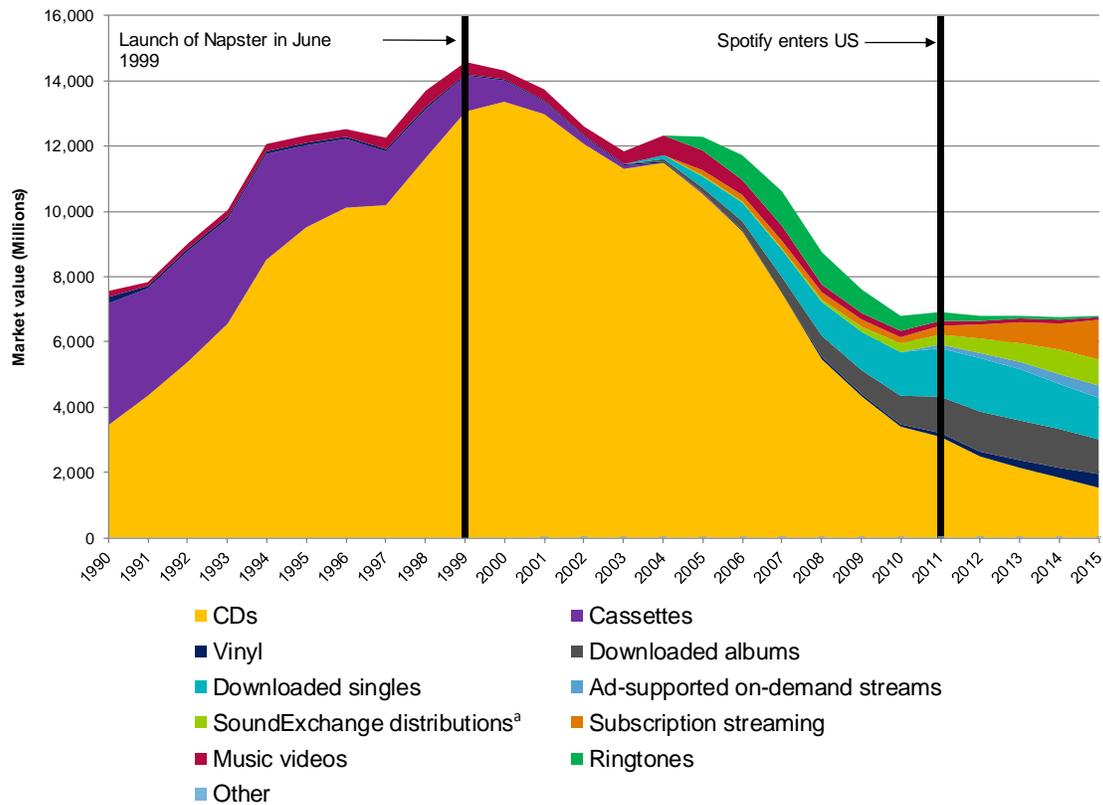
Source: RIAA US Sales Database.
a. "SoundExchange distributions" includes non-interactive streaming, satellite radio, and Cable TV music services

(29) ██ Some may be dedicated pirates who will never switch to a different distribution channel. Available evidence, however, indicates that streaming services have been effective in attracting customers who are not dedicated pirates but who engage in "casual" piracy alongside other forms of music listening. Although it is nominally free, piracy can involve significant hassle and potentially a legal and/or moral cost to the user. Interactive streaming provides easy access to content via a user-friendly interface and the ability to stream specific songs on demand, as well as music discovery algorithms and other added features, that may make it more attractive than piracy, even with a nominally higher cost for the paid tier (and the same nominal cost for the ad-supported tier).

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(31)   Spotify studies have found that in mature markets for interactive streaming – markets in which interactive streaming has a relatively long history and high penetration rate – piracy has fallen significantly. ██
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IV.C. Trends in music distribution

(32)   As shown in Figure 2, the music industry experienced a decline in revenue over the last decade that has recently started to reverse. The last decade has also seen a dramatic shift in the form of distribution from physical sales to digital content such as PDDs and streaming services. The bulk of the decline in industry revenue occurred after the advent of Napster in 1999, and industry revenue stopped decreasing alongside the rise of streaming starting in 2010.

(33)   Over the last five-and-a-half years, revenue attributed to all forms of streaming rose from 7% to 48% of recorded music revenue, according to RIAA estimates.[30] This share increase has coincided with a large increase in the number of paid streaming subscriptions, which increased 131.6% from the first half of 2014 to the first half of 2016. Within all digital content, streaming accounted for the majority of revenue in the first half of 2016.[31]

(34)   Physical sales have declined rapidly in the United States over the last decade. PDDs have also declined as streaming services have increased. From the first half of 2015 to the first half of 2016, US revenue for digital single and album downloads declined approximately 22% and 11.4%, respectively. During the same period, revenue from ad-supported and subscription-based streaming grew by 23.6% and 112%, respectively.[32]

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[28]   *Id.* at 98.

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[30]   Joshua P. Friedlander, "News and Notes on 2015 RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Sep. 15, 2016, 2, http://www.riaa.com/wp-content/uploads/2016/03/RIAA-2015-Year-End-shipments-memo.pdf. *See also* Joshua P. Friedlander, "News and Notes on 2016 Mid-Year RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Oct. 19, 2016, 2, http://www.riaa.com/wp-content/uploads/2016/09/RIAA_Midyear_2016Final.pdf.

[31]   Joshua P. Friedlander, "News and Notes on 2016 Mid-Year RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Oct. 19, 2016, 1-2, http://www.riaa.com/wp-content/uploads/2016/09/RIAA_Midyear_2016Final.pdf. *See also* Lucas Shaw, "The Music Industry Is Finally Making Money on Streaming," Bloomberg, Sep. 20, 2016, *available at* http://www.bloomberg.com/news/articles/2016-09-20/spotify-apple-drive-u-s-music-industry-s-8-first-half-growth.

[32]   Joshua P. Friedlander, "News and Notes on 2016 Mid-Year RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Oct. 19, 2016, 3, http://www.riaa.com/wp-content/uploads/2016/09/RIAA_Midyear_2016Final.pdf.

(35)   Music publishing industry revenue has increased slightly in recent years, as shown in Figure 3. This
has coincided with an increase in paid streaming and an increase in overall music listening.[33]

Figure 3: US music publishing industry revenue, 2006–2015 (2015 dollars)

(including annual percentage change in publisher revenue)
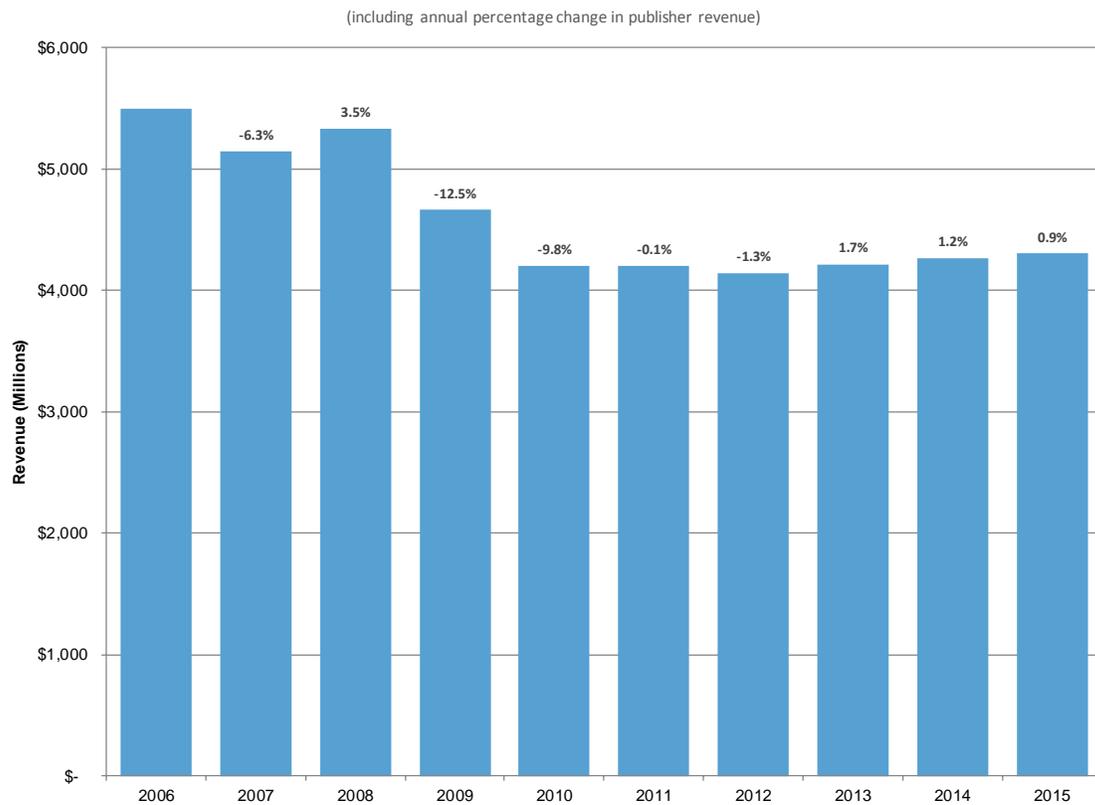
Source: 2015 IBISWorld Music Publishing Report at 34.

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[33]   *See* footnote 30. *See also* MusicWatch study: Annual Music Study 2015, Report to Spotify Ltd., June 2016, at 33.

V. The interactive streaming industry

(36)   The interactive streaming industry has grown rapidly in recent years, a trend that is expected to
continue. ███
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█████████████████████████ In the United States, use of paid streaming has accelerated
dramatically with the continued growth of Spotify ████████████████████. As seen in
Figure 4, from the first half of 2014 to the first half of 2016, subscribers to paid streaming services
increased by 131.6%.[35]

Figure 4: US paid streaming subscribers
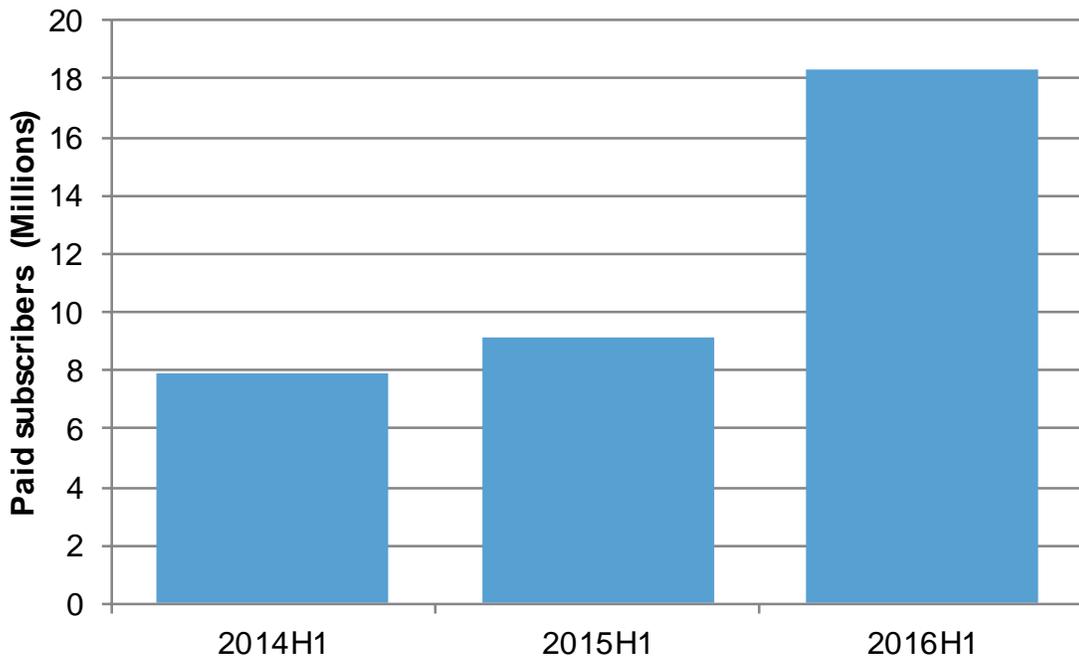
Source: RIAA 2016 Mid-Year Shipments Memo.

