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The Value of Music Copyrights: Hertzian Radio and Beyond*

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Abstract

We develop a methodology to infer from the observed behavior of commercial hertzian radio operators the competitive market value of recorded music, while stressing the difference between this competitive market value and the total value of recorded music for radio operators. Assuming that the radio station operator aims to maximize profit and therefore chooses a program time allocation between music and talk so that they are at the margin equally profitable, one can derive from this common marginal profitability condition the implicit per unit market price of music and talk. The competitive market values of recorded music and talk turn out to be proportional to their relative program time. Both values are arguably much lower than their total values for broadcasters. Because of the different cost structures of hertzian radio and internet radio – the former involves significant entry costs but zero marginal costs of audience reach, while the latter involves relatively low entry costs but positive marginal costs of audience reach with bandwidth costs increasing with audience size – socio-economic efficiency conditions suggest and support royalty payments expressed as a percentage of revenues in hertzian radio and as a per-play rate in internet radio. For technological neutrality reasons, the hertzian radio percentage rate and the internet radio per-play rate should correspond to each other. I show how these two corresponding rates can in fact be objectively determined.

* This paper builds on two reports I co-authored and on which I testified as an expert witness on behalf of Collectives of rightsholders before the Canadian Copyright Board: “The Value of Performers’ Performances and Sound Recordings to Commercial Radio Stations” (with Paul Audley and Stephen Stohn) for the 2004 Commercial Radio hearings (NRCC 2004) and “The Value of the Use of the CSI Repertoire by Online Music Services” (with Joël Blit and Paul Audley) for the 2013 Online Music Services hearings (CSI 2013). Paul Audley and I published an article out of the first report: “The ‘Competitive’ Value of Music to Commercial Radio Stations,” *Review of Economic Research on Copyright Issues* 4(2), 2007, pp. 29-50. See also Marcel Boyer, “The Economics of Fair Use/Dealing : Copyright Protection in a Fair and Efficient Way”, *Review of Economic Research on Copyright Issues* 9(1), 2012, 3-46; and Marcel Boyer, Michael Trebilcock, and David Vaver (eds.), *Intellectual Property and Competition Law*, Irwin Law, April 2009, 494 pages.

1. Introduction: objectives and challenges

The world of copyright is in turmoil, as it faces a crisis that may cause it to implode. Although the digital age is a daily experience, its most important impact is just coming home. The case of music is particularly striking for two reasons: first, because music is one of the most “digitalizable” and digitalized products and second because of the economics of new music reselling and distribution technologies such as internet radio and webcasting characterized by low entry costs (free entry) and the potential for large scale customization.

It is not an easy matter to identify the competitive market value of music copyrights. Indeed, music copyrights come in many forms or categories, which are managed under different contractual arrangements between creators (authors, composers, performers, and makers of sound recordings), intermediaries (publishers, record labels, collective societies), and end users (individuals, organisations such as restaurants, hotels and movie studios, and resellers such as hertzian and internet radio stations and online music services).

The competitive market value of music copyrights differs significantly from the total value of music for end users. Indeed, the competitive market compensation of inputs is based on their marginal, competitive value not on their total value in the production process. In hertzian and internet radio for example, the copyright royalties to be paid to rightsholders as competitive compensation will differ significantly from the total value of recorded music for broadcasters.¹ Indeed, there is typically no clear relation between the two.

Copyrights in music may be considered as falling into four different baskets with two different rights and two groups of rightsholders: the communication rights and the reproduction rights of authors and composers (publishers) and of performers and makers (record labels). Given the particular features of national copyright laws and regulations and given the particular industry considered, some of those baskets may be empty, which may or not have an impact on the total royalty payments effectively made as market value may be captured differently.² The sharing of the total royalty payments is an important issue by itself. But my concern here is the determination of the aggregate market value, not its sharing among rights and rightsholders.

¹ As we will see, this analytical error has deprived rightsholders of very significant revenues over many decades.

² In Canada, music copyrights do fall into the four different baskets and users of recorded music may have to pay royalties for both rights to both groups of rightsholders. In the US, hertzian radio broadcasters pay royalties for the communication rights or public performance of musical works (publishers) while digital radio broadcasters such as internet radio must also pay royalties for the public performance of sound recordings, whose rate is determined by the Copyright Royalty Board (although a 2008 amendment to the Digital Millennium Copyright Act 1998 have allowed negotiated rates to replace the rates set by the CRB). See Andrew Stockment (2010), “Internet radio: The Case for a Technology Neutral Royalty Standard”, Virginia Law Review 95, 2129-2180. See also the Appendix on excerpts of Pandora’s SEC 10K filing.

The case of hertzian radio (HR) is of particular importance for at least three reasons: first, it is a well-defined and well developed mature industry with informative data on revenues and costs; second, it involves different rights and rightsholders in recorded music; and third, the observed music royalty rates and payments in that industry are often used as a direct or indirect proxy to determine the music royalty rates and payments in other contexts and industries, in particular in relatively new industries such as internet radio (IR), streaming, and/or webcasting. The difficulty in identifying the competitive market value of copyrights is compounded by very particular characteristics of both music as a copyrighted good and the radio industry, which result in an absence of efficient markets for determining the market price of music use.

The determination of a competitive market value or market price of rights in recorded music must satisfy one basic principle: the price should correspond to what willing buyers and willing sellers would agree on if an efficient competitive market for music copyrights existed. Under such a basic principle, the competitive value or price of music copyrights serves two objectives: to find a price which would ensure that owners and operators of radio stations are properly and equitably compensated, that is, a price that would ensure that the risk-adjusted rate of return on capital (RAROC) in the radio industry is competitive, and second that rightsholders are properly, competitively or equitably compensated.

Hence, the premise of the analysis presented here is that the appropriate copyright tariff to be paid by hertzian radio (HR) stations for their use of copyrighted musical works and sound recordings should be based on the amount that those stations would willingly pay if they were confronted with a well-functioning competitive market for copyrights. Indeed, equitable remuneration corresponds to that level of compensation that would emerge in a competitive market where willing buyers and willing sellers, each and every one of them being economic “price-takers”, would freely agree on.

Such an approach meets the requirement that the level of remuneration be fair and equitable for both the sellers and the buyers. In a market situation where both sellers and buyers are participating voluntarily, the seller is receiving a price the buyer has agreed to and the buyer is paying a price the seller has agreed to. They would normally transact up to the point where the marginal value of an additional transaction for the buyers (demand) is just equal to the marginal cost of that additional transaction for the seller (supply), where relevant marginal value and cost concepts may be the short-run or all-inclusive long-run ones depending on the context.

On the demand side, the buyer (in this case a hertzian radio station) will want to use a quantity of recorded music³ such that its marginal value product⁴ is equal to its price, or marginal cost, or marginal opportunity cost.⁵ The marginal value product of recorded music corresponds to the additional (advertising) revenue an operator can obtain from using one additional unit (minute) of music. This additional revenue is given by the “selling price” or advertising rates of the HR product (audience size and characteristics) times the marginal product or productivity of music in attracting listeners of the desired type. A similar process applies to the purchase of other inputs such as talk content.

Clearly, the marginal value product of recorded music differs significantly from the total value product of recorded music which would be obtained by the sequential sum (or integral) of the marginal value product of music from the first to the last unit used.

On the supply side, the seller is the music producing industry comprising of authors/composers, performers and makers of sound recordings and their representatives. Two marginal cost concepts may be referred to which sometimes create confusion: the marginal cost of creation and production including the direct material cost, the opportunity value of time spent or invested, the opportunity value of the creation/innovation effort in writing/composition, performance/interpretation, fixation in a sound recording, and the marginal cost of reusing the work or reproducing the sound recording. The first cost may be significant, while the second will typically be low, even very close to zero. Both marginal cost concepts are relevant but in different contexts. In any case, all inputs or factors of production used in generating (advertising) revenues in the commercial radio industry should be properly compensated at their respective competitive market value or price level.

2. Analytical Framework and Implementation: Hertzian Radio

Recorded music has one particularly important characteristic which is both a plus and a minus: once produced, sometimes at high cost, it can be used, reproduced and shared at close to zero marginal cost. Short term or static social efficiency would call for a zero price so that its use be maximized. Long term or dynamic efficiency requires that the resources (capital, time, talent, creativity) used for the production of the first, original copy be properly compensated, otherwise the quantity and quality of recorded music will suffer. Hence the conflict between static and dynamic efficiency. It is well known that efficiency-prone market mechanisms need some help here both to emerge and to function at low cost.

³ I will use “recorded music” as meaning “musical works and sound recordings”.

⁴ Economists use marginal value product, value of marginal product, and marginal revenue product as for all practical purposes synonyms. We will stick here to “marginal value product”.

⁵ The difference between marginal cost and opportunity cost becomes particularly relevant when an additional constraint exists, for instance in the present case the fact that the total time devoted to music and talk cannot be more than the available program time.

One way out of this Gordian knot is to accept inevitable and necessary distortions: either a lower than optimal production level or a lower than optimal dissemination.⁶

A *second-best efficient* solution, that is, a solution that minimally distorts efficiency, is to grant property rights, here copyrights, to the producers of information goods, and create and/or foster the development of market processes and institutions aimed at maximizing exchanges between willing buyers and willing sellers of copyrighted goods.⁷ In such a context, the contributions of different users of copyrighted goods must be assessed by determining what such users would willingly pay for such goods in a competitive environment and what pricing structure would lead such users to demand quantities and qualities of goods close to their efficiency levels.

