Pro Rata and User Centric Distribution Models:
A Comparative Study

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1. INTRODUCTION

1.1. Background

According to the IFPI, digital revenues made up 50% of the total revenues of recorded music business on global level in 2016. The share of streaming of the digital revenues was 59% and it is growing fast. In some forerunning territories like Nordic countries the share of streaming has already exceeded the level of 80% of the overall revenues of the recorded music business.[1]

Therefore, it has become very important to study closer the current distribution methods of the subscription-based streaming services. According to our knowledge all major audio streaming services are currently using the pro rata model but various right holder groups have expressed needs to study also alternative methods such as the so-called user centric model.

1.2. Aims

The aim of the study is to compare the current pro rata system and the alternative user centric system with real data from a major streaming service in order to see how the methods affect distribution.

The hypotheses of the study were:

1. The current pro rata system favours only few top-level right holders.
2. The consumers who pay monthly subscription fees do not know which artists, works and other right holders get their money regardless of their listening habits.
3. The current distribution system does not take into account the differences between the durations of the various kinds of musical works but are treated equally.

1.3. Credits

The study was carried out during April-November 2017. The study was done in two phases.

The first part was the statistical analysis, which was done by Dr. Pradeep Durgam of Aalto University. The second part, writing of the report and some further analysis was done by Consultant, Dr. Jari Muikku of Digital Media Finland.

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[1] http://www.ifpi.org/downloads/GMR2017.pdf

2. DISTRIBUTION MODELS

2.1.   General

All major music audio streaming services such as Spotify and Apple use currently pro rata model in their distribution to the right holders. An alternative method, user centric, has been a topic of international debate for a while but, so far, none of the most important streaming services have used it.

There are some announced on-going user centric pilot projects like in France between Deezer and SACEM, but, at the time of writing this report, the results of these projects were not publicly available.

The most extensive academic study on this topic is the research project by University of Oslo (2014)[2]. A similar kind of study was done also in Denmark in 2014, and it used similar methods in order to make these two studies comparable[3]. Both studies were based on national reports from Norwegian streaming service WiMP (later Tidal).

The overall income of a music audio streaming service, which consists mainly of subscription fees and/or advertising revenues, is shared between three main groups:

GROUP	RIGHT HOLDERS	SHARE (ESTIMATED TOTAL)
Recordings	Record companies and other producers[4] Performers[5]	55-60%
Recorded works	Composers Lyricists Arrangers Music Publishers	10-15%
Streaming services	---	30%

In case of subscription-based streaming services the most common monthly fee for an individual consumer is €9.99 per month. Services have also various kinds of offerings, special prices for

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[2] https://www.hf.uio.no/imv/forskning/prosjekter/skyogscene/publikasjoner/usercentric-cloudsandconcerts-report.pdf
[3] https://koda.dk/fileadmin/user_upload/docs/Analysis_Music-Streaming-In-Denmark_2014.pdf
[4] Other producers = e.g. production companies and artists themselves. Distributors and aggregators do not usually own any rights, but they get their share from record companies' revenues.
[5] This refers mainly to the artists, who get royalties from record companies.

students, family packages, and so on, but in this study, we use the €9.99 per month per subscriber as the calculation basis.

If we deduct services' share (30%), the remaining sharable amount of money per user per month is €6.993. This sum includes VAT, but we do not discuss the VAT issues of the cross-border Internet services in this context.

In this study, we do not analyse the fore-mentioned shares or how each group divides its share between the respective parties. For the sake of clarity, we consider all royalties paid by the streaming services as 100% income for all fore-mentioned right holders.

In this study, the term "track" means a single recording, which usually consists of one recorded musical work.

2.2.   Pro Rata Model[6]

In the pro rata model, all revenues per month are put together and shared between individual tracks according to the number of total streams.[7]

The formula of the pro rata calculation method for an individual track is as follows:

$$\frac{\text{Total no. of streams of Track A}}{\text{Total no. of streams}} \quad \mathbf{X} \quad \text{Total revenue}$$

For example, if Track A gets 100 streams, the total number of streams during a month is one million and the total revenue after service's deduction is 500,000 euros, the share of Track A is calculated as follows:

100 ÷ 1,000,000 = 0.0001
0.0001 x €500,000 = €50

The sum of €50 is divided between the right holders of Track A (as described in chapter 2.1).

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[6] The numbers presented in chapters 2.2 and 2.3 are theoretical and do not refer to the Spotify report material used in this study. They are only examples to clarify the calculation methods.

[7] It should be noted that this calculation formula is a simplified model, which does not take into account the more detailed calculation methods, which are used in reality as defined in contracts between the various parties.

