Music-Use Tariffs: Options, Regulation and Bargaining

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August 3, 2017

Abstract

This paper discusses the connection between rate regulation and bargaining outcomes. We conside the case of licensing musical works for radio broadcasting. Our model illustrates the impact when music broadcasters can switch to a talk format. Using a generalized Nash bargaining setting, we interpret the revenue sharing rules established within the regulatory regimes in each country. In any negotiations over a sharing rule with the collectives that own the musical works rights, the ability of broadcasters to switch from a music to a talk format constitutes the threat point for the broadcasters. Using Canadian and US data for 2014 and 2015, we derive the bargaining weights that would generate the same revenue flows for broadcasters and collectives as those produced under the shadow of a copyright regulatory regime. These numerical examples show a higher weight to collectives than appears from the stated tariff rates.

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1   Introduction

In the US and Canada, certain commercial uses of musical works (the composition and the lyrics) and sound recordings are subject to compulsory licensing. By law, rights owners and rights users must agree to license terms, including a royalty rate, or appeal to a copyright board or rate court to arbitrate their differences and establish final license terms. Thus, even

when negotiating licensing terms, the presence of the copyright regulatory authority in the background casts a shadow that may affect negotiated outcomes.[1] The parties to negotiations and to copyright hearings view the process as one of sharing the returns to an activity that uses music as one of multiple intermediate inputs that are assembled to create a product for end consumers. The Copyright Board of Canada (CCB) estimates that, under Board-determined rates for 2012 to 2014, the annual royalty payment from commercial radio to SOCAN (the Canadian collective for performing rights) would be on the order of $55.5 million. In 2014, US radio stations paid annual aggregate license fees to each of ASCAP (American Society of Composers, Authors and Publishers) and BMI (Broadcast Music Inc.) on the order of $150 million.[2] Fees paid by US broadcasters to the small collectives, SESAC (originally Society of European Stage, Authors and Composers) and Global Music Rights are not public information.

In this paper, our goal is to describe the economic issues that surround the determination by copyright boards of royalty rates when music is available to broadcasters in a music bundle covered by a blanket license.[3] We cast our discussion in the framework of rights owners or collectives and rights users or licensees sharing the returns from a particular end use or music service, namely broadcast radio. Broadcast radio has licensing options for music use: (i) an orientation towards music, a music format; or (ii) an orientation towards news, social commentary or sports programming, a talk format. Broadcast radio pays a share of its advertising revenues to the music collectives. The revenue share for the collectives is lower for a talk format than a music format.

We present a simple model that has an equilibrium for a broadcaster's initial choice of a talk format or a music format. The music format has two possible revenue increments on music broadcaster revenues net of non-music costs, a high value draw and a low value draw. Should a low draw be realized, the music broadcaster has an option to switch from a music to a talk

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[1]Ariel Katz (2005 and 2006) examines the case for eliminating the regulated approach to administering performing rights.

[2]For Canadian payments, see Copyright Board of Canada, News Release (2016a), p.2 Payments to SOCAN were estimated to account for about 60% of total payments by commercial radio stations for music rights. For US payments, see United States Radio Music License Committee (2014), p. 2.

[3]Having paid the fee for the blanket license, users are free to broadcast their choice of how much and which music within the repertoire of music offerings.

format. A broadcaster exercising this option faces a switching cost; this cost is avoided if the broadcaster initially adopts a talk format. For the relevant broadcaster, the option to switch from music to talk constitutes a threat point in any bargaining between licensees and collectives. We compare a bargaining outcome with such an option to a regulated outcome that ignores this option.

When the number of performances to individual listeners can be tracked (e.g. performances on the Internet), fees are sometimes calculated on a per-play basis, which, in turn, may be factored into minimum fees expressed as a percent of revenue.[4] For music broadcast by terrestrial radio, the number of people listening to performances is unknown. Here, fees are generally expressed as a percent of revenue.[5] Our analysis adopts a revenue-sharing rule.

2   Institutional Setting

In Canada, collectives are required by law to propose license fee structures on behalf of member music rights holders.[6] In the US, copyright collectives such as ASCAP, BMI, and SESAC may negotiate direct licenses on behalf of their members, while collecting societies like SoundExchange may not negotiate licenses directly but may represent member rights holders in rate hearings.[7] Even when there is agreement amongst the parties, regulators must often approve the license terms.

The accepted wisdom is that the bundling of music into a blanket license offers cost savings to both collectives and licensees.[8] A counterclaim is that the bundling of music into a blanket

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[4]Even when the CCB sets a rate per music play, for the relevant licensee categories, it reports estimated annual revenues which, in turn, suggests a comparison with estimated annual royalties (See Copyright Board of Canada (2014), p.2).

[5]In the US, commercial radio broadcasters negotiated a "fixed fee" agreement with ASCAP for the period covering 2003 to 2009, but reverted to a percent-of-revenue fee for 2010 through 2016. See, United States District Court, Southern District of New York (2014), pps. 20 - 21.

[6]Canada (1985) ss. 67-68. A 1997 amendment to the Copyright Act added a definition of a "collective society" and described its functions. See, Canada (1997), Daniel Gervais (2009) and Howard Knopf (2008).

[7]For a discussion of the distinction between collectives and collecting societies, see Glynn Lunney (2006).

[8]The widespread use of digital media may lower the costs of directly negotiating and enforcing payment of license fees. At some future time, direct licensing from rights holders may grow to the extent that blanket licensing by collectives will be constrained by many competitors. So far, however, the impact of new digital

license could create market power to increase prices above competitive levels. A further observation is that, as blanket licenses cover music options that are complements, the internalization of this complementary effect might serve to lower fees. In any negotiation with licensees over sharing rules, the creation of these common blanket licenses might be expected to enhance the bargaining power of music owners (composers and performers). However, as the largest copyright collectives in the US and Canada are required to make available blanket licenses upon request, we assume that the collectives lack any credible threat to withhold music from music users.

Within a music use (such as radio broadcasting), while licensees sometimes bargain collectively for licenses, the limited set of credibly effective alternatives to blanket music licenses diminishes their collective bargaining power. The existence of compulsory licensing limits any potential bargaining power for the collectives. Both collectives and licensees have the option to appeal to a copyright board for a royalty rate determination.

Radio stations can influence the license fee that they pay through their format choice which involves their use of music. In Canada, format on the AM band is not regulated.[9] For the FM band in Canada, music stations are licensed according to formally-defined terms describing the type of music to be played by the station (such as Adult Contemporary, Country, Jazz and so on) but stations can (and often do) apply to change these conditions. In the US, radio station licensees determine the type of programming they will air.[10] As a general matter, broadcast

media, and the new rights that have been created for digital uses of music, have led to an expanded role for copyright boards that review and/or arbitrate negotiations concerning music copyright pricing.

[9]See Canadian Radio-television and Telecommunuications Commission (no date), Application to Obtain a Broadcasting License to Operate a Commercial or Ethnic Radio Undertaking (including low-power) - Form 101, Section 8.8. This section addresses format regulations for FM broadcast and imposes no format regulations for AM broadcast.

