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The economic impact of streaming beyond GDP

By

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Abstract

This paper finds that the shift from buying music as a physical product towards subscribing to music services implies a decrease of 85 percent in the price paid per song. We estimate that in 2019 the global quality adjusted value from streamed music was $76 billion compared to current revenues of $11.4 billion. Thus, the shift from consuming music in physical form towards subscribing to music services creates an enormous consumer surplus that is not recorded in GDP.

Keywords: Streaming, price index, mobile broadband

JEL codes: O31, O33, O34

Declaration of interest statement: Harald Edquist is employed by Ericsson AB, which has a commercial interest in providing Information and Communication Technology (ICT) products.

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1. Introduction

In his seminal work on the economics of lightning William Nordhaus (1997) pointed out that estimates of real income are only as good as the price indexes are accurate. Based on an investigation of the potential bias in estimating prices from lightning Nordhaus (1997, p. 30) concluded: "traditional price indexes of lightning vastly overstate the increase in lightning prices over the last two centuries, and the true rise in living standards in this sector has consequently been much understated". Thus, price indexes miss much of the action during periods of major technological progress.

The last decade has seen a revolution in the diffusion of smartphones, resulting in 6.2 billion mobile broadband subscriptions globally (Ericsson Mobility Report 2019). Subsequently, the rapid expansion of mobile broadband has provided the infrastructure for streamed music companies such as Spotify, Apple Music and Tencent. According to the International Federation of the Phonographic Industry (IFPI 2020) the revenues from streamed music have increased from $0.1 billion in 2005 to $11.4 billion in 2019. At the same time the revenues from physical music products such as CDs and records have decreased from $17.8 to $4.4 billion. Thus, the consumption of music has moved from being based on buying a good (i.e. CDs and records) towards subscribing to a service i.e. streamed music.

This paper finds that the shift from buying physical music products towards subscribing to music services implies a substantial decrease in the price per song. Based on our assumptions, we find that this shift generates a price decrease of 85 percent per song. We estimate that in 2019 the global quality adjusted value from streamed music was $76 billion compared to current revenues of $11.4 billion. Thus, the shift from consuming music in physical form towards subscribing to music services creates an enormous consumer surplus that is not recorded in GDP.

2. Literature and methodology

Digitalization has affected the music industry enormously in the last decades. New digital technologies have allowed a considerable reduction in the cost of copying and disseminating information (Aguiar and Marten 2016). Initially this created incentives to online piracy and illegal consumption of music. However, in the last decade the online music streaming services have increasingly become an alternative and increased in importance in the music industry (Aguiar 2017).

Figure 1 shows the structural effect from digitalization on the global recorded music industry revenues since 2001. While music in physical form has declined steadily during the period the streaming services have increased rapidly since 2005. According to the IFPI (2020), revenues from streaming accounted for 56 percent of the global recorded music market in 2019.

The rise of streamed music has implied that instead of buying a CD that includes a number of songs, it is possible to listen to most music available in the world by subscribing to a service provided by for example Spotify, Apple Music or Tencent. An alternative is also to use these music services for free, by agreeing to listen to commercials offered by the music providing firms.

According to Brynjolfsson *et al*. (2018), people substitute zero-price online services (e.g. Wikipedia) for goods with a positive price (e.g. Encyclopedia Britannica). As a result, the total contribution of these services to GDP figures may decrease even while consumers get access to digital goods with better quality. Nakamura *et al*. (2017) find that including advertising supported and media and marketing supported information in final output added 0.02 and 0.07 percentage points to GDP in the U.S. 1996–2015.

In economics, consumer surplus represents the difference between what a person would be willing to pay for a good and what the person actually pays. According to Brynjolfsson et al. (2018), the difficulty is that it is hard to get reliable estimates of consumer surplus at scalable manner since such measurement requires full estimation of demand curves. In this paper we will argue that the shift from consuming music by buying CDs and records to streamed services creates a consumer surplus that is not reflected by measured price changes. We present figures of the price index for CD albums in the US and estimate the price per song. We then use data released by the music streaming company Spotify to estimate the price per song played by an average Spotify consumer. Finally, we estimate the quality-adjusted value if the streamed music instead would have been consumed in physical form.

3. Results: What are we missing?

Figure 2 shows the price per CD album in the US 2008–2019. On average the price per CD album decreased annually by 1.1 percent. Thus, the price changes for CD albums have only been moderate since 2008.