The approach used here is first to infer from the observed behavior of HR operators the competitive market value of recorded music, hence royalty payments those HR operators are implicitly willing to make to rightsholders,⁸ and second to use the competitive market value of recorded music in the HR industry as a proxy for the competitive market value of recorded music in the IR industry, considering the similarities and differences between these two radio broadcasting technologies.

The profit/value maximizing strategy of hertzian radio station operators

HR station operators aiming to maximize profits or station value will use recorded music and any other program content in such quantities and proportions that their respective marginal contribution to profitability is the same: the last unit, play or minute of recorded music content and the last unit, play-equivalent or minute of any other program content must generate the same net profit (marginal revenue minus marginal cost). Otherwise, profitability and station value would not be maximized and the operator would reduce one input and increase the other, given the total program time available.

If the operator rationally aims to maximize the profitability or value of the station and chooses accordingly a particular program time allocation, say $X\%$ for recorded music and $(1-X)\%$ for other program contents, then it must be the case that the marginal net benefit

⁶ For a more complete discussion of necessary distortions, see Marcel Boyer, "The Economics of Fair Use/Dealings: Copyright Protection in a Fair and Efficient Way," *Review of Economic Research on Copyright Issues* 9(1), 2012, 3-46.

⁷ The transaction costs to be incurred in negotiating compensation with each author, composer, performer and maker for each sound recording would be astronomical, hence the commonly preferred alternative of a broad and encompassing blanket licence, priced if necessary by an impartial independent body. In such a context, the role of institutions such as the Canadian Copyright Board or the U.S. Copyright Royalty Board is to act as surrogates for competitive markets, by determining, based on the best evidence possible, what the competitive, efficient, minimally distorting price would be if such a transaction mechanism operated efficiently.

⁸ In so doing, I will borrow from NRCC (2004) and Audley and Boyer (RERCI 2007).

of the last minute of music is literally equal to the marginal net benefit of the last minute of any other program content, in particular talk content.

In the absence of a “market” for recorded music in hertzian radio, the price of recorded music is unknown. However, economic analysis allows one to infer the market price of recorded music from the observed behavior of HR station managers and operators because it establishes the link between on the one hand the relative use of inputs (say recorded music and talk) in the production of an audience by a radio station and on the other hand the relative competitive market value of those inputs.

To demonstrate this link between the relative use of recorded music and talk and their relative competitive market values, we may consider a simple model with the following simplifying assumptions, which are made to facilitate the narrative but are not essential to the key results: HR operators choose different program contents to maximize profit or station value; all station revenues come from advertising; program content is of two types, namely “music” and “talk”; the program time available is given, say F minutes per period; different program contents are used in one-minute increments (the analysis could similarly be conducted on the basis of per-play or per-play equivalent increments); the additional or marginal cost to HR operators of a one-minute increment in music and talk content are both equal to zero, since the payment for music copyrights is typically set as a *percentage* of revenues and the payment for talk content is typically set on a contract basis with a zero marginal cost within a relevant time range.⁹

A broadcaster will devote one additional minute to music, and consequently one less minute to talk, if the additional advertising revenue associated with the additional minute of music offsets any loss of advertising revenue due to the reduction of one minute of talk content; hence, the opportunity cost of the one additional minute of music is the loss of advertising revenue due to the reduction of one minute of talk, and similarly for talk versus music. In responding to the market forces in the advertising and content markets, a radio broadcaster will settle on a particular allocation of program time between music and talk such that there is no opportunity to increase revenues or profits by reallocating minutes between music and talk.

Therefore, if the HR operator chooses an (M, T) allocation of program time between music M and talk T , it must be because this allocation is expected to maximize the profits or value of the station. This is illustrated on Figure 1 where, given F minutes of program content,

⁹ The assumption of a zero marginal cost of music content is more a fact than an assumption. For the purpose of music royalty payments, music stations, those with more than 20% of the broadcast day accounted for by music, pay royalties for sound recordings as a percentage of advertising revenues, irrespective of the precise use of music in program content. A zero marginal cost of talk content is also reasonable since hosts are typically hired per on-air segments rather than on per minute basis.

the marginal value product of music content is decreasing with the increase in the quantity of music content measured in minutes from left to right, and the marginal value product of talk content is also decreasing with the quantity of talk content measured in minutes from right to left. The profit maximizing program time allocation is reached at the intersecting point of the $mvp(M)$ and $mvp(T)$ curves, that is, where $mvp(M) = mvp(T)$, with $M + T = F$. The last minute of each type of content generates the same *net* advertising revenue, that is, the additional profit (marginal advertising revenue less marginal cost) is identical for the last minute of music and the last minute of talk.

In the absence of a market for recorded music, the closest proxy to the marginal values of music content and talk content is therefore the marginal, not the total, contribution of each to advertising revenues. Given our simplifying assumption that the additional costs of a minute of music and a minute of talk are both 0, the last unit (minute) contribution of each to advertising revenues must be equal at the particular allocation point (M, T) chosen by the HR operator: this equal marginal contribution is the *implicit competitive per-unit market price* of both music and talk, which is therefore the same for both music and talk.

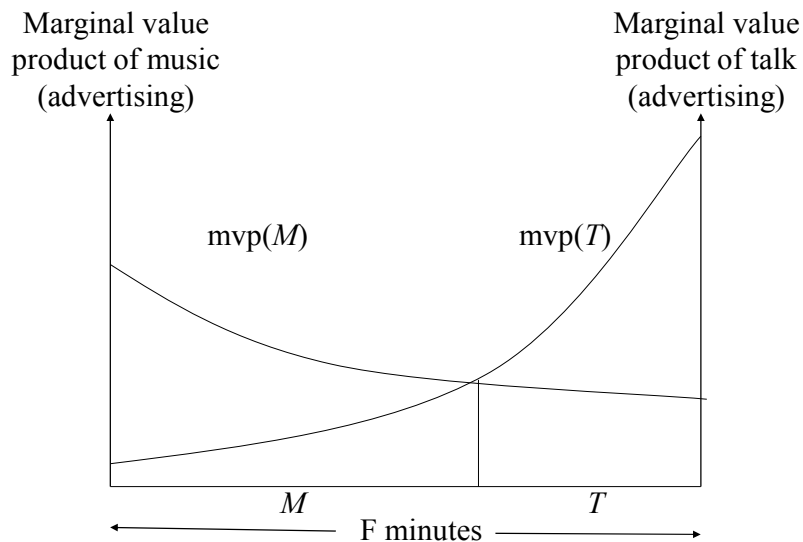


Figure 1

Indeed, confronted with that single and common per-minute price of music and talk, the profit maximizing HR operator would choose the amount of music M and the amount of talk T which equate their respective marginal value product to the *implicit competitive per-minute market price* v (Figure 2); this price differs from 0 because the total number of minutes of programming is constrained by the available number of minutes F .

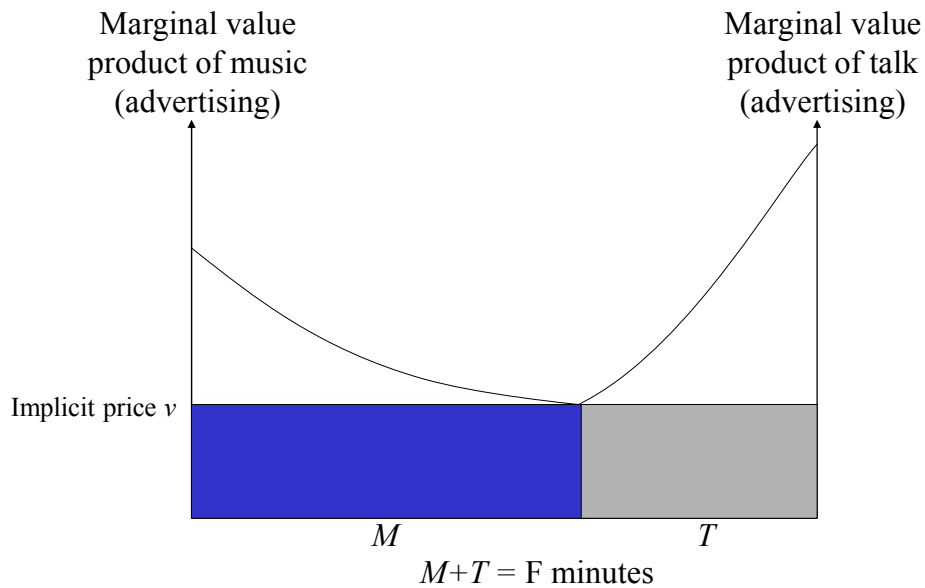


Figure 2

Hence, the competitive market payments for music and talk would be respectively vM and vT and are therefore *proportional* to the respective program time of music and talk; they appear as the blue and grey rectangles in Figure 2. This proportionality is not an assumption made or an opinion expressed by outside analysts – experts, lawyers, judges – but a direct implication of the profit maximizing choices and decisions of the HR operators.