(37)   The interactive streaming industry is made up of firms of different sizes and business models. ████
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[34]   ████████████████████████████████████

[35]   Joshua P. Friedlander, "News and Notes on 2016 Mid-Year RIAA Shipment and Revenue Statistics," Recording
Industry Association of America, accessed Oct. 19, 2016, 1, http://www.riaa.com/wp-
content/uploads/2016/09/RIAA_Midyear_2016Final.pdf.

[36]   In October 2016, Amazon launched its Music Unlimited service as a more direct competitor to the top streaming
services. Unlike the streaming service offered as a free component of Amazon Prime, which offered about 2 million

Note: These figures were calculated by excluding Pandora, a non-interactive streaming service, to get global interactive streaming share estimates. SoundCloud launched an interactive streaming service after February 2016, and so is not listed on this chart.[37]
a. Deezer entered the US market in July 2016.[38]

V.A. Value created by interactive streaming

(38)   Interactive streaming creates value in a number of different ways for consumers and artists. For consumers, interactive streaming provides immediate access to an extensive catalog of songs beyond what most individual owners could accumulate, allowing free sampling and experimentation with new music. Not only is the marginal cost to a user of listening to new music on a streaming service zero, but listeners do not incur the added cost and hassle of file storage and file management.[39] For songwriters and performers, the data generated by interactive streaming can facilitate greater understanding of their listening audience relative to CD purchases or PDD, as I explain in more detail below.

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songs, Music Unlimited will have a library of tens of millions of songs. It will be available to Prime members at a discount rate of $7.99 per month. For those who are not members, it will be available for $9.99 per month. Ben Sisario, "Amazon Pairs Its Speaker with Streaming Music, at a Bargain Price," *New York Times,* Oct. 12, 2016, *available at* http://www.nytimes.com/2016/10/12/business/amazon-music-apple-spotify.html?_r=0.

[37]   SoundCloud, "Introducing SoundCloud Go," news release, Mar. 29, 2016, *available at* https://blog.soundcloud.com/2016/03/29/introducing-soundcloud-go/.

[38]   Deezer, "Deezer Launches Direct to Consumers in US with the Most Personalized Music Discovery Platform," news release, July 19, 2016, *available at* http://www.deezer-blog.com/press/deezer-launches-direct-to-consumers-in-u-s-with-the-most-personalized-music-discovery-platform/.

[39]   "Marginal cost" is defined as the increase in total cost resulting from an additional unit of output. Streaming subscription prices do not increase with the amount of music consumed. Thus, consumers face a zero marginal cost of listening to additional music.

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████████████████████████████ New and lesser-known artists benefit from listener
experimentation. ██████████████████████████████████████
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V.B. Impact of interactive streaming on other distribution channels

(42) Interactive streaming can both substitute for or complement music consumed through other
distribution channels. To the extent that interactive streaming is complementary to other channels,
total revenue will increase.[46] To the extent that it substitutes for consumption through other channels,
the impact on total revenue is ambiguous, depending on the revenue generated by the alternative.
Moving listening from terrestrial radio to interactive streaming, for instance, will generally increase
copyright holder revenue. Displacing piracy will unambiguously increase revenue.

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[46] For evidence that interactive streaming is complementary to other forms of music distribution, *see*, e.g., Godefroy
DangNguyen, Sylvain Dejean, and François Moreau, "Are Streaming and Other Music Consumption Modes Substitutes
or Complements?" Social Science Research Network (Mar. 16, 2012), accessed Oct. 31, 2016, *available at*
http://ssrn.com/abstract=2025071.

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(44)   As I discussed earlier, the rise in streaming services has also coincided with a decline in purchases of CDs and PDDs. The additional revenue from streaming has helped the music industry replace the lost revenue from the decline in PDD and CD sales. Some of this decline in older platforms is due directly to migration to streaming. ██████████████████████████████

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(45)   As discussed in section IV.B, interactive streaming can increase total royalties by moving users away from services that collect fewer royalties. Piracy is the obvious example. ███████████████████

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███ Because terrestrial radio pays significantly lower total royalties than interactive streaming, substitution from terrestrial radio to interactive streaming also increases music revenue.

(46)   Streaming services may also be complementary to other revenue streams by promoting spending on music by, for example, exposing listeners to new composers and new artists. For example, Spotify's Discover Weekly feature compiles a personalized playlist for listeners based on their listening history and the listening history of others with similar taste in music. Discover Weekly is sent to any user who selects the service and is updated every Monday.[56]

(47)   Finally, one form of revenue to musicians and copyright holders—live performances—lies outside of recorded music distribution channels but still generates substantial revenue for artists. Concert revenue has always been a primary source of revenue for performance artists.[57] Interactive streaming may contribute to higher live performance revenue by increasing overall music listening and helping to match listeners with artists. Spotify, for example, has a "Concerts" feature that recommends nearby concerts to users based on their listening habits.[58]

V.C. Example: Spotify

(48)   Spotify, the largest interactive streaming service in the United States and globally as measured by subscribers and revenue, launched its interactive streaming service in 2008.[59] It became available in the United States in July 2011; as of October 2016 it is available in 60 countries.[60] The service offers an ad-supported, free-to-users tier as well as a paid tier, Spotify Premium.[61] As shown in ████████
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[56]   Spotify, "Discover Weekly," accessed Sep. 20, 2016, https://support.spotify.com/us/using_spotify/playlists/discover-weekly/.

[57]   Figure 2 in Peter DiCola "Money from Music: Survey Evidence on Musicians' Revenue and Lessons About Copyright Incentives," *Arizona Law Review*, Volume 55, pp. 1-70. A survey of 5,000 artists shows that they made 28% of their collective revenue from live performances, compared to 12% from songwriting and sound recording royalties.

[58]   Spotify, "Personalized Concert Recommendations," news release, Nov. 11, 2012, *available at* https://news.spotify.com/us/2015/11/12/never-miss-another-show-with-personalized-concerts/

[59]   Spotify, "We've only just begun!" news release, Oct, 7, 2008, *available at* https://news.spotify.com/us/2008/10/07/weve-only-just-begun/.

[60]   Spotify, "Hello America, Spotify Here," news release, July, 14, 2011, *available at* https://news.spotify.com/us/2011/07/14/hello-america-spotify-here/. *See also* Spotify, "Where Is Spotify Available?" accessed Oct. 26, 2016, https://support.spotify.com/us/account_payment_help/subscription_options/full-list-of-territories-where-spotify-is-available/.

[61]   Spotify, "Choose your Spotify," accessed Sep. 20, 2016, https://www.spotify.com/us/subscriptions2.

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[64] Around the same time, Spotify made a mobile version of its ad-supported service available, which can explain some of the additional growth in ad-supported subscribers. *See*, Ellis Hamburger, "Spotify announces free streaming on Android and iPhone, but only in Shuffle mode," *The Verge*, Dec. 11, 2013, *available at* http://www.theverge.com/2013/12/11/5199692/spotify-announces-free-streaming-on-android-and-iphone-but-only-in.
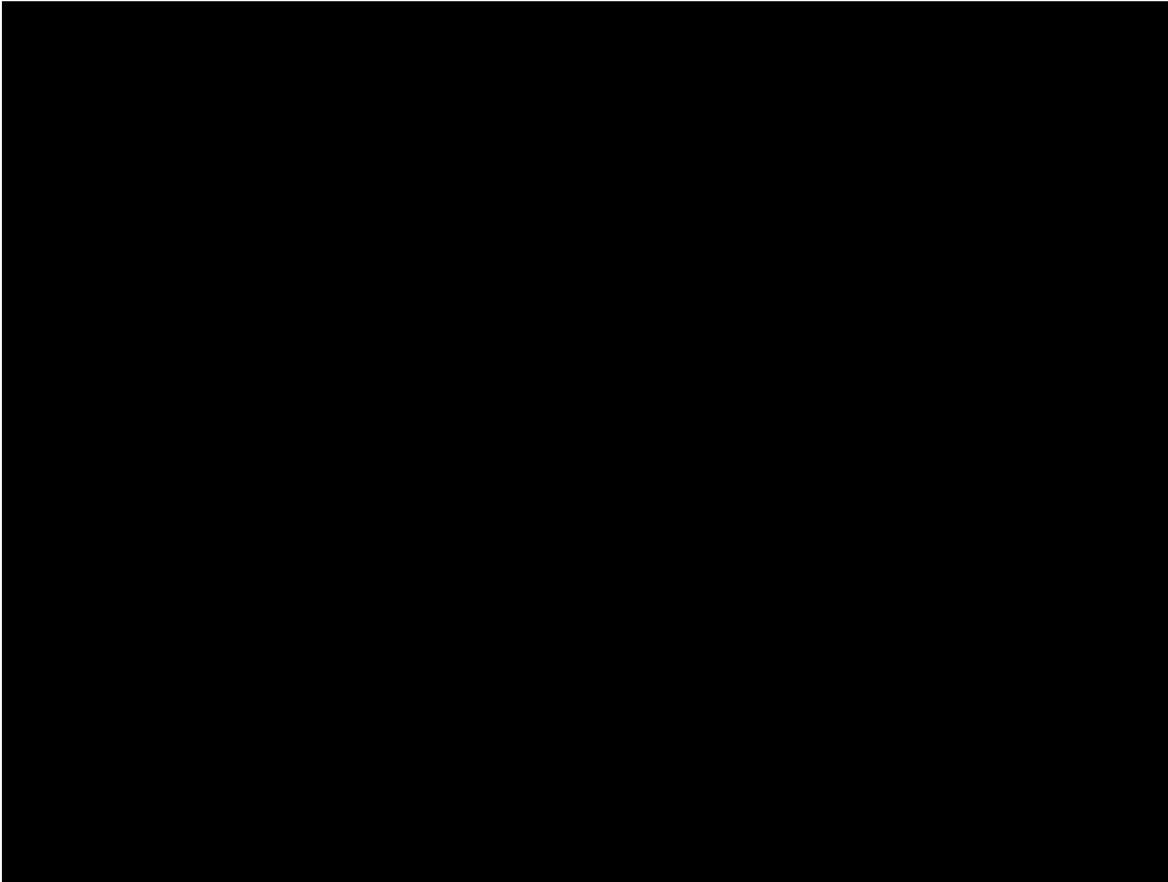
(50)   In addition to allowing subscribers to play songs of their choosing, Spotify also generates playlists for subscribers. These playlists, which can be compiled by Spotify's editorial team or algorithmically generated (or a combination of both), are often built around a genre or mood.[65] As an example, the Atmospheric Acoustic playlist features "[h]eady orchestrations scored by haunting strings and sensuous harmonies." As with a non-interactive service like Pandora, Spotify's service allows users to pick a song as a seed off which Spotify's algorithm can create a "radio station" containing music similar to the seed song.[66] Spotify also offers a Discover Weekly feature that provides a weekly 30-song playlist based on a user's listening habits.[67] These passive listening features mimic features of non-interactive services such as Pandora.

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[65]   David Pierce, "Inside Spotify's Hunt for the Perfect Playlist," *Wired*, July, 20, 2015, *available at* https://www.wired.com/2015/07/spotify-perfect-playlist.

[66]   "Spotify Radio," TechBoomers, accessed Oct. 27, 2016, https://techboomers.com/t/spotify-radio.

[67]   Patricia Garcia, "Why Spotify's Discover Weekly Is So Addictive," *Vogue*, May 30, 2016, *available at* http://www.vogue.com/13441042/spotify-discover-weekly-genius/.