In 2008, the Swedish music service provider Spotify launched its platform providing music songs from all over the world. The music service made it possible to subscribe at a certain monthly rate or to listen for free with occasional interruptions by commercials. The number of subscribers paying a monthly fee grew rapidly and reached 130 million in the first quarter 2020 (Spotify 2020a), while the figure for Apple Music was approximately 60 million in June 2019 (Statista 2019).[1] The subscription price for both Spotify and Apple Music was $9.99 in the US in June 2020 and included access to more than 30 million different songs.

Figure 3 clearly illustrate that in Q4 2017 the average Spotify user listened to content for 25 hours per month. If we assume that each subscriber listens to 10 different songs per hour, this implies that the average subscriber listens to 250 different songs per months. This implies that the average cost per song is (10/250) = $0.04. According to *figure 2*, the average price per CD album was $13 in 2008–2019. Based on Soloveichik (2013), we assume that the average number of songs on an album is 15, which implies that the average price per song is approximately $0.87.

The difference between the prices above is that the depreciation is different for a service compared to an asset price like a CD. User cost represent the amount of rent that would have been charged in order to cover costs of q dollars' worth of an asset. The following equation is used to calculate the user cost:

$$\mu_t = q_t r_t + q_t d_t - (q_t - q_{t-1}) \qquad (1)$$

where, μ_t is the user cost which is the per-period cost of using the asset, q_t is the market price of a new asset, r_t is the internal rate of return and d_t is the rate of depreciation.

[1] The total number of Spotify subscribers were 286 million (Spotify 2020a).

According to Soloveichik (2013) a typical song on CD sell most of its copies soon after release, implying that more than 75 percent of CD sales occur in the first year after a song is released. According to Soloveichik BEA plans to use simple geometric depreciation rates for songs of 26.7 percent per year in the NIPAs.

If we assume a depreciation rate of 26.7 percent in accordance with Soloveichik and an internal rate of return of 2 percent (close to long-term US government bond). Moreover, the market price of CD albums decreases by 1.1 percent on average (see figure 2). We then get the following user cost per song:

$\mu_t = 0.87*0.02+0.87*0.267+0.011= \$0.26$

This implies that for the average consumer there is a one-off unmeasured price decrease per song from \$0.26 to \$0.04, i.e. a price decrease of 85 percent.[2]

The example above illustrates that the price per song for the average consumer decreases depending on the consumer preferences. This implies that the effect from streamed music is not correctly measured in GDP statistics because the quality aspects are not correctly estimated once the consumer shifts from buying a good i.e. CD to buying a service i.e. streamed music.

Figure 4 shows the global revenues from physical music and streaming since 2005 when streaming revenues started to be measured. In 2005, consumer spent \$17.8 billion on physical music, while only \$0.1 billion was spent on streamed music in current prices. However, the shift in consumption of music in physical form towards streaming lowers the price per song by 85 percent. If we would adjust for this price change per song we would end up with a quality adjusted revenue from streaming at (\$0.1/(1-0.85))=\$0.7 billion. Thus, if the consumer would have consumed the same quantity by buying CDs and records instead of streamed music the total value spent by consumers would have been \$0.7 billion.[3]

[2] These calculations assume that the consumer listens to 250 different songs.
[3] This is based on the assumption that consumers listen to different songs.

Figure 4 also shows that as streaming revenues grow, the quality adjusted value increases substantially. For example, the quality adjusted revenues from streaming in 2019 was $76 billion. It is evident that the shift from the consumption of music in physical form towards streaming services creates an enormous consumer value. This value has been made possible by the smartphone revolution but is not recorded in GDP.

4. Conclusions

The structural shift of the music industry has implied that consumers are subscribing to streaming services instead of buying physical products such as CDs and records. In 2008, streamed music accounted for 2 percent of the total revenues in the global recorded music industry, while the corresponding figure in 2019 was 56 percent.

Based on consumer price data we find that prices of CD albums in the US only has decreased moderately since 2008. This paper finds however, that the shift from buying physical CDs and records towards subscribing to music services implies a substantial decrease in the price per song played. Based on our assumptions, we find that this shift generates a price decrease of 85 percent per song. We estimate that in 2019 the global quality adjusted value from streamed music was $76 billion compared to current revenues of $11.4 billion. Thus, the shift from consuming music in physical form towards subscribing to music services creates an enormous consumer surplus that is not recorded in GDP.

