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Analysis of the Pricing Structure and Competition of Live streaming platforms

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Abstract

Live streaming platforms are beginning to play an increasingly important role in the audiovisual sector, this work was a good opportunity to make an economic analysis of it. In this work, I have analyzed the literature on the complexity of network goods to understand how they differ from normal goods, with a focus on the demand to join these platforms, the launching strategies and on the pricing structure. Finally, I have compared this literature with practice, by analyzing how live streaming platforms have developed, what their remuneration strategies are and an analysis of the state of competition between these platforms.

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1 Introduction

Over the last few decades, the rapid advent of technology has profoundly reshaped the way people interact, consume content, and interact with media. Among the areas that have been revolutionized by this digital transformation, the live entertainment and content industry stands out for its dizzying expansion. Live streaming platforms such as Twitch, YouTube Gaming and Facebook Gaming have emerged as major players in this new era, creating virtual communities committed to sharing content in real time. These platforms allow individuals (streamers) to broadcast live content free of charge to a community (viewers).

I found it interesting to carry out an economic analysis of these live streaming platforms. Although there is a growing on economic theory on platforms, there is little research specifically on live streaming platforms, which have unique features. I looked more specifically at the pricing structure and the state of competition on the market.

I wanted to understand what obstacles the platforms had to face, and how they managed a demand that relies on the participation of other users. In addition, these platforms have set up several remuneration systems for streamers, it will be interesting to analyze the possible strategies in the course of this work. Finally, these growing platforms are making new platforms want to join this sector, but as we shall see, it is complicated to compete with platforms that already have large user communities.

This work will be carried out as follows, I will start by defining live streaming platforms. This is followed by a literature review focusing on demand in the context of network effects, platform launch strategies and pricing schemes. Our analysis then turns to the practical application of these theories, exploring how they guide platform launches, influence pricing choices and reflect the competitive state of the industry. This exploration will provide a comprehensive view of the interactions between theory and reality in the live streaming platform ecosystem.

2 Context

For several years the market for live streaming platforms has been growing, especially since the pandemic crisis of covid-19. These platforms provide an interactive space where content creators, such as streamers, gamers, artists, and influencers, can share their videos and performances with a live online audience. Viewers, meanwhile, can interact in real time by leaving comments, asking questions, or expressing their appreciation through likes and reactions via the chat on the side of the live video. Live streaming platforms encompass a variety of content such as gaming sessions, live events, tutorials, discussions, concerts and much more. They foster a direct connection between creators and their audience, creating dynamic and engaged virtual communities. Viewers can subscribe for free to all the streamer channels that exist, or they can pay for a subscription that gives them access to benefits and the possibility to skip video advertising.

Different types of content can be broadcast on these platforms, but it is mainly video games. On the most famous platform Twitch, 81.7% of the content are dedicated to it, the rest is composed of content such as: just chatting, music, sports, art, talk show, crypto content... Just chatting is an important part of content broadcasting nearly 3.2B hours watched in 2022 on the 22.8B of total hours watched on the twitch platform. Here is the list of the most broadcast games in 2022 on the 3 biggest platforms Twitch, Youtube Live & Facebook Gaming:

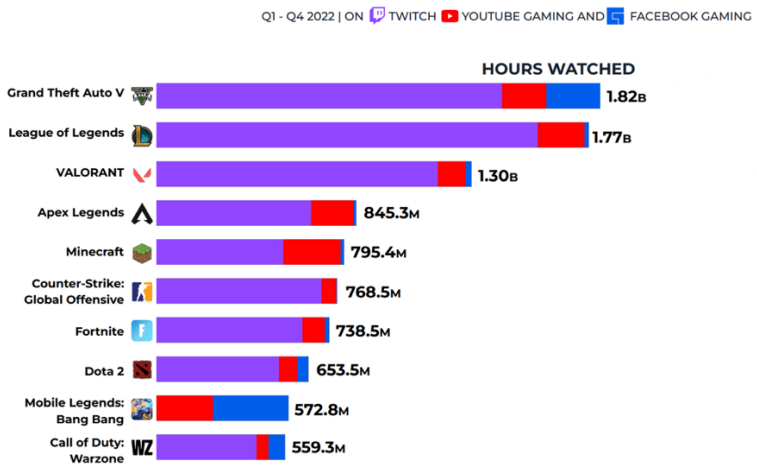

Figure 1 : List of most popular video games broadcasted in 2022: [1] Source: Stream Hatchet (2022)

The first live streaming platform to tackle this market was Twitch in 2011, broadcasting eSports competitions on Halo, Starcraft, League of Legends... These E-sport competitions are organized events where professional video game players compete against each other in a variety of video games. These competitions can range from small local tournaments to international events with huge prizes. To give you an idea, in 2012 for the second season of the League of legends world championship, the cash prize to be shared between all participating teams was 2.000.000$ and 50% went to the winning team[1].

So, in 2011, It was the most efficient way for fans to follow their favorite teams in various international tournaments. Later, the content has diversified, and more and more streamers started to broadcast different games, not only competitions of e-sport, and other types of non-gaming content. They quickly gained a monopoly on this market and attracted new competitors, including Youtube Live, Facebook Gaming, Kick...

In 2014, Amazon bought Twitch for $970 million after a fight with Google, which was also a candidate for the acquisition. According to the CEO, Jeff Bezos: *"Broadcasting and watching video games is a global phenomenon, and Twitch has built a platform that brings together tens of millions of people who watch billions of minutes of games every month. We hope to learn from them and help them create new services for the gaming community faster." (*Trends Tendances 2022)

This acquisition makes sense for Amazon which has been trying for several years to develop its offers beyond e-commerce; movie/series streaming platform, music streaming, electronic device (e.g., Fire smartphone or Kindle reader), Cloud service... Amazon has also managed to create a general ecosystem thanks to its "Amazon Prime" subscription which gives access to its streaming services, fast delivery but also gives access to Amazon Gaming. The latter offers free video games, advantages in some video games (credits, character skins...) but also the possibility to subscribe to any streamer every month.

- [1] Wiki, C. T. L. |. L. O. L. E. (n.d.). 2022 Season World Championship. Leaguepedia | League of Legends Esports Wiki. https://lol.fandom.com/wiki/2022_Season_World_Championship

As mentioned above, the market expanded during the covid-19 pandemic crisis. Following the closure of cinemas, theatres, restaurants... People turned to online entertainment platforms like Netflix, Amazon Prime, Disney+, Twitch, Youtube Live... Moreover, during the lock down period, people found themselves at home without many entertaining activities to do, the online platforms were able to meet this huge demand. Moreover, people didn't have many social links anymore and the live streaming platforms were a good solution to establish links between streamers and viewers thanks to the chat available on these platforms where agents can discuss, give their opinion, answer polls... Here is below the figure representing the evolution of hours watched on the 3 biggest platforms:

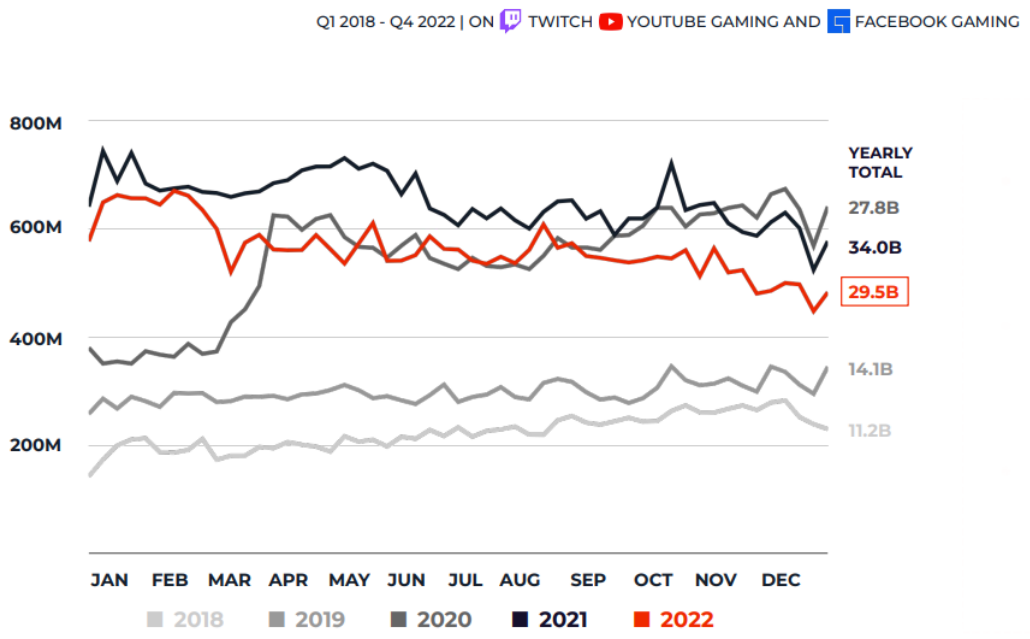

Figure 2: Evolution of hours Watched on Live Streaming Platform. Source: Stream Hatchet (2022)

We can observe the peak during the months March and April during the year of 2020 which represents the first lockdown period. Moreover, we observe that in 2022 the number of hours watched has decreased compared to the covid years but is still higher than before 2020. This could be a sign that viewers are returning to "normal" life, people have less time to devote to online entertainment as outdoor activities have reopened and they have returned to the office with less telecommuting.

3 Review of literature

For this section we will analyze the literature of platform economy. We begin by defining network effects, which are the distinguishing factor between normal and network-based goods. Next, we will examine the nature of demand in networks, and the level of interdependence that exists between all users. We will also address the issue of user demand for platforms when other competing platforms are present in the market. Finally, we explore the pricing instruments in place.

3.1 Network effect[2]

First, let's start by defining what a platform is in economic terms: "An entity that brings together economic agents and actively manages network effects between them" (Belleflamme & Peitz, 2021).

A platform only acts as a connector between two or more users. A user's utility is not derived directly from the platform, but rather from interaction with other users. This is what we call **Network Effect**: *"the impact of an additional user of a service or an additional participant to some interaction, has on the value that other users or participants attach to this service"* (Belleflamme & Peitz, 2021).

On the one hand, these network effects can be provided by several users belonging to the same group, known as ***Within network effect***: An additional user belonging to this group increases the utility derived by a user of this platform. For example, the more users there are belonging to a telephone communication network, the greater the utility of the users. On the other hand, when users belong to a certain group and derive their utility from the presence of one or more other groups on a platform, this is called a ***cross-group network effect***. For example, a platform like Amazon.com connects two types of users, buyers and sellers. The larger the group of sellers, the greater the utility of the buyers and vice versa. When these

[2] Belleflamme, P., & Peitz, M. (2021). The Economics of Platforms: Concepts and Strategy. Cambridge: Cambridge University Press. pp10-40

within and cross-group effects are positive, they are called respectively ***Attraction Loops*** and ***Attraction Spiral***.

Thanks to these network effects, platforms base their strategies on how they could create economic value, which network effect the platform manages **(Value Creation).** Then they must monetize these network effects (**Value Capture).** The examples below represent the different strategies used by various platforms.

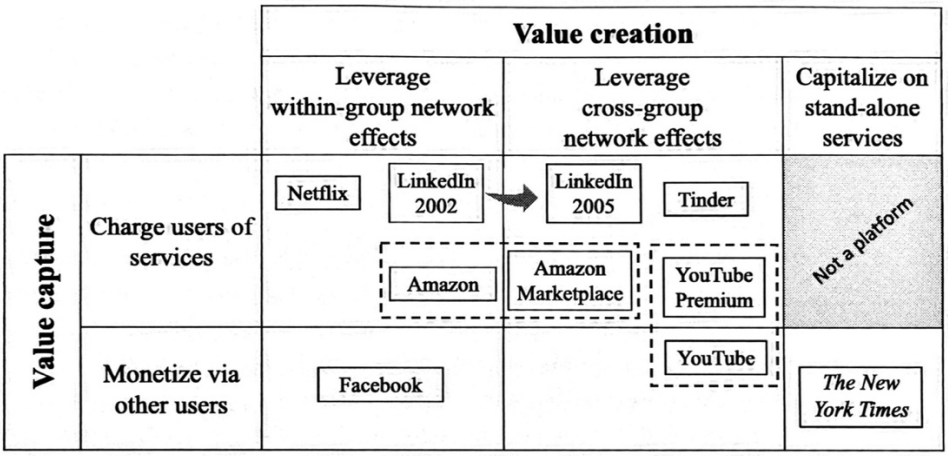

Figure 3: Examples of Value Capture and Creation Strategies. Source: (Belleflamme, P., & Peitz, M. 2021)

For example, Netflix, which buys the rights to films and series or produces them itself, charges its subscribers, thanks to its recommendation service, for within-group network effects. The more users there are on Facebook, the greater the demand to join (within-group network effects) and they don't charge their users but capture the value they bring through advertising.

