

The World of Games

eSports

From Wild West to Mainstream

eSports are moving into the mainstream. The immense popularity of survival-based games like Fortnite, growing prize pools for eSports tournaments, the rise of live-streaming, and improving infrastructure for pro leagues have all paved the way for eSports to reach nearly 300mn viewers by 2022, on par with NFL viewership today. For game publishers, we believe eSports will not only help to increase audience reach and engagement, but also drive direct revenue through established leagues. We see further tailwinds to the broader eSports ecosystem—including online video platforms, hardware manufacturers (core and peripheral), and chip makers—opportunities we outline in this report.

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Table of Contents

Executive Summary	3
The Audience Opportunity	7
eSports Can Extend Franchise Life and Drive Audience & Engagement	9
League Infrastructure Will Create Opportunities for Direct Monetization	11
Fortnite and the “Moneymaker Effect”	17
A New Paradigm for Distribution	19
Asia is Leading the Way for eSports Globally	25
New Platforms for eSports	28
The Venture Landscape	32
Disclosure Appendix	34

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The following is a redacted version of GS Research’s report “The World of Games: eSports: From Wild West to Mainstream” originally published June 26, 2018 (59 pages). All company references in this note are for illustrative purposes only and should not be interpreted as investment recommendations.

Executive Summary

As defined by the Oxford English Dictionary, a sport is “an activity involving physical exertion and skill in which an individual or team competes against another or others for entertainment.” Under this definition, we believe eSports are as much of a sport as any other, and one that at the highest levels requires intense training and focus. Professional eSports teams train for up to 8 hours a day, have coaches, trainers, and nutritionists on staff, and players receive base salaries, just like any pro sports league. In the U.S., there are roughly 50 colleges that have varsity eSports teams, and eSports are under discussion for inclusion in the 2024 Paris Olympics, according to the BBC.

To play a traditional sport, one typically needs access to an appropriate venue (field, court, etc.), and to be successful, it almost always helps to be big, fast, strong, or coordinated - or better yet some combination of all four. To play multiplayer video games, all that is necessary is the requisite hardware and an internet connection — and there is a community of millions of players online that are ready to play at any hour of the day. Also, to become successful at eSports, physical stature is not as important, in our view, as reaction time, focus, and strategic thinking. Therefore, we believe professional video game play can be appealing to a massive global audience of people who can watch and learn from pros and try to improve their own gameplay — something that we believe isn’t as possible for most traditional sports fans. And because the distribution of eSports are nearly 100% digital, fans can stream eSports content for free anywhere in the world, unencumbered by traditional TV rights that for most Western-based pro sports leagues have been segmented by geography and are often lumped into an expensive cable subscription.

In short, we believe eSports are at the cross-section of some powerful trends: social connections being formed and maintained online, digital consumption of video, and global growth in the gaming audience. Looking ahead, we see numerous public and private investment opportunities that we believe will benefit from the structural growth of eSports, both in terms of audience and, increasingly, monetization, as the requisite infrastructure is built to transition eSports from the “Wild West” of sports to a full-fledged professional sport. **We summarize our key takeaways below.**

The audience opportunity. In 2018, we estimate the global monthly audience for eSports will reach 167mn people, based on data from NewZoo, larger than that of Major League Baseball and the National Hockey League. We estimate the total online population is over 3.65bn people globally, to go along with 2.2bn gamers, but eSports viewers represent just 5% of the online population TAM, which suggests that there should be plenty more runway for audience growth. By 2022, we estimate the eSports audience will reach 276mn, similar in size to the NFL today.

Due to the growing popularity of survival-based games Fortnite and PUBG, we believe eSports viewership is moving more into the mainstream, which should support a 14% audience growth CAGR for the next 5 years. Recently, Epic games announced that it would set aside \$100mn in prize pool for the first year of Fortnite eSports tournaments, nearly the size of the entire eSports prize pool in 2017. With growing incentives for

eSports players, and by extension more interest from the casual observer, we believe the eSports audience should continue to outpace the growth of traditional leagues.

League infrastructure is creating meaningful opportunities for direct monetization.

In the early years of eSports, there was little organization or infrastructure, and as a result, the massive audience of eSports did not translate into meaningful revenue streams for players, team owners, etc. But in 2017, Riot Games created the North American and EU League of Legends leagues, while in January of 2018, Blizzard launched the Overwatch League. We believe these leagues created the requisite infrastructure that will allow eSports to finally start to close the monetization gap relative to other established sports leagues.

In 2017, we estimate eSports generated \$655mn in annual revenue, including 38% from sponsorships, 14% from media rights, and 9% from ticket revenue. But by 2022, we expect media rights to reach 40% of total eSports revenue - comparable to the average of the four major Western sports leagues today - as massive audiences and associated revenue for established online video platforms like Twitch, YouTube, Douyu, and Huya will be able to support a growing pool of media rights fees paid to top publishers for their content. As media rights and sponsorship continue to grow, along with the formalization of pro sports leagues, we expect total eSports monetization will reach \$3bn by 2022.