[10] "Licensee Discretion: Because the Commission cannot dictate to licensees what programing they may air, each individual radio and TV station licensee generally has discretion to select what it station broadcasts and to otherwise determine how it can best serve its community of license." See United States Federal Communications Commission (2008).

See Daniel L. Brenner (1978) for detail on radio format flexibility and Charles J Romeo and Andrew R Dick (2005) for an analysis of the impact of format changes on radio performance.

licenses are fungible between music and talk.[11]

In different jurisdictions, copyright boards that resolve tariff disputes operate with different criteria for establishing appropriate fees. In the US, the establishment of a federal rate court to oversee ASCAP and BMI royalty fees arose directly from a concern about the potential for undue exercise of market power.[12] At the same time, the standards set out for what is now the Copyright Royalty Board (CRB)) in the Copyright Act of 1976 (as amended in the 1990s) leave open a broad zone of "reasonableness" for fees for new digital music uses. The standard is elaborated to specify rates that could be negotiated between a willing buyer and a willing seller.[13] As the idea of a willing buyer and willing seller spans all market structures (including those with no market power to those with a high degree of market power), it offers no insight as to where the appropriate rate should be set. Further, under this rubric, there is little guidance in the Act on how to establish the preferred rate.[14] Similarly vague guidance

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[11]For an analysis of the issue of radio format fungibility see David M Grittiths (1980).

[12]The focus on competition in the ASCAP and BMI rate courts is not surprising given that oversight by those courts arose from antitrust investigations of the collectives. The amended ASCAP consent decree also calls for the courts to set "reasonable" fees. However the ASCAP court oversight has been viewed as insuring against the undue exercise of market power, and benchmarks from negotiated ASCAP rates have been adjusted downward by the court with the purpose of restraining the exercise of market power. See Stanley M. Besen, Sheila N. Kirby and Steve C. Salop (1992). BMI operates under a consent decree that is similar to ASCAP's and the royalty rates paid to each collective are the same or similar. In 2014, the Antitrust Division of the US Department of Justice initiated its most recent review of the ASCAP and BMI consent decrees to determine whether they are meeting their goals of protecting competition. See Hannah Karp and Brent Kendall (2014). The Department of Justice concluded its investigation in 2016, deciding not to seek to modify the consent decrees. See United States Department of Justice (2016).

[13]Section 801(b) of the Copyright Act and its Amendments sets out the standard governing satellite and "pre-existing" services and identifies four objectives for copyright judges setting reasonable rates for the performance of sound recordings. These include guaranteeing a fair return to licensees and licensors and setting rates that reflect the relative contributions to the two parties, as well as maximizing the availability of creative works to the public and minimizing disruption to the industries involved. Section 114(f)(2)(B) directs the CRB to establish rates and terms for new digital uses with a compulsory license that will "most clearly represent the rates and terms that would have been negotiated in the marketplace between a willing buyer and a willing seller." The CRB is to bear in mind relative contributions of licensors and licensees and whether the use in question enhances or interferes with licensors' other revenue streams. See, United States Copyright Office (2016).

[14]The CRB has stated that it is mostly concerned with finding an "effectively" competitive outcome. (See

is provided in Canada, where the mandate of establishing or certifying "fair and equitable" royalty rates leaves the details open to interpretation by the CCB.[15] Depending on the history of the music rights and the mandates of the bodies that are assigned oversight, royalty rates for new digital music uses reflect a strikingly wide range of possible sharing outcomes. Our focus is on long-established rights for the performance of musical works by terrestrial radio stations.

3   Model

3.1   Inputs and Broadcast Formats

While it abstracts from some industry and regulatory detail, a simple model of format choice by radio broadcasters and bargaining between collectives and licensees serves three goals: (i) it sets out the impact of format options for broadcasters; (ii) it illustrates the outcomes from various bargaining arrangements; and (ii) it formalizes the economic implications of sharing rules that are established in the context of de facto compulsory licenses.

We focus on two possible radio broadcasting options, a music format (mf) and a talk (or low music-use) format (tf), $i = mf$ or tf as relevant. In the following, we assume a unit mass of broadcasters so that the focus is a representative broadcaster. Consider a production function for a licensee that uses music (m^i) as a broadcast input together with non-music inputs (x^i) to produce an output (y^i) of radio broadcasts.[16] Even though there are different music genres,

David Strickler (2015), p.6). Early webcasting decisions expressed the view that effective competitive outcomes would result when hypothetical buyers and sellers have "comparable resources, sophistication and market power." See United States Copyright Royalty Judges (2007) p. 30.

[15] As a further point of interest, the revenue-sharing rules set in Canada, and sometimes in the US, allow licensors to share in the return from licensees' investments that increase revenues from users but not music use. A recent Canadian Supreme Court decision (Supreme Court of Canada (2015)) makes it less clear that such sharing will be allowed. Allowing collectives to benefit from the investments in technology made by radio stations, for example, may run counter to the Canadian Supreme Court's stated objective of "technological neutrality". Absent any input incentive effects, such sharing would not occur in a competitive input market as doing so dampens incentives for licensees to invest in service enhancements.

[16] It is helpful to think of x as an index that reflects not only non-music broadcast hours but the quality and depth of non-music options such as social commentary, in-depth interviews, news and news analysis, weather and other broadcasting such as sports reporting. To the extent that x reflects non-music broadcast hours, then

without loss of generality for our purposes, we propose to treat music as a homogeneous input. Furthermore, we treat it as a continuous input even if, in practice, music comes in a bundle such as a blanket license. The terms of trade for musical works typically are established under the regulatory watch of a copyright board or rate court – we define these terms of trade as regulated outcomes. As the focus is on input decisions by a radio broadcaster, we do not analyze competition across alternative consumer options for music.

The production relationship is defined as $y^i = y^i(m^i, x^i)$. The licensee has a scarce good, a radio broadcast license that is issued by a government authority. The operative assumption is that the license is fungible between the two formats. That is, a broadcaster could use its license for a music format $(m^{mf} > 0)$ or for a talk format, where the broadcaster faces an upper bound on music use defined as $m^{tf} \leq \overline{m}^{tf}$ where $\overline{m}^{tf}$ is defined by the relevant music license agreement.[17] Our focus is on the option of a music broadcaster credibly to exercise the option to adopt a talk format. With this in mind and to keep the model simple, without loss of generality, we assume that those broadcasters who initially choose a talk format do not have the ex post option to switch to a music format. Without loss of generality, this simplification aids in analyzing the equilibrium and defining credible threats to change format.

Define the advertising revenues for the music licensee as $\widetilde{R}^i(y)$ where $i = mf$ or tf or upon substitution $\widetilde{R}^{mf}(y(m^{mf}, x^{mf}))$ and $\widetilde{R}^{tf}(y(m^{tf}, x^{tf}))$ with $m^{tf} \leq \overline{m}$ for tf. For convenience, redefine the revenue function as $R^{mf}(m^{mf}, x^{mf})$ and $R^{tf}(m^{tf}, x^{tf})$ with $m^{tf} \leq \overline{m}$ for tf. With this redefinition, the revenue function contains both a demand and a production relationship.

