"Spoofing" And Fake Plays:
The Effect of Fans Faking Interactive Streaming Numbers to Boost Chart Metrics

Author: John McLellan

>> What is Narrowcasting?

The rise to prominence of streaming has brought significant changes, challenges and benefits to the music industry. However, there have been concerns over allegedly "fake" streaming numbers and the effect on the authenticity of music charts and "sales" numbers. What does the phenomenon of "fake" streams mean in a broader context? This article will illustrate some examples, consequences and the possible measures to counter the "fake" numbers.

>> Billboard Charts and Streaming

The Billboard charts have long been recognized as the "gold standard" by which musicians measure their success. Over the years, Billboard has undergone several overhauls to its metrics of how to measure the popularity in its compilation of charts – from including songs played in jukeboxes, to taking into account the number of airplays of recorded music in radio stations. In recent years, Billboard has also factored in the number of music streams into its chart compilations, along with other indicators such as album sales, digital downloads and radio airplays.

Currently known as the "Hot 100" songs chart, the Billboard singles chart is compiled using an undisclosed ratio of digital downloads, radio airplays, and streams of the songs. [1] Nielsen Music is responsible for collecting sales data and calculating the appropriate weighting ascribed to each element. For example, Nielsen uses a rating system, so that radio stations with larger audiences would exert a greater

influence on the chart. Songs that are played at peak hours would also receive heavier weightings.[2] Such factors, it is felt, reflect the true popularity of the songs.

The streaming component is weighted according to a point system: on-demand audio streams, such as Spotify and Apple Music, are given one point; on-demand video streams such as Youtube and Vevo receive 0.67 points; and programmed streams by Internet radio services such as Pandora receive 0.5 points each.[3] This allocation gives a heavier weighting to paid streams than free streams.

Conversely, the "Billboard 200 Albums" chart uses a different calculation method that takes into account physical album sales, digital downloads and streams. For example, 1,250 paid music streams are counted as equivalent to one album unit, while for ad-supported streams, the ratio is lowered to 3,750 streams to one album unit. For digital downloads, 10 track downloads are equivalent to one album unit.[4]

The Billboard charts consider a wide range of streaming platforms, including Spotify, Apple Music and Tidal. The proportion of streamed songs and albums that contribute to the Billboard charts would of course vary, depending on the popularity of the streaming platforms. However, it is considered that streaming sales generally constitute 20 to 30 percent of the total data Billboard considers in the compilation of its charts.[5]

According to the Global Music Report published by the International Federation of the Phonographic Industry ("IFPI") in 2018, revenue generated by paid subscription streaming services has an annual growth of 45.5%, with streaming revenue accounting for more than one-third to the total income for global recorded music sales.[6] As such, streaming services continue to be the most important growth factor for the industry.

>> The Manipulation of Charts

Given the importance of the Billboard charts in measuring the success of labels and artists, it is no surprise that there are allegations of manipulation. In earlier eras, Billboard charts were compiled by making phone calls to retail stores across America

enquiring as to their sales numbers. These kinds of oral reports were obviously unreliable, due to the fact that labels would often give out free albums and gifts which constituted great incentives for those store owners to boost the numbers.[7]

As documented by Fredric Dannen in his book *"Hit Men",[8]* during 1980 and 1990s, labels were alleged to have paid significant sums to independent promoters who in turn bribed the radio stations (more specifically station managers and DJs) in exchange for adding the labels' tracks into the radio's playlists.

In 1991, charting methodology improved somewhat when Nielsen Soundscan, a music sales management system, started to compile the Billboard charts. It identified and tracked music sales by reference to the unique commercial codes of the song tracks. However, there were still loopholes that could be exploited. For example, it was alleged that labels would give away free copies of albums to stores in advance and make them either discount the prices of the albums or swipe the barcodes of the album multiple times to inflate the sales number. It was also alleged that labels would particularly target well known independent retail stores as they tended to carry a greater weighting in compilation of the Billboard charts.[9]

Clearly the benefits to manipulating the charts can be enormous. If a song is able to get a high ranking, labels can leverage this and recommend the track to radio and TV stations for more exposure. Retail CD stores would also be encouraged to order more albums in view of their popularity on the charts; not to mention the reputation attributed to the artists and the label executives behind the songs.