Exhibit 1: Our key estimates

eSports audience, prize pool, and monetization (2018E-2022E)

	<u>2018E</u>	<u>2019E</u>	<u>2020E</u>	<u>2021E</u>	<u>2022E</u>
Audience (mns)	167	194	225	250	276
<i>y/y growth %</i>	<i>17%</i>	<i>16%</i>	<i>16%</i>	<i>12%</i>	<i>10%</i>
Prize Pool (\$ mns)	\$170	\$256	\$307	\$359	\$413
<i>y/y growth %</i>	<i>50%</i>	<i>50%</i>	<i>20%</i>	<i>17%</i>	<i>15%</i>
Monetization (\$ mns)	\$869	\$1,184	\$1,592	\$2,173	\$2,963
<i>y/y growth %</i>	<i>33%</i>	<i>36%</i>	<i>35%</i>	<i>37%</i>	<i>36%</i>

Source: Goldman Sachs Global Investment Research, Newzoo

Fortnite and the “Moneymaker” effect. In 2003, Chris Moneymaker, an accountant and amateur poker player from Tennessee, outlasted a field of 839 players to win the World Series of Poker. His victory sparked a meteoric rise in the popularity of online and tournament poker. Just 3 years after his victory, the first place prize money for the WSOP increased to \$12mn in 2006, up from \$2.5mn in 2003. The relevant lesson here is that Moneymaker elevated poker’s profile as a sport to the mainstream — and we believe Fortnite is doing the same thing for video games and eSports.

The Fortnite phenomenon has been well-documented, but by way of background, the title has reached more than 125mn players on across console, PC, and mobile. According to SuperData, as of April the game generated \$296mn of revenue across platforms, an annual run rate of \$3.6bn — more annual revenue than any major console or PC game today. As Fortnite brings more new gamers to the ecosystem, particularly those in younger demographics, we believe the eSports audience - and associated revenue streams - will benefit over time.

A new paradigm for distribution. Unlike traditional sports, the vast majority of eSports viewership is online, the same medium where multiplayer game play takes place and through which the eSports audience consumes media content. In the coming years, we believe eSports content (particularly live) will continue to grow in value, not only due to its audience reach but also the engagement it commands, creating an opportunity for advertisers to target a captive and young demographic.

In the West, we believe Twitch and YouTube Gaming are the primary distribution channels for live and recorded eSports content. Because Twitch captures 84% of live-streaming viewership in North America, we currently estimate that it over-indexes on revenue relative to YouTube, with 54% of gaming content gross revenue market share in 2017 relative to 22% for YouTube. There are three major monetization channels: advertising, tipping, and sponsorship. By 2022, we model eSports industry advertising revenue of \$429mn (25% 5-year CAGR), tipping revenue of \$372mn (24% 5-year CAGR), and sponsorship revenue of \$1.1bn (34% 5-year CAGR).

Asia is leading the way for eSports globally. China's eSports market is built upon the largest gamer base in the world, with approximately 442 million gamers as of 2017, a 57% penetration rate of Chinese internet users, according to CNNIC. By 2018, China will contribute one third of the global game industry's total revenue, according to NewZoo. For Asia more broadly, there are 89 million eSports viewers, according to NewZoo, roughly half of global audience in 2018E. We believe the popularity of eSports in this region could be a leading indicator of what is to come in Western markets, as markets like China and Korea already outpace the North America in some measures of technological change like smartphone penetration.

Venture investment in eSports has stepped up meaningfully this year. Since 2013, there has been \$3.3bn of venture capital investment in eSports-related start-ups. In 2018 YTD, we have already seen \$1.4bn of investment, a nearly 90% y/y increase from the total amount of funding in 2017. The uptick was largely driven by two outsized investments made by Tencent in Chinese online video platforms Douyu and Huya of \$630mn and \$461mn, respectively. We believe these investments in particular underscore two key trends: 1) the opportunity for live-streaming to monetize the growth in eSports in a way that few other eSports-related businesses can, and 2) the popularity of eSports in Asia in particular.

eSports in Numbers



The Audience

276mn

The estimated size of the eSports audience in 2022E—up from 167mn viewers today who already outnumber the audiences of the NHL and MLB

58mn

Unique viewers of the 2017 League of Legends finals

125mn

The number of global players for Fortnite, the highest monetizing video game in the world



The Demographics

50%+

The share of eSports viewership coming from Asia. eSports penetration has reached only 5% in the region, but already comprises the lion's share of viewership

79%

The eSports audience under age 35



The Engagement

355bn

The total number of minutes watched on Twitch in 2017, up 22% year-over-year

98 minutes

The amount of time active users on Chinese live-streaming platform Huya spend watching content every day on the mobile app



The Monetization

\$3bn

Our estimate for total eSports revenue in 2022E, up from \$655mn in 2017. We expect media rights will contribute nearly half of this amount

\$296mn

Fortnite's revenue in April. The game is the most watched title on Twitch, with ~1.5x the average viewership of the 2nd most-watched title



The Buy-In

\$20mn

The price to buy one of the 12 Overwatch League teams for sale in 2017. We expect Activision (the IP owner) to sell 28 total teams, with future sales on the order of...