As far as our streaming platforms are concerned, they would be like the YouTube example. It's a two-sided platform with streamers on one side and viewers on the other, and each exerts a network benefit on the other. In addition, the platform captures the value it creates in two ways: on the one hand it takes a commission on viewers' paid subscriptions (user are charged) and on the other it charges marketers so that they can advertise to viewers with a free subscription.

3.2 Network good Demand[3]

3.2.1 Demand for Network Goods

As we have seen in the previous point, it is important to highlight the impacts of network effects on platforms, an additional user on the platform makes it more attractive via loops and/or spiral attractions. So, unlike "traditional" goods, the demand for Network goods depends on the price to access them ***and*** on the network effects. In this section, we will first analyze requests where two users have the choice of participating or not in a platform (4.2.1.1). Then, in a second step, we'll add complexity by integrating a continuum of users (4.2.1.2). Finally, we will analyze the model when users decide whether to join the platform sequentially (4.2.1.3).

It is interesting to analyze the demand for network goods in the context of streaming platforms, given the interdependence between streamers and viewers when deciding whether to join the platform.

3.2.1.1 Demand for Network Good with two users

Let us denote two individuals: Xena and Yuri, they are both interested in buying a Network good, sold at a price or fee *A*. They have respectively an interest $r_x > r_y$ which represents their intrinsic valuation of the good (Stand-alone benefit). Additionally, we are in presence of good with positive network effect, that we denote $\beta > 0$, the latter is conditional to the participation of the other user. Then we obtain the following matrix:

		Yuri	
		Buy	**Don't buy**
Xena	**Buy**	$r_x + \beta - A, r_y + \beta - A$	$r_x - A, 0$
	Don't buy	$0, r_y - A$	$0, 0$

Figure 4: Adoption of a network good by two users Source: (Belleflamme, P., & Peitz, M. 2021)

To find the Nash equilibrium, the situation where no player can improve their position by changing their strategy, we realize that it is important to know whether the network effect β

[3] Belleflamme, P., & Peitz, M. (2021). The Economics of Platforms: Concepts and Strategy. Cambridge: Cambridge University Press. pp77-107

is relatively large compared to the difference in valuation of individuals ($r_x - r_y$). We understand that when the network benefit is weak $\beta < r_x - r_y$, the equilibrium is different than a strong network benefit $\beta > r_x - r_y$. Below are the possible matrices in the presence of weak and strong effect where N(A) represents the number of participants as a function of the Access Fee.

$$\text{If } \beta < r_x - r_y, \quad N(A) = \begin{cases} 0 & \text{if } A \geq r_x, \\ 1 & \text{if } r_y + \beta \leq A \leq r_x, \\ 2 & \text{if } A \leq r_y + \beta. \end{cases}$$

$$\text{If } \beta > r_x - r_y, \quad N(A) = \begin{cases} 0 & \text{if } A \geq r_y + \beta, \\ 0 \text{ or } 2 & \text{if } r_x \leq A \leq r_y + \beta, \\ 2 & \text{if } A \leq r_x. \end{cases}$$

Figure 5: Nash Equilibria for stong and weak Network Effect Source: (Belleflamme, P., & Peitz, M. 2021)

Firstly, when we are in presence of **weak network effect**, the platform could set a relative high price and attract only Xena, or it could set a lower price to attract both. In the case of **strong network effect**, there is no equilibrium where the platform attracts only one user, the platform is thus setting the highest fee that attracts the two users.

Secondly, on the right of Figure 5, when the fee is included between r_x and $r_y + \beta$, there is two equilibria (both buy, or both don't), this is due to the **self-fulfilling prophecy**: *"if both users believe that no one will buy, they find the fee too high and, thus they optimally decide not to buy, thereby verifying their initial belief; conservely if they both believe that everyone will buy, they find the fee low enough, they both buy" (Belleflamme & Peitz, 2022).*

Since the choices are made simultaneously by the agents, it is possible that they fail to coordinate on their belief and do not buy the good. While the fee is the same in both situations.

3.2.1.2 Demand for Network good with Continuum of users

Let's do the same exercise again but with several participants who must decide whether to join a network or not, they have heterogeneous valuation of network benefit $\beta \in [0,1]$ but they all have the same valuation of stand-alone benefit *r.* Additionally, users base their choice on

the expected network size n^e and we assume that this expectation is accurate, the actual network size *n* matches the expected n^e, we call this the **Fulfilled-Expectations Equilibrium (FEE).** The cost fee to join the platform is *A.*

Users decide to join the network if their utility is $r + \beta n^e - A \geq 0$. On one hand, **no user joins the network** if they believe that the expected participant level is null $n^e = 0$ and that the stand-alone benefit is lower or equal to the fee $r \leq A$. On the other hand, if the expected network level is positive $n^e > 0$, we find the indifferent user between join or not would be $\beta_0 = \frac{A-r}{n^e}$. So, to have a Fulfilled-Expectations Equilibrium (FEE) and **all users join the network**, we need to have $\beta_0 = 0$ with $n^e = 1$, this is so if $A \leq r$, the fee is lower than the stand-alone benefit.

Finally, **only a part of the mass of users joins the network** when $A > r \; and \; n^e > A - r$. we find the network size by resolving the solution where $n = n^e = 1 - \beta_0$. We can then find the formula for the inverse demand for network participation by replacing the previous function into the indifferent user formula $\beta_0 = \frac{A-r}{n^e}$. Such that $A = r + n(1 - n)$, which can be represented as follows:

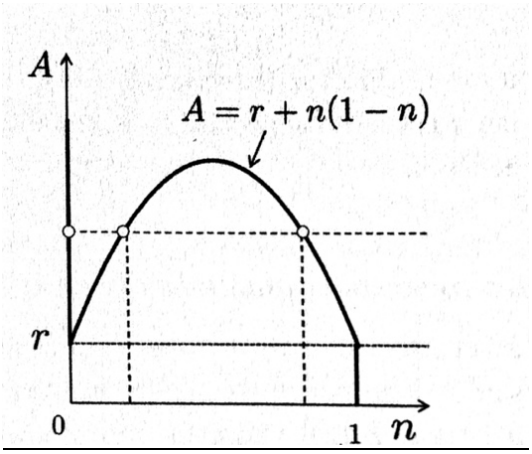

Figure 6: Multiple Equilibria Function Source: (Belleflamme, P., & Peitz, M. 2021)

We obtain the demand curve of Rohlfs (1974) where the maximum fee is reached in n = $\frac{1}{2}$, with $A = \frac{1}{4}$. Two phenomena appear; the inverse demand first increase $\left(n < \frac{1}{2}\right)$ and then decrease $\left(n > \frac{1}{2}\right)$ with the network size. Two conflicting factors come into play: the **Law of Demand**, which suggests that an increase in network size will have an adverse impact on the

fee, as it needs to decrease to attract more users; and **the Network Effect**, which implies that an increase in network size will lead to a rise in users' willingness to pay, meaning that higher fees may be compatible with a larger network. The demand curve may exhibit an upward-sloping segment, where higher demand levels result in higher fees. This occurs when the demand-expanding effects of network effects outweigh the negative impact of the Law of Demand. Therefore, it is possible for up to multiple levels of demand at the same fee level (similarly than in the previous with strong network benefit), with one of them being the zero-demand level. Thus, we are faced with the possibility of **multiple equilibria: null, small, and large**, which poses a challenge to accurately predicting the exact behavior of the market.

3.2.1.3 Dynamic Demand for Network Good

Unlike the previous simultaneous choice, in this more realistic model, future participants observe the level of users and potential benefits of network effects and then decide whether to join or not the platform (Sequential Game). An Assumption to bring to this model is that agents are *"myopic",* in the sense that they base their decisions on the current network level, but they fail to anticipate the effect of their decision in the future. Technically, in period *t* users observe the network size n_t which they use to evaluate their utility to join or not the network. Then, based on this evaluation, a fraction of users decides to join the network and generates a new network size n_{t+1}. Thereafter, the game is repeated in period *t+2* with users confirming or revising their decision in function of n_{t+1} . Finally, they reach a Fulfilled-Expectation Equilibrium (FEE) stable where myopic users produce a sequence of adoption.

Formally, we can determine the actual network size n comprised between 0 and 1, given an expected size n^e, as follows:

$$n(n^e) = \begin{cases} 0 & if\ n^e \leq A - r \\ 1 & if\ A \leq r \\ 1 - \dfrac{A - r}{n^e} & otherwise \end{cases}$$

As we saw, in the previous model, when the expectation is between 0 and 1, there are 3 levels of equilibrium: zero (n_n), small (n_s) and large (n_l) for a same access fee. Since we are now in

a sequential game and users no longer directly find the equilibrium level (FEE assumption), we must ask what happens when users estimate a level different from equilibria: n_n, n_s or n_l.

Supposing that at the end of the first period (*t=1*), with a fraction of users n_1 joining the network with $n_1 > A - r$. Then in the second period (*t=2*), users have the choice to stay or to revise their previous choice, for myopic individuals who envision the future network size to be the same as the present, $n^e = n_1$ which implies that $n_2 = n(n_1)$. We can then find the value n_2 from the figure above $n_2 = 1 - \frac{A-r}{n_1} > 0$. We are interested about the reaction of myopic users ($n_2 - n_1$). If it's positive (resp. negative), the network expands (resp. contracts) from first period to the second. We can demonstrate it as follows:

$$n_2 - n_1 = 1 - \frac{A-r}{n_1} - n_1 = \frac{1}{n_1}(n_1 - n_s)(n_l - n_1) \quad (1)$$

We notice that if the initial network size (n_1) falls within the range of n_s to n_l, we consider that the network is expanding; otherwise, it is contracting. Now we can question ourselves whether these 3 FEE equilibria are stable or not? An equilibrium is stable if when the myopic user mispredicts the network level, do the users converge back to the FEE or not? We can demonstrate this also in a more visual way with the graph below. Assuming $A > r$, the function represents $n(n^e)$, the actual network size against the shared expectation of the users. The three points along the 45°-degree line, correspond to the 3 FEE.

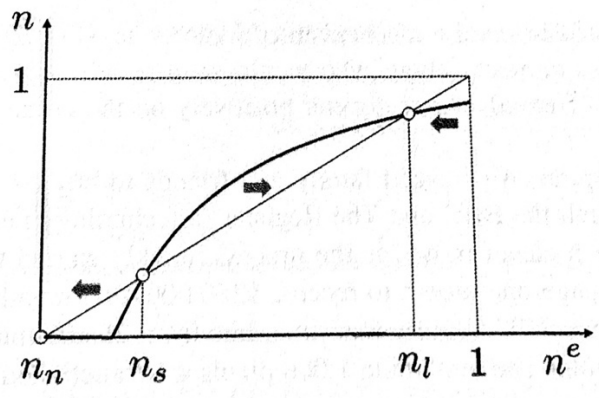

Figure 7: Multiple Equilibria Function in Sequential Gam. Source: (Belleflamme, P., & Peitz, M. 2021)

We can therefore determine that the level $\boldsymbol{n_s}$ **is not stable** according to the definition of stability quoted above because when users do not estimate the equilibrium correctly, they will go to either the zero level n_n or the large level n_l. This analysis shows us that there is a trap where the network is doomed to fail if it does not reach a sufficient level of users. Indeed, to reach a large network level, the users must expect to have a network level higher than the small equilibrium level n_s, the success depends on a critical mass of users which will have a snowball effect on the increase of users thereafter.

We can conclude that demand for access to a platform depends both on the access fee and on the expected number of users. In the case of our live streaming platforms, if potential new streamers or viewers anticipate that there will be few users on the platform, this will reduce demand for access to these platforms. Indeed, there is no stand-alone benefit if no one joins the platform, all the value comes from cross-network benefits.

3.2.2 Pricing for Network Goods in presence of monopolist or perfect competitive market

Previously, we externalized the pricing choice of platform, now let's endogenize it in our model. The main issue is to understand the interdependency choice in function of the user's behavior to join or not the platform depending to the fee.

First, in a similar way to the previous point, we consider that users represent a mass of one unit and that they are identified by the value they attach to the network benefit $\beta \in [0; 1]$. For ease of use, we consider that this model only serves connections between users, there is no stand-alone benefit *r*. We can write the utility of the users if they join the network as $\beta n^e - A$, where users must pay a Fee *A* and that n^e users are expected to join the network. Then, following the same method as for the previous point, we calculate the inverse demand of the participation in the network $A = n(1 - n)$. Secondly, we integrate the supply into the model, establishing that the cost for a platform to provide a service able to connect users is $f(n)$ with a positive marginal cost $f'(n) > 0$. We can now compare network sizes in monopoly or competitive market situations.