>> How Fans Manipulate Streaming Data

As the importance and influence of streaming platforms is on the rise, so is suspected data manipulation.

A typical manipulation works like this: take the US Billboard chart as an example, fans and companies would create accounts on music streaming sites to play the music

"One can imagine that if streaming bots could approximate human listener behavior well enough, a sophisticated botnet operation could plausibly fool any service's spam algorithms."

of a particular artist and distribute the account details to fans in other countries via Twitter, e-mail, or other instant messaging platforms. The recipients would then stream the music continuously, sometimes even using multiple devices at once. Many of the fans use virtual private networks ("VPNs"), which is a technology that can reroute a user's traffic through several different servers across the world, therefore masking or faking their actual locations. Some fans even organize donation drives so other fans can pay for premium streaming accounts.[10] In addition, they may buy fake YouTube views[11] or Spotify plays[12] to affect Billboard ranking.

Another method is the use of bots to automatically stream the music. First, a remote server will employ browser automation to sign up to a streaming account with randomly generated names, ages and e-mail addresses. This would give a virtually limitless supply of accounts via which to stream songs.

A central command server would then periodically send out the login credentials to cloud servers (or repurposed personal computers) running dozens of accounts, all masked by VPNs. Each "user" would log in, listen to a few hours of music, and then log out. One can imagine that if streaming bots could approximate human listener behavior well enough, a sophisticated botnet operation could plausibly fool any service's spam algorithms.[13]

>> Some Examples of Data Manipulation

Korea

BTS

Upon the release of BTS's album *"Love Yourself: Answer"* in August 2018, the album became the group's second Billboard 200 chart-topper. There were rumors suggesting that the superfans of BTS launched a sophisticated campaign to make sure the band reached the top of the chart. BTS fans who are located in the US would create accounts on streaming platforms and distribute the login details to BTS fans in other countries. The recipients would then stream BTS's music continuously by VPN, often with multiple devices.

By using this strategy, one BTS fan group claimed that it has distributed more than 1,000 Spotify accounts, with the sole aim to create an illusion that there are more people in the US streaming BTS's music, therefore boosting BTS's ranking in US music charts.[14]

Nilo and Shaun
Apart from the Billboard charts in the US, local music charts in Korea were also targets of potential data manipulation. Currently, two Korean artists, Nilo and Shaun, are being investigated by the Ministry of Culture, Sports and Tourism for suspected data manipulation.

In April 2018, Nilo's song "Pass", released in October 2017, suddenly rose to first place on the real-time chart of Melon, a major Korean music streaming platform, beating popular artists including EXO, Wanna One, and TWICE. A major cause of the suspicion surrounding the track was that it managed to hold on to the top spot during the middle of the night, when charts are usually dominated by fans who stream while other listeners are asleep, in order to boost the figures of their idols.[15]

In July 2018, Shaun's "Way Back Home" attained the No.1 position on all three major Korean music sites: Melon, Genie and Olleh Music. Since Shaun was a relatively unknown artist, the song's rise on the charts sparked allegations of chart manipulation. The music label has denied all accusations.[16]

On 31 January 2019, the Ministry issued a statement, stating they have instructed a data analysis company to analyze the user behaviors of those controversial tracks, and have found that they were no different from those of other tracks, where users tend to listen to the same track on repeat for a long time, or listen to the track during early morning times. The Ministry will transfer the analyzed data to an investigative agency for further investigation.[17]

Kris Wu

There has also been a similar allegation of fake numbers for digital downloads. Kris Wu, a former Chinese star of the Korean boys band EXO, released his album "Antares" in early November 2018, which quickly rose to the top of the US iTunes sales chart. However, while Kris is a household name in China, he is relatively less popular in the US, therefore the fact that his song captured the No. 1 spot was rather surprising.