The total contribution or total value of each type of content, that is, their respective capacity to generate advertising revenues is (much) larger than the competitive market payments, namely vM and vT . In fact, there is only a very weak link between total value and marginal or market value: music and talk may have the same implicit marginal value per minute or per-play and at the same time have very different total values or contributions to the profitability of the HR industry.

Indeed, the total value or capacity of music to generate advertising revenues is the surface under the $mvp(M)$ curve over the relevant interval M and the total value of talk is similarly the surface under the $mvp(T)$ curve over the complement interval T . As usual, the difference between total values and competitive market values will serve to cover other expenses as well as the cost of capital or profit (the RAROC).

It is important to stress at this point that the (M, T) allocation is chosen by the HR operator on the basis of his knowledge of the $mvp(M)$ and $mvp(T)$ curves. The outside observers, such as economists, lawyers or judges, can see only the (M, T) allocation but not the curves

themselves. Hence, although we can affirm that the chosen (M , T) allocation must be profit or value maximizing, we cannot say how much music and talk do contribute to the station's revenues either absolutely or relatively.¹⁰

3. CCB Past Decisions

The CCB has repeatedly affirmed that it considers as a fact that “on-air talent is far more important” for HR operators than music.¹¹ In its 2002 decision in the case of Digital Pay Audio (DPA) Services, the CCB wrote “... *although music may be what radio mostly provides, that does not mean that it is radio's most important input. The most important part of programming is not necessarily what consumes the most airtime: sports are crucially important to a television station's profitability, but generally represent a fairly small share of overall programming. Radio may be designed around the use of music and musical genres but as a cost, and (probably) as a drawing card, on-air talent is far more important. Commercial Radio could reduce its expenses significantly by dispensing with on-air talent and making greater use of SOCAN's and NRCC's repertoires. If it does not, it must be because radio broadcasters consider that the lost advertising revenues would be greater than the cost savings. On-air talent creates the crucial identity link between station and audience*” [page 10].

In its 2005 Commercial Radio Decision, the CCB rejected the model developed in NRCC (2004) on the following three grounds.

First, “*The model is inherently imprecise because it is based on a series of unproven assumptions. For example, music occupies 63.5 per cent of air-time between 6:00 a.m. and 9:00 a.m. The model then posits that its use brings in half the revenues generated during that period. That figure is unsupported in fact (pages 16-17).*” The CCB is right in stating that the latter figure was unsupported by fact, but in any case it is irrelevant. All that matters is the fact that music is used 63.5% of the time in that time slot.

The NRCC report mentions somewhat incorrectly that it “*looks at alternative approaches to establishing the total value commercial radio stations derive from their use of published recordings of performances of music*” (p. 10) and also that “*if we were to observe that X% of ... program content on a typical day is sound recordings, it would indicate that the total profit or value of commercial radio operators (total revenues minus costs) would in a*

¹⁰ As we will see below, the wording in NRCC (2004) was in that respect somewhat subject to misinterpretation, which contributed to the CCB erroneous characterization of the model in its 2005 decision.

¹¹ The ground on which the CCB has formed such a perception is unclear, but as we will see whether the CCB is right or wrong is irrelevant for the determination of the respective competitive market values of talk and music.

causal sense be generated by sound recordings for X% and other program content for (1-X)%” (p. 22). This wording might lead the reader to believe that the capacity of music or talk to bring in a certain percentage of a station’s revenues is at stake. It is not, but this imprecise wording may have led the CCB astray.

However, the intent of the NRCC report is clearly stated in the following two excerpts: *“the appropriate tariff to be paid by music stations should be based on the amount that those stations would willingly pay if they were confronted with a well-functioning market for the rights to use the sound recordings in question” (p.10) and “on the demand side, the buyer (in this case a commercial music format radio station) will want to buy a quantity of input (in this case sound recordings) such that the value of the marginal product of this input is equal to its price. The value of the marginal product of sound recordings for commercial radio corresponds to the additional advertising revenue an operator of a music station can obtain from using one more unit of sound recordings” (p. 11).*

The second reason given by the CCB is: *“[T]he model is highly volatile. Small changes in the share of revenues that music is thought to bring in leads to large variations in the rate. Having concluded that music brings in 60 per cent of a station’s revenues, NRCC arrives at a combined rate of 19.5 per cent. If music brought in 55 per cent of revenues, the rate would be 15.6 per cent, which is one-fifth less; if it brought in 65 per cent, the rate would be 24.5 per cent, which is one-quarter more. Such a highly unstable model cannot be useful because of the uncertainty it would create.”* This criticism is off target for two reasons. First, a change from 60/40 to 55/45 is a 20.4% change, while a change from 60/40 to 65/35 is a 21.3% change with respect to the mid-point of the respective intervals. In both cases, the resulting effect on the royalty rate is proportional to the importance of the change. A proportional or linear effect is not usually qualified as highly unstable. But it is of course important to avoid errors in measuring program time allocation. Second, as we stressed above, we are not talking here about music or talk bringing in a certain percentage of a station’s revenues, but rather about the (*M*, *T*) allocation and the amount paid to on-air talent, both being observable with a relatively high precision.

The third reason is: *“Had the Board opted to use the NRCC model, it would have applied at least one significant correction. The model assumes that a minute of music brings in about half the revenues that a minute of spoken word contents generates. In the Board’s view, this does not sufficiently recognize the fact that on-air talent is by its nature exclusive and as such, commands a significant premium. The ratio that the Board would have applied probably would have brought the final rates within the range of those that the Board sets later in this decision.”* This statement is the major inappropriate, indeed erroneous deduction made by the CCB, in part due to the (at times) inappropriate wording of the

NRCC report. The NRCC model does not rely on the ratio defined by the CCB and in fact does not even mention such a ratio.¹²

Moreover, when the CCB claims that “*as a cost, and (probably) as a drawing card, on-air talent is far more important*” (2002) and “*In the Board’s view, this does not sufficiently recognize the fact that on-air talent is by its nature exclusive and as such, commands a significant premium*” (2005), it clearly refers to the total value of music and on-air talent, not to their respective marginal or competitive market values. The CCB statements may or may not be true, but in any case they are at best irrelevant.

Even if the CCB is right in stating that the total contribution of on-air talent or talk to the CR industry is much greater than that of music, it does not contradict the proposition that music should receive a competitive compensation Z% higher than on-air talent if indeed the marginal (not total) value product of music and the marginal (not total) value product of on-air talent are equal, as they should be, and music is used Z% more than on-air talent.

Indeed competitive markets compensate inputs on the basis of their marginal value product, not on the basis of their total value in the production process. Lots of paradoxes, analytic errors, even at times distressing observations and conclusions flow from forgetting or neglecting this otherwise and nevertheless remarkable result.

The CAB-Globerman Analysis

In its 2008 decision, the CCB relied in part on a model proposed by the Canadian Association of Broadcasters (the CAB-Globerman model) with some modifications and adjustments. Let us consider that model, while stressing the necessary and significant changes to avoid what we can call the *CCB-Globerman Fallacy*.

Professor Globerman cleverly associates the repertoire acquired by radio station operators from the relevant copyright holders with the acquisition of an asset. The CCB stated in its 2008 commercial radio decision that “*The CAB provided us with a broad economic approach to assess the global value of music*” [B52]; and affirmed that “*Professor Globerman ... uses an approach that estimates the overall value of music for radio broadcasters. He assumes that the value of music is equal to the price that would be paid*

¹² See also the tentative reconciliation between the NRCC (2004) report and the CCB (2005) decision attempted by Stan Liebowitz (2013) on behalf of SOCAN. Professor Liebowitz writes: “I conclude that a 3:1 ratio is generally in line with the Board’s statements but will bookend these values with a smaller 2:1 ratio and a larger 4:1 ratio ...” (p. 12). He adds: “I cannot find where the NRCC report ever explicitly provides a value for RATIO although that does not mean that it is not somewhere in its report” (footnote 41). Clearly, both the CCB and Liebowitz were led astray by the (at times) inappropriate wording of the NRCC report. Once the wording (not the model) of the NRCC report is corrected so that its interpretation and implications are made crystal clear, both the CCB and Liebowitz analyses are at best irrelevant.

by radio broadcasters for music in a competitive market. In such a market, this price will tend to correspond to the incremental revenue derived from the music, or the value of marginal productivity of music.” [B55] But then the CCB goes on writing: “This in turn can be measured by multiplying the average productivity of music by the price paid by advertisers per hour of music audience” [B55] and “Professor Globerman contends that the value of music to the broadcaster is the product of three main variables: the average productivity of music, the net revenue per hour of music audience and the hours of music broadcast” [B57]. Note here the significant and clearly improper switch from “the value of marginal productivity of music” to “the average productivity of music”.

The CCB account of the measures proposed by Professor Globerman reads as follows: “*The average productivity of music is defined as the proportion of total number of hours of music broadcast that is listened to. It is calculated as the ratio of total music listening hours over the total hours of music broadcast. The net revenue per hour of music audience corresponds to the amount of net revenues an hour of listening to the music of a station generates. Professor Globerman calculates this as the difference between total revenues per hour of broadcast and total costs (net of royalties) per hour of music broadcast. The hours of music broadcast measures the total amount of time music is broadcast in a year. The product of the three variables results in the value of music to the broadcasters*” [B58].