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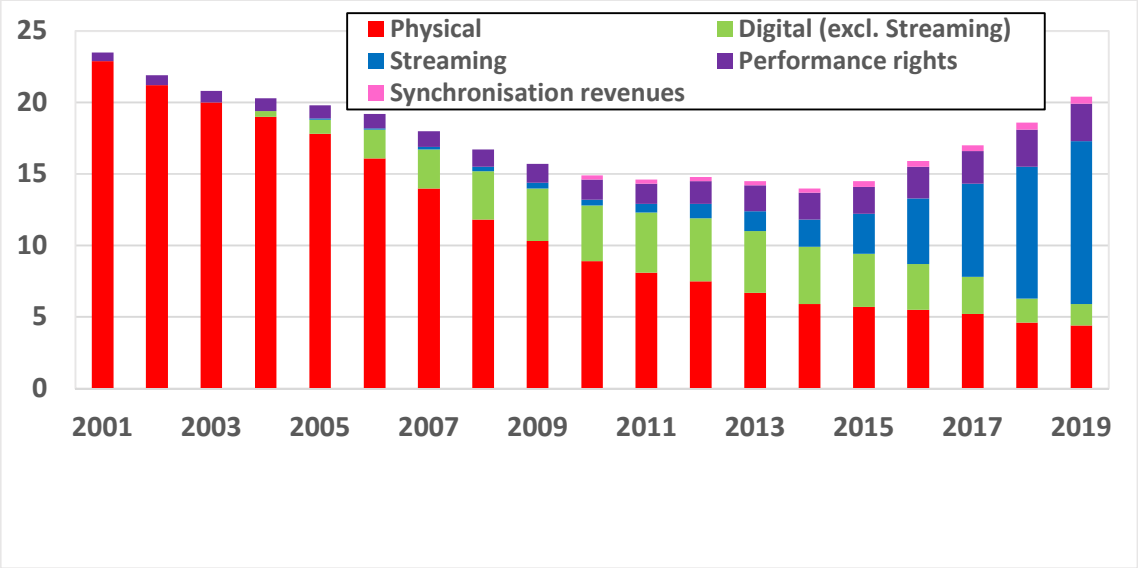
6. Tables and Figures

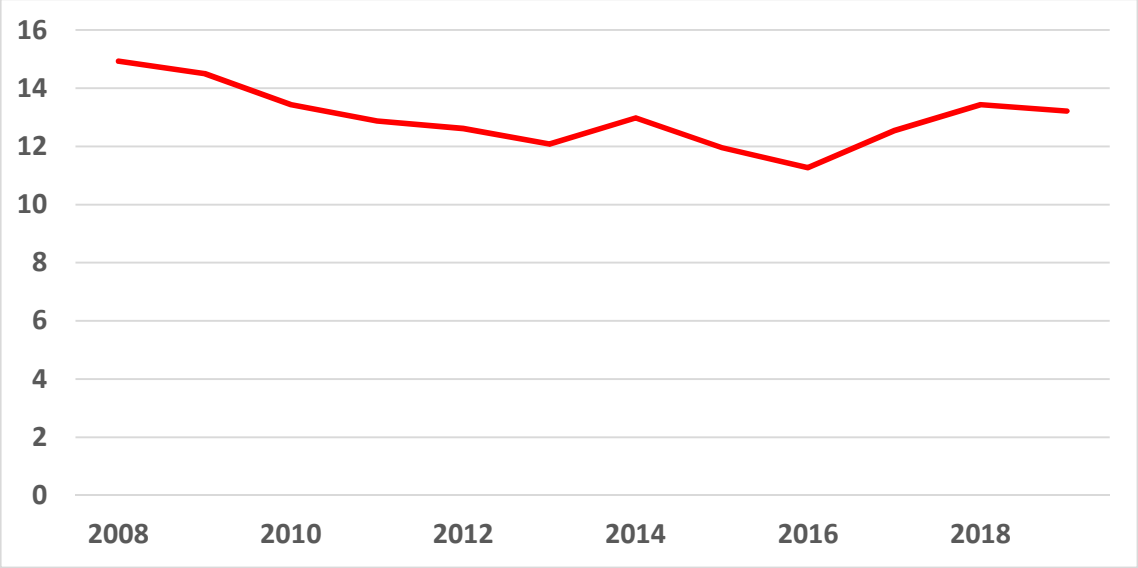
Figure 1 Global Recorded Music Industry Revenues 2001–2019 (US$ billions)



Source: IFPI (2020).

Note: All statements in this paper attributable to IFPI represent the authors' interpretation of data, research opinion or viewpoints published as part of the IFPI Global Music Report in May 2020, and have not been reviewed by IFPI. Each IFPI publication speaks as of its original publication date (and not as of the date of this paper).