Some speculated that the large sales number was due to impatient Chinese fans who wished to purchase the album in advance, since the release date of the album in the US was earlier than that in China. To purchase the album, the Chinese fans used VPNs to access the US iTunes store.[18]

The irregularity was quickly spotted by Nielsen Music who said they would investigate the legitimacy of the numbers. The circumstances were even more suspicious given that Kris's ranking in the US iTunes chart dropped to No. 90 after the album was released in China. Whilst his fans were accused of using bots to boost the sales, Kris's label, Universal Music China, released a statement that the figures were "genuine and effective."[19]

After the review, Nielsen Music announced in November 2018 that it validated Kris Wu's sales data and has removed all "unverified activities" which did not have the required validation for the Kris Wu sales. Nielsen did not reveal how they conduct the validation or what it meant by "unverified activities."[20]

Norway

Besides fans' manipulation, it is noteworthy that even streaming platforms may play a role in the manipulation of streaming data.

In May 2018, Norwegian newspaper *Dagens Næringsliv* and the Norwegian University of Science and Technology accused Tidal (a subscription-based music and video streaming service owned by rapper Jay-Z) of falsifying tens of millions of streams

for Beyoncé's "Lemonade" and Kanye West's "The Life of Pablo" albums. While Tidal has denied the claims, several investigators are looking into the incident.

As of January 2019, Tidal is being investigated by the Norwegian Authority for Investigation of Economic and Environmental Crimes, after the authority received complaints from Norwegian artist associations claiming potential loss of income from the manipulation of streaming data.[21]

China

Besides music platforms, data manipulation can also be understood in a broader context, e.g., creating fake accounts on social media. In China, some companies or key opinion leaders ("KOL") have used fake accounts on social media with attempts to promote products or boost their reputation.

It is not uncommon for companies and KOL to hire online public relations or marketing agencies to create fake accounts to "like" or to post comments in large quantities. For example, on Weibo (a Chinese social media platform similar to Twitter), some bloggers will purchase fake accounts to enlarge their follower base and fabricate interactions with their accounts, so that it appears that they have a large number of followers and high engagement rate.

Fake accounts on Weibo are usually created by sophisticated programs such as bots. Taobao, one of China's most popular online shopping websites, used to have a number of vendors offering fake accounts, "likes", and comments. In general, the price of the fake account depends on its quality. High quality fake accounts will have more details and "activities" such as profile pictures, regular updates and regular interactions with the account's purchaser. On the other hand, low quality fake accounts, also known as "vampire accounts", will not have profile picture and have no updates at all.[22]

Data manipulation is also a concern with live streaming platforms in China. In 2015, when a host was live streaming on "Dou Yu", a live streaming platform

"The foremost consequence of "fake" plays is that it rewards artists for plays which they do not deserve."

in China, for his gameplay in League of Legends, the number of his "viewers" astonishingly exceeded 1.3 billion people; meaning that, if the number was true, all People's Republic of China nationals would have been watching the show![23]

It is considered usual practice for the platforms and KOL Managers to fabricate popularity numbers. For example, when a live streaming platform claimed to have spent RMB40 million for "sponsoring" a KOL, the funds were actually given to the Manager of the KOL who will spend the money on the platform as "rewards" to the KOL. The fund will flow back to the platform and no money is actually spent. However, this can already create the illusion of popularity and reputation for the KOL.[24]

>> Implication of Data Manipulation on Music Platforms, Social Platforms and Live Streaming Platforms

Streaming revenue overtook digital downloads and CD sales as the primary revenue source for the US music industry in 2015. The figure has continued increasing year by year.[25]

The payout to artists from the streaming plays is calculated by a formula. Take Spotify as an example, 70% of its revenue from subscription fees and advertisements will be paid out to artists according to their market share of stream plays (i.e., stream plays of the artist's songs divide by total monthly stream plays of Spotify) and respective "royalty rates", which differs amongst artists. Spotify has stated that its average composite per-stream rate is around US$0.0060 to US$0.0084.[26]

Therefore, the foremost consequence of "fake" plays is that it rewards artists for plays which they do not deserve. Fake plays also increase the total stream plays of the market, therefore diluting the royalty income of other artists with legitimate plays. This is not to mention the additional prestige and reputation as well as a higher ranking that follows with more stream plays (which, given that some endorsement deals are tied to popularity and chart rankings, again reward artists with fake plays).