Professor Globerman recognizes that “*the competitive value of the repertoire cannot be directly calculated from the available data*” [G28]. Hence, he does not compute directly the competitive value of music, that is, “the price that would be paid by radio broadcasters for music in a competitive market.” More precisely, the measurement of the three underlying variables, the product of which would give us “the value of music to the broadcaster”, is rather done as index values of their average changes over the period 1997 to 2005. The product of those indexes presumably estimates the change in the reservation price of broadcasters for music, that is, “the maximum amount that broadcasters would be ready to pay for the use of music.”

Strictly speaking, the link between the competitive market price and the marginal value of an input is the following: a competitive price results from the interaction of total demand and total supply so that the price appears as given to any participant, buyer and seller; each buyer will choose to buy a quantity such that the marginal value product of the last (additional or marginal) unit of the input is equal to the given competitive price. In that sense, the (given) market price of the input and the marginal value of the last unit of that input are equal. Note the reference here to marginal value, not to average value.

Professor Globerman claims that “*Since one typically does not observe very small changes in the use of an input, it is difficult, as a practical matter, to identify changes in the marginal*

products of inputs. A practical compromise is to focus on average productivity rather than marginal productivity. Average productivity will be a reasonably close approximation to marginal productivity if marginal productivity is, itself, relatively constant over the range of input use being considered, or if only modest changes occur in marginal productivity as input usage is varied.” [G21]

Therefore, Professor Globerman explicitly makes the very strong assumption that the marginal value of music is equal to the average value: *“Recall that the competitive price for a “marginal” unit of music is the average productivity of music (assumed equal to marginal productivity) multiplied by the price paid by advertisers per unit (hour) of music audience denoted as P_{am} . The competitive price for the marginal unit is, in this context, the marginal value product of music. Total revenue associated with music broadcasting would therefore equal the marginal value product of music multiplied by the total hours of music broadcast by radio broadcasters (H_m). In conjunction with the earlier discussion, it can be inferred that a music repertoire is worth more to a broadcaster: 1. the higher the average productivity of music; 2. the higher the price paid by advertisers per unit of music audience; 3. the greater the number of hours of music that the broadcaster intends to program and broadcast. That is, the broadcasters’ reservation price is positively related to these three factors.” [G25]*

The switch in the Globerman’s statement from marginal value to average value is a wishful jump into the unknown and unfounded. Economists know very well the numerous pitfalls and biases that a measurement of marginal values by average values may give rise to. Professor Globerman properly affirms that *“the price of an input is, in theory, tied to its marginal product ... Average product will be a relatively good proxy when it approximates marginal product which it is likely to do if average product is relatively constant over anticipated hours of use of the repertoire” [G22]*. But everyone would agree that approximating marginal product or value by average product or value is in general inappropriate and particularly so and moreover unjustified if marginal values can either be observed or inferred from the available data.

In the implementation of his model, Professor Globerman relies a lot on simple averages and indexes. In other words, his calculations are mathematically correct but do not correspond to his analytical concepts that the calculations are supposed to measure. Simplicity of calculations is of course a significant plus (Ockham’s razor or *lex parsimoniae*), but only if it relies on a sound and well established link between the simple calculations and the analytical concepts embedded in the economic model.

Keeping the essential elements of Professor Globerman’s model and analysis, one can take a different route to estimate directly and more appropriately the competitive value of music

in the HR industry today. That is what NRCC (2004) and Audley and Boyer (2007) have attempted and indeed done when properly interpreted.

As in Professor Globerman's analysis, the marginal value product of an input "*is essentially the increment to revenue that the buyer anticipates from the acquisition and use of an incremental unit of the input to produce output holding the use of other factors of production constant. In a competitive market, the price of an input would equal the value of its marginal product*" [G4].

As we stressed above, in responding to the market forces in the advertising market, broadcasters will settle on a particular program time allocation between music and talk such that there is no opportunity to increase revenues by reallocating minutes between music and talk: the allocation of program time chosen by the HR operator must be such that the marginal value product of music and the marginal value product of talk are equal, indeed to v in Figure 2. As we will see next, the value of v can be directly obtained from HR accounting data, that is, from payments made for on-air talent.

4. Implementation of the NRCC Model

The competitive royalty payment vM corresponding to the competitive market value of music in the HR industry is arguably much lower than the total value of recorded music for the HR operators, that is, their total willingness-to-pay for the music they use. As Professor Globerman puts it: "*... if the Board wishes to be guided by the workings of competitive markets in its decisions regarding an appropriate tariff, the distinction between a competitive price and the maximum price that buyers would willingly pay should be kept in mind*" [G10].

To determine the competitive market royalty payments for music (the blue rectangle), one needs two pieces of information: the relative use of music and talk, the (M, T) allocation, and the payment made for talk (the size in \$ of the grey rectangle). Indeed, the relative program time devoted to music is known from CRTC and Statistics Canada sources, and the total payments made to program contents other than music can be obtained from commercial HR operators. Given that the decisions relative to the use of music and the compensation of talk content are made by HR operators to maximize the value or profits of the stations, not assumptions or opinions of outside analysts, we will be able to infer from those choices the competitive market value of recorded music to radio broadcasters.

In doing so, we take a fresh look at the value of music to HR stations, not through a somewhat arbitrarily constructed measurement of its evolution from some base year (as the

CCB did in 2005 and 2008) but through a direct measurement based on the observation of real and verified data.

Regarding the percentage of program time allocated to music, Audley and Boyer (2007) write: “*If we look at the broadcast day from 6:00 a.m. to midnight, excluding commercial content only, the Erin Research (2004) study found that 73.7% of the remaining total airtime within the schedule was accounted for by recorded music (Table 2). ... For the whole day, the weighted share of program listening accounted for by music recordings was 75.1% and hence the weighted share of program listening accounted for by other program content was 24.9% (Table 4).*” In Globerman (2007, Table 5), the report written on behalf of the Canadian Association of Broadcasters, the share of total broadcast time accounted by hours of music is 67.3% for 2004 and 2005 while other studies quoted in the report show that music as a percentage of program time was generally above 75%. The more recent ERIN Research (2008) indicates that for 2004 and 2008 the share of program listening accounted for by recorded music is respectively 76.2% and 80.6%. All these percentages point to a relatively stable share of music in CR programming hovering around 75%. Hence we can safely consider that $M = 75$ and $T = 25$ in Figures 1 and 2. Considering that music as a percentage of program time varies by day part and that those day parts generate different advertising revenues and possibly different payments for on-air talent, NRCC (2004) and Audley and Boyer (2007) disaggregated the typical day into different parts and derived a “conservative” weighted music content percentage of 60% rather than 75% obtained above.

Next, we need a value for v . Clearly, that value is not directly available. But we can estimate from HR stations accounting data the value of the grey rectangle in Figure 2, that is, the payments made by HR station operators to non-music program content, mainly talk or on-air talent content. The programming cost of non-music content in radio stations was obtained by NRCC (2004) and Audley and Boyer (2007) from a sample of 27 music format radio stations for the year 2002.¹³ The data provide the total programming costs and the music related expenses including royalty payments (98.06%) and other music related expenses (1.94%). Subtracting music related expenditures from the total programming expenses of music format stations, one obtains that non-music content represented 18.34% of revenues, that is, 176.9M\$ in 2002. This amount corresponds to the grey rectangle in Figure 2.

We can determine directly the value of the blue rectangle representing the competitive market value of recorded music, namely $18.34\% (60/40) = 27.5\%$ of revenues, that is,

¹³ The data for the sample of 27 stations was presented to the CCB by Erin Research (2004).

265,3M\$ in 2002.¹⁴ As stated by Audley and Boyer (2007): “*This is a prudent, conservative estimate derived from two pieces of information: first, the unavoidable self-evident assumption that CR operators are aiming to maximize the profit and value of their stations and second, the fact that they choose to spend some \$176.9 million [18.34% of revenues] on the talk content of their program offering.*”¹⁵

Assuming that the percentages derived from 2002 data are still relevant today¹⁶ and given the current 2012 level of revenues of the music format HR industry of about 1.6G\$, the total royalty payments corresponding to the competitive market value of music as revealed by HR operators’ behaviour and choices would amount today to slightly more than 440M\$ (27.5% of 1.6B\$), that is, about 2.5 times more than the current total (11.15% of revenues), before adjustments.

One important caveat to mention here is that such an increase or recalibration of royalty payments for music would modify in a significant way the structure of expenses and revenues. Therefore the percentages given here must be considered as indicative of the adjusted percentages that would result from the triggered modifications. The most important conclusion of the analysis is the following: if on-air talent chosen to fill 40% of programming time has a competitive market value of 18.34% of revenues, then it follows that recorded music chosen to fill 60% of programming time has a competitive market value of 27.5% of revenues.

The resulting 440M\$ amount for copyright payments corresponds to the willing buyer willing seller competitive market value of recorded music, based on the chosen programming split between music and on-air talent and the chosen competitive market compensation of on-air talent. It corresponds to the fair and equitable remuneration for both the communication and the reproduction rights of rightsholders in musical works (authors/composers or publishers) and sound recordings (performers and makers or record labels).

Given that the total available per-play equivalent program time in the Canadian HR industry is about 232 billion plays, the 60/40 split means that recorded music would

¹⁴ If one considers the blue rectangle as including the other music related expenses representing 1.94% of revenues or 18.7M\$ in 2002, one would come to the conclusion that the competitive market value of copyright payments for recorded music as revealed by the behaviour and choices of CR operators amounts to 25.6% of revenues, that is, 246.6M\$ in 2002, if indeed talk content is paid 176.9M\$.