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(52)   Spotify's service includes a social component that allows users to share their playlists with one another, providing another avenue for the discovery of new music. A user can, for example, share a song or playlist with a friend through the Spotify platform itself or through a social media platform like Facebook. Users can also share playlists through email and text.[70]

[70]   Spotify, "Share Music," accessed Oct. 28, 2016, https://support.spotify.com/us/using_spotify/share_music/sharing-music/.

VI. Two interactive streaming business models: subscription and ad-supported

(53)   Interactive streaming services operate through two primary business models: paid subscription services and ad-supported services provided free to users.[71] Paid subscription services generally offer more features than ad-supported services. For instance, Spotify's paid tier, Spotify Premium, provides ad-free listening and higher quality audio than its ad-supported tier.[72] Ad-supported free-to-user tiers generally offer interactive streaming with more limited functionality and an increased advertising presence.[73]

(54)   These two types of interactive streaming services target two distinct types of listeners: those with a relatively high WTP for music and those who are primarily searching, at least initially, for a low-cost or no-cost option. This bifurcation in WTP is recognized by the industry,[74] and was discussed at length in the CRB *Web IV* decision, where the judges found that "the record is replete with evidence corroborating this [bimodal chasm.]"[75] They cite a survey conducted by an economic expert in the case and numerous industry witnesses as supporting the notion of one group with high WTP for streaming services and another group with little or no WTP out-of-pocket.[76] Although that case was specifically about non-interactive services, this distinction exists more generally among online music listeners.

(55)   The purpose of Spotify's ad-supported tier is twofold. One purpose is to introduce potential subscribers to the Spotify service and create opportunities to upsell them with Premium only features. The second purpose is to provide a revenue-generating service to low WTP consumers who are unlikely to switch to a paid service.[77] ███

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[71] Spotify and Deezer, for example, both offer an ad-supported tier of service along with a paid subscription service.

[72] Spotify, "Go Premium. Be Happy," accessed Sep. 20, 2016, https://www.spotify.com/us/premium/.

[73] Spotify's ad-supported tier, for example, offers on demand access on desktop computers, but provides shuffle play on mobile devices, and limits the number of skips to six per hour on mobile devices. Spotify, "Spotify Free," available at https://support.spotify.com/us/account_payment_help/subscription_options/spotify-free-on-your-mobile-phone/.

[74] Glenn Peoples, "Business Matters: Study Says Consumers More Willing to Pay for Music Streaming—Except in Sweden," *Billboard*, May 31, 2013, *available at* http://www.billboard.com/biz/articles/news/digital-and-mobile/1565553/business-matters-study-says-consumers-more-willing-to.

[75] Determination, *In re Web IV*, at 69.

[76] Testimony of Daniel McFadden, *In re Web IV*, at 3.

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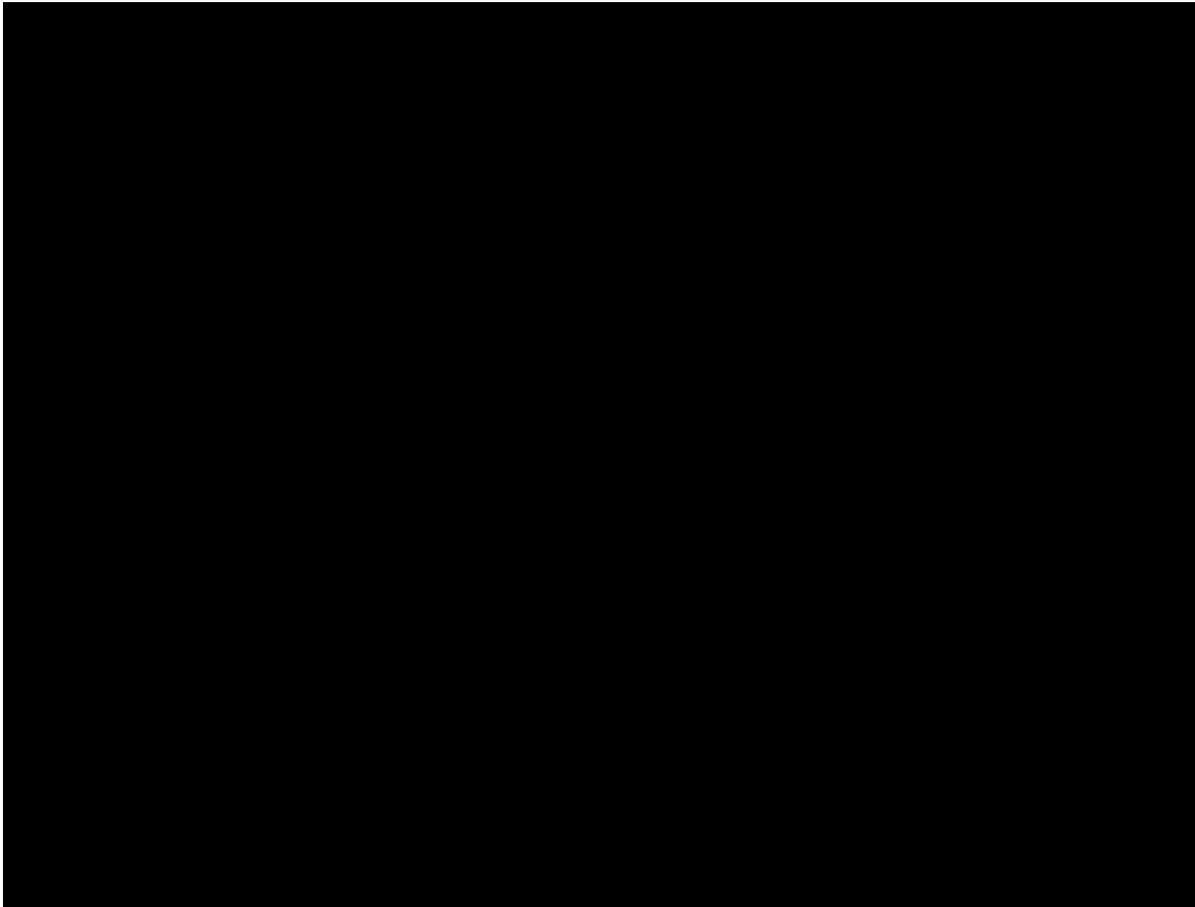
(56)   The current mechanical royalty rates for interactive streaming recognize this bifurcation in WTP by making headline rates a percentage of revenue, accommodating services that target lower WTP consumers by charging them less, and by not imposing a per-subscriber minimum fee on ad-supported services. A flat per-stream or per-subscriber fee applied to both paid and free services would change this structure and could significantly increase the royalty costs of ad-supported services relative to paid subscription services.

VII. Background on musical recording royalties

(57)   US copyright law recognizes and protects two distinct types of ownership for music: the underlying musical work created by songwriters and the sound recording that an artist performs.[78]

(58)   Within these two types of ownership, there are three general categories of rights: public performance rights, reproduction and distribution ("mechanical") rights, and synchronization rights.[79] Although distribution platforms generally pay royalties for both musical works and sound recordings, it is common for them to only have to pay for public performance, mechanical, *or* synchronization rights.[80] For instance, non-interactive streaming services pay only performance royalties, and sellers of PDDs pay only mechanical royalties. Interactive streaming services, in contrast, pay both public performance and mechanical royalties.[81]

(59)   Economic decisions are driven by total payments to musical works rights holders and total payments to sound recording rights holders, whatever their sub-components. In my analysis, therefore, I focus on these total payments and analyze mechanical royalties as one piece of the overall musical works payment made to publishers and songwriters.

VII.A. Sound recording royalties

(60)   Sound recording royalties are paid for the particular recording of a musical work.[82] Distributors of satellite radio, non-interactive streaming, interactive streaming, PDDs, and CDs are all required to pay some form of royalties to holders of sound recording rights.[83] Terrestrial radio is the only distribution channel in which holders of sound recording copyrights have no control over distribution and are not entitled to royalties.[84]

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[78]   United States Copyright Office, "Copyright and the Music Marketplace," Library of Congress, February 2015, 27, *available at* http://copyright.gov/docs/musiclicensingstudy/copyright-and-the-music-marketplace.pdf.

[79]   Ephemeral rights—the rights to make server reproductions of sound recordings to facilitate digital transmissions—are included under public performance rights, for example. Synchronization rights refer to the right to "use music in 'timed relation' to visual content." Synchronization rights are negotiated in the free market for both musical works and sound recording. *Id.* at 55-56, Appendix D. I do not directly address these rights in my analysis.

[80]   One exception to this is terrestrial radio, which does not pay royalties for sound recordings. *Id.* at 87.

[81]   *Id.* at Appendix D. Whether Section 115 licenses should apply to interactive streaming services may be a matter of legal dispute. I do not offer an opinion on that question here. For purposes of this report I take their application to interactive streaming services as given.

[82]   *Id.* at 18.

[83]   *Id.* at Appendix D.

[84]   *Id*. at 43–44.

(61)   Sound recording royalty rates for making and distributing CDs and PDDs, as well as operating an
        interactive streaming service, are established through direct negotiations with the copyright holder in
        the open market.[85] The sound recording digital public performance royalties paid by non-interactive
        streaming services, satellite radio, and "pre-existing subscription services," such as Music Choice, are
        set by statute. The CRB is responsible for setting statutory sound recording royalty rates for these
        distribution channels.[86]

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        ██████████████████████████████ ███████████████ statutory rates noted above are summarized in
        Figure 9 below.

Figure 9: 2016 US sound recording royalty rates

Platform	Sound recording royalty
Statutory rates	
Non-interactive transmission services (subscription)	$0.0022/play
Non-interactive transmission services (non-subscription)	$0.0017/play
Pre-existing subscription services	8.5% of gross revenue
Satellite digital radio services	10.5% of gross revenue
Terrestrial radio services	0
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Source: *Web IV* determination, SoundExchange, ████████

VII.B. Musical work royalties

(63)   Musical works rights can be sorted into three general categories: performance, mechanical, and
        synchronization rights. Non-interactive streaming, radio, ringtones, and sales of PDD/CD pay either
        performance or mechanical royalties, but not both. Interactive streaming services pay both
        mechanical and performance royalties for musical works. Below, I give a brief overview of these two
        types of royalties for musical works.

VII.B.1. Performance royalties

(64)   The large number of music performances makes it difficult for individual music composers to
        negotiate and collect rates from each party seeking to use their music. Performance rights
        organizations (PROs) aggregate the interests of the composers that they represent, and they negotiate
        and collect rates on their behalf. PROs acquire rights from composers of musical works and in turn

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[85]   *Id.* at 43.

[86]   *Id.* at 46, 50.

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grant "blanket licenses" that allow music users to play any of the musical works in the PRO's repertoire.

(65) There are three primary PROs in the United States: ASCAP, Broadcast Music, Inc. (BMI), and Society of European Stage Authors and Composers (SESAC). ASCAP and BMI together represent over 90% of songs available for licensing in the United States.[88, 89] Department of Justice (DOJ) consent decrees have established that PROs are required to grant a license to any user that applies, and must accept any music composer who wishes to be represented by the PRO.[90]

(66) Both BMI's and ASCAP's revenues have increased in recent years. In 2015, BMI's global revenue surpassed $1 billion, a 3.7% increase over 2014 revenue.[91] ASCAP's 2015 US revenue increased by 9.3% over 2014 revenue.[92]

(67) Figure 10 shows the statutory rates paid to PROs. ███████████████████████████████ ███ ████████

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[88] United States Copyright Office, "Copyright and the Music Marketplace," Library of Congress, February 2015, 20, *available at* http://copyright.gov/docs/musiclicensingstudy/copyright-and-the-music-marketplace.pdf.

[89] A fourth PRO, Global Music Rights (GMR), was founded in 2013 and also has a small presence.