Sharing rules establish shares of revenues paid to music collectives and shares retained by licensee broadcasters. Similar to franchise contracts, these shares are applied to (advertising) revenues. For the music format, we define the share of broadcast revenues accruing to the collectives as α $(1 > \alpha > 0)$ with the complementary share $1 - \alpha$ accruing to the licensees. For the talk format, we define the share of broadcast revenues accruing to the collectives as β $(1 > \beta > 0)$ with the complementary share $1 - \beta$ accruing to the licensees.

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total broadcast hours obviously cannot exceed 24 hours in a day. Here the assumption is that any daily hours constraint is non-binding.

[17] As revealed in the ASCAP (2010) radio station licensing agreement, for example, one category sets $\overline{m} = 0$. Even at this no-music use level, broadcasters are still obliged to remit a share of their gross revenues to the music collective because background audio and advertisements may contain music.

As noted above, we assume that music format broadcasting is subject to two ex ante uncertain revenue (net of non-music costs) draws. These revenue draws are defined as $s_1 > s_2$ where s_1 is drawn with probability θ and s_2 is drawn with probability $1 - \theta$. The broadcaster knows θ but it is private information. We assume that the revenue increment applies only to the music format and is defined as $s_j \pi^{mf}$, $j = 1, 2$ where the net return from a music format is $\pi^{mf} \equiv (1 - \alpha)R^{mf} - wx^{mf}$. Notice that this specification leaves the broadcaster's decision on music and non-music input unaffected by the draw on s_i. We assume that there is no such revenue effect for the talk format. This simplifies the model. The net return from a talk format is $\pi^{tf} \equiv (1 - \beta)R^{tf} - wx^{tf}$. Who adopts a music format and who adopts a talk radio format? Answering this is critical to our analysis. While sharing rules for music collectives and licensees are set on the basis of advertising revenues, broadcaster decisions about format are based on net returns for each format option. We now develop the choices for a broadcaster where a music format broadcaster has the option to change its format from music to talk. Our analysis is at the broadcast firm level with an atomistic assumption: as relevant, a music broadcaster can switch to a talk format and earn a representative talk format net revenue stream.[18]

We assume that a music broadcaster who chooses to switch to a talk format incurs a switching cost of K. Positive switching costs place a restriction on the switching option. Namely, if the world is one where $s_2 \pi^{mf}$ occurs, then the switching option has expected value when $(1-\theta)(\pi^{tf} - K - s_2\pi^{mf}) > 0$ or when $\pi^{tf} - K - s_2\pi^{mf} > 0$. If, on the contrary, $\pi^{tf} - K - s_2\pi^{mf} < 0$, the option has no value and switching formats is not a credible threat. If the higher revenue increment is realized, format switching also is irrelevant if $s_1\pi^{mf} > \pi^{tf} - K$ or the payoff in the high draw revenue state exceeds the talk option including the switching cost.

3.2 Format Switching and the Value of an Ex Post Switching Option

3.2.1 How does a switching option affect format choice?

To evaluate the impact of a format switching option, we compare a broadcaster's format choice in the absence and presence of the option to switch. As a reference point, absent a switching

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[18]This assumption puts aside market issues such as a satiation of talk radio in any local broadcast market or input scarcity other than the broadcast license.

option, define a critical θ^* such that the broadcaster is ex ante indifferent between the two format options. This break-even likelihood, θ^*, is defined by

$$[\theta^* s_1 + (1 - \theta^*) s_2] \pi^{mf} = \pi^{tf} \tag{1}$$

For $\theta < \theta^*$, a broadcaster's expected returns absent any option to switch, will be greater if the broadcaster chooses a talk format.

Now consider the broadcaster's choice in the presence of an ex post option to switch where switching incurs the switching cost K. As we note, choosing a talk format ex ante avoids these switching costs. The expected value of the music format to the broadcaster exercising the option is the expected net return from the music format plus the expected net return from the switching option or

$$\theta s_1 \pi^{mf} + (1 - \theta)(\pi^{tf} - K)$$

Therefore a broadcaster will choose a talk format initially (avoiding any switching cost) when

$$\pi^{tf} \geq \theta s_1 \pi^{mf} + (1 - \theta)(\pi^{tf} - K)$$

or rearranging to find an upper bound on K:

$$(1 - \theta)K \leq \theta(s_1 \pi^{mf} - \pi^{tf}) \text{ or } K \leq \frac{\theta}{1 - \theta}(s_1 \pi^{mf} - \pi^{tf}) \tag{2}$$

There is an incentive to choose the talk format initially when the switching cost is large relative to (i) the size of the music surplus from the larger revenue increment, conditional on the relative likelihood of the two revenue draws or (ii) the likelihood of higher revenue draw is sufficiently small, conditional on the size of the surplus. Put differently, when would a broadcaster initially choose a music format with the option to switch to talk if doing so would enhance expected net returns? The answer is that (i) the option to switch must have positive value (or $\pi^{tf} - K - s_2 \pi^{mf} > 0$) and (ii) as established in equation (2), the broadcaster's expected net returns must be greater with the music format and the switching option than choosing the talk format initially.

What matters is

$$sign \left[K - \frac{\theta}{1 - \theta}(s_1 \pi^{mf} - \pi^{tf}) \right] \tag{3}$$

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In summary, when $K \leq (>) \frac{\theta}{1-\theta}(s_1\pi^{mf} - \pi^{tf})$, the broadcaster chooses the music format with talk option (respectively chooses initially the talk format). We may look at this from the perspective of a critical value of θ, given K. Doing so permits us to compare the critical value of θ in the presence of an ex post switching option to the critical value of θ in the absence of such an option. Define $\widetilde{\theta}$, the critical θ that defines indifference between the choice of a music format with an ex post switching option and an initial talk format. Rearranging equation (2) yields:

$$\widetilde{\theta} = \frac{K}{s_1\pi^{mf} - (\pi^{tf} - K)} \tag{4}$$

Before we analyze the difference between $\widetilde{\theta}$ and θ^*, we note two comparative static effects.

3.2.2 Adjustment to $\widetilde{\theta}$ as K and π^{tf} change

From equation (4), the following hold:

$$\frac{\partial \widetilde{\theta}}{\partial K} = \frac{s_1\pi^{mf} - \pi^{tf}}{[s_1\pi^{mf} - (\pi^{tf} - K)]^2} > 0$$

$$\frac{\partial \widetilde{\theta}}{\partial \pi^{tf}} = \frac{K}{[s_1\pi^{mf} - (\pi^{tf} - K)]^2} > 0$$

Thus, (i) as K increases, fewer broadcasters make an ex ante decision to use a music format given that the switching costs have increased. Rather, these marginal music broadcasters initially select a talk format. This result is straightforward. And, (ii) as π^{tf} increases, fewer broadcasters make an ex ante decision to use a music format as the return to a talk format has increased. The interpretation is more insightful for a decline in the net return and, for the Canadian data, a decline is empirically relevant.[19] As the net return for a talk format declines, marginal broadcasters who formerly selected a talk format now select a music format. This change in the net return also has an an impact on the ex post option to switch formats. With declining net returns for a talk format, should a music broadcaster realize a low productivity outcome, the option to switch formats has a lower value. In the limit, this value can reach zero

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[19]In our numerical illustrations below, we assign AM radio to the talk format. See the Canadian Radio-television and Telecommunications Commission (2016) p. 93. "AM radio stations have been struggling over the last 5 years: their revenues have dropped 2.1% per year on average since 2011 to $286 million in 2016."

should $\pi^{tf} - K < s_2\pi^{mf}$. In this limiting case, music broadcasters lack a credible threat to influence any hypothetical bargaining with the music collectives.