There are some who view such plays as legitimate since fans are actually playing and paying for the songs; therefore, strictly speaking they are not "fake" plays. However, others view the plays as "fake" as they distort the measurement of true popularity. Once upon a time, fans rarely bought more than one copy of physical CD, since it would imply greater cost. However, in the world of streaming, with the help of the Internet, fabricating "fake" numbers is much easier by using VPNs and bots. This is why some say streaming platforms and society as a whole should treat "fake" plays seriously and should work to restore true integrity of the charts.

In China, manipulation of follower numbers can lead to higher remuneration received by the artists in endorsement deals. As suggested by Liu Tianchi, a Chinese film director, it has been a common knowledge in the entertainment industry that the number of followers, "likes", or "forwards" of artists' posts would determine the remuneration to be received by them.[27]

>> Potential Safeguards to Prevent Abuse

Billboard states that it has "safeguards in place" to counter fake plays, but refuses to clarify those measures, apparently to prevent fans from deliberately "gaming" the system.[28]

On the other hand, Spotify has been using both computer algorithms and human employees to monitor fake plays. For example, they look for suspicious playing patterns such as repeat listens from a single user. If they have identified a "machine" account, they will either require it to verify itself as human (i.e., completing Captchas) or will block it directly.[29] However, there have been complaints that Spotify has removed albums of innocent artists which have very loyal fan bases.[30]

Some have suggested a change to the mechanism for distributing Spotify's royalties. Instead of distribution on an "aggregate" level, i.e., artist receiving royalties by dividing his or her streaming time by the total streaming time of Spotify, it is proposed that it should adopt distribution on a "user" level, i.e., if a subscriber pays $10 a month to only listen to Taylor Swift's songs, Taylor

Swift should get all $10, instead of sharing it with other artists on Spotify.
This would limit the negative influence brought about by "fake" streams.

In view of the "fake" numbers phenomenon, brands have been cautious to spend
money on artists who claim to have large numbers of followers. For example in
China, the duration of many endorsement contracts have been shortened from
3 years to 1 or 2 years due to the unstable (and largely unverifiable) fame and
popularity of the artists. Some brands may also ask artists to show analytic reports
produced by social media platforms to prove that their popularity is authentic.

>> Experience from Asia

China and Korea may provide some guidance as to how to fight fake accounts
on social platforms and fake streaming data on local music platforms.

Korea

Chart manipulation, also known as *"sajaegi"* in Korean, is illegal in South Korea. It is
forbidden by Article 26 of the Music Industry Promotion Act (updated in 2016) to:

"unfairly buy up of music records, etc. manufactured, imported, or distributed by
business entities related to music records or music video products or coercion of
persons concerned into buying them for the purpose of increasing their sales volumes."

Further, the Minister of Culture, Sports and Tourism may, if deemed necessary, take any
of the following measures against business entities related to music records or music
video products to establish a sound order in distribution of music records or the like:

1) Order to report on the operations of such businesses;
   Order to submit related data;
2) Order to exclude sales of music records, etc. from total count; and
4) Other measures necessary to establish a sound order.

Violation of the above would lead to imprisonment with labor for not
more than 2 years or by a fine not exceeding KRW20 million.

Previously, Momoland, a girls' group in Korea was under investigation by the Ministry. The investigation concerned the group's third mini album GREAT! which was released on 3 January 2018. The song "Bbom Bbom" headed the album charts and quickly became a hit. However, the controversy began when 8,261 copies of Momoland's album were sold on one day, therefore giving rise to suspicion of *sajaegi*. In response to mounting speculation, Hantao Chart, a site that monitors the sales of records, submitted a claim to the Ministry asking for an investigation.

In June 2018, the Ministry ruled that the charges of *sajaegi* brought against the group Momoland were false. The verdict came after a months-long, two-stage investigation. However, the verdict did not come with much detail or explanation and thus, attracted a lot of criticism.[31]

In April 2018, Melon addressed reports of illegal use of IDs that could affect its charts. It stated that every month, there are approximately 15,000 IPs blocked due to illegal usage. According to Melon, the number of permanently blocked IPs including VPNs amount to approximately 1.4 million.