\$40mn+

The price we expect potential owners to pay for the next 6 Overwatch League teams sold in 2018



The Incentives

\$100mn

PLAYERS

The prize pool promised for the first year of Fortnite competitions, nearly the size of the *entire* eSports prize pool in 2017

\$500k

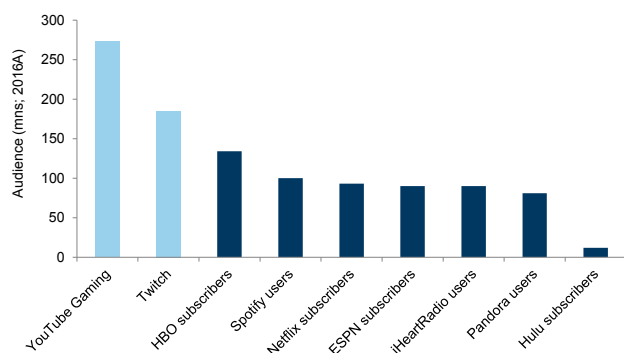
LIVE STREAMERS

The monthly income of Ninja, an online personality who live-streams gameplay on Twitch

The Audience Opportunity

eSports have been around for as long as the video game industry itself, and collectively refer to competitive video game play by professional and amateur gamers. But in recent years, growth in the gaming audience and player engagement has elevated eSports into mainstream culture as a legitimate professional sport with a massive global following. In 2018, we estimate the global monthly audience for eSports will reach 167mn people, based on data from NewZoo, larger than that of Major League Baseball and the National Hockey League. By 2022, we estimate the eSports audience will reach 276mn, similar in size to the NFL today. Unlike many existing pro sports, the eSports audience is young, digital, and global: more than half of eSports viewers are in Asia, 79% of viewers are under 35 years old, and online video sites like Twitch and YouTube have a larger audience for gaming alone than HBO, Netflix and ESPN combined.

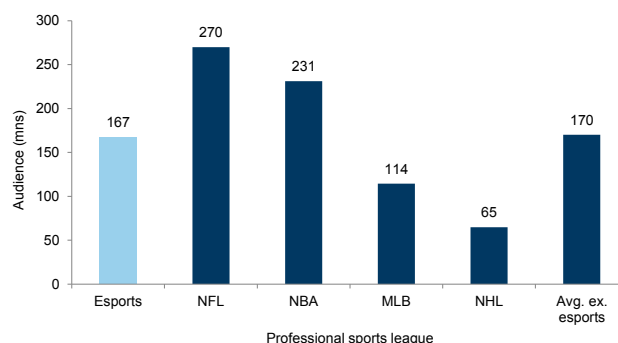
Exhibit 2: Twitch and YouTube Gaming have a larger audience than many entertainment platforms



Source: SuperData, Goldman Sachs Global Investment Research

Exhibit 3: The eSports audience is similar to the average of large professional sports leagues

Audience size by sports league (2017A)



Source: Nielsen, CBS, ESPN, Goldman Sachs Global Investment Research

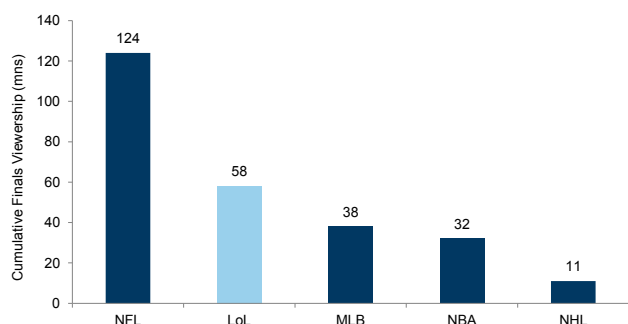
In 2017, the world finals for one of the most popular eSports titles, League of Legends (LoL), attracted 58mn unique viewers, according to Riot Games. We assume total unique viewers for LoL are equal to total cumulative viewers for TV viewership, a metric that is used to describe a broadcast's total unique audience. According to data from Nielsen and Rentrak, total cumulative viewership was as follows for major sports finals in 2017: The Super Bowl (124mn), League of Legends (58mn), The World Series (38mn), The NBA Finals (32mn), and the Stanley Cup Finals (11mn). It's worth noting, however, that these audience figures for the traditional leagues are U.S.-only while the LoL figure is global. Therefore, the global audience figures for the traditional sports championships are likely higher than the numbers we show in Exhibit 5.