¹⁵ Considering a 75%/25% split in program time for music and non-music content, the total compensation of rightsholders in recorded music should have been $176.9M\$(75/25)-18.7M\$ = 512M\$$ in 2002 if again talk content was worth 176.9M\$ for 25% of programming time. With an 80%/20% split, compensation to rightsholders should amount to $176.9M\$(80/20)-18.7M\$ = 688M\$$ in 2002 if again talk content was worth 176.9M\$ for 20% of programming time.

¹⁶ This could and should be determined *ab ovo* on the basis of current HR accounting data.

represent some 139.2 billion plays with a compensation of 0.316¢ per-play inclusive of other music related expenses (or 0.287¢ per-play net of those latter expenses). Talk content would represent 92.8 billion equivalent-plays with a compensation of 0.316¢ per equivalent-play, which is equivalent to the value of v expressed as a price per-play and is as expected the same for both music and talk.

However, this royalty payment of 440M\$ remains much smaller than the HR industry total willingness-to-pay for the music used, which would correspond to the total value of music for the HR industry. As Professor Globerman puts it: “... *if the Board wishes to be guided by the workings of competitive markets in its decisions regarding an appropriate tariff, the distinction between a competitive price and the maximum price that buyers would willingly pay should be kept in mind*” [G10].

Moreover, the fact that music rightsholders would receive a total compensation about 50% higher than the compensation received by on-air talent does not mean that recorded music is more important in generating advertising revenues than on-air talent. As we stressed above, competitive markets compensate inputs on the basis of their respective marginal value product or marginal contribution, not on the basis of their total contribution. Finally, this amount is not what CR operators will in fact pay, given the adjustments for repertoire, exemptions, concessions, legal provisions, tiering, etc.

Remarks

Four issues are worth raising at this point. First, it is possible that talk hosts have idiosyncratic characteristics that make them, more precisely each one of them, capable of exerting some market power, thereby catching a higher proportion of advertising revenues than their implicit “competitive” value given by the implicit price v times the number of minutes of airtime T . If that is so, the proportion of talk content cost in total program spending could be somewhat larger than $T\%$ but the additional payment would come from the difference between the total value of talk content, measured by the area under the $mvp(T)$ curve up to the intersection point, and the competitive market value of talk content (the grey rectangle), but would not change the intersection point itself, that is, the program time allocation (M, T) illustrated in Figures 1 and 2. This means however that the competitive market compensation of talk content would be somewhat less than 18.34% of revenues, thereby reducing also the competitive market value of recorded music to a percentage of revenues somewhat less than 27.5%.

Second, the above analysis does not mean that the pricing of recorded music is or should be done on a per-minute or per-play basis in HR. It is not and should not. In fact, there are good reasons why the payments to rightsholders should be made as a percentage of

revenues, hence at an effective marginal price of 0. The main reason is that the short run marginal cost of using additional minutes of recorded music is indeed 0. But the *implicit* competitive price (corresponding to the common marginal opportunity cost of recorded music and talk) revealed by the observed behavior and decisions of CR operators remains nevertheless positive at the marginal opportunity cost v , which can be used to determine the royalty payments made by the HR industry to rightsholders.

Third, the implicit competitive price v can be understood more rigorously as a measure of the competitive willingness to pay for recorded music rights than a strictly defined competitive price. Indeed, the notion of competitive price is ill defined in the current context as the short run marginal cost (of playing more recorded music) is close to zero while the long run marginal cost (of creating and recording new recorded music) is significantly above zero.¹⁷

Finally, if an input such as recorded music were priced below¹⁸ its competitive market equilibrium level, then other inputs, such as direct labor and/or capital, as well as advertisers as buyers of HR audience products, would benefit from partially capturing the market value of rightsholders in recorded music, thereby generating a socially costly misallocation of resources. The recognition and correction of such anomalies, leading to a proper competitive market equilibrium price of music, would trigger as usual adjustments in related input markets as well as in advertising rates. This illustrates the serious potential pitfalls in using historical values to assess the competitive market value of copyrights when the pricing of copyrights may have been distorted for many years. The competitive market pricing model developed here does not rely on historical values.

5. Beyond Hertzian Radio: Internet Radio and Webcasting

As mentioned in the introduction, the economic characteristics of the new music reselling and distribution technology known as internet radio (web radio, net radio, streaming radio, e-radio, online radio, and webcasting) are significantly different from those of hertzian radio. Although they may be imperfect and differentiated but nevertheless relatively good substitutes but subject to scope economies, hertzian radio is significantly regulated with important barriers to entry while internet radio is almost unregulated and operates under

¹⁷ As for pure public goods, the use of recorded music by different users could be priced on the basis of their respective marginal willingness to pay, that is, according to Lindhal pricing principles: each user pays a different price and the sum of those individual prices, representing the different uses of the same good, becomes the price paid to the producer of the public good. The quantity would increase (decrease) if the total price that is the sum of the individual prices is above (below) the long-run marginal cost of adding to the stock of recorded music as a public good.

¹⁸ Or above *mutatis mutandis*.

low cost of entry with a potential of large scale customization. Competition in hertzian radio is limited by the availability of licences, itself constrained by the availability of appropriate spectrum bands. Competition in internet radio is not similarly constrained.

The internet radio industry is bound to experience a Bertrand equilibrium with prices likely to fall rather rapidly to marginal costs of delivery, a situation which can only be postponed if differentiation strategies and brand name recognition are successful. Pandora, Apple iRadio, Spotify, Songza, and the like are similar to each other but each with a twist. For example, Pandora's music genome project makes it the leader in customized internet radio with a 70% market share in the US.¹⁹ It has today some 200 million customers, of which some 76 million are said to be active ones, streamed some 17 billion hours of radio in 2013 while generating some 650M\$ in annual revenues, over ten times more than the largest hertzian station in the US, where the largest hertzian stations are WTOP (Washington D.C.) with 64.6M\$ in revenues, KIIS (Los Angeles) with 56.8M\$, and Z100 (New York) with 48.2M\$.²⁰

Over the last five years, Pandora's customers have created or defined some 5 billion customized radio stations. As a point of comparison, the number of hertzian radio stations in the US was 3,494 in 2009 according to Peel Research, many of them belonging to large station groups. And about 90% of all radio is hertzian radio today.

Pandora has paid in 2013 some 345M\$ or 53% of its revenues (259M\$ or 61% of revenues in 2012) in content acquisition costs, that is, royalty payments. But at the same time, Pandora uses a phenomenal quantity of recorded music that is streamed to its listeners. Royalty payments made in 2013 represent 2.05¢ per listener-hour or 0.134¢ per-play.²¹ The latter number can be compared to the value derived above that should be paid to rightsholders by commercial hertzian radio in Canada, namely 0.316¢ per-play.²²

However, the technological differences between internet radio and hertzian radio are such that they give rise to potential scope economies, that is, would favour a joint and integrated use of internet radio and hertzian radio to generate increased value. Three characteristics, among others, underlie those scope economies. First, hertzian radio is (much) more cost efficient in reaching large audiences as its operating costs are somewhat independent of the size of the audience. It is not the case for internet radio whose bandwidth cost increases almost linearly with the number of listeners and is therefore better suited for niche audiences, although the cost for bandwidth may be dropping. Second, internet radio drags

¹⁹ Among the top 20 stations and networks in the United States.

²⁰ James Cridland (managing director, MediaUK) at IBC 2013 conference in Amsterdam
https://www.youtube.com/watch?v=xKwg1bA-FVI&feature=player_embedded

²¹ For more on Pandora finances, risks and relations with rightsholders, see the Appendix.

²² C\$ and US\$ can be considered to have been on average almost at par during those periods.

mobile battery life much faster than hertzian radio, in fact about seven times more, that is, a mobile battery will typically die seven times faster if one listens to internet radio than if one listens to hertzian radio. Third, internet radio allows for individualized advertising, that is, advertising linked to the characteristics of the individual listener, and behavioural advertising, that is, advertising linked to where the listener is or what the listener is doing at the time of listening. Hence, it is not clear that one radio technology is uniformly better than the other; the two technologies are rather likely generators of scope economies.²³

Indeed, some media companies are providing both internet radio and hertzian radio. For example, RadioDNS defines itself as hybrid radio as it is both hertzian and internet radio. It claims that: “*RadioDNS provides the link between what you're broadcasting over FM, DAB, HD Radio (or other broadcast platforms), and what you can also provide over an Internet connection. This lets you combine the power of broadcasting to reach many people, in many places very cost effectively, and the power of the internet to deliver enhanced or personalised content. Put simply, it makes better radio*” (<http://radiodns.org/>).

The fact that the cost of entry in internet radio is low but operating costs grow linearly with the number of listeners, while the cost of entry in hertzian radio is high but operating cost are somewhat independent of the number of listeners poses significant challenges for the radio industry and in turn for rightsholders in recorded music.

