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A Sports Economic Analysis of Esports with Regard to Market Structure and Competitive Balance

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Abstract

In the past decades, the esports market has grown rapidly. Due to tournaments with ever increasing spectators and revenue figures, esports has already overtaken ordinary sports in many different fields of interest. Nevertheless, there is hardly any literature on sports economics that examines the esports market. To close this gap, it is first examined whether a sufficient comparability between esports and sports exists at all. For this purpose, it is determined whether market structures of ordinary sports can also be found in esports. A special attention is paid to the structures of multisided markets. This market structure is found in ordinary sports as well as esports. Characteristic for esports is that the titles played are owned by companies. This contrasts with those in ordinary sports. Companies in the esports ecosystem are able to use different strategies, such as integration strategies, to strengthen their position on the market. Typically, two stages of vertical integration between game developer, game publisher and tournament organizer can be identified. Depending on the stages of integration, the companies have an increased influence on the course of the tournament. Therefore, the next step is to test to what extent the sporting competition of the tournaments is influenced by economic competition of the involved companies. The competitive balance of the tournaments serves as an indicator. Comparing two tournaments with different market structures, the influence of the strategies used can be identified. In structures where more separate companies have an influence on a tournament, the competitive balance is increased.

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List of Abbreviations

ACB	*analyses of competitive balance*
CB	*competitive balance*
CBC	*Complex Binary Check*
CS:GO	*Counter Strike: Global Offensive*
DGC	*Dependent Gini Coefficient*
EPL	*ESL Pro League*
ESBD	*E-Sport Bund Deutschand* e.V.
ESL	*ESL Gaming GmbH*
EULCS	*European League of Legends Championship Series*
LEC	*League of Legends European Championship*
LoL	*League of Legends*
NBC	*Non Binary Check*
SBC	*Simple Binary Check*
TGC	*Total Gini Coefficient*
UOH	*uncertainty of outcome hypothesis*

1. Introduction

Since commercially successful sports tournaments have exist, scientists have been trying to classify this market and identify potential needs for regulation. In 2014, Pawlowski summarized the needs of sport-economics as follows: "The economic development and significance of professional sport increasingly requires an economic consideration. In addition, the economic instruments (in modified form) are excellently suited to also investigate some central questions scientifically in the field of non-commercial leisure and popular sports. These are the prerequisites and framework conditions under which sports economics has emerged and developed as a relevant branch of science in recent years" (Pawlowski 2014, p. 5).

The economic background of many types of sports has already been studied. So far, there is no investigation of the application of sport-economic theories in esport. One example to show the drastic unexplored state of esports is the discussion about the right spelling for the concept of esport. In many sources, no uniform spelling is used. A detailed review can be found in the work of Chaloner. He finds that the most common expression found in the English language is "esport" (Chaloner 2020, pp. 20–21). Therefore, it is used in this work. For the German language, the Duden defined the spelling “E-Sport” as the correct one at the beginning of 2020 (Dudenredaktion 2020). Beyond that, much of the research is concerned with the question on how far esport fits into the concept of classic sports. A sufficient comparability between them is assumed. In this context it does not matter whether esport is legally recognised as sport. Since its beginnings, the esport market has developed rapidly. In contrast to the classic sports, however, esport did not originate from regional amateur sports clubs, but was driven by profit-oriented companies. Today, these markets are largely unregulated. Therefore, the aim of this thesis is to close the gap between research in sport economics and its application in esport. Given the good comparability, hypothetically **general sport economic theories must be applicable to the esports’ market**. The theories and structural models considered here relate predominantly to the interaction between the customer groups involved. Arguably the most important customer group is the audience, that everybody is trying to monetize (Scholz 2019b, p. 45). The benefit of the audience to watch a sport can be influenced by various factors. Often studied is the competitive balance (CB) and its importance in a sport. **It is questionable whether the market structure of esports is influencing the competitive**

balance of the competition. A study of this enables a deep understanding of the existence and intentions of the customer groups.

To go into depth for an analysis, a common definition for esport must be established first. It is important to understand esport only as a small part of the entire gaming industry. Gaming describes the recreational playing of computer games while esports describes a competitive environment in which computer games are played. Esport is recognized as an extension of gaming (Karhulahti 2017, p. 45). It is defined by the German Esports Federation (ESBD) as "the direct competition between human players using suitable video and computer games on different devices and on digital platforms under defined rules. The comparison of sporting performance in esports is determined by the interaction of a targeted operation of the input devices in direct reaction to the displayed game sequence and simultaneous tactical control of the overall game action. The reference object of the sporting activity are video games, which in their structure and mode of operation meet the requirements for the determination of sporting performance. They do not leave the success of the game predominantly to chance and offer a reproducible game framework for the comparison of the performance between the players" (Esport Bund Deutschland e.V. 2018b, p. 1). Karhulahti has analysed multiple definitions on esport. While all agree on this differentiation, he argues that the executive ownership by a company of the sport in question should be included (Karhulahti 2017). A characteristic of esports is that the games are owned and controlled by profit-oriented companies. In summary, esport belongs to the larger umbrella of the gaming industry and is an important part of it, but not every form of gaming can be attributed to esport (Schmidt et al. 2019, p. 2) . The term esport is to be understood in a similar way as for example the terms “ball sports” or “water sports” (Scholz 2019a, p. 8). Each kind of esport is represented by multiple games. These games are referred to as esport titles.

In the next chapter 2.1, the market structures in esport known from classic sport will be evaluated and its specific characteristics discussed. Chapter 2.2 looks at how the sport can be experienced by its audience and what benefits certain elements can bring. Especially the influence of CB on a sport is reviewed. Finally, in chapter 3, it is examined whether the market structures have an influence on the sporting competition between teams. Chapter 4 concludes the analysis and gives an outlook into further research.

2. Economic Theories Applied in Esports

2.1 Relevant Market Structures for the Consideration of Esports

2.1.1 Multisided Markets

In the attempt to examine the structure of different markets several decades ago, the ordinary model of a market of a single supplier with a unique customer group was not sufficient. That is why in 1952, the theory of two-sided markets was introduced in a paper on profit maximization by newspapers (Corden 1952). The following years it was further developed by various researchers (Gustafsson 1978; Blair and Romano 1993). However, the concept only gained relevance after the rise of digital marketplaces. Evans analysed the market structure of different credit card companies and found a similar structure (Evans 2003). Later, Armstrong proposed that two-sided markets can be found in many different industries (Armstrong 2006). To better describe more complex structures, these economists have established the theory of multisided markets as an extension of two-sided markets. In literature the terms "multisided market" and "platform market" are used synonymously.

The most important difference between multisided markets and "ordinary" goods' markets is the structure and number of the customer groups participating (Budzinski and Satzer 2011). The market for ordinary goods is shaped by the theory of the "homo economicus". It expects that the participants in a market act entirely rationally in order to make a benefit-maximizing decision, considering their own budget (Simon 1955, 1986). A basic application of direct network effects can be found here. Leibenstein describes how the structure of a customer group can influence the actions of individual members of the group. His focus is on the influence of the bandwagon and the snob effect on customer groups (Leibenstein 1950). The multisided market is characterized by a single supplier dealing with two or more different customer groups that are connected by indirect network effects (Dewenter and Rösch 2015). The impact that one customer group has on another is critical. Therefore, the multisided markets are distinguished from ordinary markets by their focus on the actions of the supplier, who operates as a market intermediary. The supplier is providing a platform for all customer groups and trying to manage their indirect effects to benefit himself or the customer groups (Rysman 2009). The terms "indirect network effects" and "externalities" are used synonymously.

These effects between customer groups are the decisive factor compared to ordinary markets. A distinction is made between direct and indirect network effects. While direct

network effects refer to the situation in which members of one customer group influence others among the same group, indirect network effects require a more complex set of conditions to be relevant. First at least two distinct customer groups must be identified. Indirect network effects can occur between them. As a last identifier of a structure the indirect network effects cannot be sufficiently internalised by each customer group on their own to qualify for a multisided market (Evans and Schmalensee 2005; Budzinski 2016). Therefore, through indirect network effects, one customer group is primarily influenced by the other customer groups of the same supplier. The size of a costumer group takes the most significant influence on the strength of an indirect network effect. As a result of these effects, the suppliers in multisided markets expect reactions from all customer groups, even if they change the conditions for only one customer group. The supplier must be aware that indirect network effects can take on both a positive and a negative form without changing the basic structure of a multisided market (Dewenter and Rösch 2015).

This concept becomes clear when discussing the example of the market surrounding a newspaper, as proposed by Corden in 1952. A newspaper is facing two distinct customer groups. First there are the readers and second the advertisers. The newspaper is selling its product to both parties. The more reader the newspaper has, the higher the attractiveness for the advertisers to run ads and pay for them. On the contrary, if there are too many ads displayed in the newspaper, paying readers might lose interest. Thus, in turn decreasing the attractiveness for the other customer group. To maximize its revenue the newspaper is incentivised to balance these indirect network effects between both customer groups (Corden 1952). One way of doing this, is to reduce cost for the unsatisfied customer group. Another option is to negate the negative effect by connecting it to other benefits, such as improved content. Here, the newspaper functions as a platform between reader and advertiser. In the case of multisided markets, the number of customer groups and complexity of the platform is increased substantially.