Under Monopoly market, the platform chooses the number *n* of users that maximize $n^2(1 - n) - f(n)$ which represents the profit of a platform where $n^2(1 - n)$ is the total

revenue and $f(n)$ the total cost to provide the service. Thus, we find the value n^m, which correspond to the intersection between the marginal revenue and marginal cost as $n^m(2-3n^m) = f'(n^m)$, because at this point the additional revenue from the sale of an additional unit is exactly equal to the additional production cost. While in perfect competition, n^c correspond to the interaction between the marginal cost function and the demand function. Thus, it implies that $n^c\ (1-\ n^c\ ) = f'(n^c)$. Remembering that the maximum fee of $A = n(1-n) = \frac{1}{4}$ is reached when $n = \frac{1}{2}$, we can observe graphically below that if $f'(1/2) \leq 1/4$, then marginal cost will cross $n^c\ (1-\ n^c\ )\ and\ n^m(2-3n^m)$ at a value *n* larger than 1/2 which implies that the number of users will be higher in perfect competitive market than monopoly , $n^c > n^m$. We can then assert that monopolists will generally decide to limit the number of accesses to the platform and charge a higher fee than if they were in a perfectly competitive market.

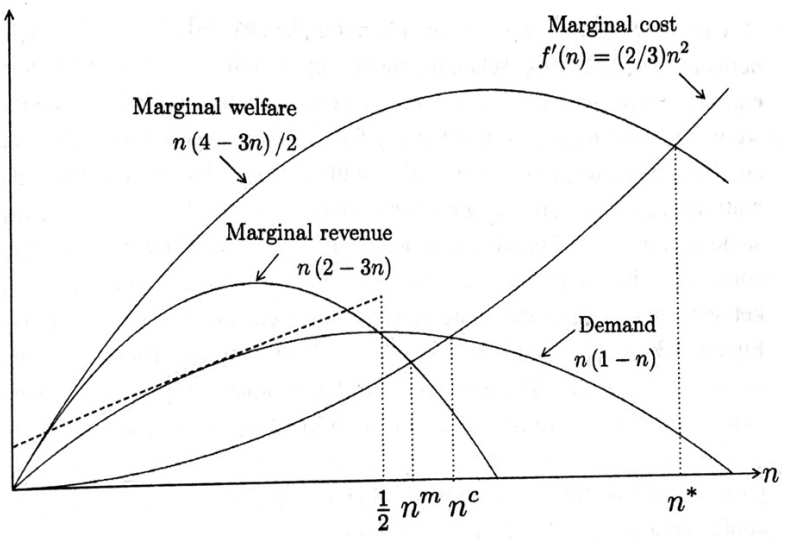

Figure 8: Pricing Function for Monopoly and Perfect Competitive Firm Source: (Belleflamme, P., & Peitz, M. 2021)

In practice, we can assume that monopoly firms choose an access fee rather than directly choosing the number of users. However, as we have shown in previous points, with the presence of network effect, the platform faces the problem of several possible equilibria. The platform must reach the largest network according to the selected access fee, otherwise, the risk is to reach a small unstable or null level.

3.2.3 Demand in presence of Alternative Network

So far, we have not considered the possibility of another network, however the multitude of network possibilities makes the choice to join or not a platform interdependent in comparison to other networks. If we consider a set of users currently present on a platform and contemplating the possibility of joining a different network. On the one hand, if a share of players joins the new platform it will reduce the value of the existing platform because network profits depend on the mass of users and therefore via the attraction loop it will make the new platform more attractive and larger. On the other hand, for the new platform it is more complicated to implement this attraction loop if no or few users have joined it yet while the existing platform has a well-established user base.

Hotelling Model for Network Good

Formally, we assume that users are located uniformly along a line with the two horizontally different platforms at the extremities, we suppose that the platforms are differentiated according to the stand-alone benefits that users' heterogeneity bring to these platforms. The new platform is on the extreme left with a value of 0 while on the extreme right the existing platform has a value of 1. The transport cost to switch corresponds to the disutility of joining a network that does not correspond to their preference, this cost increases linearly with the distance from their location to the position of the platform they choose. Joining a platform depends on three mains factors:

- **Access fee**
- **Intensity of network**
- **Quality of service**

If we assume the scenario where all users are interacting on an established network while a new platform enters the market with a higher quality of service. Users must take the choice between staying on the legacy network or pay a fee A_1 to join the new network (we suppose that users have already sunk the access fee of the legacy network). Thus, we obtain the following utility functions where users are located at $x \in \{0,1\}$:

$$U(x) = \begin{cases} r + q - \tau x + \beta_1 n_1^e - A_1 & \text{if joining the new platform} \\ r - \tau(1 - x) + \beta_2 n_2^e & \text{if staying on the legacy network} \\ 0 & \text{if not joining any platform} \end{cases}$$

Figure 9: Utility Function in presence of Alternative Network

Where $r > 0$ corresponds to the stand-alone benefit according to the ideal position of the user along the line. Then, $q \geq 0$ is the higher quality offered by the new platform related to the legacy network. Additionally, τ measures the coefficient of linear cost, thus the total cost for a user is τx if they join the platform 1 and $\tau(1 - x)$ if they choose the other platform. Finally, the network benefit is measured as $\beta_i n_i^e$ where β_i is the impact of network size and n_i^e is the expected size of network i. We find the indifferent user between the two platforms as:

$$x_0 = \frac{1}{2} + \frac{q + \beta_1 n_1^e - \beta_2 n_2^e - A_1}{2\tau} \quad (2)$$

Thanks to this, we can see that ceteris paribus the more people expect a platform to have a large network of users, the more they will have a large market share $\frac{\partial n_i}{\partial n_i^e} > 0$. Furthermore, the quality difference in this case is endogenous because the decision comes from the users themselves, however this quality difference depends also on the expected network size. As we can see, the greater the network effect β_i is, the more it creates attractiveness for the *i* platform. However, β_i must be sufficiently powerful relatively to the degree of differentiation τ between platforms.

If we are in presence of incompatible network, when users present on a network do not have the capacity to correspond with the members of another, the network benefits are specific to each platform. x_0 indicates the share of users who want to join platform 1 in relation to the chosen level A_1 and this access fee can lead to 3 levels of Fulfilled-Expectation Equilibria (FEE). First FEE all users join platform 1 if $A_1 \leq q + \beta_1 - \tau$, Second FEE all users join platform 2 if $A_1 \geq q - \beta_2 + \tau$. Third FEE to find the interior solution we use: $x_0 = n_1$ and $x_1 = 1 - n_1$. By replacing in equation (2), we obtain the following solution:

$$n_1 = \frac{q + \tau - \beta_2 - A_1}{2\tau - \beta_1 - \beta_2}$$

Through this demand equation, the sign of $(2\tau - \beta_1 - \beta_2)$ determines how the number of users n_1 reacts according to the choice of the fee chosen by platform 1. If the average of network effect exerts a weaker effect than horizontal differentiation $\frac{(\beta_1+\beta_2)}{2} < \tau$, the demand for access to the new platform is decreasing. While in the opposite situation $\frac{(\beta_1+\beta_2)}{2} > \tau$, the demand for access is increasing. It can lead to multiple levels of demands for a same access fee. We can deduce the following lesson: "*On the one hand, horizontal differentiation leads users to adopt the network that is a better fit to their tastes; on the other hand, network effects drive users to adopt the same network, as this allows them to enjoy higher network benefits. It follows that if horizontal differentiation weights more than the network effects, then there is a room for two networks; otherwise, it is possible that only one will be used" (Belleflamme & Peitz, 2021).*

3.3 Creation of a platform[4]

As we defined earlier in this work, a platform plays an infrastructure role that facilitates interactions between one or more groups of affiliated users. For several years now, we have been observing more and more platforms in different sectors: Uber in the transportation point-to-point sector, Airbnb and Booking in the accommodation market, Amazon in the online commerce... Whereas several years ago, companies operated more often vertically by hiring professionals to produce and/or distribute their services/goods (controlling mode), instead of being an intermediary between users as platforms (enabling mode). Some companies manage to combine the two methods, such as Amazon: they are both a retailer and a marketplace. Enabling mode is more adapted to sectors where it is necessary to adapt to changing market conditions (e.g., electronics) because professionals have easier access to market information and can adjust their strategies more efficiently than Amazon directly. While for sectors where markets are not very changeable (e.g., books), Amazon is more efficient at reselling their own inventory. Hagiu and Wright (2015) analyzed the data and found

[4] Belleflamme, P., & Peitz, M. (2021). The Economics of Platforms: Concepts and Strategy. Cambridge: Cambridge University Press. pp108-139

that Amazon was listed as a "seller" for 54% of new books while they were listed for only 1% of new electronics.

The enabling mode has several advantages such as motivation because professionals will be more willing to put effort into their activity to improve the quality of their services/goods because they are the ones who control the exchanges with the customers and who perceive the returns on their investments. Adaptation, the professionals have more facility to adapt to the demand because they have the information of the customers' behaviors contrary to the controlling mode. Concerning the Live streaming platforms, they act as an enabling mode between streamers and viewers, they provide access to live content.

After weighing the pros and cons of the platforms, firms choose the mode that suits their business the best. When choosing the enabling mode, platforms will face several obstacles to achieve the critical mass of users. As we have shown in section 4.2.1, it is necessary to reach a critical mass of users to get started, since in platforms where users base their choice to join the platform on the expectation of participation of other users (Self-Fulfilling Prophecy). Platforms want to overcome the zero-level users, they must attract a maximum of early users so that they can then attract other users.

In the previous cases we focused on single-sided platforms, however in the case of multi-sided platforms reaching the critical mass level is more complex since the participation in one platform depends on the participation of users from another group.

Chicken-and-egg problem

Therefore, in the presence of a multi-sided platform and the interdependency choice to join a network, the chicken-and-egg problem may appear: *"the fact that users in one group will not participate unless they expect users in the other group to participate, and vice versa"* (Belleflamme & Peitz, 2021).

3.3.1 Divide-and-Conquer Strategy

One strategy to solve this problem could be "divide-and-conquer" by managing access fees so that they are different for each group of users and even "subsidize" groups by setting access

fees below the cost of serving for one group and setting a high access fee for another group. The strategy consists in attracting a group of users ("divide") by placing access fee low, thanks to this the platform will avoid the zero equilibrium for this group. Knowing this, the other group of users ("conquer") will anticipate that all members of the other group will join the platform, this makes their willingness to pay higher and will be able to pay a higher access fee.

For simplicity, we assume that there are two groups of users: Buyers and Sellers, there are identical N_b buyers and N_s sellers (with N_b and $N_S \geq 2$) . n_b and n_s correspond to the buyers and sellers who decide to join the platform. Thus, their respective net surpluses are:

$$v_b = r_b + \beta_b n_s - A_b \; and \; v_s = r_s + \beta_s n_b - A_s \qquad (3)$$

Similarly, to the previous models, the model contains 3 elements:

- $\boldsymbol{r_b \; and \; r_s}$: Stand-alone benefits.
- $\boldsymbol{A_b \; and \; A_s}$: Different access fees relative to each group.
- $\boldsymbol{\beta_b n_s \; and \; \beta_s n_b}$: Network benefits β depending on the number of users n.

With the difference that the network benefit does not come from the members of his group but from the other group. In our example, the number of sellers on the platform depends positively on the number of buyers and vice versa.

In this model we assume 3 assumptions; First, non-participants in this platform have a constant outside option v_b^0 and v_s^0. Second, platforms do not face fixed costs when choosing this strategy, so access fees can be interpreted as the margin above (if positive) or below (if negative) the marginal cost. Third, we are in a two-stage game, the platform sets its access fees $\mathrm{A_s} \; and \; \mathrm{A_b}$, in a second step after observing these tariffs, N_b buyers and N_s sellers choose simultaneously whether to join the platform or not, since all buyers and all sellers are identical either the whole group of users joins the platform or none joins. We then obtain the following four equilibria:

$$(N_b, N_s) \text{ if } \begin{cases} A_b \le r_b - v_b^0 + \beta_b N_s \\ A_s \le r_s - v_s^0 + \beta_s N_b \end{cases} \quad (0,0) \text{ if } \begin{cases} A_b > r_b - v_b^0 \\ A_s > r_s - v_s^0 \end{cases}$$

$$(N_b, 0) \text{ if } \begin{cases} A_b \le r_b - v_b^0 \\ A_s > r_s - v_s^0 + \beta_s N_b \end{cases} \quad (0, N_s) \text{ if } \begin{cases} A_b > r_b - v_b^0 + \beta_b N_s \\ A_s \le r_s - v_s^0 \end{cases}$$

Figure 10: Multiple Equilibria of Divide-and-Conquer Strategy

As for the single-sided platform cases of the previous points, we arrive at several equilibria (N_b, N_s) and (0,0) for the same level of fee when $r_b - v_b^0 < A_b < r_b - v_b^0 + \beta_s N_b \; and \; r_s - v_s^0 < A_s < r_s - v_s^0 + \beta_s N_b$. For these same fee levels, the platform can attract both groups and neither group. To solve the chicken-and-egg problem, they can use the divide-and-conquer strategy, the platform must choose $A_b \le r_b - v_b^0 \; or \; A_s \le r_s - v_s^0$ to attract all members of one group, even in absence of interaction, to attract members of the other group in a second stage. The platform therefore subsidizes the participation of one group of users and then monetizes on the participation of the other group. Since the platform must choose a subsidy side and a money side, it would be beneficial to subsidize the group that has the biggest network benefit on the other group, because they are the ones who will attract the early users from the other group who have a higher willingness to pay.