Insofar as the cost of entry in internet radio is relatively low with operating costs increasing linearly with the number of listeners (constant marginal cost), one would expect that the intensity of competition will be high in this industry with the resulting effect of dragging prices to marginal costs, hence making it difficult for those media firms to cover their fixed costs. If that is so, not only will the firms continue to lose money but they will also likely be unable to pay fair and equitable compensation to rightsholders in recorded music. In cases of this type, competition may be too intense, even destructive of value.

One factor behind this situation is that rightsholders are often residual payees in commercial radio: they will be properly compensated only if the firms, which package and resell recorded music, can make a competitive profit. Otherwise, they will likely be compensated at a level much below the competitive market value of their music. This is what seems to be happening in internet radio.²⁴

²³ See footnote 20 above; and also Franc Kozamernik and Michael Mullane (2005), “An Introduction to Internet Radio,” *European Broadcasting Union Technical Review*, October, 15 pages

²⁴ One interesting case is that of AccuRadio, which according to Business Week (Olga Kharif, “The Last Days of Internet Radio,” *Business Week*, 2007-03-07), offered 300 channels of music and lured over one million visitors a month, employed six full-time staff members, recorded \$500,000 in sales and paid some \$50,000 in royalties. The 2007 decision of the Copyright Royalty Board to switch from royalties as a percentage of revenues to royalties as a per-play rate would raise royalty fees by a factor of ten. It would increase AccuRadio’s royalties to about \$600,000, as the per-play rate is expected to reach 0.14¢ (2¢ per

The only way out of this situation is to require providers of internet radio services pay for copyrights in recorded music on a per-play basis rather than a percentage of revenues.²⁵ The problem is to set the per-play rate at the proper competitive market level, but once that is done, the industry will adjust to achieve it. Indeed, the US Copyright Royalty Board has favoured a per-play compensation of rightsholders although the Board

A per-play royalty payment system raises costs for internet radio providers thereby limiting entry to those providers capable to develop a profitable business model. The reduced competition intensity makes it likely for the internet radio industry to develop and prosper by offering value added radio services to listeners while ensuring proper compensation of rightsholders, as well as for direct labour, innovation efforts, and invested capital (RAROC).

What should that per-play rate be? In order to ensure a level playing field in radio competition, this per-play rate should be compatible with the rate observed *in fine* in commercial hertzian radio. We showed above that this per-play rate should today be of the order of 0.316¢ per-play in Hertzian radio (Canada), a significantly higher rate than the current 0.134¢ per-play allegedly paid by Pandora (other internet radio firms may be paying a higher per-play rate).

One must realize that this change from 0.134¢ per-play to 0.316¢ per-play will have significant impacts on the working of the industry, in particular through the reduced intensity of competition internet radio providers will face. Indeed, the higher per-play rate will make the industry not only more respectful of rightsholders in recorded music but also more profitable.

(TO BE COMPLETED)

listener-hour for 14 songs per hour). Joe Kennedy, CEO of Pandora is quoted as saying “[Those] rates are disastrous.” The change was supported by SoundExchange, which collects royalties on behalf of the recording industry. Its Executive Director John Simpson is quoted as claiming that the last time royalties were negotiated, in 2002, webcasters had the same reactions “This is terrible, it’s going to put everybody out of business”, although the industry kept growing as revenues from online streaming music radio rose to \$500 million from \$49 million in 2003.

²⁵ As argued above, a percentage of revenues can provide proper and efficient compensation if entry in the industry is sufficiently costly to prevent a too high intensity of competition to emerge.

APPENDIX

EXCERPTS FROM PANDORA SEC 10-K FILING FOR THE PERIOD ENDING JANUARY 31 2013.

(Note: Pandora fiscal year is changing to the calendar year starting in 2013)

Competition

Competition for Listeners

We compete for the time and attention of our listeners with other content providers on the basis of a number of factors, including quality of experience, relevance, acceptance and diversity of content, ease of use, price, accessibility, perceptions of ad load, brand awareness and reputation. We also compete for listeners on the basis of our presence and visibility as compared with other providers that deliver content through the internet, mobile devices and consumer products. We believe that we compete favorably on these factors. For additional details on risks related to competition for listeners, please refer to the section entitled "Risk Factors."

We offer our service at no cost or through a low cost subscription plan through web, mobile and consumer electronic platforms however, many of our current and potential future competitors enjoy substantial competitive advantages, such as greater name recognition, longer operating histories and larger marketing budgets, as well as substantially greater financial, technical and other resources.

Our competitors include:

Other Radio Providers. We compete for listeners with broadcast radio providers, including terrestrial radio providers such as Clear Channel and CBS and satellite radio providers such as Sirius XM. Many broadcast radio companies own large numbers of radio stations or other media properties. Many terrestrial radio stations have begun broadcasting digital signals, which provide high quality audio transmission. In addition, unlike participants in the emerging internet radio market, terrestrial and satellite radio providers, as aggregate entities of their subsidiary providers, generally enjoy larger established audiences and longer operating histories. Broadcast and satellite radio companies enjoy a significant cost advantage because they pay a much lower percentage of revenue for transmissions of sound recordings. Broadcast radio pays no royalties for its terrestrial use of sound recordings, and satellite radio pays only 9% of revenue for its satellite transmissions of sound recordings. By contrast, Pandora incurred content acquisition costs representing 55.9% of revenue for our internet transmissions of sound recordings during

the fiscal year ending January 31, 2013. We also compete directly with other emerging non-interactive online radio providers such as CBS's Last.fm, Clear Channel's iheartradio and Slacker Personal Radio. We could face additional competition if known incumbents in the digital media space choose to enter the internet radio market.

Other Audio Entertainment Providers. We face competition from providers of interactive on-demand audio content and pre-recorded entertainment, such as Apple's iTunes Music Store, RDIO, Rhapsody, Spotify, and Amazon that allow listeners to select the audio content that they stream or purchase. This interactive on-demand content, is accessible in automobiles and homes, using portable players, mobile phones and other wireless devices. The audio entertainment marketplace continues to rapidly evolve, providing our listeners with a growing number of alternatives and new media platforms.

Other Forms of Media. We compete for the time and attention of our listeners with providers of other forms of in-home and mobile entertainment. To the extent existing or potential listeners choose to watch cable television, stream video from on-demand services such as Hulu, VEVO or YouTube or play interactive video games on their home-entertainment system, computer or mobile phone rather than listen to the Pandora service, these content services pose a competitive threat.

Competition for Advertisers

We compete with other content providers for a share of our advertising customers' overall marketing budgets. We compete on the basis of a number of factors, including perceived return on investment, effectiveness and relevance of our advertising products, pricing structure and ability to deliver large volumes or precise types of ads to targeted demographics. We believe that our ability to deliver targeted and relevant ads across a wide range of platforms allows us to compete favorably on the basis of these factors and justify a long-term profitable pricing structure. However, the market for online advertising solutions is intensely competitive and rapidly changing, and with the introduction of new technologies and market entrants, we expect competition to intensify in the future. For additional details on risks related to competition for advertisers, please refer to the section entitled "Risk Factors."

Our competitors include:

Other Internet Companies. The market for online advertising is becoming increasingly competitive as advertisers are allocating increasing amounts of their overall marketing budgets to web-based advertising. We compete for online advertisers with other internet companies, including major internet portals, search engine companies and social media sites. Large internet companies with greater brand recognition, such as Facebook,

Google, MSN and Yahoo! have large direct sales staffs, substantial proprietary advertising technology and extensive web traffic and consequently enjoy significant competitive advantages.

Broadcast Radio. Terrestrial broadcast and to a lesser extent satellite radio are significant sources of competition for advertising dollars. These radio providers deliver ads across platforms that are more familiar to traditional advertisers than the internet might be. Advertisers may be reluctant to migrate advertising dollars to our internet-based platform.

Other Traditional Media Providers. We compete for advertising dollars with other traditional media companies in television and print, such as ABC, CBS, FOX and NBC, cable television channel providers, national newspapers such as The New York Times and the Wall Street Journal and some regional newspapers. These traditional outlets present us with a number of competitive challenges in attracting advertisers, including large established audiences, longer operating histories, greater brand recognition and a growing presence on the internet.

Content, Copyrights and Royalties

To secure the rights to stream music content over the internet, we must obtain licenses from, and pay royalties to, copyright owners of both sound recordings and musical compositions. These royalty and licensing arrangements strongly influence our business operations. We stream spoken word comedy content, for which the underlying literary works are not currently entitled to eligibility for licensing by any performing rights organization for the United States. Rather, pursuant to industry-wide custom and practice, this content is performed absent a specific license from any such performing rights organization. We do, however, obtain licenses to stream the sound recordings of comedy content under federal statutory licenses as more fully described under the section captioned "Sound Recordings" below, which in some instances we have opted to augment with direct agreements with the licensors of such sound recordings.

Sound Recordings

Our largest royalty expense arises from our use of sound recordings. We obtain performance rights licenses and pay performance rights royalties to the copyright owners of sound recordings, typically performing artists and recording companies, pursuant to the Digital Millennium Copyright Act of 1998, (the "DMCA"). Under federal statutory licenses created by the Digital Performance Right in Sound Recordings Act of 1995, (the "DPRA"), and DMCA, we are permitted to stream any lawfully released sound recordings and to make reproductions of these recordings on our computer servers, without having to separately negotiate and obtain direct licenses with each individual copyright owner. These

statutory licenses are granted to us on the condition that we operate in compliance with the rules of statutory licenses and pay the applicable royalty rates to SoundExchange, the non-profit organization designated by the Copyright Royalty Board, or CRB, to collect and distribute royalties under these statutory licenses. We believe we are not an "interactive service" as defined in the U.S. Copyright Act of 1976 (the "U.S. Copyright Act"). As a non-interactive service, we are not allowed to stream a particular song "on-demand" and are otherwise obliged to limit the ways in which we stream music to our listeners. As such we are required, among other things, to restrict the number of songs that are played on a particular station from a particular artist or album within certain time periods.