Platforms can be separated in natural and artificial platforms. Within natural platforms, the marketplace can only be established with the help of the intermediary. Artificial platforms are created when a company becomes active as an intermediary between customer groups that could also interact naturally (Budzinski 2016). To be a sustainable artificial platform the indirect network effects generated between the customer groups must exceed the efficiency of the one-sided market.

Adopting the structure of the multisided markets to sports business requires the conditions discussed above to be met. In this case, a sport can be presented as a platform that attracts multiple distinct customer groups. The customer groups must be connected by indirect network effects that they cannot internalize themselves. In the case of European football, Budzinski and Satzer have already analysed the model of the multisided market. In their analysis, the football teams are identified as suppliers of the platform. The teams offer their product, the matches, to multiple distinct customer groups. These include spectators, media, sponsors, and other users of the arena. Between most of the customer groups externalities can be found. This understanding provides the teams with unique pricing strategies to maximize their profits. It clearly shows that the model of multisided markets is also applicable to sports (Budzinski and Satzer 2011). Furthermore, the way in which the broadcasting rights to the tournament's matches are distributed proves that the teams and tournament organizers already have an understanding about the theory of the multisided markets. In the seasons 2006 to 2009, the broadcasting rights for the Bundesliga were sold at lower prices in favour of a better broadcasting schedule and side program. This approach allows a better balance of externalities between all customer groups and promises higher revenue during each season (Hartwich 2007).

To transfer the model of multisided markets from classic sport to esport, the most important stakeholders of the industry must be found. The customer groups are then selected from these. They must be identical in all the major esport tournaments. To confirm the existence of a multisided market all three necessary aspects must be identified (Evans 2003, pp. 192–193). This is the platform supplier, its distinct customer groups, and their externalities. Scholz presents a broad overview of various stakeholders in the esports industry. To define the stakeholders, Scholz uses the widely accepted definition as "those groups without whose support the organisation would cease to exist" (Freeman and Reed 1983, p. 89). He arranges them into primary and secondary stakeholder groups. Primary stakeholders are those with a direct influence on the industry's value chain. Secondary stakeholders are those who only have an influence on the former, i.e. who are one step further removed from the value chain (Darnall et al. 2010; Eesley and Lenox 2006). In the core of Scholz's model of the esports industry are the audience, professional teams/ players, game developers and tournament organizers as primary stakeholders (Scholz 2019b). While others argue that this model needs to be extended (Śliwa and Krzos 2020), a constellation of these stakeholders is supported by various reports from the market research divisions of PricewaterhouseCoopers, Nielsen and Deloitte, as well as the sports business journal "The Esports Observer" (Pike 2019; Sikora and Bhat 2019; The Esports

Observer 2017; Weber and Wilke 2018). The only addition to Scholz's proposal that is displayed by all sources is the influence of advertisers on the other market participants.

Before the esport ecosystem can be presented, several issues should be addressed. In the articles examined, the terms "game developer" and "game publisher" are used synonymously. This imprecision may occur because this difference is not noticeable at the tournament level. In any case, the participants must obtain the necessary licenses from a previous instance. In the next chapter of this paper, it will also be discussed how the interaction of these entities is perceived and what influence it has on the customer. In this analysis, the term "game publisher" is used as a term for the company acting as licensor, while the game developer is only responsible for the technical realization of the games. Moreover, in the context of esports competition, the professional teams are to be considered as one unit. A substitution of players during an active match is not intended and transfers of players between teams are only allowed in narrow periods between seasons (Holländer 2017; ESL Gaming GmbH 2020a; Riot Games 2020a). In contrast to classic sports, media companies do not play a crucial role in the esports, since most major esport tournaments are broadcast on multiple streaming services at once. The utilized service providers include the largest online streaming services, such as YouTube, Twitch and Facebook. In some cases, the tournament organizers also use their own services to broadcast the event (PricewaterhouseCoopers 2019, p. 9). Classic TV companies do not play a major role in the broadcast. This reduces their bargaining power to a bare minimum.

Using these assumptions, the market consists of its participants the tournament organizers, audience, advertiser, game publishers and professional teams. To allow for the theory of multisided markets to apply, these stakeholders must function as distinct customer groups of a single platform. Before the indirect network effects between them are described, the individual customer groups are now examined.

Tournament Organizer: As a possible platform supplier, the tournament organizer is centred in the market structure. He is the driving force in maintaining a competitive tournament environment, especially if game publishers have decided not to invest resources. The tournament organizer offers its product of a fully functioning sport to the other market participants, its customer groups (Scholz 2019b, pp. 58–62).

Audience: The audience is made up by customers who are visiting offline esport events as well as watching the events online. Participants will strive to experience the event as part

of a community, either as part of the live audience in the arena or via online chat. They benefit the most from exciting matches. Apart from a few premium offers, most online streaming services are free of charge for the audience. They invest their time and willingness to deal with the other market participants. It is the critical customer group for whose interest everyone is competing for and is ultimately trying to monetize (Scholz 2019b, p. 45). According to the latest report by the market research company Newzoo the total audience in esport consists of 495 million members in 2020 and is expected to grow up to 646 million by 2023 (Newzoo 2020).

Advertisers: Every advertiser aims to increase its brand awareness and link its image and the image of its products to the image of the brand sponsored to increase demand. In the early days only companies known in the esport industry could be found as sponsors in esports. PricewaterhouseCoopers finds in its report an increasing number of non-endemic sponsors (Weber and Wilke 2018). Non-endemic companies are defined as companies that are not directly linked to the esport industry with their products. Newzoo finds that in 2020 more than 50 percent of all the revenue generated in esports will be derived from advertisers (Newzoo 2020).

Game publishers: Uniquely in esports, the sport played is fully owned and licensed by a company. As discussed above, the game publisher acts as a licensor for all customer groups involved in the market. Their goal is to build a sustainable community to sell their game to. Their strategies will later be analysed in detail.

Professional teams: Teams in esport are like teams in classic sports. Their target is to build the best team possible, relying on players, coaches, and other supporting staff (Scholz 2019b, pp. 62–70). Using their setup, they aim to compete successfully in tournaments and to create a sustainable brand that can be marketed on its own.

While each customer groups might act in its own interest, it is linked to the others through indirect network effects, as shown in figure 1.

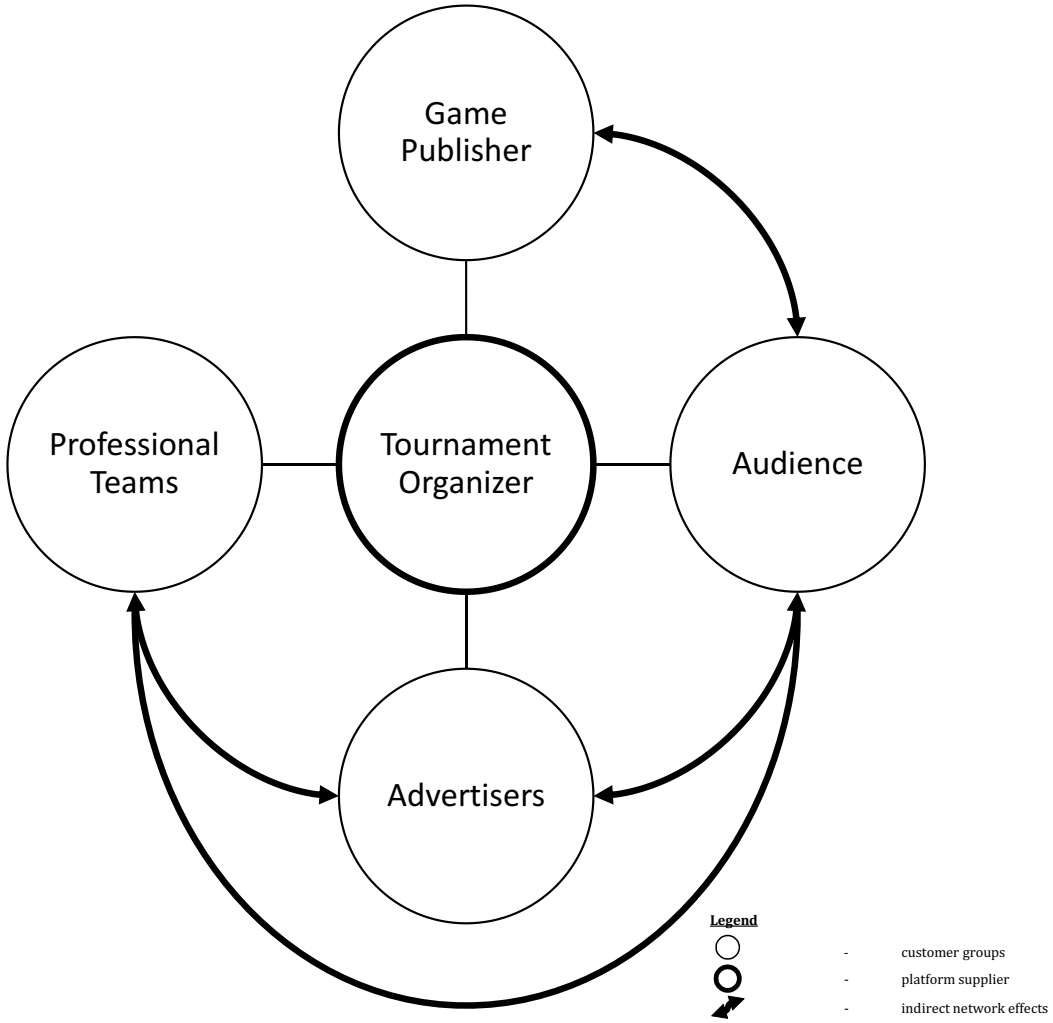

Figure 1 - The esport ecosystem modelled as a multisided market (own figure)