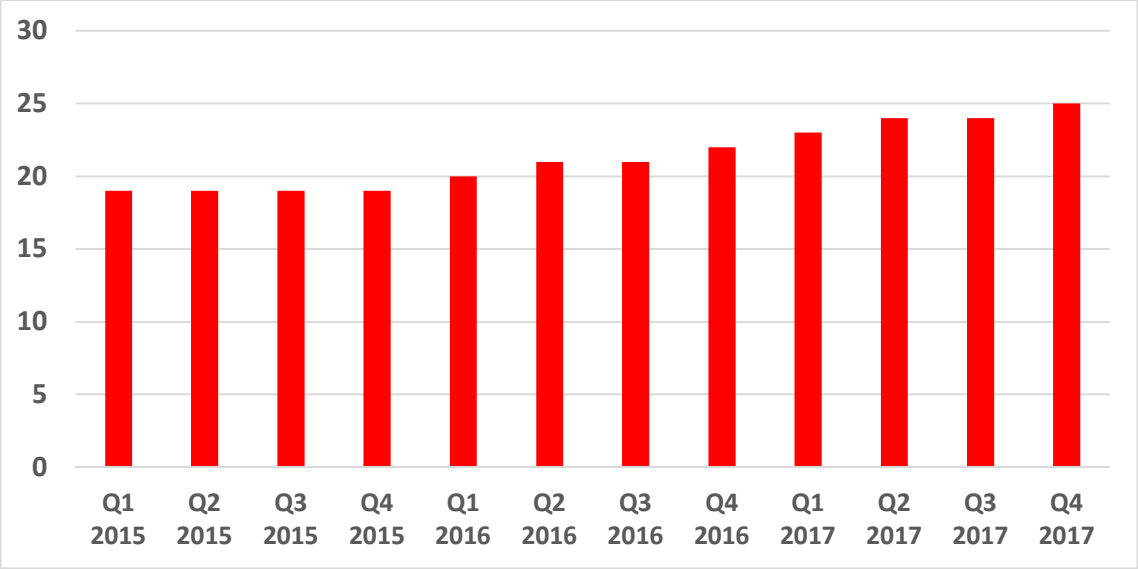
Figure 2 Price per CD album in the United States 2008–2019



Source: RIAA (2020).

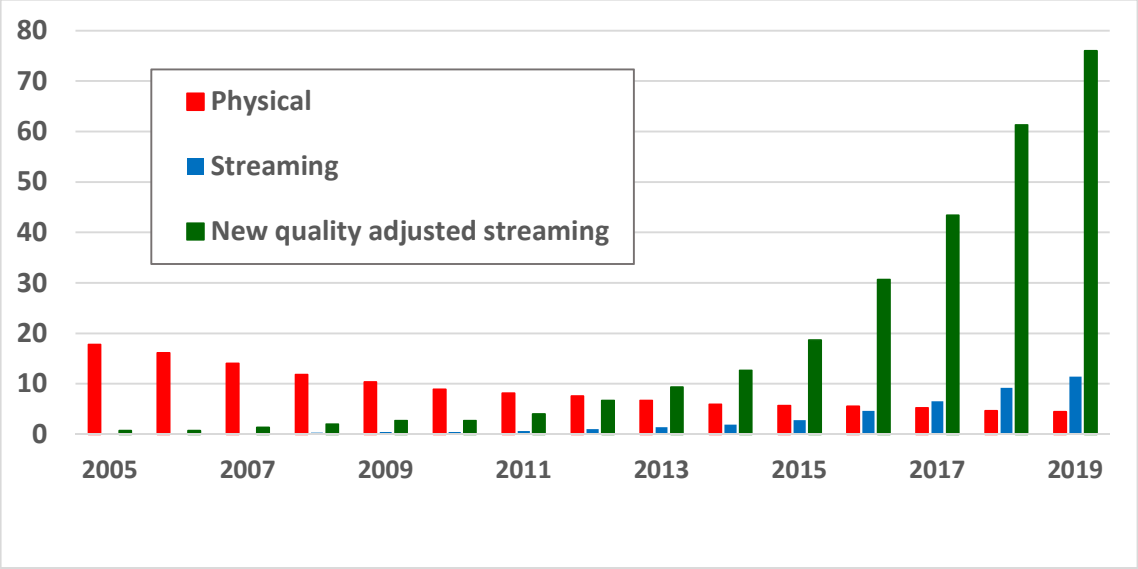
Note: Price per CD album was calculated as the total revenues from CD albums divided by the total sales volume of CD albums.

Figure 3 Content hours per Spotify monthly average user (MAU)



Source: Spotify (2020b).

Figure 4 Global revenues in physical, streaming and quality adjusted streaming (US$ billions)



Source: Own calculations based on IFPI (2020).