The rates we pay to SoundExchange for non-interactive streaming of sound recordings pursuant to these licenses are privately negotiated or set by the CRB. In 2007, the CRB set royalty rates for non-interactive, online streaming of music that were extremely high. In response to the lobbying efforts of internet webcasters, including Pandora, Congress passed the Webcaster Settlement Acts of 2008 and 2009, which permitted webcasters to negotiate alternative royalty rates directly with SoundExchange outside of the scope of the CRB process. In July 2009, certain webcasters reached a settlement agreement with SoundExchange establishing a royalty structure more favorable to us that by its terms will apply through 2015. This settlement agreement is commonly known as the "Pureplay Settlement." Once the rates and terms of the Pureplay Settlement came into effect in July 2009, any qualifying commercial webcaster could elect to avail itself of those rates and terms by filing an initial notice, followed by annual notices, of election with SoundExchange through 2015. In July 2009, we elected to be subject to the Pureplay Settlement and timely filed notices of election with SoundExchange for 2010, 2011, 2012 and 2013. We currently intend to continue to make such elections through 2015.

The table below sets forth the per performance rates for the calendar years 2012 to 2015 (1) as established by the CRB, which we have opted not to pay, (2) under the Pureplay Settlement applicable to our non-subscription, ad-supported service and (3) under the Pureplay Settlement applicable to our subscription service.

Year	CRB Rate	Pureplay Rate (non-subscription)*	Pureplay Rate (subscription)
2012	0.00210	0.00110	0.00200
2013	0.00210	0.00120	0.00220
2014	0.00230	0.00130	0.00230
2015	0.00230	0.00140	0.00250

* The rate applicable to our non-subscription service is the greater of the per performance rates set forth in this column or 25% of our U.S. gross revenue.

As reflected in the table above, we currently pay per-performance rates for streaming of sound recordings via our Pandora One subscription service that are higher than the per-performance rates for our free, non-subscription service. As a result, we may incur higher royalty expenses to SoundExchange for a listener that subscribes to Pandora One as compared to a listener that uses our free, non-subscription service, even if both listeners listen for the same amount of time.

Proceedings to establish rates that will be applicable to our service after 2015, known as Webcasting IV proceedings, are expected to commence in January 2014. While we did not participate in the prior proceedings to establish royalty rates for non-interactive webcasting services, we currently expect to participate in the Webcasting IV proceedings. At that time, webcasters, including us, will have the opportunity to enter into voluntary settlement negotiations with SoundExchange, and failing that, will participate in formal hearings before the CRB to establish rates.

We believe that our participation in the Webcasting IV proceedings as a mature player in an industry that will have evolved significantly since the prior proceedings may enhance our ability to negotiate rates on economically favorable terms. However, if we are unable to successfully negotiate rates for the 2016-2020 period, we will be forced to litigate those rates before the CRB. Any such litigation would be costly, and the outcome of such litigation would be uncertain. If the Webcasting IV proceedings establish rates applicable to us that represent incremental increases in the per performance rates set forth as "CRB Rates" in the table above for the 2016-2020 period and there is no percentage of revenue option available to us, then our content acquisition costs could substantially increase, which could materially and adversely affect our operating results. For additional details on risks related to the rate-setting process, please refer to the section entitled "Risk Factors." We

are unable to estimate the direct and indirect costs of participating in the Webcaster IV proceedings, but we expect those costs to be significant.

The existing laws and regulations governing performance royalties applicable to commercial webcasters are subject to change. For example, there is no guarantee that the royalty structure that emerged from the Pureplay Settlement will be available upon its expiration. In addition, performers and owners of sound recordings are seeking compensation for the public performance of sound recordings from terrestrial broadcasters who are not currently required to pay royalties for non-subscription broadcast transmissions. If these performers and owners are successful, terrestrial radio broadcasters will, for the first time, be subject to payment of sound recording performance royalties, a development that could potentially have a positive impact on our ability to compete with terrestrial radio broadcasters. Further, the Copyright Office has issued a report with respect to whether sound recordings released in the United States prior to January 1972 (the time at which federal copyright protection was first afforded to sound recordings), should be covered under federal copyright law. The report recommended that federal copyright protection should apply to sound recordings fixed before February 15, 1972. It proposed special provisions to address issues such as copyright ownership, term of protection, termination of transfers and copyright registration. We do not expect any potential resulting legislation to have a material impact on our business, financial condition or results of operations. We are not aware of any other proposed or pending changes to laws and regulations relating to performance royalties applicable to commercial webcasters such as us.

Musical Works

We also incur royalty expenses from our use of musical works embodied in sound recordings, with respect to which we must obtain public performance licenses and pay performance rights royalties to copyright owners of those musical works (typically, songwriters and music publishers) or their agents. Copyright owners of musical works most often rely on intermediaries known as performance rights organizations to negotiate so-called "blanket" licenses with copyright users, collect royalties under such licenses and distribute them to copyright owners. We have obtained public performance licenses from, and pay license fees to, the three major performance rights organizations in the United States: the American Society of Composers, Authors and Publishers, or ASCAP, Broadcast Music, Inc., or BMI and SESAC, Inc., or SESAC.

We currently operate under a final agreement with SESAC, which automatically renews yearly, but is subject to termination by either party in accordance with its terms at the end of each yearly term. The SESAC rate is subject to small annual increases. There is

no guarantee that the license and associated royalty rate available to us now with respect to SESAC will be available to us in the future.

In 2012, we elected to terminate our prior agreement with BMI effective as of December 31, 2012 because we believed the royalty rates sought by BMI were excessive. Notwithstanding our termination of this BMI agreement, the musical works administered by BMI are licensed to us pursuant to the provisions of a consent decree which BMI entered into with the U.S. Department of Justice. Rates to be paid to BMI can be set, in the absence of a negotiated agreement, by the rate court established pursuant to such consent decree in the U.S. District Court for the Southern District of New York. The rates to be paid to BMI may be adjusted retroactively, either by mutual agreement or order of the rate court.

In 2010, we elected to terminate our prior agreement with ASCAP as of December 31, 2010 because we believed that the royalty rates sought by ASCAP were excessive. Notwithstanding our termination of this ASCAP agreement, the musical works administered by ASCAP are licensed to us pursuant to the provisions of a consent decree which ASCAP entered into with the U.S. Department of Justice. Rates to be paid to ASCAP can be set, in the absence of a negotiated settlement, by the rate court established pursuant to such consent decree in the U.S. District Court for the Southern District of New York. In September 2011, we changed the method we used to calculate royalties due to ASCAP following the execution of an interim arrangement for the period commencing January 1, 2011, pending a final determination of new rates. The rates to be paid to ASCAP may be adjusted retroactively, either by mutual agreement or order of the rate court. In November 2012, we filed a petition in the rate court to determine final, reasonable rates and terms with ASCAP. Rate court proceedings could take years to complete, could be very costly, and there are no guarantees that the rate court will establish royalty rates more favorable to us than those we previously paid pursuant to our terminated agreement with ASCAP or those we pay pursuant to our interim arrangement with ASCAP.

We also obtain licenses directly from music publishers. In May 2011, EMI Music Publishing, or EMI, announced its decision to withdraw from ASCAP certain portions of its musical works catalog that ASCAP had been administering on its behalf. As a result, ASCAP may no longer be able to license those musical works, and new media licensees, such as Pandora, who were previously able to secure licenses from ASCAP for those musical works, may now have to enter into direct licensing arrangements with EMI. In March 2012, we entered into a licensing agreement with EMI covering the public performance of the EMI musical works purportedly withdrawn from the ASCAP repertory.

In late 2012, Sony ATV Music Publishing or Sony ATV, which led a consortium in the acquisition of EMI in June 2012, announced its intention to withdraw from ASCAP and BMI certain portions of its musical works catalog that ASCAP and BMI had been

administering on its behalf. As a result, ASCAP and BMI may no longer be able to license those musical works, and new media licensees, such as Pandora, who were previously able to secure licenses from ASCAP and BMI for those musical works, may now have to enter into direct licensing arrangements with Sony ATV. In January 2013, we entered into a licensing agreement with Sony ATV and EMI covering the public performance of the works purportedly withdrawn from ASCAP and BMI.

Other music publishers have signaled their intent to withdraw from ASCAP and BMI all or a portion of the musical works catalogs that ASCAP and BMI administer on their behalf. It is unclear whether other music publishers will be able to withdraw their catalogs from ASCAP or BMI and, if so, what specific effect those withdrawals will have on us.

Risks Related to Our Business

We operate under and pay royalties pursuant to statutory licensing structures for the reproduction and public performance of sound recordings that could change or cease to exist, which would adversely affect our business.