3.2.3 Comparison of $\widetilde{\theta}$ with θ^*

How does $\widetilde{\theta}$ compare to θ^*? Equivalently, how does the switching option bring value? From equation (1),

$$\theta^* = \frac{\pi^{tf} - s_2\pi^{mf}}{(s_1 - s_2)\pi^{mf}}$$

Compare $\widetilde{\theta}$ and θ^* as follows:

$$\widetilde{\theta} \lessgtr \theta^* \iff K \lessgtr \frac{[s_1\pi^{mf} - (\pi^{tf} - K)][\pi^{tf} - s_2\pi^{mf}]}{[s_1\pi^{mf} - s_2\pi^{mf}]}$$

Rearranging terms yields

$$\widetilde{\theta} \lessgtr \theta^* \iff 0 \lessgtr \pi^{tf} - K - s_2\pi^{mf}$$

We have set up the option to be credible (or, as noted above, $\pi^{tf} - K - s_2\pi^{mf} > 0$). Comparing $\widetilde{\theta}$ and θ^* leads to the following: $\widetilde{\theta}$ is smaller than θ^* if the net payoff from switching to the talk format exceeds the opportunity cost of the low increment draw. In other words, a broadcaster selects music with the switching option when the net value of the option is positive or the gamble is worth it. Not surprisingly, the option to switch to talk enhances the ex ante selection of a music format and has the effect of expanding music broadcasting.

What is the equilibrium? If the expected net gain from switching to the talk format is sufficiently large, there is a credible broadcaster threat to switch as needed. In the ex ante choice between music and talk, $\widetilde{\theta}$ is below θ^* where the prospect of a low revenue draw (with the switching option) remains sufficiently small that the broadcaster initially chooses music over talk. If the switching cost is sufficiently high, however, a broadcaster whose likelihood of a high revenue draw is sufficiently small is better off initially selecting a talk format. For $\widetilde{\theta} > \theta \geq 0$, the prospect of a low revenue draw is sufficiently large that the broadcaster ex ante chooses a talk format, avoiding the switching cost. Under the condition that renders the switching option credible, the relationship between $\widetilde{\theta}$ and θ^* is illustrated in Figure 1. Here with $\widetilde{\theta} < \theta^*$, it is easy to see the expansion in the music format choice for broadcasters under a credible ex post option to change the broadcast format.

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3.2.4 Could the collectives benefit if music broadcasters have an option to switch ex post to a talk format?

With the switching option in place and subject to restrictions on the size of the switching costs defined by K, so that $\theta \in (\widetilde{\theta}, \theta^*)$, the potential broadcaster will select a music format with a credible option to switch to talk as needed. As a result, as noted above, under the specification of our model, the expectation is that more music will be broadcast.

Consider the critical $\widetilde{\theta}$ and the following condition required to answer 'yes' to the question of whether the collectives are the beneficiary if music broadcasters have the option to switch ex post to a talk format.:

$$\theta \alpha s_i R^{mf} + (1 - \theta)\beta R^{tf} \geq \beta R^{tf} \ \forall \theta \ s.t. \theta^* > \theta \geq \widetilde{\theta}$$

or over the relevant range $(\theta \in [\widetilde{\theta}, \theta^*))$ for the correspondingly relevant broadcasters, when the expected value of the share of revenues flowing to the collectives with the credible format switching option exceeds the share of revenues flowing to the collectives absent the switching option, then the collectives are better off. Rearranging yields

$$\theta(\alpha s_1 R^{mf} - \beta R^{tf}) \geq 0 \ \forall \theta \ s.t. \theta^* > \theta \geq \widetilde{\theta} \tag{5}$$

As $\alpha > \beta$ and $s_1 R^{mf} > R^{tf}$, for a given (α, β), the music collectives are better off with than without the format switching option. With our structure, the answer to the question is 'yes'.

3.2.5 Are the collectives necessarily better off with a higher α?

With a credible option to switch formats, is it in the interests of the collectives to increase any sharing rule? The trade-offs are as follows: the collectives receive incremental revenues from music broadcasters who do not switch ex ante to talk but forego incremental revenues from those music broadcaster who now switch.

What happens to $\widetilde{\theta}$ as α (alone) changes? Consider

$$\widetilde{\theta} = \frac{K}{s_1 \pi^{mf} - (\pi^{tf} - K)}$$

where, as defined, net returns to a music format are $\pi^{mf} \equiv (1 - \alpha)R^{mf} - wx^{mf}$. Recall that

net returns to a talk format are $\pi^{tf} \equiv (1-\beta)R^{tf} - wx^{tf}$. Substitution yields

$$\widetilde{\theta} = \frac{K}{[(1-\alpha)s_1 R^{mf} - wx^{mf} - ((1-\beta)R^{tf} - wx^{tf} - K)]}$$

so that

$$\frac{\partial \widetilde{\theta}}{\partial \alpha} = \frac{Ks_1 R^{mf}}{[(1-\alpha)s_1 R^{mf} - wx^{mf} - ((1-\beta)R^{tf} - wx^{tf} - K)]^2} > 0$$

As α increases, the music format with a talk option becomes less viable. What is clear is that (i) if the θ that is drawn is at or greater than the new higher critical $\widetilde{\theta}$ (corresponding to the larger α), then the licensee selects a music format with a talk option and the collectives get a higher expected share of revenues should the broadcaster realize the revenue increment s_1; (ii) if the θ that is drawn is less that the new higher critical $\widetilde{\theta}$ (corresponding to the higher α) but greater than the former critical $\widetilde{\theta}$, the former music broadcaster who had a credible expected talk option as needed, now initially selects a talk format and the collectives get only $\beta < \alpha$ from this inframarginal broadcaster.

For example, while a broadcaster knows its θ, this is private information. Ex ante, the collectives need to assume a distribution of θ's. Suppose that the collectives assume that θ is uniformly distributed over the unit interval $[0,1)$. From equation (5), the expected returns to the collectives from music broadcasters with an expected credible option to switch are defined as

$$B_C \equiv \frac{(\overline{\theta} - \widetilde{\theta})}{\overline{\theta}}(\alpha s_1 R^{mf} - \beta R^{tf})$$

Then

$$\frac{\partial B_C}{\partial \alpha} = \frac{(\overline{\theta} - \widetilde{\theta})}{\overline{\theta}} s_1 R^{mf} - (\alpha s_1 R^{mf} - \beta R^{tf})\frac{\partial \widetilde{\theta}}{\partial \alpha}$$

Under our specification, the first term is positive and represents the collective's expectation of a greater share of revenues from relevant music broadcasters with the high revenue increment. The second term has a negative sign and represents the shrinkage of the likelihood support as relevant marginal broadcasters initially select a talk format without any gamble. The result depends on which effect dominates. Symmetrical results obtain for any reduction in α. The answer to the question is 'uncertain'. With a higher α, the expected revenue extraction from the inframarginal music broadcasters may be larger or smaller than the expected loss of revenue from the marginal music broadcasters who will now initially choose a talk format with its lower sharing rule.