3.3.2 Seeding Strategy

In the previous model, we based on two strong assumptions: users are homogeneous within each group and the choice to join the platform is made simultaneously. The seeding strategy exploits these assumptions to solve the chicken-and-egg problem, platforms could attract users in a sequential manner by first targeting users with the best ratios $\frac{positive \; cross-group \; network \; effect}{cost \; to \; attract \; them}$. These users generating large positive cross-group network effect are called "marquee" and can be effective to make the platform more attractive and generate positive expectations in both groups about the future of the platform. The return on investment on these marquees can be great however the cost to attract them can be as well, platforms that choose this strategy must have sufficiently large reserves at launch and investors must expect sufficient and secure returns on their investment.

3.3.3 Expansion strategy

So far, we have discussed the platforms at early stage, however in this point we will look at platforms that choose to diversify into segments they have not conquered yet. These platforms can take advantage of economies of scale on the demand side and/or the supply side to leverage the chicken-and-egg problem when they decide to extend their services to other markets.

On the supply side, it can be cheaper for an existing platform to offer their services in a new market because they have advantages that new companies who want to enter this market do not have such as: common software, data collector, user base… Similarly for the demand side where users of a platform can benefit from economies of scale and have a higher willingness to pay when they can access multiple services on the same platform, for instance they can find complementarities, lower transaction cost, trust…

3.4 Platform Pricing Instruments

In this section, we will explore the Freemium strategy of live streaming platforms, which differs from the "classic" economic theory of platforms. This is because we are not talking about a platform like Amazon, which acts as a service between buyers and sellers and then charges transaction fees or membership fees. We will then explain the revenue-sharing strategy between the platform and the streamers.

3.4.1 Freemium Strategy[5]

Several platforms are adopting a 'freemium' strategy, which consists of setting up two versions for users: a paid version that often allows advertising to be skipped, while the other free version is exposed to advertising. For instance, Spotify has adopted this strategy, indeed with a monthly/annual subscription you can listen to unlimited music without any advertising between tracks. This model is also widespread in the live streaming platform sector. On the one hand, viewers can subscribe for free to all the streamers' channels to access their content, but they will be subject to advertising. On the other hand, they can take out a paid subscription

[5] Belleflamme, P., & Peitz, M. (2021). The Economics of Platforms: Concepts and Strategy. Cambridge: Cambridge University Press. pp140-184

to avoid advertising. We will analyze this strategy using a model to understand the benefits for users and the platform. Here are the settings of the two agents we are analyzing:

- **Advertiser**: Our assumption is that the willingness-to-pay remains constant for any user who is exposed to the ad. The platform extracts the full surplus and set the ad price a equal to the willingness-to-pay. Additionally, we suppose that they are represented by a unit of mass.
- **User:** We assume that all users n_b assign a value r to the service of the platform. If they use the free version of the platform, their utility is decreased by βn_s where β represent the disturbance from advertising and n_s correspond to the level of advertising. The ad disturbance parameter β is uniformly distribued on $[1,2]$. Otherwise, users can pay a membership fee A to skip the advertising.

To realize our model, we will analyze three business strategies: *subscription-based* model, *ad-financed* model, and *freemium* model.

3.4.1.1 Subscription-Based Model (sub)

According to this model, every user experiences an equal net utility for the advertising-free service: $r - A$ and the platform benefit is $n_b A$. Given that the platform maximizes its profit, it sets $A = r$ and all users pay. Therefore, the profit of the platform is $\boldsymbol{\pi^{su} = r}$.

3.4.1.2 Ad-Financed model (ad)

In this model, only the version with advertising is available free of charge. The platform determines the ad price a and the ad volume n_s to optimize its profit $n_s n_b a$. For a user belonging to type $\beta \epsilon [1,2]$, their net utility is determined as $\boldsymbol{r - \beta n_s}$., given a specific advertising level n_s. if the platform wants to ensure that every users join the platform, the level of advertising must be: $n_s = \frac{r}{2}$. Otherwise, the platform can choose to increase its level of advertising and go beyond $n_s = \frac{r}{2}$ and attract users with ad-perturbance β below $\beta_0 \equiv \frac{r}{n_s}$. Thus, the number of users $n_b = \beta_0 - 1 = \frac{r}{n_s} - 1$ and the platform profit is $n_s n_b a = n_s \left(\frac{r}{n_s} - 1\right) a = (r - n_s)a$. We can clearly see that it is not cost-effective to set $n_s > \frac{r}{2}$ because profit decreases with n_s with this setting.

So, it's more profitable to attract the maximum of users so that $\boldsymbol{n_s = \frac{r}{2}}$ **and** $\boldsymbol{n_b = 1}$ **with a platform profit** $\boldsymbol{\pi^{ad} = \frac{ar}{2}}$**.** Therefore, $\pi^{ad} > \pi^{su}$ only if $a > 2$, which means that the ad-financed model is favored when advertising revenues are strong enough to counterbalance the participation of users with the greatest nuisance.

3.4.1.3 Freemium model (f)

As described above, this model is a combination of the previous two models, with the platform service being either free of charge but with an advertising level of n_s (version 1) or advertising-free with a membership fee of A (version 2).

If there is a user of type $\beta_1 \in (1,2)$ which is indifferent between the two versions, its net utility is such that $r - \beta_1 n_s = r - A$, then $n_s = \frac{A}{\beta_1}$. Obviously, if the menu is aimed at maximizing profit, then $A = r$ to extract the maximum surplus of users' utilities. Therefore, we obtain the following platform profit $r\left(1 - \frac{1}{\beta_1}\right) a + (2 - \beta_1)r$. After fulfilling the First Order Condition for profit maximization, we obtain that $\beta_1 = \sqrt{a}$ and to have $\beta_1 \in (1,2)$ we have to make the assumption that $a \in (1,4)$, then the profit for a freemium strategy can be written as :

$$\pi^f = r\left(\sqrt{a} - 1\right)^2 + r \qquad (10)$$

3.4.1.4 Comparison of Business Model

We realize that the freemium model is more favorable for platform than the other two strategies when $a \in (1,4)$:

$$\pi^f - \pi^{su} = \left(\sqrt{a} - 1\right)^2 > 0 \; and \; \pi^f - \pi^{ad} = \frac{1}{2} r\left(\sqrt{a} - 1\right)^2 > 0 \qquad (11)$$

However, the impact on users is not as great, indeed the advertising level n_s is higher than under the ad-financed strategy if $n_s^f = \frac{r}{\beta_1} > \; n_s^{ad} = \frac{r}{2}$ and it's the case if $\beta_1 < 2,$ so users who choose the free version of the freemium model are less well off than in the ad-financed model. Whereas users who choose the premium version are as well as in the subscription-based

model being that A = r in both models to capture the maximum of their surplus. We can draw the following conclusion:

"If a platform changes its business model from ad-financed to the freemium model, it feels less constrained to limit ad levels because it targets its subscription service to strongly ad-averse users. As a result, it may be that no user is better off, and some users are strictly worse off" (Belleflamme & Peitz, 2021)

3.4.2 Revenue Sharing[6]

A recent study *(Jhang-Li, J. H et al, 2023)* has established the strategies that can be put in place by live streaming platforms regarding the distribution of revenues between the platform and the streamers. On the one hand, income they earn comes from Marketers who want to promote their products via advertising, there are two types of advertising:

- ***Advertisements***: platforms offer marketers the opportunity to set up systems directly via pre-roll or mid-roll, video advertising placed respectively before or during streamers' live broadcasts to viewers.
- ***Advertorials***: Streamers and marketers connect directly without going through the platform, then the streamers act as advertisers to promote a product during their live session to viewers.

On the other hand, given that advertising can represent a nuisance for viewers *(Goodrich, K. et al, 2015),* there is a paid subscription option such that they can view stream content without advertisements which represents another source of revenue. However, advertorials cannot be skipped via paid subscription as they are promoted by the streamers themselves. Finally, there is a last source of revenue which is the donation system where viewers can directly donate the amount they wish to their favorite streamers via bank transfer, PayPal...

[6] Jhang-Li, J. H., & Liou, J. H. (2023). An analysis of operating strategy for a video live streaming platform: advertisement, advertorial, and donation. Information Technology and Management, 1-18.

Knowing that, Jhang-Li, J. H et al. have designed different models based on the repartition of revenue between streamers and the platform provider. Streamers and platforms are financed by advertising (that we denote *A* for advertisements and *B* for advertorials) from marketers and by subscription revenues. If marketers choose advertisements, they must have to support a cost to produce an ad video from an extern production agency. While an Advertorial require the streamer to bear the major cost of production to create brand awareness and/or convince customers to buy the product. Therefore, the ad demand and the production cost on a streamer's channel are respectively $\boldsymbol{\eta_i}$ ***and*** $\boldsymbol{c_i}$ where $i \in (A, B)$. Additionally, Marketers choosing advertorials pay a **flat fee *p*** to the streamer, adjusted to the number of subscribers on their channel. When they choose the advertisements, they must pay a **rate fee s** to the platform provider generally based on the cost per thousand impression (CPM) which is a pricing model where marketer and platform agree on a predetermined amount for thousand impressions of the ad-video. For the design of following payoffs, here is the list of variables we will be using:

Model parameters	
$\phi(1-\phi)$	The ratio of free (paid) subscribers
$M(N_{free}, N_{paid})$	The number of total subscribers (free subscribers, paid subscribers)
ρ	The streamer's innate talent
κ	The cost coefficient of hosting a video live streaming channel
$\alpha_A(\alpha_B)$	The marketer's marginal benefit from advertisements (advertorials)
$\beta_A(\beta_B)$	The coefficient for measuring the diminishing marginal return of advertisements (advertorials)
λ	The degree of cross demand between advertisements and advertorials
σ	The expected average benefit from the subscribers watching ads
τ	The average donation made by a subscriber
f	The subscription fee
s	The ad rate charged by the platform
U	The representative marketer's utility
g	The ratio of donation funds received by the streamer
$c_A(c_B)$	The cost of producing an advertisement (advertorial)

Decision variables	
θ	The streamer's share of the subscription revenue
e	The effort made by the streamer
p	The flat rate charged by the streamer
$\eta_A(\eta_B)$	The advertisement quantity (advertorial quantity)

Figure 11 : List of variables Source: Jhang-Li, J. H et al (2023)

We can now determine the marketers', streamers', and platform's payoffs. For the purposes of this work, we will focus on the set up where the platforms pay out a certain proportion of the revenue from marketers, subscriptions, and donations to the streamers. However, the paper on which we are basing ourselves sets out different strategies depending on whether the platform passes on part of the revenue to the streamers.

3.4.2.1 Marketer payoff

We assume that the marginal benefits of purchasing advertorials and advertisements are decreasing, so the marketer's utility can be represented as follows $U = \alpha_A\eta_A + \alpha_B\eta_B - (\beta_A\eta_A^2 + 2\lambda\eta_A\eta_B + \beta_B\eta_B^2)/2$, all parameters are positive constants except for degree of cross demand between advertisements and advertorials λ (both are substitutes, independents and complements when respectively $\lambda > 0, \lambda = 0\ and\ \lambda < 0$). Therefore, we can represent the payoff of the representative marketer as

$$\pi_{Mark} = U - c_A\eta_A - s * N_{free}\eta_A - p * \eta_B \tag{12}$$

For an in-depth description, $c_A\eta_A$ and $s * N_{free}\eta_A$ are respectively the production cost for ads-video and the ad expenses paid to the platform to broadcast pre-roll or mid-roll advertisements. While $p * \eta_B$ represent the fee for showing advertorials during a live.