We currently operate under statutory and compulsory licensing regimes and structures that may change or cease to exist. We must pay performance rights royalties for the digital audio transmission of sound recordings. Subject to our ongoing compliance with numerous statutory conditions and regulatory requirements for a non-interactive service, we are permitted to operate under a statutory license that allows the streaming in the U.S. of any sound recording lawfully released to the public. We are also permitted to make reproductions of sound recordings on computer servers pursuant to a separate statutory license designed to facilitate the making of transmissions. There is no guarantee that we will continue to be eligible to operate under these statutory licenses. For example, if a court were to determine that we operate an interactive streaming service or make reproductions of sound recordings outside the statutory license, we would have to negotiate license agreements with sound recording copyright owners individually, a time consuming and expensive undertaking that would jeopardize our ability to stream all music currently in our library and could result in royalty costs that are prohibitively expensive. In addition, if copyright owners object to the functionality or transmission methods of our service, we could lose our eligibility to operate under the statutory licenses. Our ability to avoid negotiating separate agreements with the many copyright owners of sound recordings depends on these two statutory licenses, and if we were to no longer qualify for operation under, or violate the provisions of the statutory licenses, we could be subject to significant liability for copyright infringement and may no longer be able to operate under our existing licensing regime. For our fiscal year ended January 31, 2013 we incurred SoundExchange related content acquisition costs representing 55.9% of our total revenue for that period.

The rates to be paid for the streaming of sound recordings pursuant to the statutory licenses can be established by either negotiation or through a rate proceeding conducted by the CRB, a tribunal established within the U.S. Library of Congress. In 2007, the CRB set royalty rates for the online streaming of sound recordings for 2006 through 2010 that were so high that the cost for streaming sound recordings alone would have been unsustainable under our current business model. In response to the lobbying efforts of internet webcasters, including us, Congress passed the Webcaster Settlement Acts of 2008 and 2009, which permitted webcasters and SoundExchange, the sole entity designated by the CRB to collect and distribute the statutory royalties paid by internet webcasters such as us, to negotiate alternative rates to those established by the CRB for the years 2006 through 2015. In July 2009, certain webcasters reached an agreement with SoundExchange, establishing a more favorable royalty structure that we have elected to accept and that by its terms will apply through 2015. We do not know what rates will be available to us following that period and there is no guarantee that the royalty structure that emerged from the negotiations with SoundExchange pursuant to the Webcaster Settlement Acts will be available after 2015. The CRB, which still has rate-making authority over us upon expiration of our agreement with SoundExchange, has consistently established royalty rates that would, if paid by us, consume an unsustainable percentage of our revenue. If we are unable to reach a new agreement with SoundExchange for the period after 2015, our operating costs may significantly increase, which could harm our financial condition and inhibit the implementation of our business plan.

In addition, the royalties that we pay to SoundExchange for the streaming of sound recordings are calculated using a per performance rate. While we believe that the mechanisms we use to track performances are sufficient to ensure that we are accurately reporting and paying royalties, our ability to do so depends in part on our ability to maintain these mechanisms as new devices are introduced and incumbent technologies evolve. Any understatement or overstatement of performances could result in our paying lower or higher royalties to SoundExchange than we actually owed, which could in turn affect our financial condition and results of operations.

We depend upon third-party licenses for the right to publicly perform musical works and a change to or loss of these licenses could increase our operating costs or adversely affect our ability to retain and expand our listener base, and therefore could adversely affect our business.

To secure the rights to stream musical works embodied in sound recordings over the internet, we obtain licenses from or for the benefit of copyright owners and pay royalties to copyright owners or their agents. Those who own copyrights in musical works are vigilant in protecting their rights and seek royalties that are very high in relation to the revenue that can be generated from the public performance of such works. There is no

guarantee that the licenses available to us now will continue to be available in the future or that such licenses will be available at the royalty rates associated with the current licenses. If we are unable to secure and maintain rights to stream musical works or if we cannot do so on terms that are acceptable to us, our ability to stream music content to our listeners, and consequently our ability to attract and retain advertisers, will be adversely impacted.

Copyright owners of musical works most often rely on intermediaries known as performance rights organizations to negotiate so-called "blanket" licenses with copyright users, collect royalties under such licenses and distribute them to copyright owners. We have obtained public performance licenses from, and pay license fees to, the three major performance rights organizations in the United States: the American Society of Composers, Authors and Publishers, or ASCAP, Broadcast Music, Inc., or BMI and SESAC, Inc., or SESAC. These organizations represent the rights of songwriters and music publishers, negotiate with copyright users such as us, collect royalties and distribute those royalties to the copyright owners they represent. Performing rights organizations have the right to audit our playlists and royalty payments, and any such audit could result in disputes over whether we have paid the proper royalties. If such a dispute were to occur, we could be required to pay additional royalties and the amounts involved could be material. We currently operate under a final agreement with SESAC, however, this agreement is subject to termination by either party in accordance with its terms at the end of each yearly term, and there is no guarantee that the associated royalty rate available to us now will be available to us in the future. We currently operate under interim agreements with BMI and ASCAP, which pursuant to their respective consent decrees entered into with the U.S. Department of Justice cannot refuse to grant us licenses for the public performance of the musical works they administer. The rates to be paid to BMI and ASCAP can be set, in the absence of a negotiated agreement, by the respective rate courts established pursuant to such decrees in the U.S. District Court for the Southern District of New York. SESAC is not subject to a mandatory licensing obligation and could withhold the rights to all of the musical works which it administers. The loss of the musical works represented by ASCAP, BMI and SESAC could diminish the appeal of our service to listeners.

In 2010, we elected to terminate our prior agreement with ASCAP as of December 31, 2010 and in 2012 we elected to terminate our prior agreement with BMI as of December 31, 2012 because we believed that the royalty rates sought by ASCAP and BMI were excessive. Notwithstanding our termination of these agreements, the musical works administered by ASCAP and BMI are licensed to us pursuant to the provisions of their respective consent decrees. In September 2011, we changed the method we used to calculate royalties due to ASCAP following the execution of an interim arrangement for the period commencing January 1, 2011, pending a final determination of new rates. In November 2012, we filed suit in the rate court to resolve the royalty dispute with ASCAP. The rate court proceedings can take years to complete and can be very costly. There is no

guarantee that final rates established by mutual agreement or by a rate court determination would establish royalty rates more favorable to us than those we previously paid pursuant our terminated agreements with ASCAP and/or BMI or those that we pay pursuant to our interim arrangements with ASCAP and/or BMI. In addition, we could be liable for both increased royalty rates going forward and a potential true-up of royalty payments in excess of any interim royalties paid for the period following December 31, 2010 with respect to ASCAP and/or for the period following December 31, 2012 with respect to BMI. For our fiscal year ended January 31, 2013, we incurred BMI, SESAC, ASCAP, EMI and Sony ATV related content acquisition costs representing 4.3% of our total revenue for that period.

We do not currently pay so-called "mechanical royalties" to music publishers for the reproduction and distribution of musical works embodied in transitory copies used to make streams audible to our listeners. Although not currently a matter of dispute, if music publishers were to change their position and seek to be paid mechanical royalties by us, and a final judgment were entered by a court requiring that payment, our royalty obligations could increase significantly, which would increase our operating expenses and harm our business and financial interests. In May 2011, we started streaming spoken word comedy content, for which the underlying literary works are not currently entitled to eligibility for licensing by any performing rights organization for the United States. While pursuant to industry-wide custom and practice this content is performed absent a specific license from any such performing rights organization, there can be no assurance that this will not change or that we will not otherwise become subject to additional licensing costs for spoken word comedy content imposed by performing rights organizations in the future.

If music publishers withdraw all or a portion of their music works from performing rights organizations for public performances by means of digital transmissions, we may be forced to enter into direct licensing agreements with these publishers at rates higher than those we currently pay, or we may be unable to reach agreement with these publishers at all, which could adversely affect our business, financial condition and results of operations.

If music publishers withdraw all or a portion of their catalogs from performing rights organizations (or "PROs") such as ASCAP, BMI or SESAC, we may no longer be able to obtain licenses for such publisher's withdrawn catalogs. Under these circumstances, we would need to enter into direct licensing arrangements with such music publishers. For example, EMI purportedly withdrew its catalog from ASCAP in May 2011, and as a result we entered into a separate license agreement with EMI in March 2012. Sony ATV, which led a consortium to acquire EMI in June 2012, announced its intention to withdraw certain rights from ASCAP and BMI to license the performance of its works effective December 31, 2012 and, as a result, we entered into a separate license agreement with Sony

ATV in January 2013. Other publishers have signaled their intent to withdraw all or a portion of their catalogs from ASCAP and BMI. Although we continue to be licensed by the PROs, it is currently unclear what specific effect a publisher's limited withdrawal of rights to public performances by means of digital transmissions from a PRO would have on us. If we are unable to reach an agreement with respect to the repertoire of any music publisher who withdraws all or a portion of its catalog(s) from a PRO, or if we are forced to enter into direct licensing agreements with publishers at rates higher than those currently set by the PROs (or higher than those set by the U.S. District Court having supervisory authority over ASCAP and BMI) for the performance of musical works, or if there is uncertainty as to what rights are administered by any particular PRO or publisher, our ability to stream music content to our listeners may be limited or our operating costs may significantly increase, and this could adversely affect our business, financial condition and results of operations.