Melon noted that attempts to evade its defense system and manipulate the charts were becoming increasingly intelligent. "Melon adopted i-Pins (Internet Personal Identification Numbers) developed to prevent the excessive collection of personal information adhering to government policies and is currently employing them," explaining "However, as illegal use of i-Pins has been steadily occurring, we plan to abolish authentication through i-Pins and further strengthen authentication through cell phones in order to completely block off illegal use."[32]

Meanwhile, the Korean government is trying to strengthen enforcement to combat data manipulation on music charts. In November 2018, it announced that starting from 2019, it will employ full-time staff to closely monitor the data submitted by the major music service providers; and should there be any abnormal pattern or phenomenon, the government will immediately take action against the relevant parties.

China
In order to combat the increasing number of fake accounts, the Office of the Central Cyberspace Affairs Commission of the People's Republic of China issued the "Notice of Provisions on the Administration of Internet Comments" in August 2017,[33] in which social media which provide Internet commentary services are required to carry out a list of duties, for example:
1) Identity verification must be carried out for registered users and no services shall be provided to those whose identity cannot be verified;
2) A service agreement should be signed between the service providers and the registered users, clearly stating the administrative rules of the commenting service, incorporating the relevant laws and regulations of the Internet;
3) A user rating management system should be established to carry out credit evaluations of users' comments. The evaluation should determine the service scope. Users severely lacking in credibility will be blacklisted and no services will be provided to them, and such users will be prohibited from using re-registration or other means to utilize the commenting service; and
4) Complaint channels should be set up for reporting illegal messages on the Internet commenting platforms.

Further, the Office issued "Notice of Provisions on the Administration of Microblogs Information Services" in February 2018,[34] which applies similar regulations on the service providers of "microblogs" which have the mechanism of "likes" and "follows." To comply with the above notices, in March 2018, Weibo issued a new set of terms and conditions, which requires identity verification for all new users. The verification requires a mobile number, passport/ China ID number and the registered code of the employer.
It is estimated that various Internet commentary platforms and microblogs in China will adopt similar identity verification mechanism in the near future. With the release of the notices, the once prevalent sales of fake accounts have decreased, although there are still some websites, such as Weibo Fans and Weifenyi, which still offer fake accounts.

It is questionable whether similar measures will be adopted in the Western jurisdictions. While data privacy of individuals is greatly valued in Western countries, Chinese citizens tend to be more willing to surrender their personal information. The identity verification measures of Chinese social media platforms (such as requesting employers' information), would likely infringe privacy rights of individuals in Western jurisdictions. In particular, with the implementation of General Data Protection Regulation ("GDPR") in Europe, excessive collection of personal data is even more likely to provoke controversy.

>> Conclusion

It appears that the phenomenon of manipulating music charts is considered by many Asian fans as just a way to support and adulate their idols, as opposed to anything corrupt. As suggested by a recent article on Billboard, the fans do not purchase albums and stream or download songs merely for their own listening pleasure. Their main goal is to achieve the highest possible ranking for their favorite singers. In particular, in China, massive coordinated grassroot efforts encourage buying several copies per person.[35] It seems that, as a matter of culture, Asian fans are simply more active and organized than their Western counterparts. They enjoy the satisfying and gratifying sense of participation in the victory of their idols.[36]

Having said that, when fans become so powerful that they can manipulate sales statistics and rankings, arguably the entertainment industry as a whole is compromised. Producers and artists may shift their focus on thinking of how to manipulate the charts and no longer concentrate on creating good works. Worse still, true artists with actual talents and skills may find it difficult to market their works, simply because they lack die-hard fans who would manipulate statistics for them. The effect is unpredictable and we, as the audience, are potentially the ultimate loser.

The author would like to acknowledge Patrick Lui and Vanessa Wong and the research they did for this article.

