1. Introduction
The “long tail” theory was celebrated by BusinessWeek as the biggest idea of the year 2004, soon after the book “The Long Tail” by Chris Anderson was published. The book argues that our culture and economy are shifting away from a relatively small number of “hit” products towards a huge number of niche products. In other words, demand will become less concentrated and the tail of the sales rank distribution will become longer and fatter over time.

Chris Anderson pointed out in his book that a significant portion of Amazon.com’s sales comes from obscure books that are not available in brick-and-mortar stores. The long tail theory suggests that there will be more marketing resources to be allocated to niche offerings than to “hit” products, especially in the digitized world; that practice is referred to as the niche strategy. For example, in today’s music business, producers and artists may spend less time on each song or track. Ramon Ibanga, Jr. (aka Illmind), a hip hop producer, in a recent interview with NPR, said it may take him “about 20 minutes” to create one track. He further said “some days I’ll spend eight hours, and I’ll create maybe 10 tracks, 10 lottery tickets. [...] because every beat, every piece of music that I make has potential to get placed somewhere”.

However, some other cultural industries may tell a different story. Elberse (2008) argued that the importance of best sellers in the home-video industry is not diminishing over time. The concentration of the most popular titles is growing, a phenomenon known as the blockbuster phenomenon. This phenomenon suggests that firms may use a different strategy. Evers (2013) reported that movie studios have been shifting their resources towards the big-budget movies. Wingfield (2013) reported that every publicly traded publisher of video games talked about a “bigger, better, fewer” strategy. That is what is known as a blockbuster strategy—focusing the limited production and marketing resources on a small number of likely best-selling products. This strategy is based on the notation that the “hit” product still plays an important role in today’s world.
In this paper, we provide a theory that unifies the long tail and blockbuster (i.e., big head) phenomena. We find one key factor in these phenomena to be the network effect. Intuitively, the blockbuster phenomenon can have a lot to do with the (positive) network effect. For one thing, people who are likely to buy the popular product because of the network effect will make the product even more popular. For another thing, producers, like studios, are willing to use more resources, e.g., for advertising and production, to produce a product that may be a hit, or blockbuster, due to the network effect. However, no one can accurately predict what will become a blockbuster. A high-budget, mainstream product—designed to cater to a broad range of tastes does not necessarily turn out to be a blockbuster. On the other hand, a low-budget, niche product—designed to cater to only a small group of customers may be a surprising blockbuster, if it becomes popular early enough due to the market uncertainty and a strong network effect. This may attract more and more niche products to enter the market although very few of them can gain a significant market share. In this sense, the (positive) network effect seemingly can also contribute to the phenomenon of the long tail.

In this paper, we unify the blockbuster and long tail phenomena to some extent by means of the network effect. In particular, we analyze a three-stage game where first a large number of potential firms make an entry decision, then those who are in the market decide on the investment in its product, and lastly customers arrive sequentially to make purchase decisions that are based on product quality and historic sales subject to the positive network effect. We solve this Stackelberg game backwards. In the third stage, sequentially arriving customers, upon arrival, make a purchase choice from the set of products available in the market, according to a customer discrete choice model. We assume each firm sells with a single product. The attraction value for each product depends on two attributes: the intrinsic quality\(^1\) of the product determined by the firm before it released the product, and the current market share of the product. In this paper, a product that is of high quality because of high-budget production has a high probability of being bought by a randomly chosen customer in the absence of network effect. In this sense, a high-quality product can be understood as a mainstream product with a high budget investment, and a low-quality product as a niche product with a low budget investment. Moreover, the network benefit from consuming a product is determined by the current (not the anticipated future) market share of the product and a network effect parameter (denoted by \(\beta\) in our model). In the base model, the

\(^1\)The term “quality” in economics and marketing is often referred to as a measure for vertically differentiating a group of products in the sense that a high-quality product generates higher surplus than a low-quality product for all customers. We abuse the term slightly and interpret “quality” as the intrinsic appeal of a product.
network effect parameter $\beta$ is assumed to be the same for all products in the industry. We adopt the special type of stochastic processes called \textit{nonlinear Pólya urn process} to estimate the random, long-term market share for each product. Before the (random) sales process starts, in the first stage potential competitive firms decide on entering the market with an entry cost, and in the second stage, all firms entering the market simultaneously decide on the quality of their product, in anticipation of future competitive market dynamics.

Using this analytical model, we show that an increasing network effect always contributes to the sales concentration on a small number of products regardless of whether the prevailing network effect is weak or strong. This supports the blockbuster phenomenon. However, product variety in the market, as an outcome of firms’ ex ante competitive decisions, may expand or shrink as the network effect increases. When the network effect parameter is lower than a threshold, the increasing network effect would shift more sales towards the products with higher qualities, thus preventing more products from entering the market ex ante. When the network effect is higher than that threshold, the increasing network effect will easily cause the market to be concentrated on a few products; even some low-quality products may have a chance to become “hits.” Interestingly, in this case, the ex ante equilibrium product variety will be broader if the network effect becomes stronger, as more firms bet on their products becoming “hits.” That is, an increasing network effect not only intensifies the “sales concentration” but also leads to the “longer tail”. This result analytically confirms the long tail theory, noting that with more products available in the market, the extreme portion of the tail in the sales rank distribution (corresponding to the additionally ranked products) would become both longer and fatter.\footnote{As a result, together with more sales concentration in the head of the sales rank distribution at the same time, the products in the middle of the sales ranking may have a lower sales with a given potential market size.}

In our model, firms also make budget decisions for their products. With the same model, we show that an increasing network effect can intensify budget (quality) competition, i.e., more use of the blockbuster strategy, when the network effect parameter is lower than the same threshold mentioned above; but it can also alleviate budget (quality) competition, i.e., more use of the niche strategy, when the network effect parameter is above that threshold.

The main contribution of our analytical model lies in linking the big head, long tail phenomenon and blockbuster, niche strategy in an industry to the strength of the network effect in that industry. Hence, the strength of the network effect can be viewed as a key to understanding a specific cultural industry.