3.3 Ex Ante Sharing Rules Under Bargaining with a Credible Expected Threat

3.3.1 Hypothetical bargaining set-up

In this hypothetical example, we assume that parties bargain ex ante over sharing rules. Our focus is the impact of credible broadcast format changes on the bargaining process. As we have noted, music-format radio broadcasters use blanket licenses for the performance of musical works. With such a license, the music-format broadcaster can select any quantity of music from the licensor's music repertoire limited only by the number of hours in the day. Without loss of interpretative value, for ease, we treat rate setting as a non-repeated game, although, in fact, the collectives and the various licensees repeatedly bargain and repeatedly appear in hearings before copyright boards and rate courts.

The role of the creators and publishers that produce the musical works is relegated to the background as first movers in an earlier stage of a rate-setting game.[20] We assume that the sequence of decisions is as follows: (i) musical works are is created; (ii) the licensee makes a decision on x^i and m^i, which determines y^i; (iii) should bargaining occur, the licensee and the collective bargain over the sharing rule.

What matters for bargaining is the identification of the threat or status-quo points for the relevant parties. Three observations are relevant: (i) as noted, music was created at an earlier recording stage of the game, (ii) music is a non-rivalrous or public good, and (iii) music must be licensed because of the actual or de facto compulsory licenses established in copyright law that cover most music. Once music is created, any threat by license holders to withhold music from licensees is cheap talk in a regulated rate-setting process. Furthermore, in Canada, for example, for music broadcasting, once the fee structure is sanctioned by the regulator, the music collective cannot withhold a blanket license on the same terms of trade from any similar potential licensee. Once more, we emphasize that our analysis assumes that the broadcast

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[20]In a sequential game, music creation would move first. The music creators in this game could rationally anticipate the outcome of the sharing and rate rules to be imposed subsequently through bargaining with broadcasters and rates set by the regulators. What is critical is that the return to music creators be sufficient to yield a risk-corrected competitive rate of return, a participation condition.

firm is atomistic in the sense that a music broadcaster can switch to a talk format and earn a representative talk format net revenue stream.

Here, sharing rules are negotiated ex ante (before the realization of any draw on the revenue increment). Music-format broadcaster expected revenues are

$$\overline{R}^{mf} \equiv [\theta s_1 + (1-\theta)s_2]R^{mf}(.)$$

The expected revenues available for establishing sharing rules are expected revenues from music broadcast less what the music broadcaster would receive if the broadcaster had a credible option to move to a talk format or

$$\widehat{R}^{mf} = R_L^{mf} + R_C^{mf}$$

where R_j^{mf} is the revenue accruing to the two parties, $j = L, C$ where L is the licensee and C is the collective.

$$\widehat{R}^{mf} = \overline{R}^{mf} - (1-\theta)[(1-\beta)R^{tf}] \tag{6}$$

with the credibility condition, equation (3)

With substitution, the relevant generalized bargaining problem[21] is defined by

$$\max_{R_C^{mf}} (R_C^{mf})^{\alpha}(\overline{R}^{mf} - (1-\theta)(1-\beta)R^{tf} - R_C^{mf})^{1-\alpha}$$

Simplification of the first-order condition yields

$$R_C^{mf} = \alpha\overline{R}^{mf} - \alpha(1-\theta)(1-\beta)R^{tf} \tag{7}$$

and

$$R_L^{mf} = (1-\alpha)\overline{R}^{mf} + \alpha(1-\theta)(1-\beta)R^{tf} \tag{8}$$

In these expressions, notice that the collectives surrender expected threats of $\alpha(1-\theta)(1-\beta)R^{tf}$ to the licensees because of the credible threat by the respective licensees to use their scarce license to switch to the alternative format. That is, equations (8) and (3) are necessary and sufficient to define a bargain with a credible threat.

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[21]See Ken Binmore et al (1986) for the development of the generalized Nash bargaining model used in this paper.

3.3.2 Credible ex ante threat adjustment and negotiated equivalents of a regulatory sharing rule

The assumption is that θ is uniformly distributed over the unit interval and, for our purposes here, we assume a closed interval, that is $\theta \epsilon (0,1)$. The following numerical examples use average revenues (the available reported data) for the relevant set of broadcasters. Thus, for music broadcasters, the relevant value of θ for the average music broadcaster is $\overline{\theta}^m = \widetilde{\theta} + \frac{1-\widetilde{\theta}}{2} = \frac{1+\widetilde{\theta}}{2}$ (see Figure 1). Next, consider the implicit negotiated sharing rule that results when a regulatory agency sets a sharing rule but does not recognize that music-format broadcasters can have a credible threat to switch to a talk format. Recognizing the credible threat potential for music broadcasters to change their format, we calculate the ex ante *negotiated* value of α that yields the same revenue flow to the collectives as the regulated value $\widehat{\alpha}$. The assumption is that the regulated rate ignores any credible threat option to change the music format to talk. The expected draw of the low revenue state for the average music broadcaster under our assumptions is given by $1 - \overline{\theta}^m = 1 - \frac{1+\widetilde{\theta}}{2} = \frac{1-\widetilde{\theta}}{2}$. The equivalence of the revenue flow to the collectives in the negotiated and regulated rate scenarios from the average music broadcaster is given by

$$(1-\widehat{\alpha})[(\overline{\theta}^m s_1 + (1-\overline{\theta}^m)s_2)(R^{mf}(.)] = (1-\alpha)[\overline{\theta}^m s_1 + (1-\overline{\theta}^m)s_2]R^{mf}(.) + \alpha(1-\overline{\theta}^m)(1-\beta)R^{tf}(.)$$

such that condition (4) for relevant values of θ is satisfied. Solving for α yields

$$\alpha = \widehat{\alpha}\left[\frac{[(\overline{\theta}^m s_1 + (1-\overline{\theta}^m)s_2]R^{mf}}{[(\overline{\theta}^m s_1 + (1-\overline{\theta}^m)s_2]R^{mf} - (1-\overline{\theta}^m)(1-\beta)R^{tf}} \right]$$

The adjustment factor *Adj* that brings the revenues flows from the negotiation and regulation into equality is defined by

$$Adj \equiv \frac{[(\overline{\theta}^m s_1 + (1-\overline{\theta}^m)s_2]R^{mf}}{[(\overline{\theta}^m s_1 + (1-\overline{\theta}^m)s_2]R^{mf} - (1-\overline{\theta}^m)(1-\beta)R^{tf}} > 1$$