[90] In 2014, ASCAP and BMI asked the DOJ to open an inquiry into the operation and effectiveness of the original 1941 consent decrees. ASCAP and BMI made a number of suggestions to change the consent decrees, including a proposal that would allow music publishers to "partially withdraw" from PRO blanket licenses. This would have allowed publishers to negotiate directly with digital services, such as Spotify and Pandora, in order to garner higher rates. United States Copyright Office, "Copyright and the Music Marketplace," Library of Congress, February 2015, 36, *available at* http://copyright.gov/docs/musiclicensingstudy/copyright-and-the-music-marketplace.pdf. *See also*, in August 2016, the DOJ rejected any modification of the consent decrees. With regards to partial withdrawal, the DOJ concluded that it could not "determine whether modification to permit partial withdrawal would be in the public interest." Department of Justice, "Statement of the Department of Justice on the Closing of the Antitrust Division's Review of the ASCAP and BMI Consent Decrees," Aug. 4, 2016, at 16, *available at* https://www.justice.gov/atr/file/882101/download. *See also*, BMI appealed the DOJ's decision and in September 2016, a New York federal judge ruled that the 1941 consent decrees did not necessarily prohibit fractional licensing. Kevin Penton, "Judge Sides With BMI Over DOJ On Music Licensing Deals," *Law360*, Sep. 16, 2016, *available at* http://www.law360.com/competition/articles/841250?nl_pk=ee4365fb-0074-43dd-880f-36.

[91] Broadcast Media Inc., "Annual Review: 2014–2015," Oct. 20, 2014, at 2, *available at* http://www.bmi.com/pdfs/publications/2015/BMI_Annual_Review_2015.pdf.

[92] American Society of Composers, Authors, and Publishers, "Our ASCAP: 2015 Annual Report," at 27, accessed Sep. 20, 2016, http://www.ascap.com/~/media/files/pdf/about/annual-reports/2015-annual-report.pdf.

Figure 10: Performance royalty rates paid to PROs[a]

Distribution channel	Performance royalty rate
CD or PDD	0%
Terrestrial radio stations (Radio Music License Committee)	3.7% of revenue
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Source: Billboard, Radio Music License Committee, Spotify data.
a. RMLC's statutory rate in Figure 10 was calculated by taking the sum of its known rate of 1.7% to each of ASCAP and BMI and adding it to my estimate of its rates paid to other PROs (0.34%). This estimate was arrived at by calculating the average non-ASCAP/BMI rate as a percentage of the total PRO rate for non-interactive streaming, Spotify (ad-supported), and Spotify (subscription).

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VII.B.2. Mechanical royalties

(68)   Mechanical rights allow one to make and distribute copies of a musical work.[93] The CRB has responsibility for setting statutory mechanical royalty rates for musical works, which vary by distribution channel and by business model within the channel. Different rates apply for portable paid subscription services, free-to-user ad-supported services, bundled services, and other categories. Current mechanical royalty rates for interactive streaming are based on a settlement ratified by the CRB in 2009.[94]

(69)   Headline rates for many types of interactive streaming services are an "all-in" 10.5%, including both public performance and mechanical royalties—public performance royalties are subtracted from 10.5% of revenue to derive mechanical royalty payments. But effective rates can be significantly higher than 10.5%. The formulas contain provisions, such as per-subscriber minimums or minimums based on sound recording payments, that can inflate the headline 10.5% number.

VII.B.3. Total musical work royalties

(70)   Interactive streaming services, which pay separate performance and mechanical royalties for musical works, pay a relatively high fee for musical works rights compared to other distribution channels.

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[93]   The Harry Fox Agency (HFA), representing over 48,000 publishers, administers the mechanical license for musical works, collecting fees from copyright users and distributing them to holders. Mechanical licenses can also be directly issued and administered by publishers. United States Copyright Office, "Copyright and the Music Marketplace," Library of Congress, February 2015, 21, *available at* http://copyright.gov/docs/musiclicensingstudy/copyright-and-the-music-marketplace.pdf.

[94]   Mechanical and Digital Phonorecord Delivery Rate Determination Proceeding; Review of Copyright Royalty Judges Determination; Final Rule and Notice, 37 C.F.R. § 385 (2009).

(71)   Figure 11 shows musical work royalty rates for CDs, PDDs, and interactive streaming.[95] Interactive streaming services pay significantly more than other channels, in part because they pay both mechanical and performance royalties. ███████████████████████████████████████

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Figure 11: Typical musical work royalty payment by distribution channel

Distribution channel	Mechanical royalty rate	Performance royalty rate	Total musical works royalty rate
CDs or PDDs	$0.096 per song (weighted average)	0	$0.096 per song (weighted average) (7.7%-8.7% of revenue)
Terrestrial radio stations (Radio Music License Committee)	0	3.7%	3.7% of revenue
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VIII. Current mechanical royalty calculations for interactive streaming services

(72)   Interactive streaming mechanical royalties are calculated based on different statutory formulas depending on the type of interactive streaming service offered. The formulas often take an "all-in" approach to calculating musical works royalties, defining a total musical works royalty pool and deducting performance royalties paid to PROs to determine the mechanical license royalty pool. The exception is a mechanical-specific per-subscriber royalty rate that in some cases takes precedence over the "all-in" royalty pool and can create total musical works royalties that are greater than the "all-in" musical works headline rate.

(73)   The statute determines which of these formulas applies. The most common formulas for interactive streaming services are the formula for "standalone portable subscriptions, mixed use," which applies to most paid subscriber services, and the formula for "free non-subscription ad-supported services," which applies to ad-supported services.[96]

VIII.A. Royalty formula for paid subscriber subscriptions

(74)   The flowchart in Figure 12 graphically explains the statutory formula for mechanical royalties for a large category of paid subscriptions.

Figure 12: Mechanical royalty formula for standalone portable subscriptions, mixed use
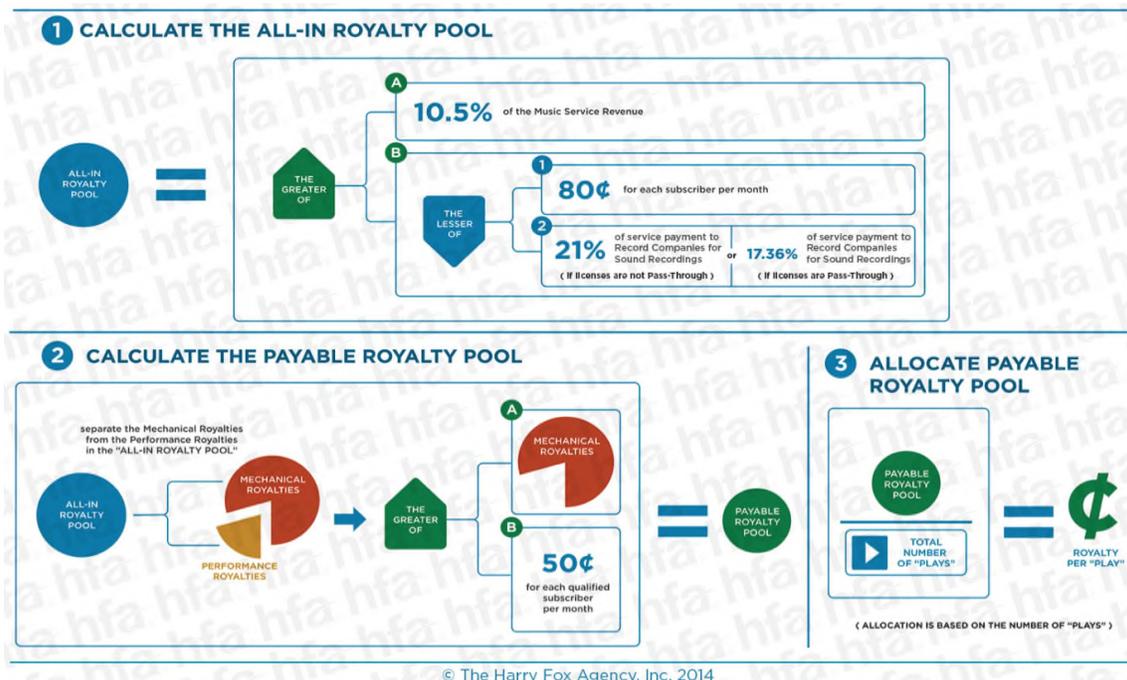
Source: The Harry Fox Agency.

(75) Under this formula, there are four possible determinants of mechanical royalty rates: the 10.5% headline rate (Step 1A), the lesser of 21% of sound recording payments rate and the $0.80 per-subscriber per-month rate (Step 1B), and the $0.50 per-subscriber minimum rate (Step 2). In all cases except the $0.50 per-subscriber minimum payment, payments to PROs are deducted from the total royalty pool to determine mechanical royalty payments. Thus, the $0.50 per-subscriber minimum has no connection to a service's PRO payments.

(76) ███ Using 2015 revenue, subscriber months, PRO payments, and sound recording payments identified in ████████████ ███████████████████

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99 Spotify, Apple Music, Tidal, Google Play, YouTube Red, Rhapsody, Groove Music, Deezer, and Amazon Unlimited all offer standard monthly individual subscriptions for $9.99. Some charge more, if the subscription is purchased on Apple's app store, to cover the app store costs (for instance, Spotify charges $12.99 for subscriptions purchased through Apple's app store to cover the 30% of the headline price that Apple charges). Chris Welch, "Spotify urges iPhone customers to stop paying through Apple's App Store," *The Verge*, Jul. 8, 2015, *available at* http://www.theverge.com/2015/7/8/8913105/spotify-apple-app-store-email.

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VIII.B. Royalty formula for ad-supported subscriptions

(81)   Figure 17 is a flowchart describing the statutory royalty rate for ad-supported interactive streaming services.

Figure 17: Mechanical royalty formula for free non-subscription ad-supported services
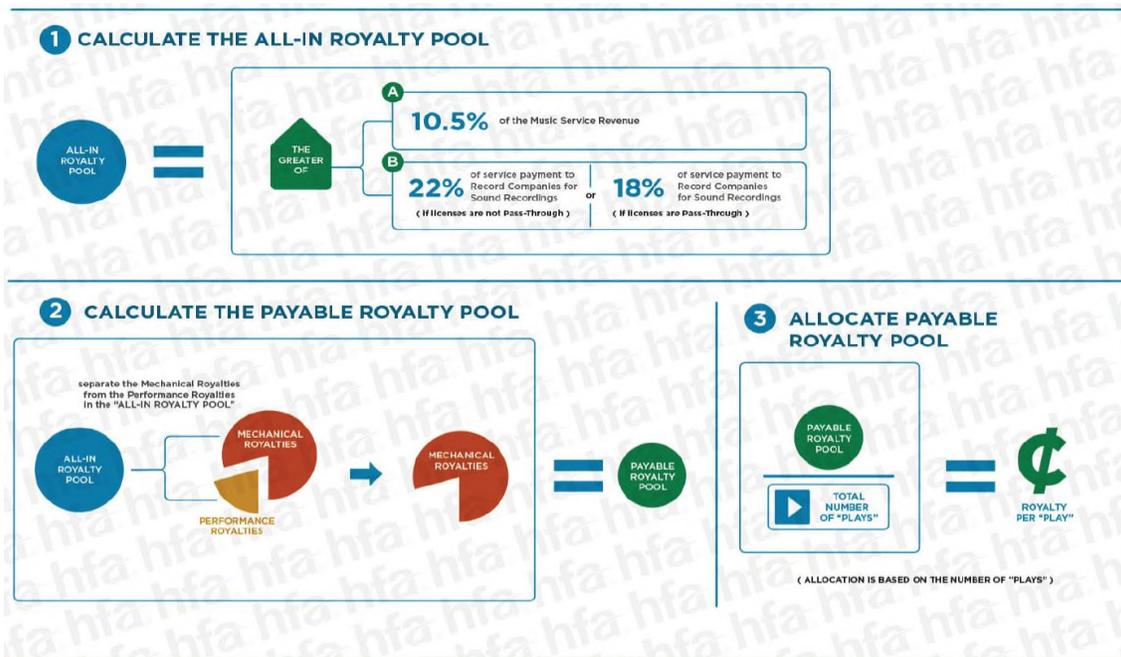
Source: The Harry Fox Agency.