Audience – Advertisers: The indirect network effects between audience and advertisers in esport is identical to other sports. Detailed documentation can be found in the corresponding literature (Budzinski and Satzer 2011). It is obvious that a larger group of audiences increases the attractiveness of the event for advertisers. This results in a more extensive acquisition of advertisers for the event or an incentive for existing partners to commit to more advertising time. From the other perspective, it is questionable whether the audience will benefit to the same extent from an increased presence of advertisers (Budzinski and Satzer 2011, pp. 8–9). Research suggests that the audience is discontent with more advertising (Hartwich 2007, pp. 21–22). This is contradicted by the observation in esport that new sponsors regularly ensure an increase of the production value of the events and create new content for audiences (PricewaterhouseCoopers 2019, p.16).

Audience – Game Publishers: The esport itself would not exist without the game publishers. By supporting a large community in esport tournament, they aim to create a market

with high potential for themselves by indirect network effects. This increased market potential through a large interested community can be achieved through the audience of a tournament. Thus, a larger audience at tournaments potentially leads to more customers for existing or future products of their company. The audience also benefits from a larger group of publishers. At major tournaments, smaller side events can be observed regularly (Śliwa and Krzos 2020). In this way, the audience can enjoy additional activities at the same event without any effort. As a potential customer of the publisher, the audience also benefits from the competition between several publishers. This competition ensures an increased incentive for publishers to support major tournaments and leave the option for others to host even more.

Audience – Professional Teams: At the basic level, the teams benefit from a larger audience through emotional support and fans for the competition. With larger audiences at tournaments, teams can increase their brand awareness. Sales of their own products, such as merchandise and other peripheral items will be increased on tournament days. Also, a larger number of fans improves the teams' ability to get better sponsorship deals. From the audience's perspective, they expect sporting achievements from the teams. At the tournaments, a larger number of teams increases the chance to see star players and to observe rivalries between teams. In addition to the number of teams, the quality of the teams is a crucial factor for the audience. The presence of star teams or local heroes creates a benefit for the audience. That is why the indirect effect between these groups is not solely based on the size of their counterpart. If players or teams maintain an online presence outside of the professional esports' environment, they introduce a new market, in which they are directly engaged with their customers. In this case they operate in a market comparable to that of social media stars (Gaenssle and Budzinski 2020).

Advertisers – Professional Teams: When investigating the indirect effects between advertisers and professional teams in this multisided market, it is important to remember that direct activities between the customer groups must not be considered. Only advertisers who place their advertisements in direct relation to the tournament are examined. However, for professional teams, a big advertiser group indicates a more attractive tournament. A practical example is the larger prize pool. This results in a way to increase their budget and monetize their access to the audience. On a mutual basis, it is possible to link the image of the team, brands, products, and sponsors and make it tangible for potential customers. Finally, the sponsors are, like the audience, not only interested in the number of teams involved, but also in the quality of the teams competing in a tournament. They

aim for tournaments with high stakes to transfer the enthusiasm of the fan groups to their own products.

Overall, this analysis clearly shows that the theory of multisided markets can also be applied to esports. As discussed above, the requirements necessary for the presence of a multisided market and the corresponding indirect network effects can be fulfilled. In contrast to the classic sport, the teams do no create the centre of the platform (Budzinski and Satzer 2011). The tournament organizer is at the heart of the multisided esport market. It can manage the indirect network effects of all its customer groups and bring them to an efficient point. On the receiving end, all customer groups have already adapted to the tournament organizer's standards. This observation calls for further investigation through literature on sport economics. One factor that can be noticed at this point is the previously introduced relationship between game developer, game publisher and tournament organizer. The business strategies that dominate these entities are examined in the following chapter.

2.1.2 Concentration Strategies through Vertical Integration

To strengthen their position in the market from an economics perspective, companies have various concentrations strategies at their disposal. Regarding the market structure discussed in chapter 2.1.1, integration strategies might be the most relevant option. They are distinguished between vertical and horizontal integration. Horizontal integration describes the structure in which a company produces several identical products that are located at the same position in the value chain. On the contrary, vertical integration strategies are available. Here the departments process products from other departments of the same company into new end products. The departments in vertically integrated companies are arranged in subsequent stages of the value chain (Hungenberg and Wulf 2007, pp.132–141). By merging, companies can better utilize existing synergies between them as well as increase their bargaining leverage over other market participants (Nayyar 1992). Horizontal as well as vertical integration strategies can be observed in other branches of the media industry (Stöhr et al. 2019). Here several mergers of both types have been discussed. Traditionally, the media industries can be separated into content production, distribution, and exhibition. A recent example is the horizontal merger of Disney and Fox. After the Disney-Fox merger, their influence on the content production segment increased. Another instance where vertical integration can be observed is the merger of AT&T and Time Warner. This enables the new company to control the full value

chain from production all the way to the customers. The effect of integration strategies is controversial (Rittaler 1989; Schmidt and Haucap 2013). Questions concerning the welfare of industry and customers as well as competition law issues are at the centre of the discussion.

In contrast to classic sports, esports was not formed by local sports clubs but was driven by companies and their expected business opportunities. Since esports has grown from the top down, this market is historically largely unregulated (Scholz 2019a, p. 5). Amateur tournaments and other grass-root movements have only been established in recent years. This knowledge puts the owner of the esport title in a monopoly position of power over all other customer groups. Its position is supported by the fact that in the esports market the sport played is owned by one company (Karhulahti 2017). All users of the product must get the permission to use the game from the licensor of the title. This gives them a, in sports, unique opportunity to gain more control over every other company involved. A comparable situation in classical sport can be found in the sale of broadcasting rights. Here, the teams join together to strengthen their position (Budzinski 2017; Budzinski and Satzer 2011). That is why, when looking at a single esport tournament, it is important to understand how the companies are structured along the value chain. In the esport ecosystem there is a differentiation between game developers, game publishers and tournament organizers (see figure 2). Their interaction must be considered (Scholz 2019c, p. 118). While the companies can also use horizontal strategies, only the vertical integration of the companies is relevant for this analysis, as only a single product is considered here. Using different integration stages, companies can increase their control over the platform established in the multisided market structure. Integration strategies gain increasing relevance in esports. This allows the company at the head of the value chain to

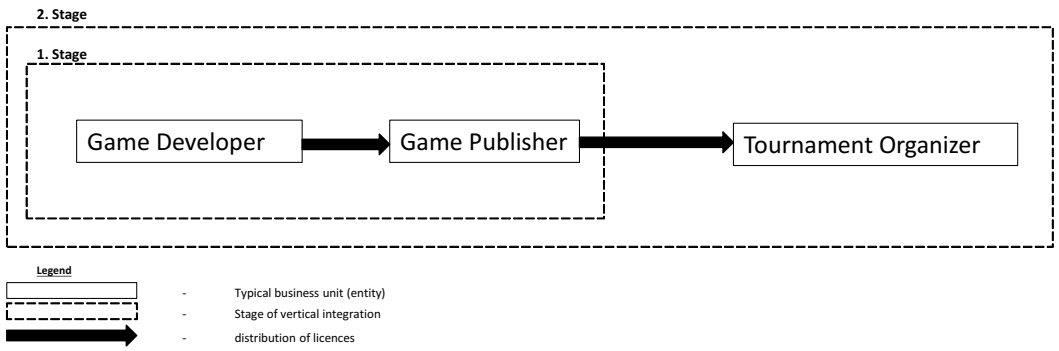

Figure 2 - Vertical chain of integration (own figure)

control more steps of the process all the way to the customers at the end of the value chain (Montgomery 1994) .

The first entity, the customers of esport will interact with is the tournament organizer. It is positioned at the end of the value chain. As an organizer, this company creates the platform on which the other market participants can meet. To be able to organize tournaments around esport, the necessary licenses for the game used, are required. The tournament organizer receives these licenses through the preceding instance of the value chain. It is possible that the tournament organizer does not plan events exclusively for one title. In this case, he must contact all the necessary licensors for the various games. These can be identical for several titles and may be different for others. Organizing multiple tournaments simultaneously increases the power of the tournament organizers, as more companies depend on them (Scholz 2019b, pp. 58–62). The game publisher of the respective title is available to the tournament organizer as a licensor. Fundamentally they serve as intermediaries between developers and customer groups. A publisher usually serves multiple titles either from the same developer or from different ones. Depending on the region, type of competition and other factors, the game publisher grants one or more tournament organizers the right to host a tournament. On the other hand, a game publisher is used to position the game developer's product on the market. Since they focus on the technical development and implementation of the game, operational businesses of sales, marketing, and licensing are places in the game publishers' hands. The developers produce the basis on which further activities are carried out. They are the head of the value chain (Scholz 2019b, pp. 49–57).