This defines an upward adjustment to $\widehat{\alpha}$ in light of an expected value associated with a format-switching option or credible threat point for the average music broadcaster. What we are considering is an adjustment to a sharing rule $\widehat{\alpha}$ already set by regulators, not a de novo determination of the sharing rule. Requiring a format switching option to be credible places

an upper bound on the ex post firm switching costs for the marginal music broadcaster (defined by $\widetilde{\theta}$) as follows:

$$K \leq \frac{\widetilde{\theta}}{1 - \widetilde{\theta}}(s_1\pi^{mf} - \pi^{tf})$$

Interpretation of the adjustment to regulatory sharing rules: As discussed, the operative assumption is that the regulatory authority ignores any credible threat potential by relevant music broadcasters to switch to a talk format. Under this condition, the adjustment formula says that the credible threat-corrected sharing rule for music broadcasters is the regulated rate increased by factor *Adj* to yield the same revenue flow to the collectives. Put differently, the adjustment factor is the upward adjustment that must be made to the regulated rate if the revenue base to be shared with the rights holder is the music broadcasters' revenues net of the threat point. Here we explore the sensitivity of the adjustment factor using radio station revenue data to proxy for revenues to music-format and talk-format broadcasting before music performance rights payments. Relevant music broadcasters in this model are music-format stations meeting two conditions. First, should they draw the low revenue increment, they have a higher net return by incurring a switching cost and switching to a talk format. Second, the expected value of the high over the low revenue increment is large relative to the switching cost or $\theta \geq \widetilde{\theta}$.

3.3.3 Adjustment factors that equate negotiated and regulatory sharing rules

To gauge the sensitivity of the regulated sharing rules to relevant measures of θ, we use observed radio station revenues and calculate relevant average revenues for a music-format and talk-format broadcaster. For the average music-format broadcaster, a lower $\overline{\theta}^m$ means that the likelihood of the low–revenue draw increases, which increases the likelihood that the talk-format option will be exercised by the music-format broadcasters. In turn, this increases the expected value of the threat point in the generalized bargaining process for the average music format broadcaster, reducing the amount of broadcast revenues available for bargaining between the broadcasters and the collectives.

US Data: For each Nielsen-rated station in 266 US Designated Market Areas (DMAs) in

2014 and 2015, S&P Global Market Intelligence compiled data indicating the station's format, frequency band, and estimated annual net advertising revenue.[22] We focus on FM stations and categorize the station as music or talk based on the format of the primary station.[23] The regulatory rates determining revenue flows to the collectives are as follows: $\widehat{\alpha} = .017$ (for a music broadcaster) and $\widehat{\beta} = .002958$ (for a talk broadcaster).[24] Results using the US data appear in Tables 1a and 1b (for 2014) and Tables 2a and 2b (for 2015).

There are two caveats: (i) the assumption is that the values of the average music broadcaster revenues $R^{mf}(.)$ include the respective and unobserved values of (s_1, s_2, θ) as θ adjusts; (ii) as $1 - \theta$ increases ($\widetilde{\theta}$ decreases), the assumption as revealed in the last column of Tables 1b and 2b reveal the increasing restriction on the admissible value of K for a credible option for a broadcaster to switch its format from music to talk.

Subject to these caveats, our US examples reveal the following: in the presence of a credible threat for music broadcasters, the negotiated sharing rule that yields the same revenues to the collective needs to increase from 1.7%. As the likelihood of a low-revenue draw for the average music broadcaster reaches 45%, the threat-corrected share yielding the same revenues to the collective increases from 1.7% to 3.0% (a 77.2% increase) with 2014 US data and to 2.7% (a 60.5% increase) with 2015 US data.

Here is the interpretation: as the likelihood of a low-revenue draw increases for the average music broadcaster, the expected value of the ex post option to change the format to talk also increases. In any bargaining with the collective, this increases the expected credible threat position of the music broadcaster and enhances the revenues retained by the broadcaster in negotiations. The only way that the revenues accruing to the collectives can remain unchanged is with an increase in the collective's revenue share.

Canadian Data: The Canadian Radio-Television and Telecommunications Commission (CRTC) reports aggregated annual financial data for AM and FM radio stations in Canada.

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[22] DMAs are defined by Nielsen. Net revenue estimates are based on year-end financials for calendar years 2014 and 2015. See S&P Global Market Intelligence (2016).

[23] The format of any additional HD stations may differ from that of the primary station, although the revenue of the HD stations is included in the station revenue figure.

[24] ASCAP (2010) Pps. 3-4. The license covered the period from 2010 through 2016. We adopt the "base fee" for radio stations with limited music use.

There is no breakdown, however, between music format and talk format. According to other reports, of the roughly 213 commercial music stations listed, 11 are on the AM band while 202 are FM.[25] Of the roughly 26 commercial talk radio stations, 23 are on the AM band while only 3 are on the FM band. This excludes public, religious, community and info radio stations. Thus, AM stations are primarily talk format while FM stations are primarily music format. From the CRTC financial data reports for 2014 and 2015, we calculate average revenues for AM and FM broadcasts and, based on the format patterns discussed above, assign the AM average to talk radio and the FM average to music radio. The regulatory rates for Canada are as follows: $\widehat{\alpha} = .044$ (the marginal rate for a music broadcaster with revenues over \$1.25 million) and $\widehat{\beta} = .015$ (for a talk broadcaster).[26] Results using the Canadian data appear in Tables 3a and 3b (for 2014) and Tables 4a and 4b (for 2015).

The caveats expressed for the US numerical illustrations continue to apply and are worth repeating. There are two: (i) the assumption is that the values of the average music broadcaster revenues $R^{mf}(.)$ include the respective and unobserved values of (s_1, s_2, θ) as θ adjusts; (ii) as $1 - \widetilde{\theta}$ increases ($\widetilde{\theta}$ decreases), the assumption as revealed in the last column of Tables 3b and 4b, reveal the increasing restriction on the admissible value of K for a credible option for a broadcaster to switch its format from music to talk.

Subject to these caveats, our Canadian examples mirror those of the US. In the presence of a credible threat for music broadcasters, the sharing rule that yields the same revenues to the collectives needs to increase from 4.4% with increases in the ex ante likelihood of a low revenue draw. As the likelihood of a low-revenue draw for the average music broadcaster reaches 45%, the threat-corrected share yielding the same revenues to the collectives increases from 4.4% to 7.1% (a 61.3% increase) with 2014 Canadian data and to 7.1% (a 60.3% increase) with 2015 Canadian data.

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[25] Calculated from Canadian Radio-television and Telecommunications (2017) data and supplemented by Canadian Radio Station List (no date).

[26] The most recent rates available (for 2012 and 2013) for SOCAN licenses for commercial radio are from Copyright Board of Canada (2016b).

3.4 Bargaining as a Prescriptive Tool in Setting the Sharing Rules

The generalized Nash bargaining structure permits an interpretation of the outcomes of established sharing rules in the shadow of a rate court or a copyright board. This leads to a normative question: does an analytical bargaining structure provide insight for setting music tariffs? To capture regulators' views on the prescriptive use of bargaining models, we expand the discussion of music-licensing decisions beyond the performance of musical works by radio broadcasters to include decisions concerning other music rights. What follows is a discussion of how regulatory boards in both the US and Canada have responded when experts use bargaining models to propose or defend tariffs. Much of the regulatory discussion centers around "surplus" measures (corresponding to the net revenue of our model) as the appropriate objective measure for rate setting.