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(82)   Under this formula, there are two possible determinants of mechanical royalty rates: the 10.5%
headline rate and the 22% of sound recording payments rate. [101] In both cases, payments to PROs are
deducted from the total royalty pool to determine mechanical royalty payments.

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VIII.C. Summary

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IX. An economic approach to determining royalties

(87)   The US Constitution's Copyright Clause is intended to "promote the Progress of Science and useful Arts…by securing for limited Times to Authors…the exclusive Right to their respective Writings."[103] A copyright on a musical work or a sound recording exists to protect the rights of creators to receive appropriate compensation for their creations. From an economist's point of view, copyrights are designed to reduce the problem of free-riding.[104] If a creator of a work had no copyright, imitators could easily copy and profit from that work without incurring the cost of creation, thereby reducing the profits of the original creator and diminishing their incentive to create in the first place. This dynamic can result in under-provision of new works, reducing social welfare.[105]

(88)   The incentives of creators, however, are not perfectly aligned with society's interests either.[106] Because the copyright owners have market power over their unique musical work or sound recording, they have an incentive to over-price and thus under-supply works relative to the level that would maximize social welfare. Thus, the rights granted by copyrights are statutorily limited, for instance, in their length and breadth, and in some cases in the level of pricing allowed.

(89)   In the current setting, the mechanical license fee paid to musical work rights holders is statutorily mandated to account for objectives that an unconstrained profit-maximizing creator of works would not explicitly take into account, such as "maximizing the availability of creative works to the public" and providing the copyright user a "fair income under existing economic conditions."[107] Although the exact weights are unspecified, the 801(b) factors indicate that the royalty rate should take into account overall social welfare, in addition to the welfare of the parties involved in the transaction, in a way that a market solution typically would not.[108]

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[103]   United States Constitution, Article I, § 8, clause 8.

[104]   *See* Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization*, 4th ed. (London: Pearson Higher Ed, 2005), 526–35.

[105]   The extent to which increased compensation upstream actually results in new works being created is an empirical question. Ku, Sun, and Fan (2009), for instance, find that increasing protection under the copyright law (by, for example, extending the length of the copyright) does not increase the number of new works created. *See* Ku, Sun and Fan, "Does Copyright Law Promote Creativity? An Empirical Analysis of Copyright's Bounty," *Vanderbilt Law Review*, 62, no. 6 (2009): 1669–1746.

[106]   *See*, Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization* (London: Pearson Higher Ed, 2005), 548–50.

[107]   17 U.S.C. § 801(b)(1).

[108]   Private transactions between two parties can often impose negative externalities on a third party. Negative externalities are costs imposed on parties as a result of an economic transaction in which they do not participate. For example, environmental pollution has a cost to society that is the consequence of the production and sale of automobiles, that neither the buyer nor the seller has an incentive to account for in a private transaction. For a more detailed description of externalities and social welfare, *see*, Robert S. Pindyck and Daniel L. Rubinfeld, Microeconomics, 7th edition, Pearson Education, Inc., 2009, 645-648.

(90)   Economics can inform a reasonable statutory mechanical license fee in a number of ways. First, economics can inform analysis of existing rates that may provide reasonable benchmarks for future rates. Second, economics can inform the appropriate *rate structure* from an economic efficiency standpoint. By "rate structure," I mean whether royalties are determined by number of plays, number of subscribers, revenue, or some other metric. That choice can affect economic efficiency, returns to copyright owners and users, costs to final consumers, and overall social welfare. Third, an economic approach to the "fair" division of surplus—the Shapley value—can provide insight into the appropriate division of the gains from trade between creators of musical works and developers of interactive streaming services, although this approach does not take into account the surplus of final consumers and thus may overstate royalties relative to what the 801(b) factors would dictate. In my analysis, I consider all of these approaches in order to evaluate common predictions in both level and structures of rates called for by these methods.

(91)   Each of these economic approaches corresponds to one or more of the 801(b) factors. The use of existing benchmarks speaks generally to the fourth 801(b) factor of "minimizing disruptive impact" on existing industry practices. Economic analysis of the appropriate rate structure informs the analysis of "maximizing the pie" of surplus created by interactive streaming in a way that benefits final consumers, as well as copyright owners and users in the aggregate, corresponding with the first 801(b) factor of "maximizing availability of creative works to the public." The Shapley value approach provides a way of allocating producer surplus among copyright owners and users according to relative contributions, which speaks to the second and third 801(b) factors related to "fair returns" and appropriate division of joint surplus according to relative contributions.

IX.A. Using benchmarks to inform reasonable royalty rates

(92)   In other proceedings before the CRB, privately negotiated contracts have provided benchmarks as a starting point to determining statutory rates under the "willing buyer, willing seller" standard.[109] For instance, the CRB found in the *Web IV* proceeding that privately negotiated royalties between music labels and *interactive* streaming services for sound recordings provided, with appropriate adjustment, an appropriate benchmark for determining statutory rates paid by *non-interactive* streaming services for sound recording rights.[110]As previously discussed, such a direct benchmarking from private rates to determine statutory rates is less appropriate in this case because market-determined rates may differ from those called for by the 801(b) factors.[111] In addition, without access to the specific

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[109]   The "willing buyer, willing seller" standard, which applies, for example, to non-interactive streaming sound recording rates determined by the CRB, attempts to mimic the rates and terms that would have been negotiated in a competitive marketplace, between a willing buyer and willing seller. This contrasts with the 801(b) standard, which specifically eschews the willing buyer, willing seller standard in favor of the objectives set in section 801(b). 17 U.S.C § 114(f)(2)(B) and (f)(5)(C) (2015).

[110]   Determination, *In re Web IV*, at 66.

[111]   *See* section VII.B.

negotiations surrounding a particular contract, it is difficult to know whether there are exchanges in value elsewhere that are not spelled out in the contract.[112]

(93)   That said, there are two potential benchmarks for future mechanical royalty rates: existing statutory rates for interactive streaming mechanical licenses and statutory rates for PDD/CD mechanical licenses, which would be extended through 2022 under a recent agreement between copyright owners and licensees.[113] Considering the existing statutory mechanical royalty rates as a benchmark for determining a new mechanical royalty rate is appropriate, given the 801(b) mandate to minimize any disruptive impact on generally prevailing industry practices.[114]

IX.B. Using economic theory to inform reasonable rate structure

(94)   As discussed in section VIII, current statutory mechanical royalty rates for interactive streaming services are a complicated function of downstream revenue, music label payments, per-subscriber fees, and performance royalties.[115]

(95)   The structure, as well as the nominal level, of royalty rates is an important determinant of industry outcomes. The rate structure affects both downstream pricing and overall surplus, which in turn affects the total availability of music.

(96)   Upstream per-play or per-song costs can encourage over-pricing and, accordingly, under-consumption downstream. This inefficiency is greater the higher the per-play or per-song rate. In addition, royalty rates that are a function of the number of subscribers, without distinguishing between the income from and valuation of different subscribers, discourage efficient discounting plans, such as family or student discounts. Flat per-play or per-subscriber rates applied to both paid and ad-supported tiers can discourage the offering of an ad-supported tier. All these outcomes hinder the goal of the first 801(b) factor: maximizing the availability of creative works to the public.

(97)   Royalties based on a percentage of revenue offer fewer distortions than per-play or per-subscriber fees. In particular, such a structure gives streaming services a greater ability to pursue low WTP customers through discount plans and ad-supported services. A percent-of-revenue structure also

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[112]   In addition, differences in business models among interactive streaming services mean that it is not clear that any one of these firms could be considered "similarly situated" to another for benchmarking purposes. Apple, Google, and Amazon, the major interactive streaming services aside from Spotify, ▮▮ The specific conclusion that private agreements with Apple are not an appropriate benchmark for statutory rate setting to other streaming services was noted in the recent Pandora–ASCAP rate-setting case. Opinion & Order, *In re Petition of Pandora Media, Inc.*, 1:12-cv-08035-DLC, 1:41-cv-01395-DLC-MHDF. 738 (S.D.N.Y. Mar. 14, 2014) at 86–88.

[113]   Determination of Rates and Terms for Making and Distributing Phonorecords (*Phonorecords III*), 81 Fed. Reg. 48,371 (July 25, 2016).

[114]   17 U.S.C. § 801(b)(1)(D).

[115]   Payments to PROs are also used in the calculation. These formulas are described in more detail in section X.A.1.

encourages the "all-you-can-eat" downstream pricing (in this case, "all you can stream") that is typical of interactive streamers. Setting the price of marginal downstream listening at its marginal cost of zero induces more music consumption and variety than per-song or per-album pricing.

(98)   Setting royalties as a percentage of revenue has a potential downside if interactive streaming revenue is difficult to separate from other forms of revenue. In that case, basing royalties on the number of subscribers or streams might serve the purpose of defining royalty payments more clearly. But even in that case, the per-subscriber or per-play fees should be calibrated to approximate an appropriate percentage-of-revenue rate. Under the current rate structure, the per-subscriber rate equates to a percentage-of-revenue rate far outside current market reality.

IX.C. Using the Shapley value to inform reasonable royalty rates

(99)   The second and third 801(b) factors speak to allocations of profits among copyrights owners and copyright users based on fairness and relative contributions to the final product. Although there is not a uniquely defined concept of fairness in economics, the Shapley value provides a framework for allocating benefits from an agreement according to relative contributions and outside options.[116] Although this method does not necessarily determine the market allocation of surplus, it provides useful insights into a "fair" allocation of surplus reflecting relative contributions.

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[116]   Lloyd S. Shapley, "A Value for N-Person Games," in Harold W. Kuhn and Albert W. Tucker, *Contributions to the Theory of Games* (Princeton, NJ Princeton University Press, 1953) as cited in Copyright Royalty Board, "Distribution of 1998 and 1999 Cable Royalty Funds," Docket No. 2008-1 CRB CD 98-99 (Phase II), 2015, footnote 26. The basic idea of Shapley value is that every entity gets its average marginal contribution to the entities who arrive in a hypothetical market before it, where the average is taken over all possible arriving orders.

X. Determination of reasonable interactive streaming mechanical royalties

(100)   In this section, I use the three approaches outlined above to determine a reasonable level and structure of mechanical royalties for interactive streaming services. No single approach yields an exact answer to the question of what rate satisfies the 801(b) factors, but all approaches corroborate my conclusion that a reasonable mechanical royalty rate is lower than the current rate and that $0.50 the per-subscriber fee component of that formula should be removed, except in cases where interactive streaming revenue is difficult to separate from other forms of revenue.

X.A. Benchmark approach

(101)   There are two potential benchmarks for the interactive streaming mechanical royalty rate: existing statutory interactive streaming rates and mechanical rates for the PDD/CD channel.

X.A.1. Existing statutory rates for interactive streaming

(102)   The use of existing interactive streaming statutory rates as a benchmark fulfills factor D, minimizing disruption to the industry relative to existing industry practices. I thus use existing statutory mechanical rates for interactive streaming as one benchmark.

(103)   Although this is a helpful starting point, the current structure of rates leads to potential economic inefficiency, as explained in more detail in section X.B. Also, as discussed in section X.C, aside from changes in the rate structure, the 801(b) factors argue for a reduction in the levels of current statutory rates. Thus, any movement away from existing rates should be in the direction of lower rates ▇▇ ▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇

X.A.2. PDD/CD rates

(104)   The underlying principle of using PDD/CD rates as a benchmark for interactive streaming rates is that compensation to musical works rights holders for comparable channels of distribution should be comparable, so that the statutory royalty rate structure does not create artificially favored or disfavored forms of distribution that are out of line with underlying demand. Using PDD/CD statutory rates for musical works royalties, industry standards for converting song sales to number of

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[117]   The $0.80 per subscriber top-line minimum in the mechanical royalty formula serves the purpose of preventing a substantial increase in rates from current levels. That fee could usefully be reduced, ▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇ ▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇

streaming plays, and data from industry sources and from the largest interactive streaming service (Spotify), one can compare rights holder compensation from on-demand streaming to that from PDD/CD sales.[118]

(105) I apply this logic using two alternative measures of equivalence between compensation from PDD/CD sales and interactive streaming. The first equilibrates the per-song fee of PDD/CD to the per-stream fee of streaming. The second equilibrates royalties as a percentage of per-song revenue of PDD and CD sales and royalties as a percentage of revenue of interactive streams.