2.3.   User Centric Model

In the user centric model, the calculation is based on the listening habits of each individual user. The formula of the user centric calculation method for an individual track is as follows:

No. of streams of Track A listened by User 1
_____   **X**   Total revenue from User 1

No. of total streams listened by User 1

For example, if the total number of streams listened by User 1 during a month is 100, the share of Track A out of these 100 streams is 25, and the revenue from User 1 is €6.99, the share of Track A is calculated as follows:

25 ÷ 100 = 0.25
0.25 x €6.993 = €1.75

The sum of €1.75 is divided between the right holders of Track A (as described in chapter 2.1).

3. RESEARCH MATERIAL

The research material consisted of a confidential usage report, which was kindly provided by Spotify. The material was available only to the researcher, Dr. Pradeep Durgam of Aalto University.

The material consisted of usage information on Finland during the month of March 2016. It included all Spotify Premium subscribers (anonymised) in Finland and all the streams they had listened during this period of time. The report consisted of more than eight million individual streams.[8]

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[8] The analysis process steps have been described in detail in the Appendix.

The data received from Spotify was arranged according to the following parameters:

1. User ID: Unique IDs per user[9]
2. Track ID: Automatically generated track IDs
3. Track Title: Title of the track
4. Track Artists: Artist of the Track
5. Album Title: Album title from which the track was played
6. Stream Count: Number of times the track was streamed

The researcher took a random sample of 10,000 tracks to represent the whole material. This sample included tracks from 4493 individual artists and 22,496 streams (individual listening times), listened by 8051 user IDs.

4. ANALYSIS AND RESULTS

The analysis is presented in two sections. In the first part, we present the results of the statistical analysis. In the second part, we present the analysis from the point of view of individual tracks and artists.

4.1. The Results of the Statistical Analysis

The statistical analysis of the research material was done by using the Pearson Two-Tailed Correlation Analysis method. The results were as follows:

Correlations

		Revenue Diff User-Pro	Consolidated Stream Count
Revenue Difference: User Centric vs. Pro Rata	Pearson Correlation	1	-.769[**]
	Sig. (2-tailed)		.000
	N	4493	4493
Consolidated Stream Count	Pearson Correlation	-.769[**]	1
	Sig. (2-tailed)	.000	
	N	4493	4493

** = Correlation is significant at the 0.01 level (two-tailed)
N = Number of individual artists

The table shows that there is a high correlation between the Stream Count and the Revenue Difference between the User Centric and Pro Rata models.

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[9] The user-data was totally anonymized.

The negative sign -.769 means that the variables, Stream Count and Revenue Difference, are moving in opposite directions. This means that as the overall Stream Count decreases, the revenue difference between the User Centric and Pro Rata models increases. This indicates that User Centric revenue for tracks with smaller number of streams gets bigger as the total number of streams per user gets smaller.

Therefore, User Centric revenue for tracks with smaller number of streams will increase when the total stream count per user is lower. The tracks with smaller number of streams will earn more from each user, which indicates that tracks with smaller number of streams will earn relatively more in User Centric model than in the current Pro Rata model.

## 4.2. The Results for Individual Artists and Tracks

The results of the more detailed analysis were decided to be arranged according to the artists[10]. The 4493 individual artists[11], who were included in the sample of 10,000 tracks[12], were divided into three main groups according to the total number of streams.

The percentage figures in the following diagram refer to their share of the total number of artists, and the stream count to the total number of streams per artist within the sample (can include only one track or several different tracks):

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[10] It should be noted that even though we use here artists as the leading parameter of the analysis, the analysis concerns all right holders of each individual track.

[11] As the report material did not include information on the nationality of the artists, we were not able to compare the results between national and international artists.

[12] Dr. Durgam did also an additional test computer run with a sample of 50,000 tracks with a limited number of artists in order to verify the results of the smaller sample. The results confirmed that the overall results were the same as in the sample of 10,000 tracks. The main trend is that as the size of the sample grows, the relative size and the stream count of the Basic-Tier remains the same but the difference between the basic and Top-Tier stream counts grows exponentially.