[1]   *Sammy Pisano, "How Billboard's Updated Streaming Methodology Will Impact Charts", 9 May 2018, The Daily Rind, https://www.dailyrindblog.com/billboard-streaming-charts-methodology*

[2]   *Oh, "How Much Music Do You Need to Sell to Get on Billboard Charts", 29 March 2016, Oh., https://olitunes.com/much-music-need-sell-get-billboard-charts*

[3]   *Glenn Peoples, "Why Billboard's New Chart Changes Will Please Some – But Aggravate Others", 21 May 2018, Music Business Worldwide, https://www.musicbusinessworldwide. com/why-billboards-new-chart-changes-will-please-some-but-aggravate-others*

[4]   *Billboard Staff, "Billboard Finalizes Changes to How Streams Are Weighted for Billboard Hot 100 & Billboard 200", 1 May 2018, Billboard, https://www.billboard.com/articles/ news/8427967/billboard-changes-streaming-weighting-hot-100-billboard-200*

[5]   *Chris Molanphy, "How Streaming Services Are Remaking The Pop Charts", 5 June 2015, National Public Radio, https://www.npr.org/sections/therecord/2015/06/05/412037432/how-streaming-services-are-remaking-the-pop-charts*

[6]   *The report can be found at https://www.ifpi.org/downloads/GMR2018.pdf*

[7]   *Neil Strauss, "Are Pop Charts Manipulated?", 25 January 1996, The New York Times, https://www.nytimes.com/1996/01/25/arts/are-pop-charts-manipulated.html*

[8]   *Fredric Dannen, "Hit Men: Power Brokers and Fast Money Inside the Music Business", Vintage, 1991*

[9]   *Neil Strauss, "Are Pop Charts Manipulated?", 25 January 1996, The New York Times, https://www.nytimes.com/1996/01/25/arts/are-pop-charts-manipulated.html*

[10]   *William Bedell, "I Built a Botnet that Could Destroy Spotify with Fake Listens", 16 October 2015, Motherboard, https://motherboard.vice.com/en_us/article/gv5xbx/i-built-a-botnet-that-could-destroy-spotify-with-fake-listens*

[11]   *Michael H. Keller, "The Flourishing Business of Fake YouTube Views", 11 August 2018, The New York Times, https://www.nytimes.com/interactive/2018/08/11/technology/youtube-fake-view-sellers.html*

[12]   *See, for example, Streamify (https://www.streamify.me/services-spotify-plays.html)*

[13]   *William Bedell, "I Built a Botnet that Could Destroy Spotify with Fake Listens", 16 October 2015, Motherboard, https://motherboard.vice.com/en_us/article/gv5xbx/i-built-a-botnet-that-could-destroy-spotify-with-fake-listens*

[14]   *Blake Montgomery, "Fans Are Spoofing Spotify With 'Fake Plays,' And That's A Problem For Music Charts", 13 September 2018, Buzzfeed, https://www.buzzfeednews.com/article/blakemontgomery/spotify-billboard-charts*

[15]   *J,K, "Nilo's Agency Says They Also Don't Understand How His Song Is Topping Charts As Controversy Continues", 18 April 2018, Soompi, https://www.soompi.com/article/1156849wpp/nilos-agency-says-also-dont-understand-song-topping-charts-controversy-continues*

[16] *"Overnight hit or fake? K-pop charts disputed as Shaun beats giants like BTS", 23 July 2018, The Straits Times, https://www.straitstimes.com/lifestyle/entertainment/ overnight-hit-or-fake-k-pop-charts-disputed-as-shaun-beats-giants-like-bts*

[17] *I D. S.kim, "Ministry Of Culture, Sports, And Tourism Gives Final Statement On Digital Chart Manipulation Controversy", 31 January 2019, Soompi, https://www.soompi.com/article/1300539wpp/ministry-of- culture-sports-and-tourism-gives-final-statement-on-digital-chart-manipulation-controversy*

[18] *Tamar Herman, "After Topping iTunes, Kris Wu's 'Antares' Sales Come Under Scrutiny", 8 November 2018, Forbes, https://www.forbes.com/sites/tamarherman/2018/11/08/after- topping-itunes-kris-wus-antares-sales-come-under-scrutiny/#666b75f05615*

[19] *Shirley Halperin, "Kris Wu's iTunes U.S. Sales Acquired 'Fraudulently' and Won't Count Toward Charts", 7 November 2018, Variety, https://variety.com/2018/music/news/kris-wus-massive-itunes- u-s-sales-were-acquired-fraudulently-and-will-not-count-towards-charts-1203022049*