(106) The compensation paid to musical works rights holders is the sum of the total performance royalties and mechanical royalties that they receive. My focus is on the total payment to musical works rights holders, although given the total payment and the amount of performance royalties paid by streaming services, one can back out their mechanical royalty.

X.A.2.a. Using PDD/CD per-song fee equivalent as a benchmark

(107) To convert per-song (PDD/CD) fees to equivalent per-play (streaming) fees, equation (1) below sets the PDD per-song mechanical fee—the only musical works royalties paid on PDDs—equal to the sum of the interactive streaming per-play performance and mechanical fees, with the latter adjusted by a conversion ratio to equalize purchases and streams.[119]

$$(1)\ (PDD\ mechanical\ license\ fee) =$$
$$(IS\ per\text{-}play\ performance\ royalty + \quad IS\ per\text{-}play\ mechanical\ royalty) \times$$
$$(PDD\ equivalent\ number\ of\ plays).$$

(108) The inputs to this equation are calculated as follows. The PDD mechanical license fee is calculated as the weighted average of the PDD/CD mechanical license fee for songs five minutes or less and songs greater than five minutes: $0.091 per copy for the former and $0.0175 per minute or fraction thereof for the latter.[120] Lacking more precise data, I conservatively assume that songs longer than five minutes have an average length of eight minutes. Based on this assumption, the PDD/CD mechanical license fee is $0.096 per song. I use the conversion ratio of PDDs to streams of 1:150, calculated by

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[118] This principle of equalizing rates of return across different platforms has some similarities with that underlying the approach of W. Baumol and G. Sidak, "The Pricing of Inputs Sold to Competitors", *Yale Journal of Regulation* 11, no. 1 (1994): 171–202. They propose an efficient component pricing rule whose purpose is to ensure that the bottleneck owner (in our case, the copyright holder) should get compensation for access from all downstream market participants, whether existing or new entrants, that leaves him as well off as he would have been absent entry. Baumol and Sidak recognize that entrants may expand the market. To the extent that Spotify attracts new listeners, publisher revenue will rise above what it would have been before Spotify's entry.

[119] As indicated in section VII.B, PDD/CD sales pay no performance royalties, thus this equation sets equal total payments per song from PDD/CD and streaming. All calculations ignore administrative fees deducted from payments to publishers.

■ ██████████████████ For statutory rates, *see* "Royalty rates for making and distributing phonorecords," 37 C.F.R § 385.3.

the RIAA based on comparative consumption patterns of downloads and streams. I also explore the sensitivity of my calculations to an alternative conversion rate of 1:137 derived in a recent academic paper by Aguiar and Waldfogel.[121] Using a different methodology, these authors arrive at a conversion ratio slightly lower than that of the RIAA.

(109)   With these inputs, I obtain the following:

$$(2)\ (IS\ per\text{-}play\ performance\ royalty + IS\ per\text{-}play\ mechanical\ royalty) = \frac{\$0.096}{150}.$$

(110)   Solving this equation yields a value for the per-play total streaming royalty of $0.00064.

(111)   As I explain elsewhere in this report, a per-play royalty for streaming introduces inefficiencies and would represent a departure from the current practice of using a percentage-of-revenue headline rate. I am thus calculating per-play royalty rate solely as an intermediate calculation to find an appropriate percentage-of-revenue rate. The per-play royalty rate can be translated to a percentage-of-revenue rate using Spotify's data on streaming and revenue.[122] ████████████████████████████████ ████████████████████████████ ████████████ ██ ████████████████████████ ████████████████████████ ██ ████████████████████

(112)   These calculations are summarized in Figure 22.

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[121]   Recording Industry Association of America, "RIAA Debuts Album Award with Streams," Feb. 1, 2016, *available at* http://www.riaa.com/riaa-debuts-album-award-streams/. *See also* Aguiar and Waldfogel estimate that 137 Spotify streams displace one PDD. Luis Aguiar and Joel Waldfogel, "Streaming Reaches Flood Stage: Does Spotify Stimulate or Depress Music Sales?" (working paper, National Bureau of Economic Research, Cambridge MA, 2015) [hereinafter Aguiar and Waldfogel (2015)].

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X.A.2.b. Using PDD/CD percentage of revenue as a benchmark

(113)   An alternative way to use PDD/CD rates as a benchmark is to calculate the percentage of PDD/CD revenue that current per-song royalty rates imply, and then to apply that percentage of revenue to interactive streaming. Digital sales have a per-song revenue of $1.10 and physical sales have a per-song revenue of $1.24.[127] The weighted average royalty paid per song, taking into account the percentage of songs under five minutes and assuming that songs longer than five minutes are all eight minutes long, is ████ for digital sales and ████ for physical sales. If interactive streaming pays this same royalty of ████████, then its imputed mechanical royalty rate would be ████████ ████████

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Figure 23: Implied mechanical royalty calculation using PDD/CD percentage of revenue

Format	Input: Tracks shipped (Millions)	Input: Dollar value (Millions)	Per-track price	Weighted average royalty per track	Total royalty rate (% track price)	Performance royalty (% track price)	Mechanical royalty (% track price)
Digital	2,115	$2,317.60	$1.10	$0.096	████	████	████
Physical	1,229	$1,520.80	$1.24	$0.096			

Source: RIAA 2015 Year-End Shipments memo and Spotify data.

X.A.2.c. Summary of PDD/CD benchmark results

(115)   Figure 24 summarizes the results of using PDD/CD as a benchmark using either a per-stream equivalent or a percentage-of-revenue equivalent approach. They predict a range of ████████ of revenue for total musical works royalties, implying ████████ of revenue for mechanical royalties alone given current PRO rates that Spotify pays.

Figure 24: Interactive streaming mechanical royalty rate based on PDD/CD benchmark[128]

Benchmark	Total interactive streaming royalty payment to musical works rights holders	Existing interactive streaming performance royalty	Interactive streaming imputed mechanical royalty
Per-song fee equivalence (%)	████	████	████
Per-song % royalty equivalence	████	████	████

████████████████████████████ RIAA 2015 Year-End Shipments memo and Spotify data.

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[127]   RIAA 2015 Year-End Shipments memo ████████████████████████
██ ██
████████████████

X.B. Using economic theory to determine appropriate rate and price structure

(116)   A core principle in microeconomics is that economic efficiency increases as price moves closer to marginal cost.[129] Gains from trade can be shared through lump-sum payments or other methods that do not distort the level of output. This result can be implemented, for instance, through two-part tariffs that charge price equal to marginal cost alongside a lump-sum or subscription fee.[130]

(117)   In the current setting, where the marginal costs of providing rights to a particular musical work and streaming it to the consumer are effectively zero, economic efficiency is best achieved with marginal upstream and downstream prices that approach zero, with appropriate upstream compensation achieved via transfers rather than prices above cost.[131]

(118)   The economic concepts of surplus, deadweight loss, and economic efficiency provide a useful context for discussing these principles, and more broadly how the form and level of royalties can affect copyright holders, users, and final consumers. I first discuss these concepts generally and then discuss how they apply to the current proceeding.

X.B.1. Background on surplus and economic efficiency

(119)   The creation of a product or service that consumers value more than its cost creates value for society. The value that a product or service creates—its *total surplus*—is the sum of two components: the value that consumers place on the product above the price they pay, which is referred to as *consumer surplus,* and the payment that producers receive net of their cost, or *producer profit*.

(120)   When a producer prices a product above its marginal cost, consumers who value the product more than its cost to produce but less than the price will not purchase it. Thus, some value-enhancing transactions do not take place. This creates a *deadweight loss* for society and reduces total surplus.[132] This deadweight loss is sometimes labeled *economic inefficiency.* It reduces the total value available to be divided among producers and consumers. The economically efficient outcome, in contrast, maximizes total surplus.

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[129]   The first welfare theorem in economics says that the allocation of resources is efficient in a general equilibrium with perfect competition. In a perfectly competitive market, price equals firms' marginal cost. *See* for example, B. Douglas Bernheim and Michael D. Whinston, "Microeconomics," Second Edition, McGraw-Hill Irwin, 2014, p.561, and pp. 561-562, 601-602.

[130]   For example, cable TV payments are structured as lump-sum subscription fees and not as a per-minute usage fee because the marginal cost of watching a show is close to zero.

[131]   There are small incremental costs of providing streaming services, but most costs involved in the delivery of streams to consumers are fixed. A marginal cost of zero is a close approximation of true costs of delivery.

[132]   "Deadweight loss" is defined as a reduction in total surplus (producer + consumer benefits) due to an inefficient allocation of resources.

(121)   Thus, economic efficiency normally requires that price be equal to marginal cost. However, for
          products with essentially zero marginal cost, such as digital music, this creates a problem. Setting a
          price of zero means that a supplier does not earn the revenue required to cover its fixed costs and so
          will not provide the good at all. One way this problem can be addressed while maintaining economic
          efficiency is by charging a fixed amount, such as a subscription fee, for the right to purchase multiple
          units of a product, while pricing individual units at or close to marginal cost.[133] This type of pricing
          may exclude users whose total value from the product is less than the subscription fee, but users who
          purchase the subscription have an incentive to access the economically efficient amount of the
          product. Thus, the use of subscription fees can reduce economic inefficiency and thereby increase
          total surplus relative to the use of positive per-unit prices.

(122)   Although debates over reasonable royalties tend to focus on the question of dividing surplus between
          copyright holders and copyright users, a royalty structure that reduces economic inefficiency
          increases the total value available to be divided, which can benefit both sides. In addition, the first
          801(b) factor highlights the importance of "maximizing availability" to the *public* in setting a
          reasonable mechanical royalty rate, which suggests a consumer surplus standard and counsels for
          considering factors beyond just the profits of upstream and downstream producers.

X.B.2. Economic efficiency of interactive streaming pricing model

(123)   Economic principles applied to music listening imply that efficiency is enhanced if the consumers
          face a marginal price of music equal to marginal cost, as in the interactive streaming pricing model.
          These efficiencies tend to increase the volume and variety of consumer listening relative to a model in
          which consumers pay "cost plus markup" on each song or album purchased, as in the PDD/CD
          permanent ownership model.

(124)   This concept is illustrated in Figure 25. Consider a single consumer's purchases of songs or streams,
          under two scenarios. In the first scenario, the consumer faces a price of marginal listening
          approximately equal to zero, the marginal cost of streaming. In the second scenario, the consumer
          faces a marginal listening price greater than marginal cost, because of pass-through of an above-cost
          per-unit royalty, markup of marginal price above cost, or extra costs incurred by the channel that are
          higher than the cost of streaming (such as printing of CDs).

(125)   In the first scenario, facing a marginal cost of zero, a listener consumes up to the efficient point q^*—
          consuming all music that produces value to them above the marginal cost of producing it. This creates
          consumer surplus, and total surplus, of **A+B+C** in Figure 25. In the second scenario, facing a
          marginal price above zero, the consumer reduces consumption to q', at the point where the marginal

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[133] Examples include Amazon Prime, Netflix, health clubs, and to a lesser extent warehouse clubs (in the last, price is not
       literally marginal cost but is generally lower than that available outside the club).

value of extra consumption equals the price. This creates an inefficiency, as measured by the deadweight loss triangle **A**, which reduces social surplus by **A** and reduces consumer surplus by **A** + **C**.[134] The marginal production encouraged by the subscription model encourages more music listening and experimentation with music for which consumers may have low or uncertain value—in the example, all music between *q'* and *q**.