At this point in the value chain, the first of two stages of vertical integration can be identified. Many game developers, especially leading esport game developers, are publishing games by themselves. Thus, eliminating the intermediary towards the customers. Most prominent examples in esport are "Riot Games" and "Activision Blizzard" each on their own launcher as well as "Valve Software" using its own digital marketplace "Steam" to sell its own and third-party products to the regular player (Riot Games 2020c; Activision Blizzard 2020; Valve Software 2020).

While the integration of game developer and publisher can be found regularly, the question about the second stage of integration remains controversial among the industry. Empirical research on the integration of the tournament organizer has not been publicised. The indecision for the right integration system can be seen at Activision Blizzard. As

discussed above the company develops and publishes its own titles. Outsourced the organisation of the tournaments for the title StarCraft, but for the title Overwatch a few years later, they decided to produce the tournaments entirely in-house. Riot Games has decided to host all major tournaments from national up to world level for their game League of Legends (LoL) by themselves, leaving only minor regional tournaments to be hosted by other companies. Another system can be found with Valves' game Counter Strike: Global Offensive (CS:GO). Here the ESL Gaming GmbH (ESL) is licensed to produce national as well as international tournaments. Valve only becomes active in a supporting role when tournaments on a worldwide scale are conducted. While this is a commercial decision for the involved companies, its impact is felt by all customer groups. The CB of a tournament might be one indicator.

2.2 The Importance of Competitive Balance in Esports

The discussion about competitive balance (CB) can be traced back to the beginning of sports economics. It is based on the uncertainty of outcome hypothesis (UOH) established by Rottenberg and Neale (Rottenberg 1956; Neale 1964). The UOH states that the spectator can derive greater benefit from sports events where the outcome of the competition is uncertain for as long as possible, whereas the audience loses interest when the result can be foreseen early on. The UOH is defined as follows: "Uncertainty of outcome hypothesis is predicated on the assumption that fans receive more utility from observing contests with an unpredictable outcome and posits that the more evenly team playing abilities are matched the less certain the game's outcome and the greater the game's attendance will be" (Knowles et al. 1992, p. 72).

The term "competitive balance" in this context describes the balance of the competitiveness of the individual participants of a sporting competition in relation to each other (Fort and Quirk 1995; Zimbalist 2002). A high CB implies that all participants of a competition have the same chance of winning and no favourite can be identified. In essence, it means that a certain level of CB between athletes and/ or teams translates into a certain degree of uncertainty about the outcome in a sports competition (Pawlowski and Nalbantis 2019, p. 154). Humphreys states that, "if a league lacks competitive balance, fan interest in the weaker teams will fall and, eventually, fan interest in the stronger teams will also decline. Thus, greater competitive balance should lead to greater demand" (Humphreys 2002, p. 133). For this reason, increasing the suspense should be beneficial for the audience. In theory, CB should have a direct influence on the demand of the audience for the sport. In

reality, various other effects have an additional influence on the demand and prevent a direct derivation of the CB on it. Effects such as price elasticity of demand, superstars and local heroes in sport and overall customer behaviour as well as others have been in discussion to be an influencing factor (Budzinski and Feddersen 2015; Adler 2006; Hedlund et al. 2020; Brandes et al. 2008). A deviation between the measured competitive balance and the perceived competitive balance can also be observed (Pawlowski and Budzinski 2012, 2014). In addition, one of the greatest challenges of research about CB is that the CB cannot be considered as an absolute value. It is necessary to always regard it in relation to comparable figures (Budzinski and Feddersen 2019). The evolution of CB in a sport, a tournament or the comparison between sports can serve this purpose. It remains difficult to determine at what point a sufficient CB is met. It may be enough for only a few teams to be at the same sporting level within a tournament to reach this adequate CB value (Pawlowski and Anders 2012). When considering these effects, more room for interpretation of the figures is left and a greater demand for additional research is created.

The first things to consider are the diverse approaches that are used to analyse CB. These include different perspectives, potential classifications of CB and the measurement methods that are applied to display the evolution of CB. Then, market participants that are able to influence a sports CB can be identified. In the end, it can be reviewed to what extent these theories can be applied to esport.

Existing literature on CB can be divided into two distinct fields of interest (Fort and Maxcy 2003). On one hand, the literature reviews the influence of the CB on the audience and thus the validity of the UHO. Here, the impact of the CB on the demand of the fans for a sport is considered and not the development of the CB of a sport itself. On the more fundamental level, there is literature that focusses on the analyses of competitive balance (ACB). It is defined as the literature that "focuses on what has happened to competitive balance over time or as a result of changes in the business practices of pro sports leagues" (Fort and Maxcy 2003, p. 155). The change in the CB can be determined by several different measurement methods. A single method analyses one of two factors or their correlation (Evans 2014). The first aspect that can be examined is the level of dominance found in a tournament. Dominance has been established when the same team wins consistently over several seasons. The other aspect that can be analysed, is the level of concentration of the teams. It is represented by the closeness between teams in a tournament in one season.

Closely related to this differentiation, three more levels of uncertainty have been identified in literature. These levels differ based on the period of time observed. Possibilities are match uncertainty, seasonal uncertainty, and continuous uncertainty (Berkowitz et al. 2011; Alavy et al. 2010; Pawlowski and Nalbantis 2019). Measurable periods are given by the sport and tournament system observed. Match uncertainty describes the predictability of the result of a single match. With a high level of uncertainty, it is expected that each team could beat every other team on any given day. Seasonal uncertainty takes the idea of match uncertainty and extends it over the full period of a season. The uncertainty level increases if each team can beat every other competitor and the final seats within the table remain open until the later matchdays. While the first two uncertainty levels use the aspect of concentration, the third level focuses on the aspect of dominance. Looking at continuous uncertainty, it depends on whether a few teams succeed in winning several seasons of a tournament or whether they regularly reach high ranked seats in succession. If every team in a tournament has the same chance of winning and champions differ on multiple seasons, the continuous uncertainty will increase (Berkowitz et al. 2011, p. 257). Moreover, measurement is not limited to the first seat but can also be extended to other important thresholds in the tournament table. Prominent examples are the entry into the playoff-bracket, seats for international tournaments or the relegation battle (Eckard 2001).

Because of the many different angles from which the CB can be viewed, there does not seem to be a single measurement method that can accurately describe a tournament. A broad overview of the different measurement methods and their fields of application can be found in the work of Richard Evens. Furthermore, Fort and Maxcy discuss the need for some of the aspects and methods of research in the field of CB after others have questioned their significance before (Evans 2014; Fort and Maxcy 2003; Hall et al. 2002).

Since the perceived CB can have a strong impact on the experience of the audience of a sport, there is a great interest in influencing it. This goal might involve tournament organizers, the government and even other market participants (Budzinski 2017). The strongest leverage to control the CB of a sporting competition is held by the entity that is hosting the tournament. One way to influence the CB between matches is to adjust tournament rules. One of the most important rules concerns the distribution of the prize money (Sanderson and Siegfried 2003). Researchers have found a direct correlation between the teams' budgets and their chances of winning (Hall et al. 2002). It is questionable whether it is reasonable to give more financial support to losing teams so that they can catch up

with the others in subsequent seasons. Here, different strategies can be found in most sport tournaments (Budzinski 2017). In classical sports, the sale of broadcasting rights represents a constant revenue stream for the teams. Governments have created antitrust exemptions for a few tournament organizers to ensure a good CB (Fort and Quirk 1995). This allows the teams, for example, to sell their broadcasting rights collectively rather than having to rely on individual marketing. By uniting the teams, even those that are not as successful as others in a sport get the chance to profit from the popularity of the tournament as a whole. They could manage to close the gap to the other teams (Falconieri et al. 2004; Peeters 2011). In the past years, the theory has been applied to different sports with different approaches.

In esport, the CB of the various tournaments within the titles has not yet been measured. There is no ACB literature and its influence on the audience in terms of UOH has not been determined. Most of the existing research is scattered over several topics. Reitman has identified 150 research papers on esport, that can be sorted into seven fields of interest. Of these research papers, 26 deal with the business aspect of esport and only 20 others with its relationship to classic sport. An application of classical sport economics is not mentioned (Reitman et al. 2020). Some researchers have been working on the dynamic of esport matches. The goal is to be able to predict the outcome of encounters during the match. They define an encounter as a situation in which two or more units from opposing teams are in range to affect each other (Schubert et al. 2016). The overall idea of this concept is to be able to make statements about the performance of the teams and to calculate statistical probabilities of a favourite team. The MIT researchers have discovered that the probability of a certain outcome is based on its initial conditions such as players, team compositions and strategic decisions made by the teams. This observation could make the outcome of an encounter predictable and thus reduce match uncertainty. However, the analyses do hardly go beyond a single encounter and cannot predict the outcome of the given match or even an entire tournament. To be able to do this, the test would have to be more robust against changing game rules and player strategies.