While established pro sports leagues are mostly watched through traditional media like TV, nearly all of the eSports audience is online, with the exception of some broadcasts that have taken place on ESPN and Turner networks. As measured by concurrent viewership, a recent live stream of Fortnite gameplay by celebrity Twitch personality Ninja attracted 628k concurrent viewers, almost double the average concurrent viewership of the NFL's Thursday Night Football on Twitter and Amazon Prime (though that was a subset of overall TNF viewership). While traditional pro sports leagues in

many cases may need to shift their business models toward online distribution from TV to reach younger and international demographics, eSports is already reaching this audience in the West through OTT platforms like Twitch, YouTube Gaming, and in China through Douyu, Panda TV, and Huya, among others.

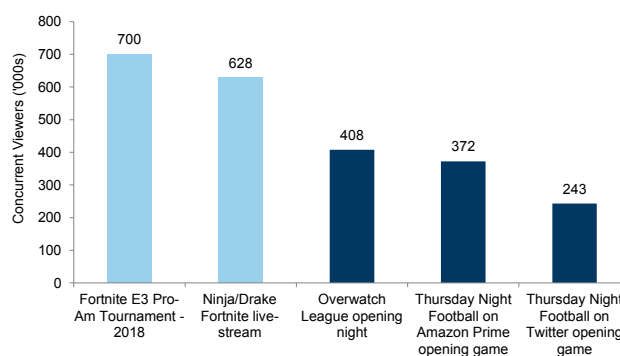
Exhibit 4: We estimate LoL finals cumulative viewership was comparable to other major sports finals

Cumulative finals viewership - NFL, LoL, NBA, MLB, and NHL (2017A)



Source: LoLesports.com, Goldman Sachs Global Investment Research, Nielsen, Rentrak

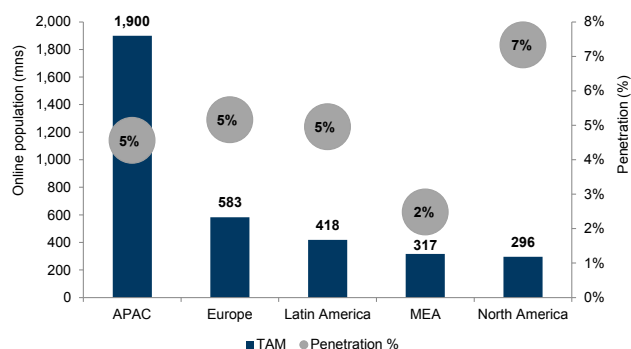
Exhibit 5: The Overwatch World League's opening night viewership surpassed Thursday Night Football's streaming debuts



Source: Company data, Nielsen, ESPN, Goldman Sachs Global Investment Research

According to NewZoo, there are over 2.2bn active gamers globally. Today, the eSports audience represents just 5% of the total online gaming population, which suggests that there should be plenty more runway for eSports audience growth. Even in Asia, which contributes more than half of the global eSports audience, penetration is just 5%. As younger demographics increasingly communicate via online channels, and social interactions take place online, we believe eSports as an interactive and social form of sports viewership should continue to take share of traditional sports, thereby supporting a 14% 5-year audience growth CAGR.

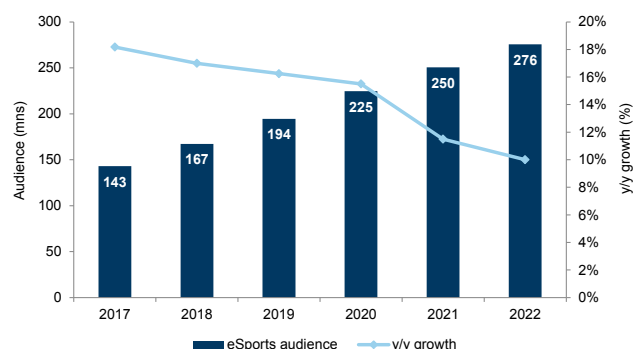
Exhibit 6: APAC's TAM is nearly 4x that of any other region
eSports TAM (online population; mns) and penetration (%)



Source: eMarketer, Goldman Sachs Global Investment Research

Exhibit 7: We expect the eSports audience to grow at a 14% 5-year CAGR

GS eSports audience growth forecast - 2017A to 2022E



Source: NewZoo, Goldman Sachs Global Investment Research

To support this audience growth, we believe there are a number of factors, including growth in the global gaming audience as well as the increasing prize pools of eSports, which we believe will continue to build interest among players and fans. Today, the biggest eSport in the world, as measured by prize money, is Dota 2. For the 2017 Dota 2

International, the total prize pool was \$23mn, but only \$1.6mn of that was contributed by Valve, the game's publisher. The rest of the prize pool — more than \$21mn — was actually sourced through crowdfunding. We'd note that the total purse for the Dota 2 International exceeded Wimbledon (\$16mn for men's / women's singles separately, not combined), The Masters (\$11mn), and the Daytona 500 (\$18mn as of 2015 when figures were last provided).