Figure 25: Efficiency of pricing marginal consumption at zero
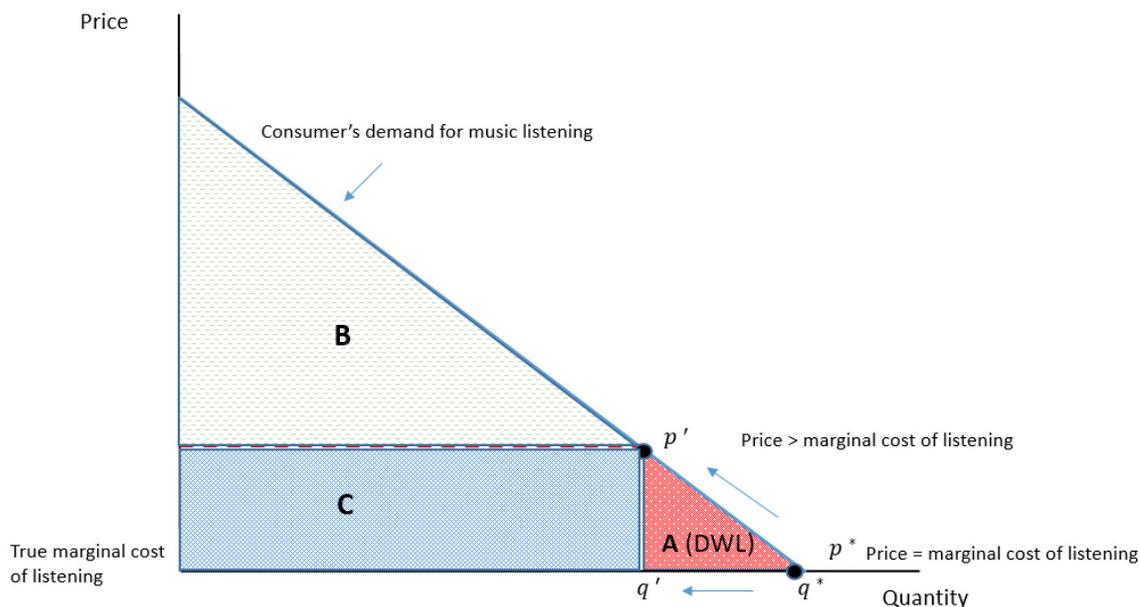
(126)   In this example, a consumer who subscribes to a streaming service that prices marginal listening at zero, as all interactive streaming services currently do, consumes the efficient amount of music, more than if they faced a positive price for incremental listening. Deadweight loss can still be created under this model, however, to the extent that low WTP consumers are priced out of the paid subscription market. Offering a separate tier of service targeted to low WTP consumers, such as a free-to-user ad-supported service, can mitigate this other source of deadweight loss.

X.B.3. Efficiency benefits of ad-supported services

(127)   As discussed in section VI above and at length in the *Web IV* decision, there is a bimodal distribution of consumers' WTP for streaming services, with a large group unwilling to pay much or anything at all out-of-pocket for streaming services. The main alternatives for this low WTP group are other free services or piracy.

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[134]   **C** is transferred from consumers to producers, and so doesn't represent a loss to total surplus.

(128)   An ad-supported service does not charge consumers a fee but charges a "price" via watching or
hearing ads, which generates revenue for the producer and may still be acceptable for low WTP
consumers. To the extent that these consumers receive value from streaming but are not willing to pay
much or anything out-of-pocket, total and consumer surplus is increased by offering them ad-
supported services. By generating some revenue from these consumers, even if not to the same level
as paid subscribers, such services can increase total royalty payments.

(129)   Current royalty rates support the existence of ad-supported service by not imposing a per-subscriber
or per-stream minimum on ad-supported services and by scaling royalties for such services to their
revenue or to sound recording payments. ████████████████████████████████
██ cause
a loss of surplus as affected users move to no revenue or low revenue channels, such as piracy, in
response.

X.B.4. Inefficiency of per-play or per-subscriber royalties

(130)   The subscription model provides an efficiency benefit because the price of a play is equal to the
marginal cost of roughly zero—a subscriber faces the true marginal cost of playing a song over the
internet and thus consumes music at the efficient level. When subscribers face a per-play royalty cost
of zero, interactive streaming services have the appropriate incentive to encourage music listening at
the margin.

(131)   In contrast, if interactive streaming services faced a positive per-play royalty cost, they would have a
diminished incentive to attract and retain high-use consumers, the very type of consumers who create
the most social surplus through their listening. They would also have an incentive to discourage
music listening among the high-use consumers they retain. The higher the level of per-play royalties
is, the more this incentive might affect the behavior of interactive streaming services. Such
discouragement as a response to this kind of perverse incentive is not just a theoretical possibility. It
is seen, for instance, in the actions of fitness centers once they have sold a membership.[135]

(132)   A flat per-subscriber fee also can reduce economic efficiency. The higher the per-subscriber fee, the
less the incentive for interactive streaming services to expand the set of users by offering terms, such
as student and family discount plans, under which users with a lower WTP can participate in the
service. To the extent that users with a lower WTP are also users who are more likely to switch to

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[135]   According to *The Atlantic*, gyms make most of their money from those who use them least. "One way to build a
financially efficient gym is to make it appear really financially inefficient for gym rats: 'Commercial health clubs need
about 10 times as many members as their facilities can handle, so designing them for athletes, or even aspiring athletes,
makes no sense.'" Derek Thompson, "This is Why You Don't Go to the Gym," *The Atlantic*, Jan. 13, 2012, *available at*
http://www.theatlantic.com/business/archive/2012/01/this-is-why-you-dont-go-to-the-gym/251332/.

piracy if streaming is too expensive, a per-subscriber fee may mitigate the positive effect that streaming can have on decreasing piracy.

(133)   In contrast to per-play or per-subscriber fees, a royalty based on a percentage of revenue aligns the incentives of the interactive streaming service with surplus maximization. Under this royalty structure, actions by the interactive streaming service that increase revenue benefit both the interactive streaming service and rights holders. Per-unit fees that are equal to marginal cost and lower subscription prices to lower WTP consumers both increase economic efficiency. Thus, aa percentage-of-revenue format for mechanical royalties is generally superior to a per-subscriber or per-play fee in supporting economic efficiency.

X.B.5. Rationale for per-subscriber or per-play fees in some circumstances

(134)   ██
████████████████████████ Their use in some circumstances may be a response to difficulties in allocating revenue for bundled products. For example, Amazon Prime is a subscription service that charges a single fee for many related services, including interactive streaming. Or such royalties may be used as a way of allocating risk for new, unproven business models.[137] Such circumstances, however, do not arise for most streaming services today. In addition, even in cases with bundled products or new services where a per-subscriber or per-play fee may be useful, such a fee should be set at a level that mimics an appropriate percentage of royalty amount for market conditions, not supersede it by a significant amount.

X.B.6. Summary

(135)   Economic efficiency would be improved by removing the $0.50 per-subscriber fee floor from the paid subscriber mechanical royalty formula. In addition, history has shown that a per-play royalty is not a necessary part of a mechanical license fee. Its introduction would yield perverse downstream incentives, as discussed above, which run counter to the 801(b) factor of maximizing the availability of works to the public.

■ ██
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██
████████████████████ *See also*, the Web IV decision also decided in favor of maintaining a per-play structure. Determination, *In re Web IV* at 1.

[137]   Because the current statutory royalty formula includes a floor based on the percentage of music label payments, the formula includes downside protection even without the $0.50 minimum.

X.C. Using the Shapley value to determine a "fair" allocation of surplus

(136) I use the Shapley value to corroborate my determination of reasonable royalties for interactive streaming using the benchmark approach, and to investigate the extent to which this approach is in keeping with the 801(b) factors calling for a "fair" allocation of surplus between copyright holders and users.

(137) Fairness is not a uniquely defined concept in economics. Nonetheless, certain economic models provide algorithms for dividing surplus among contributors according to a measure of their relative marginal contributions. The Shapley value has this property and a number of other desirable properties.[138] The Shapley value reflects the fairness requirements of the 801(b) factors in the sense that every entity's payoff is determined by its average marginal payoffs under alternative arrangements—a measure of its relative contribution to the joint surplus. It provides a comparison to a hypothetical market with a "fair" allocation of surplus.[139]

(138) The merit of the Shapley value in royalty settings was recognized by the CRB in its recent decision with regard to the distribution of cable royalty funds.[140] The CRB judges explained that "the Shapley value analysis not only enriches the development of the relative market value standard, but it also would allow the Judges in this proceeding to carry out their statutory mandate to distribute the deposited royalties by comparing the parties' respective valuation methodologies to that optimal standard, to determine which of their methodologies more closely reflects the optimal hypothetical market."

(139) Following the Judges' suggestion, I use the Shapley value to evaluate the validity of my benchmark approach. As the Judges also note, the Shapley value often suffers data availability problems.[141] Some of the required inputs can only be estimated imprecisely. I investigate the sensitivity of the results to a

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[138] These properties are efficiency (all surplus is distributed to the coalition of entities), symmetry (payoffs only depend on contributions), linearity (payoffs depend on the profits of coalitions linearly), and dummy axiom (the entities who do not contribute to any coalitions do not get any payoff). *See* Andreu Mas-Collel, Michael D. Whinston, and Jerry R. Green, *Microeconomic Theory* (New York: Oxford University Press, 1995), 682. The basic idea of the Shapley value is that "each player gets 'his average marginal contribution to the players that precede him,' where averages are taken with respect to all potential orders of the players." *See* Uriel G. Rothblum, "Combinatorial Representations of the Shapley Value Based on Average Relative Payoffs," in Alvin E. Roth, *The Shapley Value: Essays in Honor of Lloyd S. Shapley* (Cambridge, UK: Cambridge University Press, 1988), Lloyd S. Shapley, *"A Value for N-Person Games,"* in Harold W. Kuhn and Albert W. Tucker, *Contributions to the Theory of Games* (Princeton, NJ: Princeton University Press, 1953) as cited in Copyright Royalty Board, "Distribution of 1998 and 1999 Cable Royalty Funds," Docket No. 2008-1 CRB CD 98-99 (Phase II), 2015, footnote 26.

[139] The Shapley value does not account for consumer surplus or for relative risks undertaken by the various entities. These two factors, identified by the 801(b) criteria, would tend to call for lower royalty payments by interactive streaming services

[140] Copyright Royalty Board, "Distribution of 1998 and 1999 Cable Royalty Funds," Docket No. 2008-1 CRB CD 98-99 (Phase II), 2015.

[141] *Id.*, footnote 33. "The Shapley model provides a reasonable working solution for regulators…. However, it does suffer from a particularly pressing problem—that of data availability," citing Richard Watt, "Fair Copyright Remuneration: The Case of Music Radio," *Review of Economic Research on Copyright Issues* 7, no. 2 (2010): 21–37.

reasonable range of estimates. Due to the abstractions and simplifications I use to achieve workable approximations, the royalty rates calculated in this section should not be viewed as perfect estimates. However, the Shapley value does provide insights about the directional change for fair royalty rates relative to current values.

X.C.1. Intuition behind the Shapley value

(140)   I have personal experience with the Shapley value, and since it illustrates the concept I think it is useful to share it here.[142] While on vacation earlier this year, my family took a boat ride to an island with another family. We were able to save some money on the booking by doing it jointly, so we did that. There were four people in my family (my youngest son JJ was under the age of 10 and so was free, so I am not counting him) and five in the other family. The boat trips were priced as follows:

- $500 for a group of 4

- $800 for a group of 8

- $100 for each additional person added to a group

(141)   As you might expect with 9 in our group, we made our booking as a group of 8 plus one extra person, for a total of $900. But then the question arose how to split the cost between us. We could have split the cost 50-50, but that didn't seem quite fair because my group had four people and theirs five.

(142)   Here is how we thought about it. If my family had travelled alone, the cost would have been $500. Adding the other family increased the cost to $900, an increase of $400. But if the other family travelled alone, they would have to pay $600, and so adding my family increased the cost above that by $300.