3.4.2.2 Streamer and platform provider payoffs

Many factors come into play to estimate a streamer's subscriber base (M), but in this model, we estimate that this base depends on the streamer's effort (e) and innate talent (ρ), therefore $M = \rho * e$. To encourage streamers to put more effort into their work, the platforms are prepared to pay out part of the revenue from paid subscriptions as an incentive. In contrast, the platform may have an incentive to set up a built-in reward system by charging a commission on each donation made by viewers to streamers. Therefore, we can design the platform payoff as:

$$\pi_{plat} = (1-\theta)f * N_{paid} + s * \eta_A N_{free} + (1-g) * \tau\left(N_{free} + N_{paid}\right) \tag{13}$$

To decode the platform's payoffs, there are first $(1-\theta)f * N_{paid}$ which represent the portion of revenue from paid subscriptions retained by the platform, augmented by income from marketers in exchange for the broadcasting of advertisements $s * \eta_A N_{free}$ and finally augmented by the commission taken on total donation $(1-g) * \tau\left(N_{free} + N_{paid}\right)$. Then the streamer payoff is designed as follows:

$$\pi_{streamer} = g * \tau(N_{free} + N_{paid}) + \theta f * N_{paid} + (p - c_B) * \eta_B - \kappa * e^2 \qquad (14)$$

To decode, we observe the share revenue from the donation $g * \tau(N_{free} + N_{paid})$, augmented by the share revenue of paid subscriptions $\theta f * N_{paid}$, plus the mark up to deliver advertorials multiplied by the advertorials demand $(p - c_B) * \eta_B$ and finally subtracted by cost of the streamer's effort $\kappa * e^2$. The relationships between these three players can be expressed graphically as below:

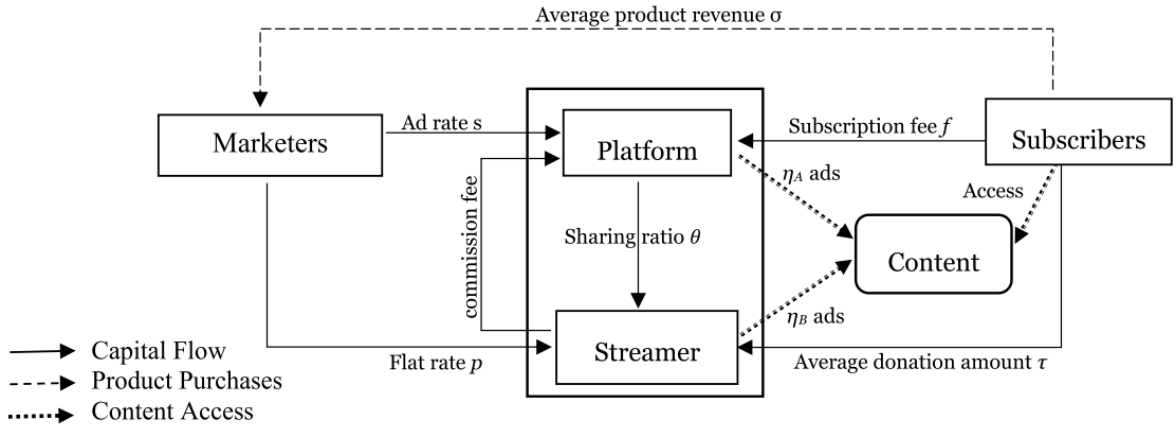

Figure 12 : Revenue Sharing Schema Source: (Jhang-Li, J. H et al.*, 2023)*

Now that these payoffs have been established, the authors of the article put forward two interesting theoretical propositions concerning the effect of sharing subscription revenue and the Mix of revenue sharing and a Built-in Reward System.

3.4.2.3 Effect of Sharing Subscription Revenue

When streamers receive part of the revenue from paid subscriptions, they will put more effort into their live shows $\frac{\partial e^*}{\partial \theta} > 0$ and they will also raise the prices of their advertorials $\frac{\partial p^*}{\partial \theta} > 0$. In addition, the demand for advertorials will increase $\frac{\partial \eta_B^*}{\partial \theta} > 0$. Moreover, if the ratio of free subscribers over paid subscribers is large enough and do not exceed a certain threshold $\hat{\phi}$, the demand for advertisements increases also $\frac{\partial \eta_A^*}{\partial \theta} > 0$.

The streamer will try to find the means to increase the number of global subscribers and especially the number of paid subscribers. As a result, the optimal streamer's level of effort will be higher than someone who does not receive any of the subscription revenue. In addition, the rise of effort put in by the streamer increases the size of their subscriber base, it gives marketers more visibility for their advertisements and advertorials. However, the ratio $\frac{\text{paid subscribers}}{\text{free subscribers}}$ must not exceed a certain threshold, otherwise too many subscribers will be able to skip advertisements.

3.4.2.4 A Mix of Revenue Sharing and a Built-In Reward System

In addition, it is more interesting for the platform to choose a strategy with a mix of giving a share of the revenue from paid subscriptions, while taking a commission on donations. In fact, sharing part of the revenue with the streamers increases the effort they put into their tasks.

In the first stage, platforms share subscription revenues only when the streamer achieves a certain level of performance (number of hours worked, number of paid and free subscribers, number of average viewers, etc.), so during the period when the streamer is not receiving subscription revenues, platforms boost their payoffs. Then, due to this commission on donations, streamers may consider this system negative for their payoffs, however if the platforms share part of the revenue from paid subscriptions this balances the equation. Thanks to this, the mix strategy is the best compared to the others. However, for streamers who have not yet applied for certification of the platform and do not yet have access to revenue sharing from paid subscriptions, the commission on donations will reduce their income considerably.

In this paper (Jhang-Li, J. H. et al, 2023), they analyze three strategies: the model where the platform only shares revenues from paid subscriptions (Model II), the model where the platform only shares revenues from donations (Model III), and the mixed strategy (Model IV).

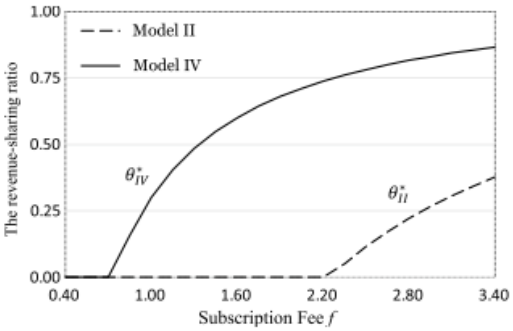

Figure 14 : Revenue sharing ratio in function of Subscription Fee. Source: Jhang-Li, J. H. et al, 2023),

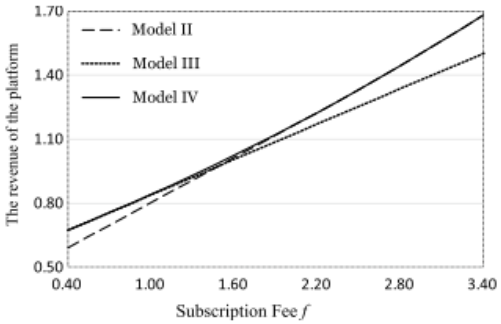

Figure 13 : Platform Revenue in function of Subscription Fee. Source: Jhang-Li, J. H. et al, 2023),

Figure 14 shows the optimal share of paid subscription revenue to be distributed to streamers in function Subscription Fee and Figure 13 shows the platform' payoffs as a function of subscription fees for the various strategies. From these two figures we can see that the mix strategy (Model IV) dominates the two others because the payoffs are higher as long as $\theta_{IV}^* < 1$. Although the commission on donations can be detrimental to top streamers, platforms can set up a larger share of paid revenue to compensate, As can be seen in Figure 13, when the platform uses the mix strategy, it does so more quickly than in a model based solely on revenues from paid subscriptions.

4 Economy of Live Streaming Platforms

In this section, we're going to apply the theory we've seen above to the practice of live streaming platforms. We have seen a lot of theory about the platform economy, but theory does not always apply to reality, as we will show in the next few points.

4.1 Network effect

Before defining the network effects present on this type of platform, it is important to define the two types of agents present: viewers and streamers.

- **Viewers**: The agent who watches entertaining content on the platform, they can interact with the streamer or other viewers via chat
- **Streamers**: The agent who streams in live entertainment content (video games, music, cooking...), they are financed by the viewers' donations, subscriptions and by advertising.

Although there are within-group network effects within the two groups; viewers can communicate with each other on the streamer's chat, streamers can collaborate with each other to offer better quality content... However, live streaming platform services are essentially based on exchanges between streamers and viewers with cross-group network effect: streamers offer content on the platform to viewers who in return pay for this service directly (donation or subscription) or indirectly (advertising). This revenue is then split between the platform and the streamers.

According to the theory, we are in presence of **Attraction Spiral**, given that each group has a positive effect on the other, a higher level of activity in one group attracts more participation in the other group, and vice versa. To determine whether this is true, we can compare the evolution of the average number of viewers on a platform with the number of streamers affiliated to that platform. We will carry out this exercise using data[7] from the biggest platform: Twitch.

[7] *Twitch stats by month for the past several years - SullyGnome. (2023)*. https://sullygnome.com/longtermstats & *Press center. (s. d.). Press Center*. https://www.twitch.tv/p/press-center/

The average number of viewers corresponds to the average number of viewers at any given moment. Partners streamers are streamers who have obtained certification from the platform. To be eligible, you must have 1000 followers, have streamed at least 25 hours in the previous 30 days, have streamed 12 unique live streams in the previous 30 days and have an average of 75 viewers. Below are the trends in these two variables from 2016 to 2023:

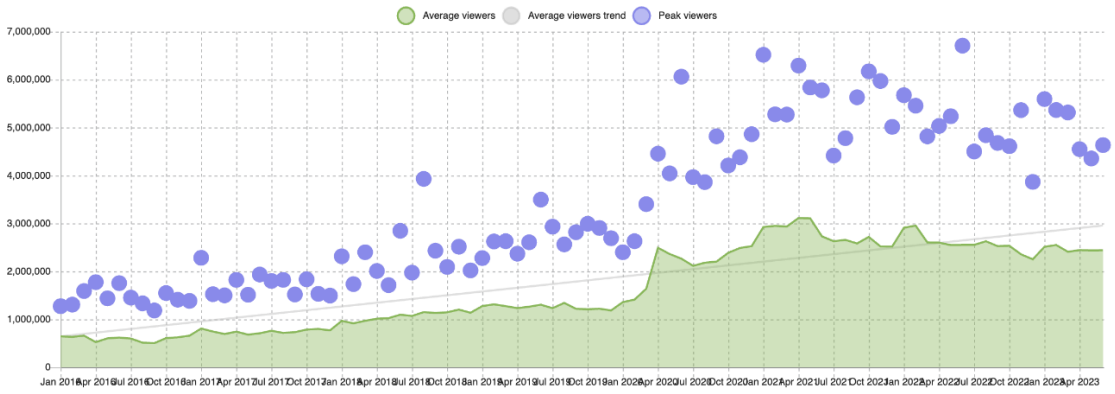

Figure 15: Evolution of Average Viewers on Twitch. Source: SullyGnome (2023)

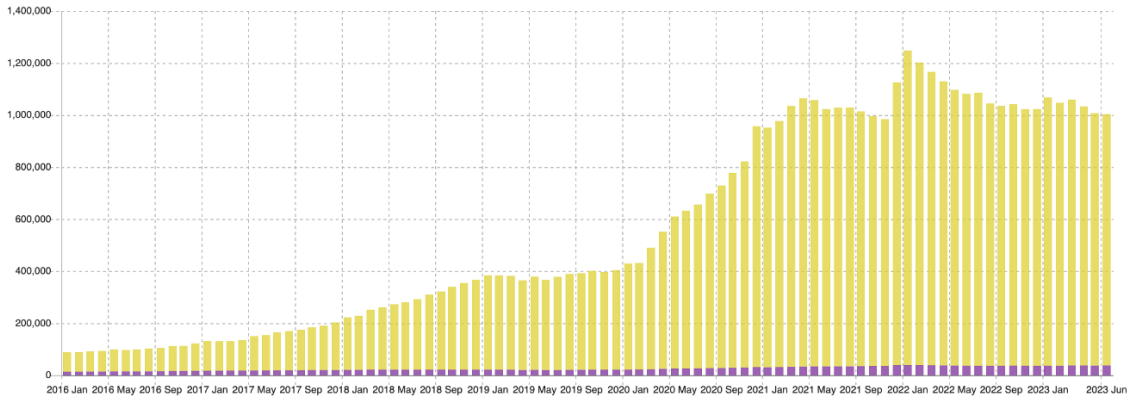

Figure 16: Evolution of Affiliates and Partners streamer and on Twitch[8]. Source: SullyGnome (2023)

Between June 2019 and June 2023, the number of average viewers rose from 1.3 million to 2.5 million, an increase of 92%, while the number of partners streamers rose from 1,803 to

[8] Yellow sticks represent affiliated streamers (low standards requirement) and purple sticks represent partner streamers (high standards requirements)

3,084, an increase of 87%. We can observe a positive correlation between average viewers and partners streamers; however, this is only a correlation does not cause and effect relationship.

4.2 Launching phase

As we have seen, there are several strategies for avoiding the chicken-and-egg problem during the launching phase of a platform. For example, no streamer will join a platform if he anticipates little or no viewer participation, and vice versa. And as we saw in point 4.2.1, it is important for a platform to have a sufficiently large user base to prosper, otherwise there may be a risk of zero user level over the long term.

4.2.1 First Mover

The first platform to enter this sector was Twitch. It started out as a platform focused primarily on live streaming of e-sport competitions. Its innovative concept quickly captured the attention of video game enthusiasts and fans of virtual competitions. The key to its success lay largely in the fact that, at the time, no other platform offered such a specialized solution for the instant broadcast of live content. Thanks to this exclusivity, Twitch was able to quickly reach a critical mass of users early on in its journey, creating a committed community of viewers and content creators. This solid foundation laid the foundations for the exponential growth that followed, transforming Twitch into the diverse streaming platform we know today, covering not only e-sports competitions, but also a multitude of other live content such as games, creative art, music and much more.