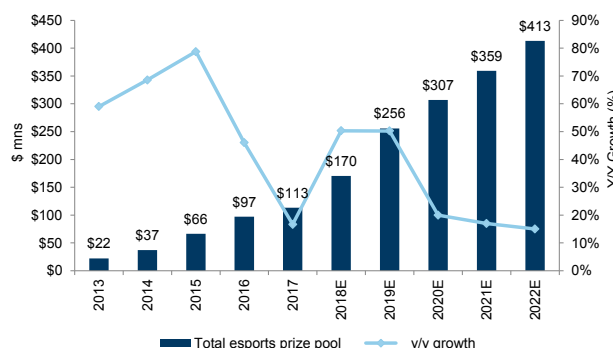
Recently, Epic Games announced that they planned to provide \$100mn in prize pool money for Fortnite eSports competitions in the first year of game play — nearly as much as the total \$113mn of prize pool awarded for all eSports in 2017. As a result, we expect total eSports prize pools to more than double in the next couple years, driving more players into eSports competition, not only in Fortnite but in all types of games. With higher stakes, we believe audiences will follow, giving us increased confidence in our eSports audience forecast of 276mn by 2022.

Exhibit 8: Dota 2 has the largest prize pool of all eSports titles
eSports prize pool by title

Title	Prize Money (2017)	Tournaments
Dota 2	\$38,053,795	159
Counter-Strike: Global Offensive	\$19,252,556	894
League of Legends	\$12,060,789	153
Heroes of the Storm	\$4,783,333	31
Call of Duty: Infinite Warfare	\$4,027,895	72
Hearthstone	\$3,452,684	112
Overwatch	\$3,408,254	259
StarCraft II	\$3,386,454	612
Halo 5: Guardians	\$1,748,000	14
SMITE	\$1,567,900	8
Other Games	\$21,511,703	1,619
Total	\$113,253,364	3,933

Source: Goldman Sachs Global Investment Research

Exhibit 9: We estimate the eSports prize pool will grow at a 30% 5-year CAGR between 2017 and 2022E
Total eSports prize pool



Source: Goldman Sachs Global Investment Research

eSports Can Extend Franchise Life and Drive Audience & Engagement

Before discussing the potential for direct monetization of eSports leagues, we first examine the impact that eSports can have on audience & engagement for video games, an indirect benefit that can be a significant tailwind to monetization. For example, in the exhibit below, we show the top 15 highest monetizing PC & console titles through in-game purchases, an indicator of player engagement with a game. Not surprisingly, 7 of those games are also top 15 eSports titles as measured by total prize money paid out to players. Therefore, we believe eSports can not only help to increase the audience of games through "free" marketing on OTT video platforms like Twitch & YouTube, but it can also drive player engagement, manifested through in-game purchases — a source of revenue that we believe will reach roughly half of total for the Western based publishers in 2019. Due to caps on prize pools in Japan, we also show the top 10 most watched games on Twitch in Exhibit 12, a similar list to the rankings by prize pool, but including the Japanese game Street Fighter, which was the 6th most watched game on Twitch in 2017, as measured by hours watched.

Exhibit 10: Seven of the top 15 eSports titles...

Top titles by eSports prize money (2017A)

Rank	Title	Prize Money	Year Since Initial Release
1	Dota 2	\$38.0	5
2	Counter-Strike: Global Offensive	\$19.3	6
3	League of Legends	\$12.0	8
4	Heroes of the Storm	\$4.8	3
5	Call of Duty: Infinite Warfare	\$4.0	14
6	Hearthstone: Heroes of Warcraft	\$3.4	4
7	Overwatch	\$3.4	2
8	StarCraft II	\$3.4	8
9	Halo 5: Guardians	\$1.7	2
10	H1Z1	\$1.6	3
11	CrossFire	\$1.5	11
12	Quake Champions	\$1.5	1
13	FIFA 17	\$1.4	9
14	Rocket League	\$1.4	3
15	Smite	\$1.2	4

Source: esportsearnings.com, Goldman Sachs Global Investment Research

Exhibit 11: ...Are also among the top 15 highest monetizing PC & console titles in-game

Top titles by in-game revenue (2017A); FIFA, GTA, CoD, OW, Tom Clancy, and Assassin's Creed are GS estimates; all others are SuperData

Rank	Title	2017 in-game revenue (\$ mns)	Year Since Initial Release
1	League of Legends	\$2,100	8
2	Dungeon Fighter Online	\$1,600	8
3	Crossfire	\$1,400	11
4	FIFA franchise	\$868	9
5	GTA franchise	\$622	20
6	Call of Duty franchise	\$478	14
7	World of Tanks	\$471	8
8	Dota 2	\$406	5
9	Roblox	\$310	12
10	MapleStory	\$279	15
11	Counter-Strike: Global Offensive	\$221	6
12	Hearthstone (PC Only)	\$217	4
13	Overwatch	\$211	2
14	Tom Clancy franchise	\$197	10
15	Assassin's Creed	\$137	10