3.4.1   US

In the US, economists have put Nash bargaining models or similar "surplus-splitting" models before the CRB and its antecedents to defend proposed royalty rates. The analytics assume parameter values for bargaining weights and measure surplus from accounting data. The bargaining analytics assign surplus shares to the two parties. The proposed Nash bargaining models use threat or status quo points and assign bargaining power to determine the allocation of the surplus.[27] These "surplus-splitting" models assume a specified return on investment for the licensees (for example 20%)or calculated the excess of revenues over cost and make further assumptions about the division of any residual surplus via royalty payments to the collectives.[28] For two reasons, the CRB in the US has not found any of the evidence from bargaining or surplus-splitting models to be informative in rate determinations.

First, the CRB has found that there are many data elements and assumptions underlying the models.[29] The challenge has been exacerbated by a perceived lack of data.[30]

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[27]See United States Copyright Royalty Board (2013) Pps. 23056-57.

[28]See United States Copyright Arbitration Royalty Panel (2002) Pps. 72-74; United States Royalty Board (2013), p. 23082; and United States Copyright Royalty Judges (2007), Pps.34-36.

[29]See United States Copyright Arbitration Royalty Panel (2002), Pps 73-74 and United States Copyright Royalty Judges (2007) Pps. 35-36.

[30]See United States Copyright Royalty Judges (2007) Pps. 35-36.

Second, the CRB has been uncomfortable with assumptions as to the division of the surplus. For example, in United State Copyright Royalty Judges (2007), the Board characterized as "questionable" an expert's assumption that conditions in the real world justify a division of the surplus in the proportions of 75% to the licensor and 25% to the licensee, saying "[n]o evidence from this market was provided to support this assumption. A different assumption of equal bargaining power would yield a different estimate of the proposed royalty rate."[31] In another example, the dissenting judge in United States Copyright Royalty Board (2013) was not persuaded by evidence put forward by economists to establish the bargaining parties' threat points.[32] In relation to the surplus-splitting models, the Board protested that there is no reason (i) it should ensure all licensees a particular return on their investments[33] or (ii) the collectives should be residual surplus claimants after a licensee has paid other expenses and derived a given return on its investment.[34]

A statement by the majority of CRB judges in their Final Determination in PSS/SDARS II sums up the discomfort the Board has with attempts to apply the Nash bargaining structure.

> The Nash Framework is a theoretical concept whose goal is to evaluate how the surplus from a hypothetical transaction might be divided between negotiating parties. Even assuming that the Nash Framework has predictive value in some real-world contexts, Music Choice provided no data to support the theoretical approximations in the market for any intellectual property rights, much less those that the Judges are charged with evaluating. Therefore, the Judges find that the Nash Framework is not useful corroborating evidence.[35]

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[31] United States Copyright Royalty Judges (2007), Pps. 34-35.

[32] See United States Copyright Royalty Board (2013). p.23083. In footnote 17 on p. 23058, the other judges concur with a dissenting judge's "more spirited rejection of the probative value of the Nash Framework as proffered in this context. The Judges concur with (the dissenting judge's) assessment, but believe, as a threshold matter, that the Nash Framework, without real-world data to support its predictive capacity, is unworthy of further consideration."

[33] United States Copyright Royalty Board (2014) p. 23107.

[34] See United State Copyright Arbitration Royalty Panel (2002) p. 3.

[35] United States Copyright Arbitration Royalty Panel (2002) p. 23058 (note omitted).

3.4.2 Canada

The CCB in Canada has also evaluated surplus-splitting/bargaining proposals in its copyright royalty hearings. Perhaps to its chagrin, the CCB has opened itself up to these approaches by expressing the view that when a new or existing platform for delivering music offers efficiency gains and lower costs, owners of music should share in the resulting higher returns.[36]

In Canada, some surplus-splitting proposals have been premised on the expectation that collectives would extract all the available surplus in negotiations with licensees. Some proposals calculate the maximum willingness-to-pay for music (the price a licensee would pay) on the assumption that the collectives have market power in the relevant business segment.[37] Such claims may be premised on the CCB's observation that "in information industries, pricing tends to be based on the value to the buyer, not on cost to produce."[38] However, the preponderance of the discussion by the CCB has been more moderate, indicating that the Board expects a solution somewhere between the minimum price the seller is willing to accept and the maximum price the buyer is willing to pay.[39] Bargaining proposals put before the CCB have assumed equal bargaining power between negotiating parties.[40]

In discussion that is similar to that of the US CRB, the CCB has expressed strong reservations about cost and revenue measurement and assumptions and the resulting fragility of surplus-splitting and bargaining results. The CCB has expressed distaste for reliance on accounting data:

> . . . using profits to determine the rate for a collective society is inherently problematic. Profits are an artifice of accounting conventions and can be manipulated.

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[36] "In a competitive market, all the inputs used in the process should share the benefits of the increased profitability. Thus, the value of the bundle of rights should only increase by an amount equal to the increase in profitability multiplied by the current share of total expenses represented by the bundle." (Copyright Board of Canada (2007) para 155; .see also, para. 148.)

[37] Copyright Board of Canada (2002) Pps. 3-4; Copyright Board of Canada (2005) Pps. 17-18; Copyright Board of Canada (2009) paras. 129-140.

[38] Copyright Board of Canada (2002) p. 8.

[39] ". . . collectives are not entitled to appropriate all of the efficiencies achieved by using their repertoires." Copyright Board of Canada (2002) p. 18. See also, Copyright Board of Canada (2012) para. 67.

[40] Copyright Board of Canada (2012) para. 70.

Large corporations, including the record labels, recognize revenues and costs based on complex accounting rules, making profits appear greater or smaller than they would be on a strict cash basis. Using data for unaudited business lines increases the problem. So does using data from different corporate entities whose accounting conventions, while legitimate, may be vastly different. [41]

Moreover, the CCB has voiced concerns over the time horizon over which revenues and costs are measured. For example, while rights holders claim certain user costs as sunk and therefore irrelevant to any surplus calculation, the Board has pointed out that investment decisions recur and most costs are not sunk over a relevant time horizon.[42] For these reasons and others, the CCB has observed that, while the theoretical concept of normal profits may be simple, the practical measurement issues are difficult.[43]

Not surprisingly in light of the foregoing, the CCB has more than once voiced its discomfort with attempts to specify the level of normal economic profits and to identify a surplus over which parties to hypothetical license agreements will bargain. Furthermore, as relates to the theory behind bargaining and surplus-splitting approaches, the CCB has expressed concern that at any given hearing, royalty payments to certain other collectives (that is, those not participating in the current hearing) are treated as fixed.

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[41] Copyright Board of Canada (2012) para. 85.