4.2.2 Expansion strategy specific to Live streaming platform

When we look at the 3 largest platforms in this sector: Twitch, YouTube Gaming and Facebook Gaming, we realize that they are owned respectively by the multinationals Amazon, Google, and Meta, which are among the 5 most quoted companies on the stock market in 2022[9]. The fact that these platforms are owned by digital giants makes them easier to launch, as they already benefit from significant economies of scale. These platforms are then the result of

[9] Daelen, O. (2022, 30 décembre). Quelles sont les entreprises les plus précieuses au monde en 2022 ? Business AM - Infos économiques et financières. https://fr.businessam.be/top-100-entreprises-les-plus-precieuses-2022-valeur-capitalisation-boursiere/

other platforms' expansion strategies, and in the following points we analyze the reasons why they have adopted this strategy to develop this new and growing sector.

Twitch and Amazon

Although the Twitch platform existed before 2014, it was when it was acquired by the online retail giant that the level of users started to become significant. This acquisition was made with the aim of extending its ecosystem, and Amazon is legitimate because it can bring economies of scale to this sector.

Twitch is integrated into the Amazon Web Services (AWS) cloud service, giving it access to numerous data processing, network, and storage resources. In addition, thanks to its large user base, Amazon can promote the platform to increase the number of users of the latter. Notably with its Amazon Prime service, a monthly (6.99€/month) or annual (69.90€/year) subscription which gives access to several services such as priority delivery, Prime Video, Amazon Music Prime, Prime Reading and especially since 2018 **Twitch Prime** which offers a free monthly subscription to a viewer for the streamer of their choice. Twitch prime is a win-win solution for both users and Amazon. On the one hand, people who don't know Twitch but have an Amazon Prime subscription will be encouraged to participate on the live streaming platform, and on the other hand, thanks to access to the entire Amazon ecosystem, viewers will be ready to contract an Amazon Prime subscription in order to benefit from the monthly Twitch subscription plus all the other services, bearing in mind that the classic subscription to a channel on Twitch costs €3.99 per month. Also, it brings additional income to streamers because they receive income from the use of the Twitch Prime subscription on their channel, however Twitch takes a commission on these subscriptions which we will detail later in this work.

However, this Twitch Prime subscription is interdependent between all its services. In 2022, Twitch's commission on each paid subscription paid to streamers was increased from 30% to 50%. Because of increased competition from on-demand streaming platforms (Prime Video, Netflix, HBO, Apple TV, etc.), Amazon has had to increase its spending to keep up, notably by

buying the rights to The Lord of the Rings ($250 million)[10]. And, express delivery charges, which are increasingly high because of the current recession.

In addition, for several years, thanks to its software, hardware and data holding services, Jeff Bezos has wanted to diversify his services into several segments: entertainment, news, information, manufacturing, science, technology, commerce, and video games. They have made several mergers and acquisitions to improve their game engine: Lumberyard and Twitch can be a good complement to this segment of video games because the platform mainly broadcasts video games.

Finally, thanks to shared marketing resources, by integrating Twitch into its ecosystem, Amazon can carry out targeted advertising to potential future users and generates an additional revenue for the platform and streamers.

Youtube Gaming

In August 2016, on the 10th anniversary of its creation, Youtube launched its own live video game streaming platform, Youtube Gaming, with the aim of competing with Twitch. Indeed, more and more popular streamers are emerging and attracting crowds to video game streaming sessions.

Youtube was legitimate when they decided to join this live broadcasting sector because the content broadcast on Twitch was essentially video games. In 2016, the ten biggest gaming channels were generating 2.2 billion video views per month[11]. In addition, at that time the biggest Youtuber, PewDiePie, had almost 47 million subscribers in 2016 with video game content. So, when Youtube Gaming was launched, the platform already had a strong community of viewers and creators of gaming-oriented content who could move towards live streaming and achieve sufficient critical mass to get started.

[10] Laborde, L. (2022, July 27). Le prix d'Amazon Prime augmente : comment cela affecte-t-il l'abonnement gratuit à Twitch ? Millenium FR. https://www.millenium.org/news/392976.html

[11] Rauline, N. (2015, août 26). YouTube vient concurrencer Twitch dans les jeux vidéo. Les Echos. https://www.lesechos.fr/2015/08/youtube-vient-concurrencer-twitch-dans-les-jeux-video-270676

In addition, YouTube can leverage its existing technical infrastructure, including its servers and content distribution network. This can reduce the cost of setting up a new platform from scratch and enable faster implementation.

Facebook Gaming

Similarly, Facebook launched its Facebook Gaming platform in June 2018. The latter boasts the world's largest user base for a social networking platform, with nearly 2.072 billion monthly active users in 2018[12]. Moreover, Facebook also has technical expertise in broadcasting services (servers, networks, video, etc.). Finally, we can see interconnectivity between Facebook Gaming and Facebook Group to match individuals with the same interests more easily.

4.2.3 Seeding Strategy specific to Live streaming platform

As we saw in section 4.3.2, the seeding strategy is a solution for achieving critical mass to avoid the chicken-and-egg problem. This solution consists of attracting users sequentially by subsidising a small number of users in a group with the capacity to generate very large cross-group network benefits to attract a maximum number of users in a second group, without spending too much money on attracting them. The platforms target agents with the best ratio: $\frac{positive\ cross-group\ network\ effect}{cost\ to\ attract\ them}$. This strategy has been seen twice in the highly competitive live streaming platform sector with Mixer in 2019 and more recently in 2022 with Kick. In the next few points, we will analyze the seeding strategies of these two platforms.

Mixer

This platform was launched in January 2016 and then acquired by Microsoft in August 2016. It stood out from the rest thanks to its very fast retransmission technology, which means that interactions between streamers and viewers take place in just a few seconds. Microsoft was very interested in this platform because it was a great opportunity for them to create a

[12] Coëffé, T. (2019, January 2). Les 50 chiffres à connaître sur les médias sociaux en 2018. BDM. https://www.blogdumoderateur.com/50-chiffres-medias-sociaux-2018/

complement to its Xbox video game console ecosystem, enabling gamers to stream their content directly from their consoles onto the Mixer platform. However, after two years in existence, the platform did not manage to compete with the market leader Twitch (75% of market share) and had only 1%[13] of market share.

In 2019, Microsoft then proposed a seeding strategy for its Mixer platform, by acquiring the exclusive services of the biggest streamers of the day, notably Ninja (14 million Twitch subscribers) and Shroud (10.6 million Twitch subscribers). The amounts of these exclusive contracts remain anonymous, but in an article[14] Ninja already claimed to earn nearly $500,000 a month from his twitch income before joining Mixer, so we can estimate that to leave such a level of income, the contract must be worth several million dollars.

However, we can't say that the strategy worked, because a year later, Mixer's market share had only increased by 2%, and in June 2020, Microsoft announced the merger of the Mixer platform with Facebook Gaming, and steamers were encouraged to join the Meta group's platform.

[13] Yosilewitz, A. (2021, December 13). State of the Stream 2019: Platform Wars, the New King of Streaming, Most Watched Game and More! Medium. https://blog.streamelements.com/state-of-the-stream-2019-platform-wars-the-new-king-of-streaming-most-watched-game-and-more-ab0596d5c13d

[14] Paumgarten, N. (2018, May 14). How Fortnite Captured Teens' Hearts and Minds. The New Yorker. https://www.newyorker.com/magazine/2018/05/21/how-fortnite-captured-teens-hearts-and-minds

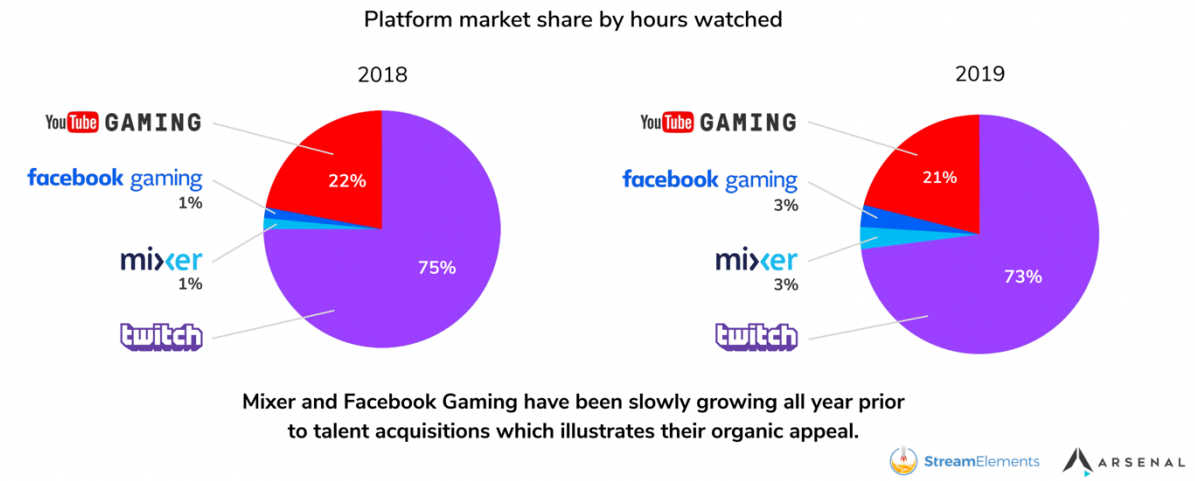

Figure 17: Streaming Platform market share 2018 VS 2019. Source : StreamElements (2019)

Kick

This live streaming service was launched in 2022 by Stake.com, an online casino played with cryptocurrency. It is the world's leading online casino, responsible for 6% of every monthly Bitcoin transaction with nearly 340 million Bitcoin placed each month (IndustryTrends, 2023).

This casino made a name for itself in 2021 by sponsoring celebrities such as rapper Drake, footballer Sergio Aguero and Formula 1 team Alfa Romeo, as well as Twitch streamers who were sponsored to play live casino games on Stake.com. Among these streamers were Trainwreckstv with 2.1 million Twitch subscribers, Roshtein with 1.1 million Twitch subscribers, Xposed with 538,000 Twitch subscribers and other streamers who played on Stake.com without being sponsored, such as xQc, the biggest streamers in the world with almost 11.9 million Twitch subscribers. However, in October 2022, Amazon's streaming platform decided to ban live casino broadcasts, for ethical and moral reasons but also for fear of scaring off marketers who didn't want to be put in front of casino content.

In response, the online casino platform decided in December 2022 to launch its own live streaming platform: Kick. To differentiate itself from other platforms and attract a sufficient mass of users, they announced that streamers would have the right to stream gambling, but also that streamers would be paid more than anywhere else. On Twitch, the platform takes

50% of streamers' revenue from paid subscriptions, whereas Kick only takes 5%, as shown in the figure below[15].

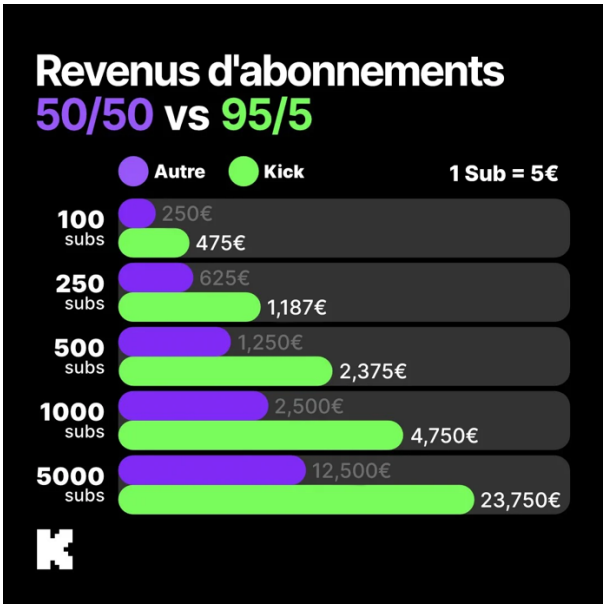

Figure 18: Platform commission Twitch VS Kick

In addition to these preferential rates for streamers, the platform has paid out millions of dollars in contracts to bring in Twitch's biggest streamers. This includes the famous Canadian streamer Felix Lengyel (aka xQc), who is said to have landed a two-year contract worth around $70 million, with incentives that could bring the total to around $100 million according to his agent Ryan Morrison[16], moreover, this contract as many other is not exclusive in the sense that the streamer is still allowed to live on twitch. This contract would exceed that of NBA superstar Lebron James, who signed a two-year contract with the Los Angeles Lakers for $97.1 million in 2022. This strategy consists of attracting the streamers with the biggest cross-group benefits to attract as many viewers as possible and then create an Attraction Loop.

[15] Kick France : Vos abonnés, votre argent. (2023). Twitter.com. https://twitter.com/Kick_FR/status/1654192167919710208/photo/1

[16] Browning, K. (2023, June 21). Twitch Star xQc Signs $100 Million Deal with Kick, a Rival Platform. The New York Times. https://www.nytimes.com/2023/06/16/business/twitch-kick-xqc.html

The figure below shows the situation before and after kick's penetration of the market. We can see that in a very short period of time it has managed to achieve a 2% market share. It remains to be seen whether the platform will be able to achieve the critical mass of users it needs to prosper in this sector over the long term.