Top-Tier: ~0.4%
Stream Count:
100+

Mid-Tier: ~9.6%
Stream Count: 10-99

Basic-Tier: ~90%
Stream Count: 1-9
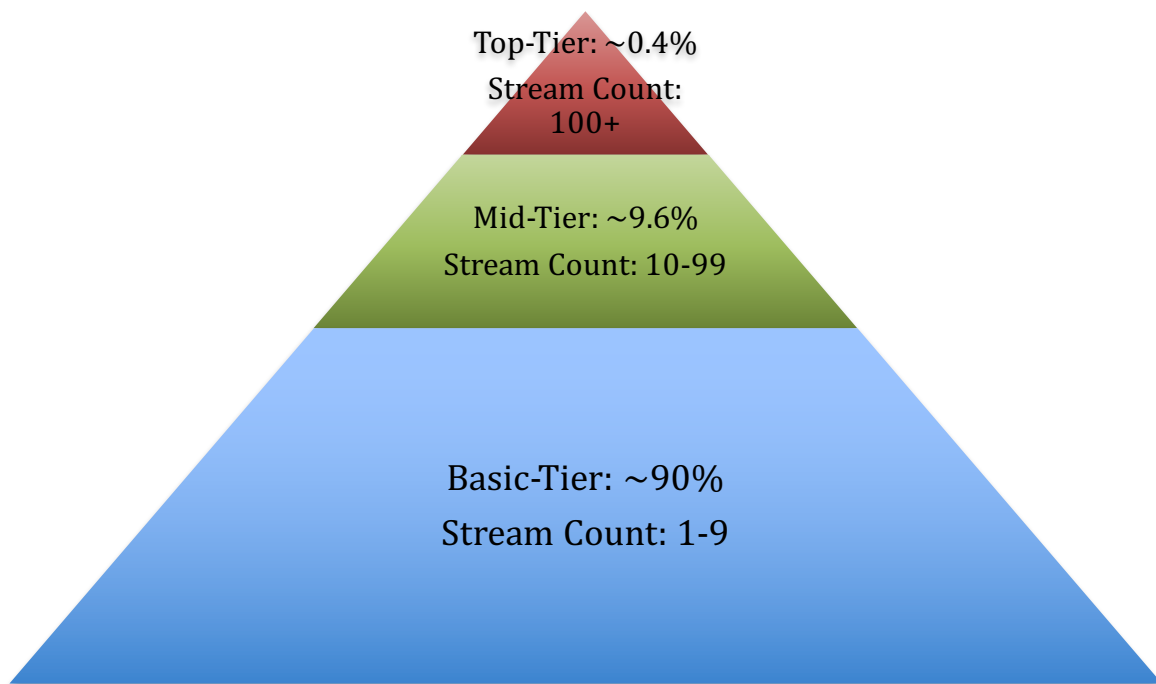
In all fore-mentioned groups the differences in the financial results between the pro rata and the user centric models were quite dramatic from the point of view of an individual artist.

In the **pro rata model** the situation is quite clear. The more you get streams, the bigger is your share of the total revenues.

The share of the Top-Tier artists of the total revenue was 9.9% according to the pro rata system whereas only 5.6% according to the user centric system. None of the Top-Tier artists got more revenues in the user centric distribution model. The difference between the two distribution models in the top-tier shows that the pro rata model favours the few top artists when the calculation is based only on the total number of streams per artist.

However, in the Mid- and Basic-Tiers the differences between the pro rata and user centric models for individual artists were per cent -wise high to both directions. In other words, artists could get either much more or less in the user centric model depending on the case within the sample report material.

In the **user centric model** each artist's share depends on, firstly, the total overall number of streams or whether it is lower or higher as presented in chapter 4.1. Secondly, it depends on the individual listener's habits or whether he/she listens only certain artists, how many times certain tracks are listened, how the listened streams spread among various artists, and so on.

The only artist group, which got almost the same financial results in **both models**, was artists, who are popular in many consumer segments and have a large listener base. This and all other observations seemed to concern both domestic and international artists[13].

Popular artists, who would have got much less money in the user centric model, are most likely listened by a smaller number of subscribers who listen their tracks many times. Popular artists, who are listened by a large number of individual listeners and who listen them fewer times, are less affected by the changes between the two models. This seemed to relate also, to a certain degree, to different musical genres[14].

In case of most artists, who get only few streams, the changes are per cent -wise dramatic between the two models. In the user centric model the revenues are directly affected by each subscriber's listening habits. If a subscriber listens only a certain artist either few times or a lot of times, his/her money goes only to this artist and the respective tracks. However, if his/her listening is spread among many artists, the revenue is also spread accordingly and affects each artist's and the other track's right holders' revenues in a negative way.

The extreme alternatives can be demonstrated in the following way:

- If a subscriber listens only one track once during a month, the whole €6.933 would go, according to the user centric model, to that track and its right holders.
- However, in the pro rata model this money would be just added up to the overall pot, which would be divided according to the number of streams of each track, and the right holders of that one track would get only a fraction of the same one-track-once-a-month-user's money.

Furthermore, if the listening habits of various subscriber groups are cumulated, the overall effects can be remarkable in the user centric model. According to the statistical analysis of the sample, the changes of 50% or more to both directions between the two models are not rare.

The overall share of the Top-Tier artists is quite different in the two models. Compared with the pro rata model, in the user centric model almost half of the Top-Tier's revenues would have been spread among the artists and the other right holders with fewer streams (Mid-Tier and Basic-Tier).