These first approaches show that the general concept of CB also is applicable in esports' tournaments. Overall, the analysis in chapter 2 has shown that multiple theories applied in classic sport economics can be transferred to the esports' market. To find whether the discussed market structure is influencing the CB in a competition, it is worthwhile to look at the development of the CB over the lifetime of different esport tournaments in the next chapter.

3. Empirical Analysis to Assess the Influence of Market Structure on the Competitive Balance in Esports Competition

3.1 Analysis of the Market Structure and Organisation of Selected Tournaments

The aim of the empirical analysis is to find out to what extent the market structure has an influence on the evolution of the CB. The assumed basis of the expected divergence is the different level of vertical integration surrounding the companies that are involved in organizing the tournament. The target of the companies is to keep their esports' ecosystem interesting and relevant. To achieve this, the tournament's organizing entity must be in a prime position to function as a platform and manage every need for all customer groups in its multisided market. To justify the existence of an external tournament organizer to the game developers and publishers, they must offer economic benefits to the value chain. If the tournament organizers cannot ensure this, there is little reason to assign them separately and not move the vertical integration forward. One way to achieve this added value is to insure an improved CB within the sports tournament. As discussed in chapter 2.2, higher CB value enhances the benefit of the audience watching the tournaments. By pleasing the audience, the other customer groups are also impacted as discussed in chapter 2.1.1 through the indirect network effects. That is why not all customer groups need to be dealt with individually. It should be observable that there is a significant difference between the evolution of the CB values based on the underlying market structures of the tournament.

To be able to generate a robust analysis, comparable tournaments must be used. This means that the chosen tournaments may only differ regarding the variable to be checked. All other influencing factors must either be kept identical or brought to a point where they cannot influence the results. As discussed in chapter 2.1.2, there are only two strategies used in the esport ecosystem. They differ in the extent to which companies along the value chain are vertically integrated. While some game developers and game publishers have decided to organize their own tournaments, others have entrusted an external tournament organizer with this task. For the following analysis, one example each for both systems is needed.

These specified conditions narrow the selection of possible tournaments to only a few options. Samples such as major international tournaments like the "League of Legends

Worlds Championship" or "the ESL ONE Counter Strike: Global Offensive Series" can be ruled out (Riot Games 2020b; ESL Gaming GmbH 2019). As discussed in chapter 2.1.2 Riot Games hosts all tournaments for League of Legends by themselves, while the ESL is a third-party tournament organizer. For these tournaments, the regular change of location even between countries and continents, sometimes several per year, causes constantly changing basic conditions. Another option for examination could be the tournaments of Blizzard Entertainment's titles Overwatch and StarCraft 2. The StarCraft games are historically best known for their prominent role in establishing a sustainable esport ecosystem. Here, the game publisher has given up on hosting any major tournaments by themselves and has left the regulation of tournaments to external tournament organizers. With the release of the title Overwatch in 2015, they have decided to launch their own tournament (Blizzard Entertainment 2020). For their analyses, the biggest obstacle is that the two tournaments take place in different countries. It can also be argued that StarCraft is already losing relevance, while Overwatch is still very young.

The best option can be found among regional tournaments of the most popular titles LoL and CS:GO (Esport Bund Deutschland e.V. 2018a). For both games, a respective European tournament can be analysed. In the case of the title League of Legends, the developer and publisher Riot Games offers the "League of Legends European Championship" (LEC) (Riot Games 2020b). On the other hand, the "ESL Pro League" (EPL) is a tournament for the Valve developed and published game CS:GO. This tournament is organized by the ESL in Europe (ESL Gaming GmbH 2020b). Therefore, an example for both stages of vertical integration strategies are given. A distinct advantage given by this constellation of tournaments is that both tournaments have their seat in Germany. Even if the core gameplay is fundamentally different, both tournaments are similar on the organisational level: both games require a team of five players, completed by substitutes and supporting staff. Additionally, some esport organisations have decided to compete in both tournaments with unique teams simultaneously. This is possible because the additional effort to manage a second team in similar tournaments is minimal. Characteristic for esport, is that a single match does not allow for a draw. The match only ends when a single winner is determined. Tournaments are played over several match weeks in sequence. A single match week runs over several consecutive match days. Within this period, a fixed number of matches is held between every team. By combining several days of play into one match week, the amount of variation between individual days is reduced. In some cases, it is possible to postpone matches between days, so that they have unplanned different lengths. However, it is still possible that some match weeks have varying numbers of

matches planned. Another common ground between both tournaments is that they allow the teams to qualify for higher ranked international tournaments. On the other end of the scale they are supported by more lower tier tournaments. This gives the teams a stable structure even outside of the tournament and allows the fans of each esport title to strive with the success of their teams.

The LEC, formerly known as "European League of Legends Championship Series" (EULCS), was established in the spring of 2013 (Gamepedia 2020). Since then it has completed 15 full seasons, two seasons per year. The latest iteration was launched in June 2020 and will not be finished by the due date of this thesis. That is why the latest season cannot be considered in this paper. Since the first iteration multiple alterations of the tournament rules have been applied. These alterations include changes implemented by the tournament organizing entity, such as the number of teams competing in a season, the number of weeks played per season as well as changes to the tournaments format. Formats that can typically be used, refer to the number of rounds played, matches in best of one, two or longer formats, and the use of group stages or playoffs. The most important changes of LEC tournament rules are the use of a best of two format in the second season of 2016, the division of the teams into groups for both seasons in 2017 and, the implementation of a franchise system in 2018. These happen only in parallel to the constant patching cycles done by the game developing entity. In the case of the LEC both are controlled by Riot Games. Taking a first look at the numbers of the LEC, a short empirical description of the tournament can be made. In the LEC a total of 29 teams have competed. Of these 29 teams, only eight teams played against each other per season until the summer season in 2014. From 2015 onwards this number was increased to ten teams. The exchange of teams is the result of relegation of the weakest teams, rebranding of teams or the trading of a team's slot between organisations. Other teams have remained in the tournament for longer periods of times, some have even competed in all seasons.

The EPL was founded in the spring of 2015 (Liquipedia 2020). Since then a total of 11 season, with two seasons each year, have been organized. The last season was prematurely cancelled due to the increasing spread of Covid-19. This leaves a total of 10 complete seasons. This tournament as well has experienced a series of rule alterations in its lifetime, that are in their core like the ones applied in the LEC. The most striking adaptation for this analysis is the reduction of match weeks in the last two seasons of the EPL down to only two weeks. The rule changes must be considered in the later analysis. Rule alterations for the EPL and new patches for the game do not have the same origin in a

single company. As mentioned above, this major difference is based on the alternative market structures supporting the tournament. The empirical description for the EPL shows that in this tournament a total of 32 unique teams have appeared. With growing popularity of the EPL the number of competing teams has steadily been increased from twelve teams in the beginning up to 16 teams in its tenth season. The exchange of teams in between season is due to the same reasons as in the LEC.

Given the similarity between the tournaments, it can be assumed that any differences in the CB are due to the already discussed market structure. This is the only variable that is not equal in both tournaments. To determine whether there is an impact from the companies on the CB of a tournament, the CB will be measured. All information relating to rules and data on the course of the tournament originates from the respective wiki pages (Gamepedia 2020; Liquipedia 2020). Before the data was used, it was randomly checked against the official recordings of the tournaments. As there are different factors on the CB of a sport, a single evaluation is not sufficient. A complete picture is provided at least by examining the dominance and concentration of teams in the tournaments. Within these factors, it is necessary to measure different variables and to test them on multiple approaches. It can be identified to what extent the companies, utilizing their individual market structures, have a relevant influence on the CB of the tournaments.

3.2 Evaluation of the Competitive Balance and Comparison of the Tournaments

The first available analysis of the CB tests the existing dominance in sports tournaments. To do this, relevant thresholds within the tournament must be chosen as measuring points. Dominance may be given if the same teams regularly reach these thresholds in succession (Evans 2014). In the further course of the analysis, these thresholds are referred to as achievements that can be attained by the competing teams. After the relevant achievements are identified, it is counted how often a team manages to reach these. The first available achievement is the champion of the tournament. It is the first seat of the table. This can be extended to the second and third seat (Eckard 2001). To assess if the same teams regularly reach any high ranked seats, it is also possible to get the total sum of first to third place seats for each team over the full period of the tournament's existence. Following the table even further down the next relevant achievement can be identified as the entry of a team to the playoffs. These five possible achievements present the measuring points for a resilient analysis. Once it has been identified how often each team has

attained these specific achievements, it is possible to determine the degree of their distribution among all teams.

An established coefficient to present this degree of distribution is the Gini coefficient (Evans 2014, pp. 42–43). The Gini coefficient is a statistical method derived from the Lorenz curve. The coefficient adopts a value between zero and one. It reaches zero in the case of equal distribution and one in the opposite case of maximum inequality of distribution of achievements. Equal distribution is defined as a distribution with a variance of null. Regarding the theory on CB a Gini coefficient near the value one is to be interpreted as a more imbalanced situation. The extreme scenario, where the Gini coefficient reaches one indicates that an achievement has been dominated by a single team in every season. An improved CB can be found as the value of the Gini coefficient decreases. A Gini coefficient valued zero represents a perfectly balanced competition. Here every team attained the same amount of the given achievement over the course of the tournament (Budzinski and Feddersen 2019).