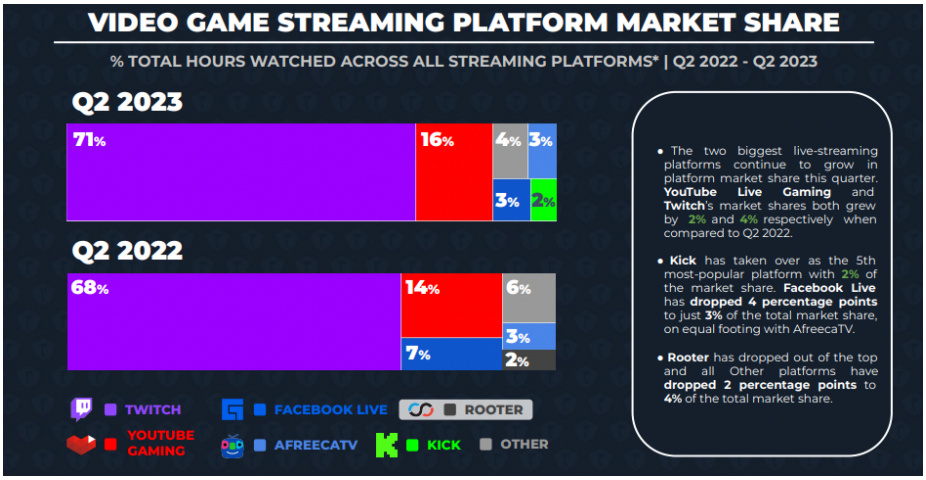

Figure 19 : streaming platform market share Q2 2022 VS Q2 2023. Source: Stream Hatchet (2023)

4.3 Pricing instruments

Contrary to traditional platform theory, where platforms offer free access to attract users from a certain group and charge the other group of users. Here platforms take a more subtle approach to generating revenue. Rather than charging directly for access, they capitalize on the advertising and freemium strategy. In this model, basic access remains free, but the platform monetizes it by offering premium options or integrating ads. This strategy makes it possible to attract a wider audience and maintain a constant flow of users, while offering added value to users who are prepared to invest in advanced features and an ad-free experience. By relying on indirect monetization, these platforms can guarantee widespread accessibility while generating the revenue needed to support their continued growth and development.

4.3.1 Revenues ressources

Contrary to the theory we saw previously, the platform is not a service that links buyers and sellers and then takes commission on the transactions or charges a membership fee to access the service of exchange. In our sector, we have a platform and streamers who offer all their services to marketers so that they can promote their products and increase their sales. Registration to the platform is free for streamers and viewers, and streamers broadcast and interact with their subscribers. Thanks to the advertising offer, marketers pay to promote their products, and this money is then shared between the platform and the streamers.

We will describe the different sources of revenue for platforms and streamers. We will then discuss in more detail the strategies that have been put in place.

4.3.1.1 Advertising

Like many digital platforms, marketers are an important source of revenue for both the platform and the streamers. On the one hand, Marketers take advantage of the audience on streaming platforms to promote their products. They use pre-roll and mid-roll ads at the beginning and middle of their live stream respectively, these kinds of ads are called "**Advertisements**". Indeed, these ads are an excellent way for brands to increase business

sustainability and brand popularity. The author of a study demonstrated that there was a significant effect between advertising on social networks and customers' intention to buy. (Alalwan, A. A., 2018).

Twitch uses Cost per thousand impressions (CPM) as a means of pricing on their platform, meaning that the marketer agrees to pay a certain amount for a thousand impressions on streams (Leys, K., 2020). It means that, the larger the viewer base, the more advertising revenue the platform will generate. Once the money has been collected, the platform shares part of the advertising revenues with the streamers. On Twitch, you must be a partner to receive this money, and streamers can choose the number of adverts per hour (3, 4 or 5 minutes). The more advertising there is, the higher the income, but other factors come into play when it comes to remuneration, such as the content broadcast, the average number of viewers present, the number of brands present in the streamer's country, etc.

Marketers need to consider the effect of ad-blockers when setting CPM rates with platforms, as these tools can block ads for a percentage of users, reducing ad visibility and potential revenue. The higher the number of users with ad-blockers, the more the CPM can be impacted, which can result in lower rates to compensate for the potential loss of ad impressions. According to a report (Kratky-Katz, 2022), 11% of the world's Internet population blocks advertising.

Another way for marketers to promote their products is by partnering directly with streamers without going directly through the platforms, where the streamers play the advertising role and promote the product themselves, these ads are the "**Advertorials"**. Given that this type of advertising does not pass directly through the platform, it can represent a loss of earnings for the platform, however Twitch decided to create a marketplace that helps to connect marketers with a vast of twitch partners, this is called the Bounty Board. Thanks to this service, brands can promote the gameplay features of a video game or a trailer with deep engagement because streamers select only advertorials that fit with their community and brands only pay for what works. The streamer that accepts the Bounty will play the game or broadcast the trailer to their community and then the marketers will be able to see reporting metrics of these advertorials.

4.3.1.2 Paid Viewer Subscription

The access to the platform is free for viewers, who can subscribe free of charge to as many streamers' channels as they like and become part of their community. However, as we saw in model 4.4.3, when the platform opts for a freemium strategy, the most ad-averse individuals are prepared to pay a subscription fee to avoid these pre-roll and mid-roll ads. In fact, a study (Goodrich, K. et al., 2015) has shown that adverts make people feel intrusive when they are shown video adverts to them.

However, to encourage more people to take up this paid subscription, it brings other benefits besides being free of ad. In fact, these subscriptions give access to other advantages such as a personalized badge showing how long the subscriber has been paying for the subscription each month, emotes bearing the streamer's effigy for use in viewer chat, and some streamers block replay of previous lives so that only paying subscribers can access them.

In addition, a study (Jhang-Li, J-H. et al., 2023) was carried out to find out what social factors might encourage people to take out a paying subscription to a channel. They obtained the following results:

Variables	Estimate (99.9% CI)	*SE*
Social Interactions	.49* [.29, .69]	.06
Sense of Community	.31* [.10, .52]	.06
Information Seeking	-.12 [-.28. .04]	.05
Meeting New People	.10 [-.14, .34]	.07
Entertainment	.08 [-.22, .39]	.09
External Support	-.03 [-.08, .03]	.02
Social Support	.02 [-.26, .30]	.09
Social Anxiety	-.01 [-.02, .01]	.00

Note. *SE* = Standard Error; $^{*}p < .001$.

Figure 20: Socio-motivational OLR coefficients for explaining Twitch Subscriptions (Jhang-Li, J-H. et al., 2023)

As we can see, the two significant social variables are social interaction and sense of community, which best express the variances in the sample results. Participants were asked to indicate on several items how involved they felt in a community and their motivations for taking part in a virtual community. We can therefore assume that streamers are encouraged to increase the participation of their communities to increase their income. This can be done, for example, by encouraging viewers to vote on which game to play, including viewers in decisions or planning, noting and personally thanking subscribers, etc.

4.3.1.3 Donation

Finally, the last source of revenue for platforms and streamers is viewer donations. Platforms can create a section under the live stream to allow viewers to make donations to their favorite streamers, who can then attach a message to their donation. The same study (Jhang-Li, J-H. et al., 2023) as for the previous point tried to find out which social-motivation factors might influence viewers' decision to donate.

Variables	Estimate (99.9% CI)	*SE*
Social Interactions	.66* [.45, .87]	.06
Sense of Community	.29* [.06, .52]	.07
Entertainment	.23 [-.11, .57]	.10
Information Seeking	-.08 [-.26, .10]	.05
Meeting New People	.05 [-.20, .30]	.08
External Support	-.04 [-.10, .02]	.02
Social Support	.03 [-.26, .31]	.09
Social Anxiety	-.01 [-.02, .01]	.01

Note. $^{*}p < .001$.

Figure 21: Socio-motivational OLR coefficients for explaining Twitch Donations (Jhang-Li, J-H. et al., 2023)

As with paid subscriptions, the two significant variables are social interaction and sense of community, but social interaction is even more important when it comes to donations.

4.3.2 Mix strategy of the platforms

As we saw in section 4.4.4, the Mix strategy, which consists in giving a share of the revenue from paid subscriptions to streamers and taking a commission on donations, is the best strategy for a platform if it wants to maximize its profit in theory. Thanks to the effect of sharing subscription, this encourages streamers to make more effort, which has a positive effect on viewer engagement and therefore on marketers too.

In practice, we see this strategy on the two market leaders Twitch and Youtube, each taking respectively 50% and 30%[17] of these paid subscriptions. The new entrant Kick even offers to take just 5% commission on these subscriptions, probably to grab a maximum of streamers with positive cross-network effect and then grab viewers to join Kick. Facebook also uses the same strategy, but it is more complicated to obtain data on the platform's commissions.

[17] Jhang-Li, J. H., & Liou, J. H. (2023). An analysis of operating strategy for a video live streaming platform: advertisement, advertorial, and donation. Information Technology and Management, 1-18.

About commission on donations, to prevent users from making transactions outside the platform, Twitch has launched its own virtual 'currency': bits. The platform takes a commission of 20% for each donation[18]. However, It is difficult to obtain data on the donation systems of other platforms.

To be eligible to earn money from their streams, streamers must achieve a certain level of performance and obtain a certification from the platform. On Twitch, to become a Twitch Partner you need to have a certain number of stream hours, stream days and a certain number of average viewers over the last 30 days. On YouTube[19] you need to have reached a certain number of free subscribers. On Facebook Gaming, you need to have streamed for a certain number of hours and respect the conditions of use[20].

On Kick, to attract many users quickly, anyone can apply to receive income from subscriptions and donations.

Finally, in the model developed in point 4.4.4, the authors of the article do not consider the fact that part of the advertising revenue is paid back to the streamers. Moreover, these streamers can choose the number of minutes of advertising per hour, and thanks to an efficient dashboard, they can easily see the estimated revenue they can earn.

[18] Twitch. (2023) Customer Service. https://help.twitch.tv/s/article/earning-revenue-from-bits-in-extensions?language=fr

[19] Emily. (2021, December 16). All you need to know about YouTube channel memberships. Medium. https://medium.com/@emily-campbell/all-you-need-to-know-about-youtube-channel-memberships-fe51a735fd99

[20] Lefaix, É. (2019, October 14). Facebook Gaming serait plus rentable que Twitch et YouTube pour les streamers. Siècle Digital. https://siecledigital.fr/2019/10/13/facebook-gaming-plus-rentable-twitch-youtube/

4.4 Statuts of Competition Level

In 2023, the streaming platform sector is highly concentrated, largely driven by Twitch with 71% of the market share, followed by Youtube Gaming with 16% and the rest shared between smaller platforms such as Kick, Facebook Gaming... In this section we will establish the barriers to entry that exist in this market, then we will see that some platforms have adopted a horizontal differentiation strategy to gain a foothold and finally we will discuss the war for contracts to get the biggest influential streamers.

4.4.1 Barriers to entry

As we saw in section 4.2, the demand for a network good depends essentially on the participation of other users in that network. Indeed, if users assume that the platform will not reach a sufficient mass of users, it is doomed to failure. Given that the market-leading platforms Twitch and YouTube have a large user base, if new platforms want to enter this sector, they need to have a sufficiently large user base to have as much demand for access as the leaders and to be as competitive. This can act as a kind of barrier to entry for potential new entrants.

In 2014, Amazon and Google (owner of YouTube) battled over the purchase of Twitch but in the end, it was Amazon that bought the platform. So, in 2016, YouTube launched their own live streaming service to compete with them. Thanks to their base of potential viewers and streamers already using the 'classic' YouTube application, they have succeeded in reaching a sufficiently large base of cross-benefit network users. With 16% market share in Q2 2023 *(StreamHatchet, 2023)*, Youtube is the 2nd largest platform in the live streaming sector. However, it seems that they arrived too late, and that Twitch already had the streamers who were exercising the most positive cross-group network effects on a large viewers audience. In addition, people tend to go to Youtube to watch pre-recorded content, whereas Twitch only focuses on live streaming.

Platforms such as Mixer, Rooter and Rooter have tried to penetrate this market, however, they have never succeeded in obtaining the critical mass of users which has meant that demand for joining these platforms is low. Mixer tried the Seeding strategy by buying the services of streamer Ninja, which had a large cross-benefit network effect, in order to attract

its Twitch community to Mixer. However, in an interview (Irwin, 2021), Ninja claimed that the switching costs for its viewers were too high, and that to create a user account on the platform, you had to create a Microsoft account, which was a complex and time-consuming step, which must have put a brake on users' desire to join Mixer.

The Amazon Prime subscription may prove to be a barrier to entry for players in the live streaming platform sector. Subscribers to this service enjoy a considerable advantage: the ability to take out a paid subscription to a Twitch channel of their choice each month, at no extra cost. This feature creates a double dynamic, where users are inclined to concentrate their financial investments on Twitch channels rather than on new live streaming platforms. For new players trying to establish themselves in the market, attracting subscribers and retaining viewers may prove more complex, as Prime subscribers may be less inclined to diversify their subscriptions outside the ecosystem already covered by their existing Prime subscription. This may therefore be an obstacle to the growth and long-term viability of live streaming platforms that are not part of the Amazon ecosystem.