[42] "Costs can only be considered sunk for a specific, limited period; over time, revenue streams from preexisting properties become integrated into the overall cost analysis. A short term increase in profits, based on a sunk cost approach does not justify a rate increase. Only an increase in revenues that would be perceived as relatively permanent, arising for instance, from new, more efficient technology, could lead to an increase in the remuneration for all of the inputs, including music." (Copyright Board of Canada (2008) para 14.) The Board has also declined to consider cannibalization effects, noting that while a new service may cannibalize certain music sales today, the same new service may grow to be even larger than the service it displaces. (See, Copyright Board of Canada (2009) para. 151.)

[43] Copyright Board of Canada (2012) para. 77. "The concept of normal profit is not controversial for economists. However, measures of normal profit can be. . . ." Copyright Board of Canada (2012) para. 88. ". . . [T]he question of normal profits, as noted, is not difficult in theory but challenging in practice. To measure them properly, one needs to assess the outside opportunities available to those in the recording industry, as well as the implicit risks being taken by operating in that industry. This calculation requires a considerable amount of information, from inside and outside the music industry."

The CCB is uncomfortable acting as an arbiter of profitability, even if it were able to measure profits with confidence and work out satisfactory sharing rules for all parties involved in music copyright licensing. "Taking profitability into account in setting a fair tariff is one thing; regulating profitability is another."[44] The CCB is most comfortable setting rates without regard to the parties' profitability and then considering the rights users' profitability only insofar as it confirms their ability to pay the expected royalty fees. A notable exception was in the first hearing for certain copyright royalties for online music services, where the CCB took record companies' profitability from compact disc sales as a benchmark for setting a royalty rate for permanent music downloads (and, eventually, for limited downloads and streamed music).

4   Conclusions

We survey the relevant institutional structure in the US and Canada for setting royalty rates for music performance rights. We specify a broadcast format choice model where radio stations choose either a music or talk format based on the likelihood of a high or low increment to their net revenue associated with the music format choice. In the presence of a low-revenue draw, music format broadcasters know that they have the possibility to switch, at a cost, from a music to talk format. We set out equilibrium conditions that give rise to some broadcasters having a credible threat to switch from a music to a talk format. Then, we examine a simple generalized Nash-bargaining model to illustrate sharing rules, the royalty rates that music format stations pay to a collective, when the threat to switch formats is credible. We calculate the implicit generalized bargaining outcomes that correspond to the de facto regulated sharing rules (set by or negotiated in the shadow of regulators' decisions) adjusted to recognize those threat points where music broadcasters would switch to a talk format. Under our assumptions and with caveats, we demonstrate that these published de facto regulated rates correspond to significantly higher threat-point-corrected shares of revenues accruing to the collective. While boards and rate courts may have reservations about using formalized bargaining models as a normative device for establishing or approving sharing rules between collectives and licensees, the use of bargaining models that identify the threat points of the licensees generate a useful

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[44]Copyright Board of Canada (2005), p.18.

benchmark for comparison with the de facto regulated sharing rules.

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TABLES

(In the following tables $\Phi \equiv s_1\pi^{nf} - \pi^{tf}$)

Table 1a
Net Revenues per Radio Station
and Adjustment Factor US 2014

$R^{mf}(.) = 2,281,000$
$R^{tf}(.) = 2,216,000$
$Adj = \dfrac{2,281,000}{2,281,000 - (1-\overline{\theta}^m)2,202,890}$

Table 1b

Sensitivity of Threat Point-Corrected

Regulatory Rates to θ Using

Average Station Revenues in US 2014

$\widetilde{\theta}$	$1-\overline{\theta}^m$	% Adj	α	$K \leq \frac{\widetilde{\theta}}{1-\widetilde{\theta}}\Phi$
.90	.05	5.1	.018	$K \leq 9\Phi$
.75	.125	13.8	.019	$K \leq 3\Phi$
.50	.25	31.9	.022	$K \leq \Phi$
.25	.375	57.0	.027	$K \leq .33\Phi$
.10	.45	77.2	.030	$K \leq .11\Phi$

<table>
<tr><td colspan="2" align="center">Table 2a

Net Revenues per Radio Station

and Adjustment Factor US 2015</td></tr>
</table>

$R^{mf}(.) = 1,942,000$
$R^{tf}(.) = 1,631,000$
$Adj = \dfrac{1.942,000}{1,942,000 - (1 - \overline{\theta}^m)1,626,180}$

<table>
<tr><td colspan="5" align="center">Table 2b

Sensitivity of Threat Point-Corrected

Regulatory Rates to θ Using

Average Station Revenues in US 2015</td></tr>
</table>

$\widetilde{\theta}$	$1 - \overline{\theta}^m$	% Adj	α	$K \leq \frac{\widetilde{\theta}}{1-\widetilde{\theta}}\Phi$
.90	.05	4.4	.018	$K \leq 9\Phi$
.75	.125	11.7	.019	$K \leq 3\Phi$
.50	.25	26.5	.022	$K \leq \Phi$
.25	.375	45.8	.025	$K \leq .33\Phi$
.10	.45	60.5	.027	$K \leq .11\Phi$

Table 3a
Net Revenues per Radio Station
and Adjustment Factor Canada 2014

$R^{mf}(.) = 4,168,242$
$R^{tf}(.) = 3,574,218$
$Adj = \dfrac{4,168,242}{4,168,242 - (1 - \widehat{\theta}^{m})3,520,605}$

Table 3b
Sensitivity of Threat Point-Corrected
Regulatory Rates to θ Using
Average Station Revenues in Canada 2014

$\widetilde{\theta}$	$1 - \overline{\theta}^{m}$	% Adj	α	$K \leq \widetilde{\theta}\Phi$
.10	.05	4.4	.045	$K \leq .11\Phi$
.25	.125	11.8	.049	$K \leq .33\Phi$
.50	.25	24.2	.055	$K \leq \Phi$
.75	.375	46.4	.064	$K \leq 3\Phi$
.90	.45	61.3	.071	$K \leq 9\Phi$

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Table 4a

Net Revenues per Radio Station

and Adjustment Factor Canada 2015

</td></tr>
</table>

$R^{mf}(.) = 4,115,565$
$R^{tf}(.) = 3,491,004$
$Adj = \dfrac{4,115,565}{4,115,565 - (1 - \widehat{\theta}^{m})3,438,639}$

Table 4b

Sensitivity of Threat Point-Corrected

Regulatory Rates to θ Using

Average Station Revenues in Canada 2015

$\widetilde{\theta}$	$1 - \overline{\theta}^{m}$	% Adj	α	$K \leq \widetilde{\theta}\Phi$
.10	.05	4.4	.046	$K \leq .11\Phi$
.25	.125	11.7	.049	$K \leq .33\Phi$
.50	.25	26.4	.056	$K \leq \Phi$
.75	.375	45.6	.064	$K \leq 3\Phi$
.90	.45	60.3	.071	$K \leq 9\Phi$

Figure 1
Impact of Option to Change Format

choose music format when
ex post switching is possible

choose music format when
ex post switching not possible

0       $\tilde{\theta}$ θ^* 1

Probability of high incremental revenue in music format