Before discussing the Gini coefficient, the major challenges in compiling the data[1] should be mentioned. In contrast to the LEC, there are no playoffs played at the end of an EPL season. Therefore, this specific option of comparing the two tournaments is eliminated. The missing playoffs do not influence the other achievements. The battle over the seats in the playoff stage of the LEC might still offer a deeper insight into the tournament and is therefore kept in the further analysis. Secondly when calculating the Gini coefficients, it can be noted that the ratio of attainable achievements and teams entered has a strong influence on the result. A perfectly equal distribution is ruled out, as it is impossible that all teams receive the same number of achievements. For example, in the LEC a total 29 teams have competed in 15 seasons. Thus, at maximum less than one halve of the participants have had a chance to reach the first seat. To compensate for this inaccuracy a second Gini coefficient is determined.

[1] See MS Excel: “Empirical Analysis” Sheet: “3.2_1-Data”

This second calculation disregards every team that has not reached the examined achievement and only takes those into account that did reach it at least once (Evans 2014, pp. 33–37). This method allows for a second more differentiated view on the distribution of achievements among the teams. While the consideration of only one calculation poses the risk of receiving a distorted picture of the situation, the combined consideration of both allows a complete evaluation. This problematic can clearly be seen when processing the example of the first seat in the LEC. The teams "G2" and "FNC" both finished first 7 out of 15 times. Leaving it only once for a third team. Calculating the degree distribution of the first seat over all 29 participants of the LEC results in a Gini coefficient of 0.96. When observing the same achievement, but only including the three teams that have attained it, a Gini coefficient of 0.4 is found. This shows that the competition for the top seats in the LEC is dominated by only a few teams. The competition between those teams however is relatively more balanced. Understandably, both perspectives are needed to represent the perceived CB. When discussing CB its perception by the audience is crucial (Pawlowski and Budzinski 2012, 2014). For the audience, the balance of the total tournament might be irrelevant if certain matches are adequately balanced (Pawlowski and Anders 2012). The result of the first calculation, considering the total amount of participants of a tournament will be regarded to as "Total Gini Coefficient" (TGC). In this paper the second calculation considering only a reduced number of participants depending on whether they attained the observed achievement will be referred to as "Dependent Gini Coefficient" (DGC). Once all these challenges have been worked out the coefficients can be determined and listed in table 1 below.

	TGC		DGC	
Achievement	**LEC**	**EPL**	**LEC**	**EPL**
First seat	0,96	0,91	0,40	0,31
Second seat	0,77	0,77	0,27	0,00
Third seat	0,78	0,77	0,30	0,00
Top three seat	0,74	0,76	0,49	0,33
Entry into playoffs	0,55	-	0,44	-

Table 1 - Gini Coefficients: Distribution of Achievements in a Tournament (own table)

When examining these Gini coefficients separately, some general observations can be made. As shown in the earlier example in both tournaments the battle for the first seat seems to be dominated by only a few teams. A significantly high TGC value of over 0.9 in both cases is striking. Behind the battle for the first seat a reasonable gap between the

TGC of it to the TGC values of the second and third seat can be seen. While an average TGC value of 0.77 indicates that more teams compete for these seats, they are still not reachable for all participants of the tournament. Looking at the distribution of all three top seats together the TGC roughly stays on this level. In the case of the LEC the best TGC figures can be found when checking the degree of distribution of the teams that enter the playoffs. Reaching playoffs is equivalent to reaching the sixth seat. Here a TGC of 0.55 is found.

To be able to make a statement about the degree of distribution within an achievement, the DGC value is used. Comparing the TGC to the DGC values the first observation to be made is that all DGC results are positioned at a lower range then the TGC values. One main reason for this is that the extreme of team not reaching the achievement is eliminated. It also indicates that the competition between the teams in this range is better balanced. The most striking DGC values can be found on the EPL side of the chart. The distribution between the teams that have reached the second and third seat is perfectly equal. No team was able to reach the given seat more than once, thus the Gini is valued at zero. For this analysis it does not matter if the observed teams have met in the tournament. In conclusion, both tournaments top positions have been dominated by only a few teams. Domination decreases as the degree of distribution of the lower ranked achievements increases. While the CB is increasing in this range, it is questionable whether it can already be considered satisfactory. The overall Gini values of these positions are still considered to be unequally distributed.

To draw a more in-depth comparison between both tournaments, the complete set of Gini coefficients will be viewed in relation to their counterparts. All but one value for the TGC as well as the DGC values are higher on the LEC side of the table. In Figure 3, the highest values for each achievement in both calculation methods are highlighted. This indicates that the achievements attained by the teams in the LEC are distributed more one-sided then in the EPL. In terms of the LEC this should result in the same teams attaining the set achievements more often than others. The competition in the LEC can be viewed as more dominated by some teams. Thus, a lower CB will be perceived. It is the first valuable evidence that the structural difference in the ecosystems attached to the tournaments might influence them in varied ways. To confirm this, a statistical significance test is used. This will show if the slightly increased values on the LEC side appear only by chance or whether this is based on some reasoning.

For this set of data, a two-sample t-test assuming equal variances is applicable[2]. This test determines whether the mean values of two data sets differ significantly from each other (Humphreys 2002). First, the significance of the deviation between the TGC values of the LEC and the EPL is determined. The test finds a slightly lower mean of the TGC values on the side of the EPL but does not rate this difference as significant. The TGC mean for both tournaments is located at an approximate value of 0.81. Next, the DGC values are examined. Here, a significant correlation can be identified. While the EPL DGC mean is a value of 0.16 it is more than doubled for the LEC at a mean of 0.36. This statistical analysis excludes pure coincidence as the reason for the more favourable values on the EPL side. It confirms that the structural differences in corporate structures can have a significant influence on the happenings since all other variables are ruled out by the tournaments overall setting. The described effect on CB does not appear by chance but is influenced. To gain a broader understanding further investigation on the other perspective CB is required.

The second analysis of the CB in the given tournaments refers to the concentration of the teams. The goal is to identify how close the teams stay to each other within a season (Berkowitz et al. 2011, p. 257). The distance between the teams is determined by their win/loss ratio. A characteristic of esport matches is that a draw in a single match is not an outcome that has to be considered. Matches are played until a single winner is determined. This allows for the data set to simply display the win and loss ratio as a binary number. Exemptions to this rule will be highlighted individually. Looking at the proximity of the teams to each in the table, it can be determined if the teams are on a similar sporting level (Budzinski and Feddersen 2019). In the sense of the theory of CB, a higher proximity of the teams is an indication of balance. A basic mechanic of every sports tournament is used. Every team is placed in the tournament's table and regularly changes its seat, depending on its sporting success. If the teams in the table do not have a large distance to each other, it is to be expected that one team can regularly overtake another. As soon as the distance increases, this scenario becomes less likely. A tournament depends on a large number of these changes to reach a sufficient CB. To obtain data on this topic, the course of the season must be shown in fixed intervals and then the changes in between must be examined. This is done by creating a new intermediate table after each match week. A comparison between these intermediate tables allows to understand the evolution of the team's concentration within the season. A change in the positioning of the teams can be evaluated. There are multiple ways to count and display this change[3].

[2] See MS Excel: "Empirical Analysis" Sheet: "3.2_1-Summary"
[3] See MS Excel: "Empirical Analysis" Sheet: "3.2_2"

The first method used is a “Simple Binary Check” (SBC). It shows if the team on a certain seat has moved from one week to another. Counting the value as one if a team has changed, but zero if it is the same as the previous week. This approach is applicable because the change of seats in the table is the result of one team overtaking another. In Table 2 a fictious example A is shown. Team B has won two matches in match week and thus has managed to climb one seat up and pass Team A, which did not gain any wins. The SBC correctly indicates a value of two for the match week, because it has identified a change in both the seats number one and two. It is not differentiated if a team climbs or drops in the table. Every team that has been influenced by that must change its seat in comparison to the previous week and will therefore be noticed by the SBC. This is also true if a team climbs or drops more than one seat. However, while processing the data, some inaccuracies in this measurement method have been identified. One of the major challenges for this formula arises when two or more teams reach a point tie, or when the tie is resolved. In this case sheer randomness decides if a team will be able to pass another team. Here the order of the teams is determined by their alphabetical position relative to each other. The tournament organizer does not experience this challenge since equal ranking of the teams has no influence during the ongoing season. The problem will at the latest be resolved by additional tiebreaker matches in the last match week of the season. Eventual following playoffs do not give the possibility of further ties.

For the few cases in which ties might be appearing, a “Complex Binary Check” (CBC) is useful. This check can react more sensitively to changes in the table. Its formula works by first checking if the ranking of a seat for a team changes and then secondly applying the same formula as the SBC. If one or both criteria are met, it registers a change in the table and increments by one. Considering the fictive example B given in Table 2, it can be seen how Team B is able to close the gap towards Team A and reach a tie at three wins. This results in both teams being ranked in the first seat. The CBC detects a change of Team B’s and of the two following Teams’ seats, while the SBC in this specific case does not. The CBC adds up to a value of three. Here a potential downside of the CBC can also be seen: a team that from a “Win’s” perspective did nothing might also be registered as a team that has changed its seat. This procedure corresponds to the actual representation in the tournament but could lead to misleadingly elevated CBC values.

