Exposure Doesn't Pay the Bills

Aaron Graybill

14 November 2021

Literature Review

In this paper I will examine how an artist's production decisions and reputation are influenced by algorithmically uncertain audience size in the digital streaming economy. This topic is tethered to multiple lines of research each of which informs the construction of the model below. I will now discuss this topic's connection to the branding literature, the superstar literature, and the budding streaming literature.

Branding Literature

An artist concerned with growing their audience faces many similar incentives to a new firm trying to develop a brand. One can view a firm's brand as a set of signals about the quality of the firm's product. Branding becomes an important consideration when consumers do not have ex ante knowledge about the quality of the product they are purchasing. As such, consumers rely on the signals presented by a firm's brand, to inform their consumption decisions. The branding literature begins with the signalling literature pioneered in Spence (1973). In this paper, Spence finds that observable characteristics, both impactful and superficial, can have substantial effects on the hiring decisions of a potential employer. More directly, Klein & Leffler (1981) presents a simple model that identifies key characteristics that a market must possess in order for firms to invest in branding and selling a high quality product. Central to their model is consumer reputation formation. They propose a rather draconian baseline in which consumers' trust can never be regained upon a firm choosing to deceive them. A key finding is that with sufficient differentiation between high and low quality products, some firms may choose to invest in their reputation into perpetuity. Shapiro (1983) generalizes the model proposed by Klein and Leffler to a case where reputation can exist on a continuum of values and can evolve in a less austere manner to its predecessor. The authors describe the characteristics of a market equilibrium and find that again so long as there is sufficient price difference between low and high quality products, producers may choose to invest in building a brand.

The application of the branding literature to the problem posed in this paper lies in the way that streaming platforms' alogrithms reveal information and content to consumers. Generally streaming platforms allow users to choose their own content, but many platforms like Youtube, Spotify, and Apple Music also

provide content algorithmically based on the consumer's revealed preferences. When this content is previously unknown to the consumer, we can view the platform as relying on its branding to present desirable content to the user. In this way, we incorporate the branding literature presented above into the model presented below.

Superstar Literature

The use of the word superstar in an economic context was popularized in Rosen (1981) in his seminal exploration of why art markets have tremendously skewed income distributions even when the underlying talent pool may be much less skewed. In his paper, he presents a model where consumers can perfectly observe talent ex ante and price an artist's work accordingly. In this framework, Rosen finds that small increases in underlying artistic talent can have disproportionately large increases in resultant revenue in market equilibrium. Art market concentration is further explored in MacDonald (1988) which takes an alternate modeling approach and introduces uncertainty in the talent of an artist. This uncertainty is market-wide where neither the consumer nor the artist knows their talent until they have performed. This model also intersects with the branding literature because it explores how an artist's perceived talent evolves over multiple periods based on the quality of their performance.

The superstar literature is important to this analysis because it emphasizes the artist's production decisions and how they affect market revenues. As I will discuss later, much of the recent literature on streaming platforms has focused on the streaming platform and the end consumers, so the superstar literature gives a more nuanced view of how artistic production can be modeled and optimized.

Streaming Literature

The third and most closely related field of study is the streaming literature. The advent of streaming has garnered considerable attention from both theoretical and empirical angles. Streaming platforms can take many forms, but they can be broadly characterized as an internet-based two-sided media marketplace. The streaming platform is in the middle of this two sided marketplace. The first side of the marketplace is the streaming platform accepting media from content creators. The other side of this marketplace is the streaming service delivering this content to consumers. Usually money is changed hands on both sides of this market. Researchers have focused on various aspects of the streaming economy as it has evolved. I will begin by giving an overview of some of the key topics addressed by theoretical papers. After discussing theory, I will mention some relevant empirical studies that analyze how digitization has affected the distribution of artist popularity—a central question of the research at hand.

Early papers in the streaming literature investigate how streaming may curbing pirating, the (usually free) illegal download of unlicensed music, like on Napster. One such early paper is Thomes (2013) which takes the perspective of the music streaming platform when deciding how to price its paid subscription service

relative to its free-with-ads alternative. Thomes endogenizes the demand for advertising by advertisers which governs the streaming platform's revenue from its free-with-ads service. The author finds that if both a free and paid option exist, a streaming platform's profit is maximized when consumers are very permitting of advertising. This result is a product of high ad tolerance leading to a maximal advertising market size. In this case streamers are able to generate revenue from high paying subscribers and high paying advertisers. The author further shows that if there is a free piracy alternative that carries some risk of punishment, the streaming platform strives to make their free-with-ads alternative as desirable as possible which crowds out piracy from the market due to its inherent risk. The first claim, that profit is maximized when ad tolerance is high, seems not to have held up empirically as Spotify claimed that 93% of its 2020 quarter two revenue comes from premium subscribers.[1] This paper provides a valuable description of the incentives of the streaming platform when designing its features, and pricing but the analysis below will take these features as given to focus on the artist's problem.