All in all, the most important point in comparing the two models is the relation between the total number of streams and the listening habits of a single subscriber or subscriber groups.

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[13] It must be emphasized that this was not analysed statistically as the data did not include information on the nationality of the artists.
[14] This point of view was not analysed statistically as the data did not include any genre classification.

In the pro rata model only the number of streams count, whereas in the user centric model the total number of streams per subscriber, as well as how they are spread among various tracks and artists. Therefore, the user centric model is less predictable. It is also clear that the pro rata model favours the few top-tier artists who get biggest amounts of streams.

This analysis could also have been done based on works instead of artists. In that case there would have been different kinds of variations such as several different recordings of a work by several different artists, works created by several composers and lyricists, and so on. However, we assume that the results of the work-based analysis would have most probably been quite similar.

It could also be studied if subscribers choose tracks they listen based on an artist, a work or a combination of them, or simply prefer to use ready- or self-made playlists. Subscribers can also rely on each service's algorithms, which learn the taste of each user and offer recommendations or playlists based on their listening habits.

It should also be noted that the current pro rata distribution system does not take into account the big differences between the durations of the various kinds of musical works. For example, each play of a three-minute pop song is treated in distribution in the same way as a play of a 15-minute classical music work. In this study, it was not possible to analyse this, as the research material did not include information on the duration of the individual tracks.

5. CONCLUSIONS

The study has demonstrated the basic differences and correlations between the pro rata and the user centric distribution models.

The basic trend is that as the overall stream count decreases, the revenue difference between the user centric and the pro rata models increases.

The pro rata favours artists and tracks, which get the biggest amount of played streams regardless if they are created by a large number of users with few plays or a smaller number of users who have played them repeatedly.

The user centric model favours artists with smaller number of streams, especially when the overall stream count is smaller. However, it should be emphasized that the positive financial effect is not automatic in all user centric cases but the result may as well be the opposite. The results depend on the cumulative effects of both individual and user groups' listening habits.

In any case, the user centric model gives more direct power to users to target the money they pay for the service to the artists or tracks they favour compared with the pro rata model, which is not transparent from their point of view.

6. APPENDIX: THE ANALYSIS PROCESS

The report consisted of more than eight million individual streams. The data was received in a text format. It was converted into an excel format (.xsls) and SPSS format (.sav) for analysis.

The analysis of the reporting material provided by Spotify was done by executing the following steps:

6.1.   Pro Rata Model

Step 1: To get the total subscription fee collected from the users in the 10,000 tracks, the just User ID and the Stream Count were extracted.

Step 2: The User ID was consolidated with Stream Count through the consolidation function under the data tab. After the consolidation, the number of unique User IDs was reduced to 8051 and the stream count added to each User ID.

Step 3: The Track Artist and Stream Count were extracted from the original data file and copied to a new excel sheet. Track Artist and stream count were consolidated through the consolidation function under the data tab in the excel sheet.

After this is was possible to count the total amount collected and the total amount for distribution:

> Collected: 8051 x €9.99 = €80,429
> For distribution: €80,429 x 0.7 = €56,300 (30 % deduction for Spotify)

Step 4: The distribution was calculated for each artist according to the formula presented in chapter 2.2.

6.2.   User Centric Model

Step 1: The consolidated User ID and consolidated Stream Count were extracted.

Step 2: The revenue per stream for an individual user fee was calculated as follows:

> Revenue received from each user = €9.99
> Deduction (30%) for Spotify
> Final revenue received from per user = 0.7 x €9.99 = €6.993

Revenue per stream for each individual's user fee =
Revenue received from each user ÷ consolidated stream count

The result was revenue per stream for each user.

Step 3: The revenue per stream for each user and the consolidated User ID (count 8051) was then placed alongside with the User ID and Track Artists, which had the original count of 10,000.

Then the revenue per stream was placed next to the individual Track Artist (with count 10,000) and User ID (with count 10,000). After the SUMIF function of the excel sheet the count of column of revenue per stream was 10,000.

Step 4: Revenue per stream and per user was calculated with the count of 10,000.

Step 5: Then the User Centric Revenue per Artist was calculated by using SUMIF function on column Track Artist (count 10,000) and revenue per stream that was calculated earlier. The result was a new column of user centric revenue for all artists.

Step 6: The artists were repeated and the amount they earned were repeated. Therefore artists and their revenues were consolidated at the same time as summing up their number of streams.

Step 7: After consolidation, the Pro Rata Revenues were placed alongside with User Centric Revenues. Then the Revenue difference was calculated.

Step 8: After having the Stream Count, Pro Rata Revenue, User-Centric Revenue and the difference between User Centric and Pro Rata Revenues IBM SPSS was used.

The correlation function was used in order to understand the correlation between Stream Count and the Revenue Difference.