To create an even more precise representation of the evolution of a season in between match weeks, a third value can be included. By displaying the actual values of the changes in seating, this "Non Binary Check" (NBC) is able to circumvent the challenges of both binary measurements. In Table 2, the fictitious example C shows how the NBC measurement is used. By winning three times, Team C climbs from the third seat all the way up to the first. Doing that the team passed two seats. Both teams A and B drop by one seat each. As the NBC forms the amount of these values, it indicates the total value of four in match week two. In this case, both the CBC and SBC agree on a total value of three since the teams positioned on seats one to three have changed.

A **Week 1**

Seat	Team	Wins
1	Team A	3
2	Team B	2
3	Team C	1
4	Team D	0

Week 2

Seat	Team	Wins
1	Team B	4
2	Team A	3
3	Team C	1
4	Team D	0

Analysis

Simple Binary Check
1
1
0
0
Σ 2

B **Week 1**

Seat	Team	Wins
1	Team A	3
2	Team B	2
3	Team C	1
4	Team D	0

Week 2

Seat	Team	Wins
1	Team A	3
1	Team B	3
2	Team C	1
3	Team D	0

Analysis

Complex Binary Check	Simple Binary Check
0	0
1	0
1	0
1	0
Σ **3**	**0**

C **Week 1**

Seat	Team	Wins
1	Team A	3
2	Team B	2
3	Team C	1
4	Team D	0

Week 2

Seat	Team	Wins
1	Team C	4
2	Team A	3
3	Team B	2
4	Team D	0

Analysis

Non Binary Check	Complex Binary Check	Simple Binary Check
2	1	1
-1	1	1
-1	1	1
0	0	0
Σ **4**	**3**	**3**

Legend

no change	change

Table 2 - Examples for SBC, CBC, and NBC counting methods (own table)

While analysing the data, two levels of detail can be useful. These depend on the duration of the period under consideration. On the one hand, positional changes in the table can be viewed for each match week individually. Doing this gives a precise overview for the full tournament but is not capable to produce a reliable comparison between tournaments. On the other hand, it is also possible to calculate the sum of these weekly changes over a whole season. The evaluation of a complete season equalises possible extremes in individual match weeks. These analyses will further determine if in the LEC a substantially different CB value can be found, when compared to the EPL. Possible differences must be based on the influence of the different companies involved.

First, the analysis is taking the individual amount of changes for each week under consideration. It can be seen for both tournaments individually that the SBC, CBC, and the NBC

show a similar progression of data points (see Appendix A). This is a good indication that the formulas work as intended. In general, it can be observed that CBC values lie above the SBC values. The NBC curve includes more extreme amplitudes. This is based on their measurement formulas as explained above.

In the evaluation of the curves, the first striking feature is that the beginning of a new season in each year is always rated with zero changes. This is since in this match week the teams are sorted into the table for the first time in the season. Here a change of the seats is impossible. Other extreme data points are caused by specific rules or formats implemented in the tournament. In the seasons from 2013 until 2015 the LEC for example has relied on so called “super weeks”. In those weeks, every team plays double as many matches as in the other weeks (Gamepedia 2020). After such a week more changes in the table can be observed. In contrast, the EPL has allowed the teams to find their own dates to play a match in some seasons. As a result, there are some match weeks in the EPL in which substantially more matches are played then in others. Further, both seasons nine and ten, the EPL was shortened to only two match weeks. This modification prevents a comprehensive analysis of these seasons and must be noted. Matching these week by week results to the respective patching cycles it could be detected in which ways and to what extent these updates manage to influence the CB of a tournament individually. This analysis would be distorted by multiple uncontrollable variables, such as strength and weaknesses of competing teams, tournament rules or number of matches played. Instead, to get a better impression of the overall evolution of the seat’s changes in a season, it is worthwhile to calculate an average amount of changes for each week. Thus, the course of an average season can be reproduced in the data set. This average season will reveal the phases that are common in all seasons of a tournament and at what point of the season the most seats are changed. This is what the companies and audience will focus on. For simplicity, only NBC values are used. An equal graph can also be drawn using the other variables as well.

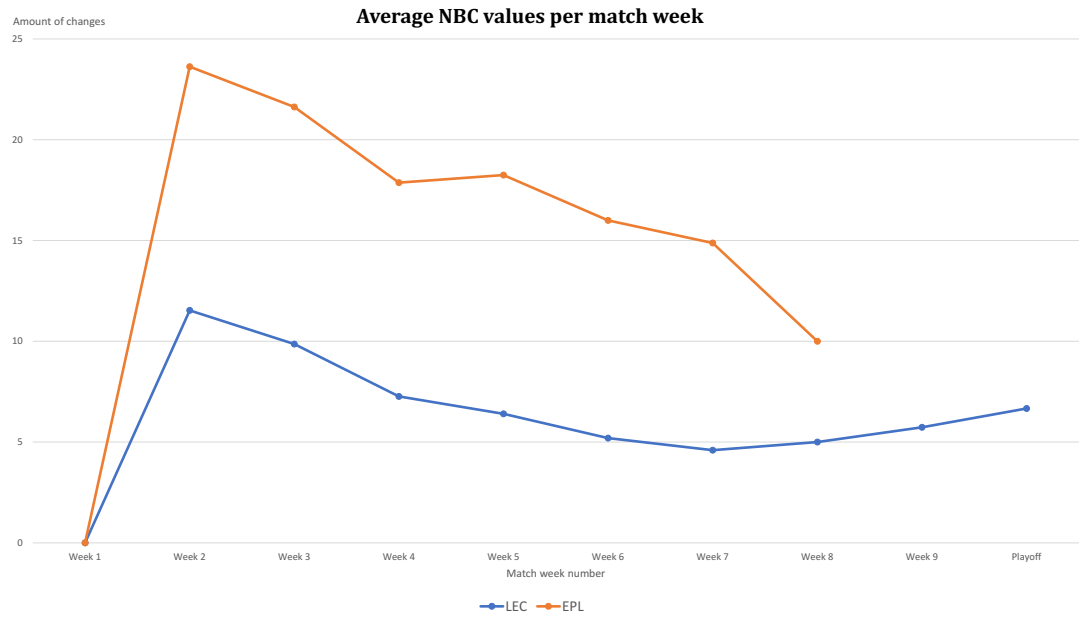

Figure 3 - Average NBC values per match week in the LEC and EPL (own figure)

As expected, it is found that the average season must have zero changes in the first match week. In the following match weeks, the overall highest number of changes are recorded. After that, the number of recorded changes start to decline each week. This high score is explained by the fact that at the beginning of the season the maximum distance between the teams is only equal to the possible number of wins of a single week. This gap can increase with each additional week. It gets harder to catch up and overtake teams during the season. In the LEC a small recovery can be found at the end of the season. This peak at the end of the season is created by the playoff bracket that the top six teams enter. Here, a single-elimination format is used. Two teams are matched directly against each other. While the winner moves into the next round, the looser gives up his seating. This can result in all six competing seats changing within one week – in average 4.2 seats are changes during the LEC playoff matches. In the match weeks leading up to the playoff bracket a small increase of recorded changes can also be observed. In those weeks, the last existing ties in the tournament are resolved by additional tie breaking matches. By their definition, every additional tie breaking match must create a change in the seating of the teams. All these pieces of information show that the total value of CB over the season is a result from the different phases of the tournament. In contrast, there are more seats changed in EPL in every match week after the first. One reason for this phenomenon might be that there are more teams competing in the EPL which allow for more overall changes. Besides that, the number of changes in the EPL is kept at a high level for a longer period before it drops

rapidly. Another supporting empirical observation[4] shows that in the LEC the first seat of the regular season, without playoffs, is set in 8 out of 15 seasons by the second match week. This placement was only overtaken during the playoffs in six seasons. In contrast, the first seat in the EPL is in 8 out 10 cases only decided in the second half of each season. While the task of the organizer is to keep this overall value as high as possible, it might still be more rewarding for the audience to become active during tournament phases with a high chance of changes in seating, especially considering the information that a tournaments' champion might already be decided within the first halve of a season. (Hedlund et al. 2020). This corresponds to the earlier observation on dominance. Again, the external tournament organizers of the EPL manage to consolidate an adequately high level of CB.

To provide a second perspective, these values in turn must not be examined individually. The weekly data is consolidated into a single value per season. Next, a basis to which these figures can be tested against is defined. A reliable basis is the maximum amount of changes in the seating during a single season. Using the binary measuring methods, this maximum number of changes can be identified. It is unique for the binary methods, because every seat can only change by a set amount of one per day. Calculating the maximum possible value for the NBC is impossible. The number of seats each team might change is always depended on the previous match results and the already existing grade of concentration in the tournament. Both factors cannot reliably be predicted. For this reason, this analysis will be using the binary measuring methods. The maximum value of the SBC and the CBC is calculated by multiplying the number of teams participating in a season with the number of weeks in a season minus the first week. Subtracting the first match week is necessary since in this week no positional changes are possible. The number of teams is equal to the number of seats in the table. This calculation must be repeated for every season in every tournament. There is no guarantee that the same number of teams or the same length for every season is kept. Using this maximum value as a basis for comparison more types of analyses are possible.