Another more recent paper that takes the streaming platform's perspective is Bender et al. (2021). This paper analyzes how competition between permanent digital MP3 sales and streaming platforms. It analyzes consumer demand in this case, and how the platform should optimally set its royalty to attract artists to the platform. The authors find that it is the most popular artists that might choose to hold out and sell their work only via permanent download, a result seen anecdotally in the Beatles who kept their music off of streaming services for a famously long time.[2]

The final theoretical model that I will touch on most closely resembles the topic that this paper analyzes. Hiller & Walter (2017) incorporates elements from both Thomes (2013) and Bender et al. (2021) by modelling an economy with digital purchases as well as free and paid subscriptions to a streaming service. The authors investigate the artist's decision to produce one high-quality piece of art versus multiple comparatively lower-quality pieces. The authors find that the streaming economy fosters an environment in which profit-maximizing artists focus on generating high-quality singles instead of lower-quality albums. The quality quantity tradeoff will be examined in the analysis below but with the key difference of uncertain audience size. Instead of being a simple tradeoff between high-volume, low-price or vice versa, the proceeding analysis acknowledges the fact that releasing more content may increase an artist's chance of reaching a larger audience. This uncertainty drives the analysis below.

Another driving question of this research pertains to the debate of whether or not streaming platforms have created a "long tail" of products and who is benefiting from the long tail. I will now summarize some empirical work that analyzes this topic.

The long tail term was popularized in Anderson (2006). The principle of the long tail is that digitization of commerce allows consumer's access to a wider variety of products, far more than a brick and mortar store could every stock. The greater variety of products allows consumers to pinpoint the product that best

---

[1]Calculated from Spotify's published shareholder letter, available here: https://s22.q4cdn.com/540910603/files/doc_financials/2020/q2/Shareholder-Letter-Q2-2020_FINAL.pdf

[2]A discussion of the Beatles decision to stream their music is available here: https://www.fastcompany.com/3054965/its-official-the-beatles-are-coming-to-spotify-apple-music-and-more

suits their preferences which results in many products having a small number consumers. As such the distribution of consumers per product should have much longer tail than pre-digitization. The streaming economy is an excellent example of where this long tail might exist—Spotify can stock hundreds of times more songs into a server than a vinyl record store could ever stock in-store. The long tail hypothesis would suggest a diffusion of revenues across many artists. However, Rosen (1981), finds that revenue should be concentrated among only a few artists. This disagreement suggests a fundamental shift in the way we should model the modern art market.

That being said, opinions are mixed as to whether or not the long tail hypothesis holds empirically. Elberse (2008) initially pushed back against the idea of a long tail. She cites data from Quickflix (a now-defunct Australian pay-per-view movie streaming platform) which showed that a small number of DVDs comprised a large portion of sales. However the analysis in this paper will model a different type of streaming platform, one in which customers have unlimited access to content either for free or for a monthly subscription fee.

A more recent alternate perspective on the long tail, Aguiar & Waldfogel (2018), posits that the benefits of the long tail may come from producers and not consumers. Aguiar and Waldfogel argue that digitization substantially lowers the entry cost of new firms which marries well with the uncertainty about whether or not a firm will be successful. Lower entry costs allow firms with lower expected profit into the market. When their true talent is realized, firms may have profit well above their expectation. They test this hypothesis using digital music sales to estimate demand and use this to estimate consumer surplus. They compare their findings to the the hypothetical in which firm performance perfectly predictable and robustly show that variety is much more important in the uncertain case. They argue that since we live in an uncertain world, the value of variety provides evidence that there exists a long tail of producers.

This Paper's Contribution to the Literature

The preceding discussion reveals a few key unexplored area that this paper will investigate. One, previous literature has focused on behavior of the streaming platform and the end-user. This analysis contributes to the comparatively understudied role of the artist in the streaming economy. Two, this paper will endogenize audience development, a similarity to the branding and superstar literature not yet applied to the streaming literature. Third, this paper will contribute the debate of the long tail in the streaming literature by exploring the equilibrium distribution of artist talent. Finally, This paper will also contribute to the presently-unexplored role of unpredictable algorithms on streaming platforms in shaping an artist's career and optimal behavior.

References

Aguiar, L., & Waldfogel, J. (2018). Quality Predictability and the Welfare Benefits from New Products: Evidence from the Digitization of Recorded Music. *Journal of Political Economy, 126*(2), 492–524. https://doi.org/10.1086/696229

Anderson, C. (2006). *The long tail: Why the future of business is selling less of more* (1st ed). Hyperion.

Bender, M., Gal-Or, E., & Geylani, T. (2021). Attracting artists to music streaming platforms. *European Journal of Operational Research, 290*(3), 1083–1097. https://doi.org/10.1016/j.ejor.2020.08.049

Elberse, A. (2008). Should You Invest in the Long Tail? *Harvard Business Review*, 11.

Hiller, R. S., & Walter, J. M. (2017). The Rise of Streaming Music and Implications for Music Production. *Review of Network Economics, 16*(4), 351–385. https://doi.org/10.1515/rne-2017-0064

Klein, B., & Leffler, K. (1981). The Role of Market Forces in Assuring Contractual Performance. *The Journal of Political Economy.*

MacDonald, G. M. (1988). The Economics of Rising Stars. *The American Economic Review, 78*(1), 155–166.

Rosen, S. (1981). The Economics of Superstars. *The American Economic Review, 71*(5), 845–858.

Shapiro, C. (1983). Premiums for High Quality Products as Returns to Reputations. *The Quarterly Journal of Economics, 98*(4), 659–679. https://doi.org/10.2307/1881782

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics, 87*(3), 355–374. https://doi.org/10.2307/1882010

Thomes, T. P. (2013). An economic analysis of online streaming music services. *Information Economics and Policy, 25*(2), 81–91. https://doi.org/10.1016/j.infoecopol.2013.04.001