Source: Goldman Sachs Global Investment Research, Company data, SuperData

Exhibit 12: Japanese games such as Street Fighter ranked in the top 10 games on Twitch as measured by eSports hours watched in December 2017

Top 10 games on Twitch by eSports hours watched - global - December 2017

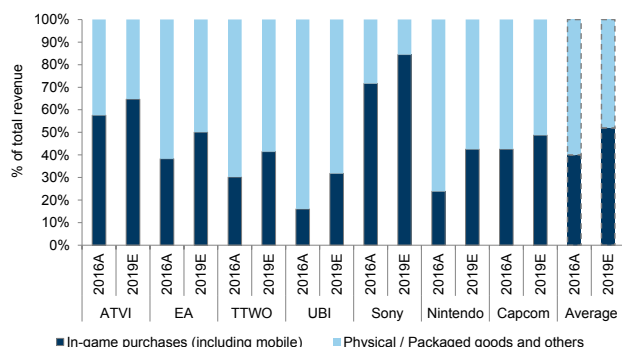
Game Title	Total Hours (mns)	Esports Hours (mns)	Share Esports (%)
Dota 2	32.4	11.8	36%
CS: GO	18.8	6.8	36%
League of Legends	69.6	6.2	9%
Hearthstone	43.2	4.5	10%
CoD: WWII	6.9	1.6	24%
Street Fighter V	2.7	1.4	54%
StarCraft II	3.7	1	26%
Overwatch	17.9	0.7	4%
Rocket League	2.3	0.6	26%
Super Smash Bros.	0.9	0.6	68%

Source: NewZoo

Also of note, the top eSports titles by prize pool have been around for an average of 5 years, and while this is largely because publishers are constantly updating these titles with fresh content to keep players engaged, we believe eSports also play a part. To the extent that eSports can maintain or grow player interest through regular tournaments and online viewership, we believe that can extend the life-cycle of games and in some cases can even accelerate in-game monetization. As an example, EA launched an eSports mode for FIFA 18 called FIFA Ultimate Team Champions in June 2017 ([link](#)), which drove 5x the player engagement as regular Ultimate Team mode. As a result, an acceleration in Ultimate Team growth in the F3Q18 caused overall live services growth to reach +39% y/y, up from +22% in the F2Q and 15% in FY17. The quarterly live service growth — an absolute y/y increase of \$221mn — was the fastest for EA in 3 years, and mostly attributable to eSports, in our view.

Exhibit 13: In-game revenue (including mobile) should reach 52% of total revenue on average in 2019E

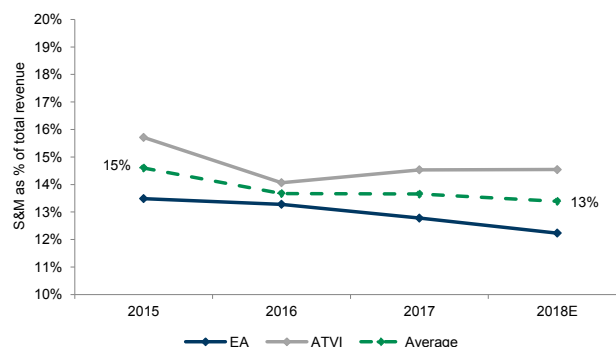
In-game revenue as a % of total revenue by publisher (including mobile)



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 14: Sales & Marketing as a % of revenue is declining for ATVI/EA

Sales & Marketing as % of total revenue (2015A to 2018E) - ATVI, EA, and Average



Source: Company data, Goldman Sachs Global Investment Research

Lastly, we believe eSports will ultimately lower the cost of customer acquisition for games. To the extent that a title has a regular eSports presence, which can yield millions of monthly views, we believe it can ultimately save publishers on the cost of customer acquisition. As an example, the Overwatch League launched with 10mn viewers in its opening weekend, while the latest FIFA Champions Cup tournament had 17mn views online. To otherwise reach 10mn viewers would cost an estimated ~\$300k for a minute long ad, but through eSports a publisher can reach an audience of 10mn+ viewers for hours at a time at little to no cost. While there is typically noise in sales & marketing spend for major publishers around major game releases, we expect the general trend will be lower in the next 5 years, as has been the case in the last 5 (see Exhibit 14).