The following figure 4 shows the course of the maximum amount of positional changes that can be achieved in a season for both tournaments in comparison to the values that have been achieved. Both the values from the SBC and the CBC are used. From the ratio between the maximum and the actual values a percentual degree of completion can be established.

[4] See MS Excel: "Empirical Analysis" Sheet: "Summary LEC", "Summary EPL"

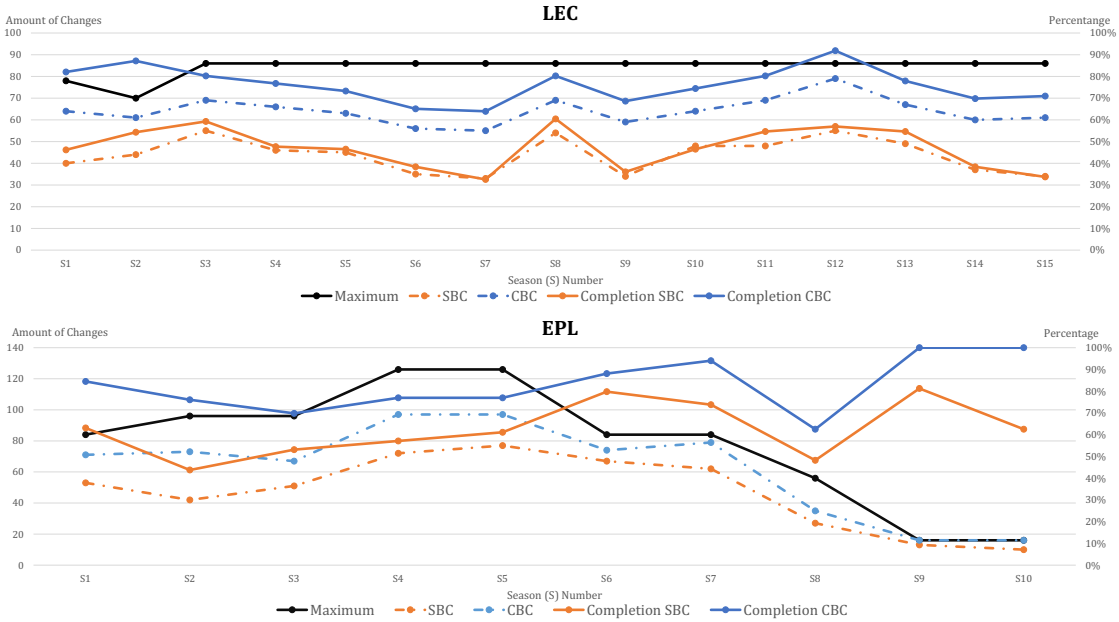

Figure 4 - Completion of possible changes in the LEC and EPL (own figure)

Before comparing the percentual degree of achievement between both tournaments their courses can individually be described. As mentioned in the introduction of the tournaments, both have experienced some major changes in tournament rules. Their influence on the number of positional changes can now be discovered. Starting with the LEC, a sudden increase of changes is found in the second season of 2016. This is caused by the best of two format that is only played in this season. A best of two format creates a for esports tournaments artificial outcome of a draw in a match. Having the option of a draw, the teams stay closer together and thus more changes in seats are possible. An equally sudden drop is caused by the introduction of groups in the following season (Riot Games 2017). Because of the smaller groups the dominant teams are separated from each other and therefore can create large gaps. Here, the format is also rolled back to the standard best of one system. The LEC stabilizes as soon as the franchise system is introduced. Second, the course of the EPL is dominated by two factors. These are the number of match weeks a season consists of and the number of teams competing in it. By steadily decreasing the number of weeks but increasing the number of teams, this course is formed.

Comparing the percentage ratio between maximum and actual changes in seating, it can be observed, that the EPL mostly reaches a higher degree of completion. A direct comparison can be found in Figure 5. The LEC has an average completion ratio for the SBC of 51.9 percent, while the CBC reaches the even higher value of 76.0 percent. Compared to that, ELP reaches values of 60.5 percent and 79.7 percent, respectively. These numbers show that out of all possible changes in the seating of the table the ELP completes more. The teams are mixed more often during the time of tournaments relatively. As a result, the outcome of ELP is less predictable for everyone involved. It can be expected that over the course of an EPL season the teams change their seats more often. This again points to the ELP as being better competitively balanced than the LEC. This discovery is consistent with previous observations. Here too, the EPL, in the sense of the CB, can retain an uncertainty about possible outcomes for a longer period.

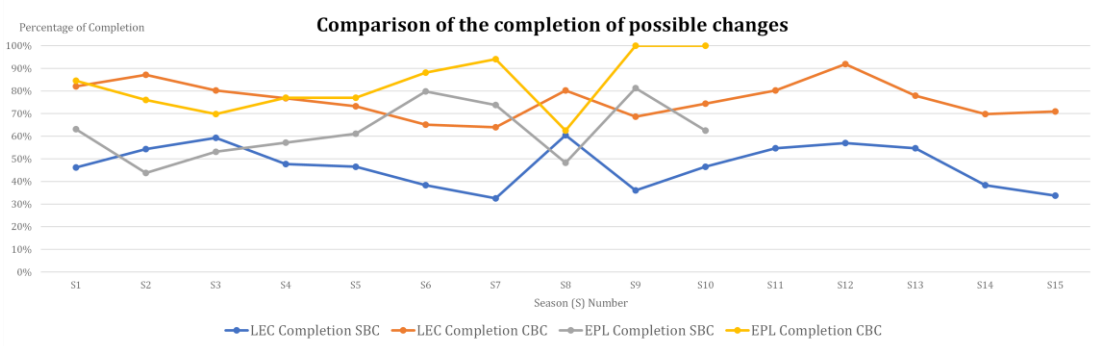

Figure 5 - Comparison of the completion of possible changes in the LEC and EPL (own figure)

To complete the analysis, some observations can be recorded. The first part of the investigation has shown that there is a significant difference in the dominance of the tournaments. This observation is complemented by the result that the concentration of teams in the structurally different tournaments is not equally strong. Therefore indicating, that the CB in the EPL is higher than in the LEC. In the examples chosen, the EPL is the tournament that is not offered by the game developer/publisher, but is organised by the ESL, an external tournament organiser. Thus, it is confirmed that the initial hypothesis "the market structure of esports is influencing the competitive balance of the competition" is true.

This corresponds to the assumption that external tournament organizers are dependent on creating added value to justify their existence. Added value can be created by offering the audience a higher CB in a tournament, as seen in the data. For the audience, this can imply that they have a greater benefit from watching tournaments offered by non-vertically integrated tournament organizers. It is to be expected that the tension is higher due to a better CB. Leading to a higher demand for of the given tournament and thus agreeing with the work of the external tournament organizer.

4. Concluding Remarks and Sports Economics Outlook

The aim of this thesis is to bridge the gap between research in sports economics and its application in esport. In order to do this, it is first tested if classic sport economic theories are true in the esports ecosystem. It is shown that the structure of multisided markets which are typical for sports is also found in esports. A focus is put on the possible stages of vertical integration of the companies involved with organizing a tournament. Here two possible integration stages are identified. It is questionable if the underlying market structure has an influence on competition. It is assumed that companies in a different esport environment have varying degrees of interest in controlling its tournaments. The indicator chosen to measure a difference in the attractiveness of a tournament is the CB. A CB value aims to measure the benefit the audience gains when watching a sport. Due to the similarity between ordinary sport and esports this theory is also applicable. To test CB, a fitting sample was determined. A single analysis alone cannot make a complete statement about the overall situation of CB in a tournament. Therefore, two tournaments were compared, using several approaches. The chosen tournaments, LEC and EPL, are identical except for the stage of integration of the companies involved. While the LEC is organised by a fully integrated company structure the EPL is dependent on an external tournament organizer. In the end, it was shown that the EPL has a higher CB in the head-to-head comparison. This is reflected in the fact that the result of a season is more difficult to predict than in the LEC, and that the variation in the mix of teams over the course of a season is also greater. Thus, the hypothesis established can be verified. A tournament organizer that is not fully vertically integrated into the value chain is keen to increase CB in a tournament. The market structure of esports is influencing the CB of the sporting competition.

Further steps that need to be taken concern the confirmation of this statement for the entire esport industry. It is uncertain whether the same observation can be made for other esport titles with similar differences in market structure. Here, two tournaments are not sufficient as test subjects. Other factors may also have an influence on the CB. This empirical ACB analysis also leaves open the question of how the CB of the tournaments is received by the audience. Other sports have shown that a balanced competition at the top of the table can already be satisfying for the audience. At a macroeconomic level, the need to regulate the fast-growing industry and protect consumers remains to be addressed.

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Appendix

A. Course of SBC, CBC, and NBC data points