[20] *Colin Stutz,"Kris Wu's 'Antares' Album Debuts on Billboard 200 Chart After Sales Audit", 13 November 2018, Billboard, https://www.billboard.com/articles/columns/ chart-beat/8484851/kris-wu-antares-album-billboard-200-chart-sales-audit*

[21] *Simon Cohen, "Tidal faces legal jeopardy over fake stream numbers accusation", 14 January 2019, Digital Trends, https://www.digitaltrends.com/music/tidal-criminal-investigation*

[22] *Jackie, "All You Need to Know About Fake Accounts on Chinese Social Media", 20 February 2017, Chozan, https://chozan.co/2017/02/20/fake-accounts-chinese-social-media*

[23] *"Biggest Ever Mistake on Dou Yu TV, 1.3 Billion People Watching 'Smile's' Live Streaming of LOL?" (English translation), 11 February 2016, China Daily, http://www. chinadaily.com.cn/interface/yidian/1083961/2016-02-11/cd_23452544.html*

[24] *Tan Xiangfei, "Top Up $1 Million and Get $1.15 Million in Return - The Bubble of Live-Streaming Platforms is Going to Explode" (English Translation), 19 September 2016, Sina, https://sina.com.hk/news/article/20160919/0/5/2/%E5 %85%85%E5%80%BC%E7%99%BE%E8%90%AC%E8%BF%94115%E8%90%AC-%E7%9B%B4%E6%92%AD%E5%B9 %B3%E5%8F%B0%E6%B3%A1%E6%B2%AB%E9%9D%A2%E8%87%A8%E7%A0%B4%E6%BB%85-6315742.html*

[25] *Matthew Garrahan, "US streaming revenues overtake CD sales", 19 March 2015, the Financial Times, https://www.ft.com/content/f2b9bed2-cd90-11e4-8760-00144feab7de*

[26] *Kabir Sehgal, "Spotify and Apple Music should become record labels so musicians can make a fair living", 26 January 2018, CNBC, https://www.cnbc.com/2018/01/26/how-spotify-apple-music-can-pay-musicians-more-commentary.html*

[27] *See the interview of Liu Tianchi at https://www.youtube.com/watch?v=XuLqv-U_uWI&t=1186s*

[28] *Blake Montgomery, "Fans Are Spoofing Spotify With "Fake Plays," And That's A Problem For Music Charts", 13 September 2018, Buzzfeed, https://www.buzzfeednews.com/article/blakemontgomery/spotify-billboard-charts*

[29]   Stuart Dredge, "The curious tale of Spotify, 'mysterycore' artists and (possibly) fake streams", 25 January 2019, Music Ally, https://musically.com/2019/01/25/the-curious-tale-of-spotify-mysterycore-artists-and-possibly-fake-streams

[30]   Windshieldman, "Indy band album removed because of a too loyal fan base", 24 June 2015, Spotify, https://community.spotify.com/t5/Content-Questions/Indy-band-album-removed-because-of-a-too-loyal-fan-base/td-p/1157659

[31]   O.C, "Ministry of Culture Clears Momoland of 'Sajaegi' Charges", 25 June 2018, KPOP Love, http://kpoplove.koreadaily.com/ministry-of-culture-clears-momoland-of-sajaegi-charges

[32]   Y. Jang, "Melon Responds To Reports Of Music Chart Manipulation", 27 April 2018, Soompi, https://www.soompi.com/article/1160915wpp/melon-responds-reports-of-music-chart-manipulation

[33]   "Translation: Provisions on the Administration of Internet Comments", 25 August 2017, Fei Chang Dao, http://blog.feichangdao.com/2017/08/translation-provisions-on_25.html

[34]   "Provisions on the Administration of Microblog Information Services [Effective]", 2 February 2018, PKU Law, http://en.pkulaw.cn/display.aspx?cgid=309714&lib=law

[35]   Fred Hwang, "Are Asian Fan Armies Going to Keep Invading the Charts? (Column)", 16 November 2018, Billboard, https://www.billboard.com/articles/business/8485390/asian-fan-armies-billboard-charts-bts-exo-kris-wu

[36]   Zhang Yu, "China's obsessed fan economy is manipulating music charts", 7 November 2018, Global Times, http://www.globaltimes.cn/content/1126306.shtml