4.4.2 Horizontal Differentiation

As we saw in our Hotelling Model adapted to network effects, when a new platform wants to join this live streaming sector, they can differentiate themselves on 3 dimensions: access to fee, intensity of network effects and the quality of service. We concluded that there is a room for several platforms when horizontal differentiation weighs more than network effects, otherwise the platform with the highest network benefit captures all the market shares.

In practice, we realized that this model corresponds well to reality. In fact, Twitch has the largest user base of all the platforms because it was the first to enter the sector and it has built up a strong community. Although Kick and Facebook have tried to penetrate the market with horizontal differentiated services that we will explain in detail in the next section, viewers and streamers generally place more weight on network effects and network levels than on the degree of horizontal differentiation and prefer to stay on their legacy platform.

Some platforms, such as Facebook Gaming and Kick, have chosen to position themselves on a horizontally different range of services in order to attract some of the streamers and viewers.

Facebook Gaming, launched in 2018, has attracted a number of streamers thanks to the ease with which they can start live video game broadcasts from their mobile phones. Some of the top 100 channels on Facebook Gaming stream mobile gaming content (Stream Hatchet, 2022). This makes access to streaming easier, as all you need is a phone and an internet connection to stream content, whereas on Twitch you need a powerful enough computer or a gaming console to stream. Thanks to this service, Facebook Gaming is the leader in North Africa and South Asisa thanks to its ease of distribution.

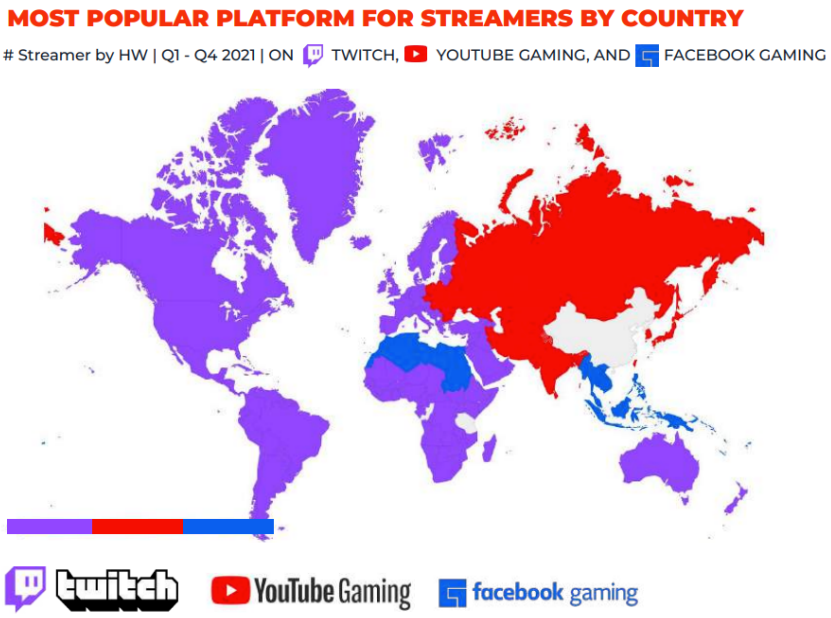

Figure 22: World repartition of most popular Streaming Platform in 2021 Source: StreamHatchet (2021)

A source of differentiation has been recently provided by Kick regarding the freedom to stream any content including online casino content. In fact, since 2020 the gambling category was one of the most streamed contents on the Twitch platform, many influential streamers played it, and many viewers were interested in this type of content. However, in October 2022, Twitch decided to ban this type of content because of the addictive deviances it could lead to among viewers and the reluctance of marketers who did not want to be associated with the image of the casino. So, in December 2022, Kick was launched and authorized the broadcasting of casino content. This attracted several streamers to join Kick, although their

market share appeared to be low for the time being, with only 2% of the market in the second quarter of 2023.

4.4.3 Streamer Contracts Competition

As explained in section 5.2.3 of our study, it is notable that new emerging platforms such as Mixer and Kick are adopting a strategy aimed at attracting content creators by highlighting significant reciprocal benefits within their ecosystems. This approach is based on the idea of generating the maximum cross-benefit effect for streamers, before leveraging the attraction of their respective communities.

However, a crucial aspect of this dynamic lies in the considerable costs associated with the contractual exclusivity of a streamer's services. This exclusivity has become a major component of negotiations between platforms and leading content creators. By way of illustration, when the challenge is to attract streamers with several million subscribers, platforms are prepared to invest colossal sums, sometimes running into tens of millions of dollars, to secure their commitment.

This is part of a growing competition within the streaming industry, where platforms are vying to attract the most influential creators, aware of the significant impact they have on the audience and engagement within their ecosystem. However, the financial aspect is not the only element at play, as exclusivity strategies can also give rise to complex dynamics concerning audience loyalty and the fragmentation of content between different platforms. Looking at current practices highlights the tension between the potential benefits of attracting big-name creators and the financial challenges inherent in acquiring their exclusivity. As new platforms strive to establish themselves in this competitive environment, managing these trade-offs wisely is crucial to shaping the evolving streaming landscape.

As far as the Mixer platform is concerned, the application of this strategy has been an undeniable failure. However, it will be interesting to see whether, when applied to the Kick platform, this strategy will endure and bear fruit over time.

5 Conclusion

This in-depth analysis of the pricing structure and competition within live streaming platforms offers some illuminating insights into the complex dynamics of this constantly evolving sector.

Firstly, as we saw in the theory of network good, the demand to join the platform is highly interdependent on the participation of other users. It is undeniable that dominant players such as Twitch, YouTube Gaming and Facebook Gaming have been able to circumvent the chicken-and-egg problem thanks to their solid pre-existing user base and economies of scale. This advantageous position has enabled them to strengthen their presence and establish themselves as essential pillars of the market. Other platforms have opted for seeding strategies, acquiring the services of large streamers with multi-million-dollar contracts.

The freemium business model has emerged as a predominant strategy for generating revenue within these platforms. By combining various sources of revenue such as paid subscriptions, donations, and advertising broadcast before or during live. The platforms have succeeded in diversifying their sources of funding while maintaining a relatively free experience for users. Revenue sharing between platforms and streamers has proved to be a crucial incentive for content creators, motivating them to produce quality content while remaining active on the platform.

Finally, during the analyze of the live streaming platform competition. It is important to recognize that the barriers to entry in this environment are important. The need for a considerable user base to compete with the established giants has made it difficult for new players to emerge on the market. Emerging platforms have explored horizontal differentiation strategies, aiming to create niches and meet the specific needs of smaller audiences such as Facebook Gaming and Kick. This approach can prove fruitful for new entrants, as it allows them to cultivate engaged communities, while avoiding head-on competition with the heavyweights. Another crucial element in the competitive landscape is the race to attract and retain the most influential streamers. The cross-group network effect, where popular streamers attract massive audiences, has become a key factor. Platforms compete to offer attractive terms to leading content creators, with the aim of creating a cascading audience

attraction dynamic. This has led to lucrative deals and strategic partnerships aimed at balancing supply and demand for quality content.

In conclusion, in the course of this work we have understood how the pricing structure of streaming platforms is set up and how it differentiates itself from other platforms thanks to revenue sharing. We were able to take an overview of the state of the market and how complicated it is for a new entrant to compete alongside giants such as Twitch and Youtube Gaming and get off the ground to achieve the critical mass of users needed to prosper in the long term.

6 Bibliography

- Alalwan, A. A. (2018). Investigating the impact of social media advertising features on customer purchase intention. International journal of information management, 42, 65-77.

- Afp, L. M. A. (2020, June 23). Jeux vidéo : Microsoft ferme Mixer, sa plate-forme de streaming, et s'allie à Facebook. Le Monde.fr. https://www.lemonde.fr/pixels/article/2020/06/23/jeux-video-microsoft-ferme-mixer-sa-plate-forme-de-streaming-et-s-allie-a-facebook_6043875_4408996.html

- Armstrong, M. (2006). Competition in a two-sided market. Rand Journal of Economics 37, 668-691

- Belleflamme, P., & Peitz, M. (2021). The Economics of Platforms: Concepts and Strategy. Cambridge: Cambridge University Press.

- Belleflamme, P., & Peitz, M. (2015). Industrial organization: markets and strategies. Cambridge University Press.

- Customer Support. (Twitch, 2023.). https://help.twitch.tv/s/article/earning-revenue-from-bits-in-extensions?language=fr

- Coëffé, T. (2019, January 2). Les 50 chiffres à connaître sur les médias sociaux en 2018. BDM. https://www.blogdumoderateur.com/50-chiffres-medias-sociaux-2018/

- Daelen, O. (2022, 30 décembre). Quelles sont les entreprises les plus précieuses au monde en 2022 ? Business AM - Infos économiques et financières. https://fr.businessam.be/top-100-entreprises-les-plus-precieuses-2022-valeur-capitalisation-boursiere/

- Emily. (2021, December 16). All you need to know about YouTube channel memberships. Medium. https://medium.com/@emily-campbell/all-you-need-to-know-about-youtube-channel-memberships-fe51a735fd99

- Freedman, E. (2019). New Media Ecosystems: Amazon and the Advancing Game Economy.

- Gaber, H. R., Wright, L. T., & Kooli, K. (2019). Consumer attitudes towards Instagram advertisements in Egypt: The role of the perceived advertising value and personalization. Cogent Business & Management.

- Goodrich, K., Schiller, S. Z., & Galletta, D. (2015). Consumer reactions to intrusiveness of online-video advertisements: do length, informativeness, and humor help (or hinder) marketing outcomes?. Journal of advertising research, 55(1), 37-50.

- Hagiu and Wright (2015). Marketplace or reseller? Management Sciences 61, 184-203

- Irwin, K. (2021, October 20). Ninja details the shortcomings, failure of Mixer. Dot Esports. https://dotesports.com/streaming/news/ninja-details-the-shortcomings-failure-of-mixer

- IndustryTrends. (2023). Best Online Casino: How Stake.com Became The Biggest Thing In Gambling. Analytics Insight. https://www.analyticsinsight.net/best-online-casino-how-stake-com-became-the-biggest-thing-in-gambling/

- Jhang-Li, J. H., & Liou, J. H. (2023). An analysis of operating strategy for a video live streaming platform: advertisement, advertorial, and donation. Information Technology and Management, 1-18.

- Kratky-Katz, M. (2022). PageFair 2017 Report: The State of the Blocked Web. Blockthrough. https://blockthrough.com/blog/adblockreport/

- Laborde, L. (2022, July 27). Le prix d'Amazon Prime augmente : comment cela affecte-t-il l'abonnement gratuit à Twitch ? Millenium FR. https://www.millenium.org/news/392976.html

- Lefaix, É. (2019, October 14). Facebook Gaming serait plus rentable que Twitch et YouTube pour les streamers. Siècle Digital. https://siecledigital.fr/2019/10/13/facebook-gaming-plus-rentable-twitch-youtube/

- Leys, K. (2020). What marketers should know about Twitch - Stream District. Stream District. https://streamdistrict.com/what-marketers-should-know-about-twitch/

- Paumgarten, N. (2018, May 14). How Fortnite Captured Teens' Hearts and Minds. The New Yorker. https://www.newyorker.com/magazine/2018/05/21/how-fortnite-captured-teens-hearts-and-minds

- Rauline, N. (2015, août 26). YouTube vient concurrencer Twitch dans les jeux vidéo. Les Echos. https://www.lesechos.fr/2015/08/youtube-vient-concurrencer-twitch-dans-les-jeux-video-270676

- Stream hatchet (2022) Yearly Report 2022 - Live Streaming Trends.

- Stream hatchet (2023) Q2 2023 Report - Live Streaming Trends.

- SullyGnome (2023) Twitch stats by month for the past several years https://sullygnome.com/longtermstats

- Twitch. (2023.). Press Center. https://www.twitch.tv/p/press-center/

- Trends Tendances, (2022). Amazon rachète Twitch. Mais au fait c'est quoi ? Trends-Tendances. https://trends.levif.be/a-la-une/tech-medias/amazon-rachete-twitch-mais-au-fait-cest-quoi/

- Welch, A. (2015). A cost-benefit analysis of Amazon Prime Air.

- Wiki, C. T. L. |. L. O. L. E. (n.d.). 2022 Season World Championship. Leaguepedia | League of Legends Esports Wiki. https://lol.fandom.com/wiki/2022_Season_World_Championship

- Yosilewitz, A. (2021, December 13). State of the Stream 2019: Platform Wars, the New King of Streaming, Most Watched Game and More! Medium. https://blog.streamelements.com/state-of-the-stream-2019-platform-wars-the-new-king-of-streaming-most-watched-game-and-more-ab0596d5c13d