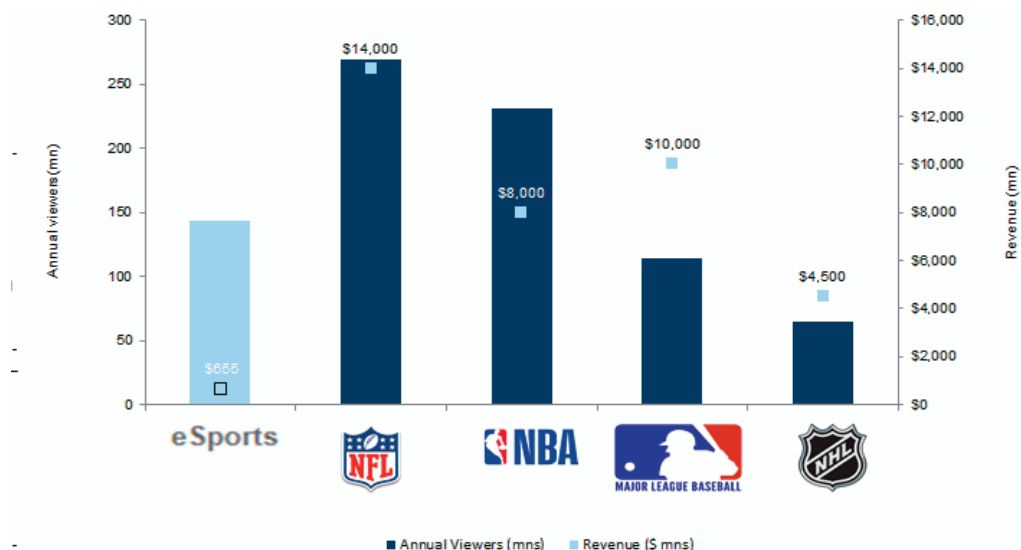
League Infrastructure Will Create Opportunities for Direct Monetization

Historically, eSports has been the Wild West of sports; it has lacked the organization, structure, and revenue streams of established leagues. We believe the lack of structure is attributable to the fragmentation of IP, each of which is technically its own "sport." Unlike professional football, a single sport that attracts an estimated audience of 270mn globally, eSports represents hundreds of video game IPs that collectively attract an audience of 167mn globally. While some publishers own several popular eSports titles, the viewership associated with these titles is still a subset of the global eSports audience. A traditional sports league like the NFL can collectively bargain for media rights on behalf of its various teams, but eSports as an entity cannot do the same for all of its IP.

eSports is more global than traditional sports; the audience is more geographically dispersed relative to MLB or the NHL, for instance, which have more audience concentration in North America. For traditional sports leagues, we believe the audience concentration in local US markets has helped to drive local revenue streams: ticketing, concessions, merchandise — and in some cases, regional media rights, as is true with MLB. On average, local revenue makes up 54% of revenue for traditional sports

leagues, with the NHL indexing the highest at 73% of total. While regional eSports tournaments have generated local revenue streams — tickets sales, concessions, etc — typically that revenue has gone towards paying the third-party event organizer and prize pool for the players, the size of which is crucial for attracting top teams and audiences. All of this is to say that eSports has under-monetized relative to its audience potential, but we believe that is finally starting to change.

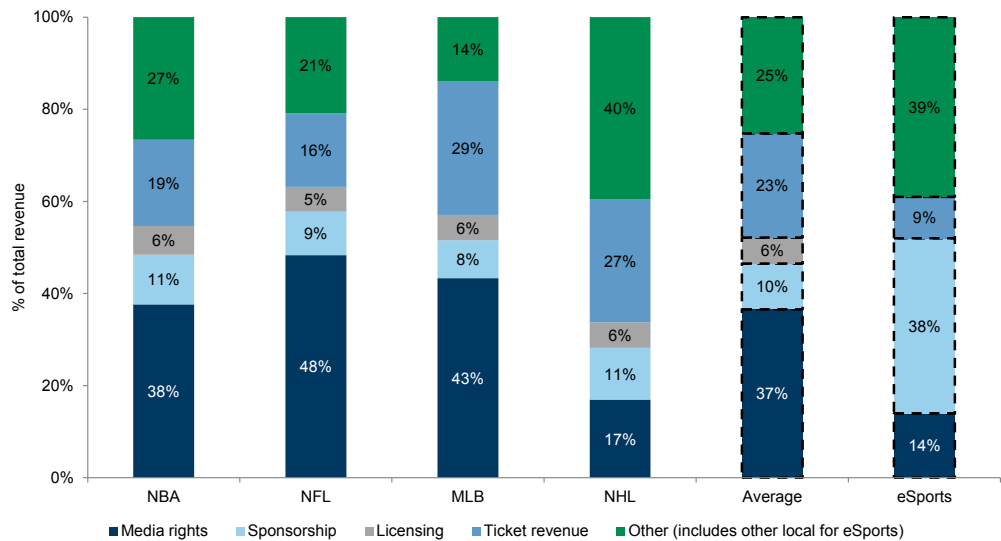
Exhibit 15: eSports dramatically under-index on monetization relative to established sports leagues
Annual viewership (mn) and revenue (\$mn) for eSports and professional sports leagues, 2017A