(143)   Thus, my family's contribution to cost is $500 if we go first and $300 if we go second, for an average of $400. The other family's contribution to cost is $600 if they go first and $400 if they go second, for an average of $500. And that's how we divided the cost -- we each paid our average contribution to the cost. My family paid $400 and the other family paid $500. Those were our Shapley values.

(144)   The idea of the Shapley value is that each party should pay according to its average contribution to cost or be paid according to its average contribution to value. It embodies a notion of fairness.

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[142]   While this example concerns allocation of costs, while the model presented here concerns allocation of value created, the intuition is similar.

X.C.2. Delineation of the entities contributing to value

(145)   The Shapley value depends on how I delineate the entities contributing to a particular outcome. A version with N entities needs to specify the values of the $2^N - 1$ possible subsets of entities. Therefore, a version with many entities runs into workability problems because it is difficult to estimate the values of all $2^N - 1$ possible combinations of entities. Determining a workable solution requires some abstraction and simplification from the number of entities and potential entities involved in the music industry.

(146)   At a high level, the entities that work together to create and distribute music to consumers are music distributors and copyright holders of sound recordings and musical works. Each is necessary for musical products to be provided to consumers.[143] Rights holders create the works and distributors add to the value by facilitating their acquisition and consumption. To estimate the royalty rates of interactive streaming services while capturing their potential substitution effect on other music services, one has to at least treat music distributors as two entities or channels: interactive streaming and other music distribution services. In the baseline calculation, I treat rights holders as one upstream entity, reflecting the broad overlap in ownership between publishers and record labels. In Appendix B, I explore the robustness of these results by ungrouping the copyright holders into two separate entities: musical works copyright holders and sound recording copyright holders.[144]

X.C.3. Estimation of revenue and costs

(147)   The calculation of the Shapley value depends on the total value created by all of the entities together and the values created by each possible subset of entities. These values are functions of the associated revenue and costs.[145] In this section, I define a copyright user's *profit* as its revenue minus its non-content cost (i.e., cost excluding royalty payments). Then, the value created by copyright users (downstream) and copyright owners (upstream) is the copyright users' profit minus the copyright owners' non-content cost (i.e., cost excluding payments to other copyright owners or to creators of musical works and sound recordings).

(148)   To calculate the Shapley value, I need estimates for each upstream entity's non-content cost and each downstream channel's profit.

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[143]   Ultimately, songwriters and artists create the musical works and sound recordings. They typically do not bargain directly with distributors, however. Their compensation is generally a function of the (separate) deals they reach with publishers and record labels. I do not model that negotiation here, and the results of that negotiation would not affect the key points I make in this section.

[144]   Musical works' royalty rate is lower in a Shapley value model with two substitutable publishers than in one with only one publisher; it is higher in a Shapley value model with two substitutable interactive streaming firms than in one with only one interactive streaming firm.

[145]   Note that internal transfers among the contributors of an agreement are not part of the value created by an agreement.

X.C.3.a. Upstream

(149)   The three major music publishers, Sony/ATV Music Publishing ("Sony/ATV"), Warner/Chappell Music, and Universal Music Publishing Group ("UMPG"), together control over 60% of the music publishing market.[146] The three major labels, Sony Music Entertainment, Inc., Warner Music Group, and Universal Music Group ("UMG"), account for roughly 65% of US recording industry revenue.[147] The majority of revenue on each side of the market is thus earned by the same three companies.

(150)   Among these three copyright holders of musical works and sound recordings, only Warner Music Group's 2015 publicly available data breaks down its cost by geographic region and by source in enough detail to estimate the amounts needed.[148] Therefore, I use Warner Music Group's financial data and market share to estimate the upstream firm's non-content costs. The estimated upstream non-content costs are summarized in Figure 26. Details of the estimates are in Appendix B.1.a.

Figure 26: Total estimated upstream non-content costs

Musical work copyright holders' total non-content costs	Sound recording copyright holders' total non-content costs	Total upstream non-content costs
$424 million	$2.605 billion	$3.028 billion

Source: *See* Appendix B.1.a.

(151)   The above cost corresponds to upstream cost when all entities work together to create value. To calculate Shapley values, I also need to know upstream costs if only one of the downstream channels is active. In a hypothetical market involving the upstream copyright holders and only a subset of the music distributors, there could be lower demand with correspondingly lower costs. Thus, I assume that upstream non-content costs shrink proportionally to downstream profits in the hypothetical markets involving only a subset of music distributors.

X.C.3.b. Downstream

(152)   My estimates of downstream revenues and costs mostly rely on the following sources: RIAA's "News and Notes on 2015 RIAA Shipment and Revenue Statistics," Spotify's financial data, Pandora's 2015 10-K and Sirius XM's 2015 10-K.[149,150,151,152]

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[146]   United States Copyright Office, "Copyright and the Music Marketplace," February 2015, 19, *available at* http://copyright.gov/docs/musiclicensingstudy/copyright-and-the-music-marketplace.pdf.

[147]   *Id.* at 23.

[148]   Warner Music Group, Annual Report (Form 10-K) (Dec. 10, 2015), at 43–44, 50.

[149]   Joshua P. Friedlander, "News and Notes on 2015 RIAA Shipment and Revenue Statistics," Recording Industry Association of America, accessed Sep. 15, 2016, 2, http://www.riaa.com/wp-content/uploads/2016/03/RIAA-2015-Year-End-shipments-memo.pdf.

[151]   Pandora Media Inc., Annual Report (Form 10-K) (Feb. 18, 2016).

(153)   The estimates are summarized in Figure 27 and the details are in Appendix B.

Figure 27: Total estimated downstream revenues and profits

Interactive streaming's revenue	███████	Other music distributors' total revenue	Other music distributors' profit	Total downstream revenue
$1.604 billion	█████	$8.514 billion	$3.576 billion	$10.118 billion

Source: *See* Appendix B.1.b.

X.C.3.c. Estimation of substitution effects

(154)   Although different music distribution channels have different features, they are to some extent substitutes for one another because they all have the same fundamental feature: distributing music to consumers. Therefore, in the hypothetical market involving copyright holders and all music distribution channels except interactive streaming, one would expect some substitution from interactive streaming to other distribution channels, which would raise the profits of other distribution channels. Similarly, if the only music distributor were interactive streaming, its profit would also increase due to substitution from other channels. Because it is difficult to determine the exact value of this substitution effect, I consider a range of possible substitution effects in my Shapley value calculations.

X.C.3.d. Summary

(155)   If an entity has a positive marginal contribution to total value, then its Shapley value is positive. This says that entities that contribute to value should earn a positive payoff. ███████████████████ ██ ██████████████ music publishers and record labels earn large positive profits. ██████ ███ ██

X.C.4. Calculation of Shapley values in the baseline model

(156)   In the baseline model Shapley value calculations, I consider the allocation of values among three entities: a representative copyright holder of musical works and sound recordings, a representative interactive streaming channel, and a representative music distributor that provides all music distribution services except interactive streaming.

(157)   I consider a wide range of possible substitution effects between the representative interactive streaming channel and the other representative distribution channel. The key results are summarized

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152   Sirius XM Holdings Inc., Annual Report (Form 10-K) (Feb. 2, 2016).

in ███████ The details of the calculation and results are in Appendix B. I find that interactive streaming's Shapley value ranges from ████████████████████████ other music distributors' Shapley value ranges from ██████████████████████ and copyright holders' Shapley value ranges from ██████████████████████

(158)   Using Shapley values and each entity's revenue and cost, I can estimate reasonable royalty payments. Each downstream channel's total royalty payment equals its profit minus its Shapley value, because its profit is the sum of its total payoff and its transfer to upstream rights holders. Each upstream entity's total royalty income equals its non-content cost plus its Shapley value, because its final payoff is the difference between its total royalty income and its non-content cost. The sum of the downstream royalty payments is the same as the sum of the upstream royalty income.

(159)   Given possible substitution effects, interactive streaming's total royalty payments range from ████ ██████████████ other distributors' total royalty payments range from ██████████ ██████████ and copyright holders' royalty income range from █████████████████ ████

(160)   In terms of percentage of its revenue, the estimated interactive streaming's total royalty rate ranges from ██████████

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(161)   Given that Spotify's current royalty payment as a percentage of revenue is above ████████ ██ ██

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(162)   In this baseline calculation, musical works copyright holders and sound recording copyright holders are modeled as one representative copyright holder. This assumption captures the observation that the majority of royalty revenue is earned by the same three companies. To check the robustness of this approach, I relax this assumption in Appendix B.

X.C.5. Alternative Shapley value calculations

(163)   In Appendix B, I consider alternative assumptions where the upstream music industry is modeled as two entities: a representative copyright holder for musical works and a representative copyright holder for sound recordings. This alternative shows that interactive streaming's total royalty payments range from ██████████████ of its revenue, musical work copyright holders' total royalty income as a percentage of upstream revenue ranges from ██████████████ and sound recording copyright holders' total royalty income as a percentage of upstream revenue ranges from ██████████████

(164)   Although the royalty rate in this alternative calculation is higher than the baseline calculation it again shows that Spotify's total upstream royalty payment is higher than what is implied by the Shapley value.[153]

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[153]   Because both sound recording copyright holders and musical copyright holders must be active in order to create value, there are two "must-haves" in the alternative calculation compared to one "must-have" in the baseline calculation. Therefore, the upstream entity has more market power and consequently higher payoffs than the baseline calculation.

XI. Conclusion

(165)   I conclude, based on an economic interpretation of the 801(b) factors, that mechanical royalty rates should decrease, yielding reasonable total musical works rates in a range of ▮▮▮▮▮▮▮▮ with imputed mechanical rates in the case of Spotify of ▮▮▮▮▮▮▮ In addition, ▮▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮ should be removed or adjusted so it does not supersede a reasonable headline royalty rate. Finally, no new or increased per-stream or per-subscriber fees should be imposed in any revision to the rates

(166)   Figure 29 shows the range of rates that are predicted by the benchmarking analysis that I develop in this report and how they would affect Spotify's mechanical royalty rate and total musical works royalties. All these rates are lower than Spotify's existing effective mechanical royalty rates. The conclusion that rates should decrease is supported by my Shapley value calculations, which demonstrate that across a range of reasonable parameter values, the overall royalty rate for interactive streaming services should decrease.

Figure 29: Summary of reasonable royalty rates

Approach	Implied total musical works rate for interactive streaming (% of revenue)	Implied mechanical royalty rate to Spotify (% of revenue)
Current paid subscriber rate without minimums	10.5%	▮▮
Current ad supported subscriber rate without minimums	10.5%	▮▮
▮▮▮▮▮▮▮▮▮▮	▮▮	▮▮
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(167)   ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ As discussed in section X.B, a percentage-of-revenue royalty rate is more efficient than either per-play or per-subscriber royalties. ▮▮

(168)   Throughout this analysis, I have been guided by the 801(b) factors, which call for maximizing the value of creative works to the public, affording both rights holders and rights users a fair return on their investments and risks, and minimizing disruption from current industry practices. Creating a rate structure that is economically efficient by removing per-play or per-subscriber royalties speaks to the first criterion. Allocating returns across contributors according to their relative contributions, as in the

Shapley value, addresses the second and third. Benchmarking to musical works royalty rates for interactive streaming and PDDs addresses the fourth.

Before the
UNITED STATES COPYRIGHT ROYALTY JUDGES
The Library of Congress

In the Matter of	**Docket No. 16–CRB–0003–PR (2018–2022)**
DETERMINATION OF RATES AND TERMS FOR MAKING AND DISTRIBUTING PHONORECORDS (PHONORECORDS III)	

DECLARATION OF LESLIE M. MARX

I, Leslie M. Marx, declare under penalty of perjury that the statements contained in my Written Direct Testimony in the above-captioned proceeding are true and correct to the best of my knowledge, information, and belief. Executed this 31st day of October 2016 in Durham, North Carolina.

Leslie M. Marx