Source: eSports annual viewership and revenue from NewZoo; shows enthusiasts only, Marketwatch, CBS, Forbes, Goldman Sachs Global Investment Research

In 2017, we estimate eSports generated \$655mn in annual revenue, and in the past 5 years revenue has grown at a 38% CAGR, according to data from NewZoo. Of the \$655mn in revenue, we estimate 38% came from sponsorships, 14% from media rights, and 9% from ticket revenue. Given the fragmentation of audience globally, we believe media rights, sponsorship, advertising, and in-game monetization will be the largest contributor to total revenue to eSports leagues at scale. On average today, the four largest pro sports leagues in the West generate 37% of revenue from media rights, 23% from ticket sales, 10% from sponsorship, and only 6% from licensing.

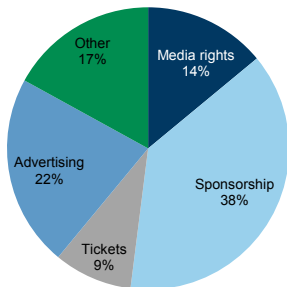
Exhibit 16: 37% of revenue in traditional professional sports is derived from media rights
Revenue breakdown for the NBA, NFL, MLB, NHL (2017A), and eSports (2017A)



Source: Goldman Sachs Global Investment Research, Sports Business Daily, New York Times, Wall Street Journal, CBSSports, ESPN, Forbes, MLB.com, Liberty Media

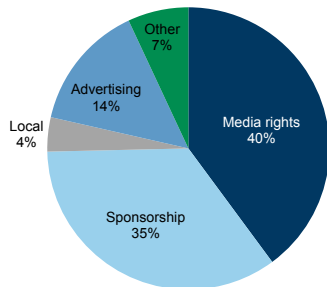
By 2022, we believe eSports revenue streams will look much different than they do today. While sponsorships make up the largest percentage of global revenue today, we believe media rights will eventually become the largest source of eSports revenue, as massive audiences and associated ad revenue for established online video platforms like Twitch, YouTube, Douyu, and Huya will be able to support a growing pool of media rights fees paid to top publishers for their content. In 2022, we expect media rights to reach 40% of total eSports revenue, comparable to the average of the four major Western sports leagues today. We have already seen a few landmark deals in the last couple of years. As the eSports audience continues to grow, and more league infrastructure continues to improve, we expect to see more deals in the future.

Exhibit 17: Advertising and sponsorship are the largest sources of eSports revenue today
eSports revenue by type (2017A)



Source: NewZoo

Exhibit 18: ...but we see media rights as the largest revenue opportunity in 2022E
eSports revenue streams (2022E)



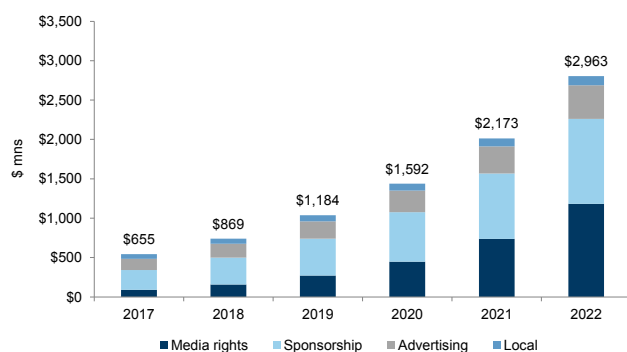
Source: Goldman Sachs Global Investment Research

After media rights, we expect sponsorship will become the second largest contributor of revenue, at 35% of total in 2022. Historically, sponsorships in eSports were mostly limited to endemic sponsors, like hardware manufacturers. But in the last couple of years, we have seen more mainstream subscribers enter the fray, eager to reach the millennial & Gen Z audience of eSports. Sponsors for the League of Legends League include Geico, State Farm, Nissan, Axe, and Coca-Cola, while the Overwatch League is sponsored by Toyota, Sour Patch Kids, Intel, and T-Mobile. And it was only after Riot and Blizzard created established leagues that we started to see the landscape for sponsorship change.

As league infrastructure develops for more games, we expect to see a step function change in monetization for eSports. Today, we estimate eSports generates close to \$655mn in revenue, but by 2022, we expect that figure will reach \$2.96bn, based on a bottoms up analysis (see the section “A New Paradigm for Distribution” for more detail on our estimates). We continue to believe that eSports will under-index on monetization relative to the size of its audience, given the structural difference between it and traditional sports leagues — namely, that there is fragmentation of IP across eSports and therefore it’s challenging for any one eSports league to have the same audience scale and bargaining power as the NFL, for instance. That being said, we still see an enormous opportunity for eSports to close the monetization gap, given our expectation for a 35% 5-year CAGR for total eSports revenue between 2017 and 2022.

Exhibit 19: We forecast eSports revenue growing at a 35% 5-year CAGR through 2022E

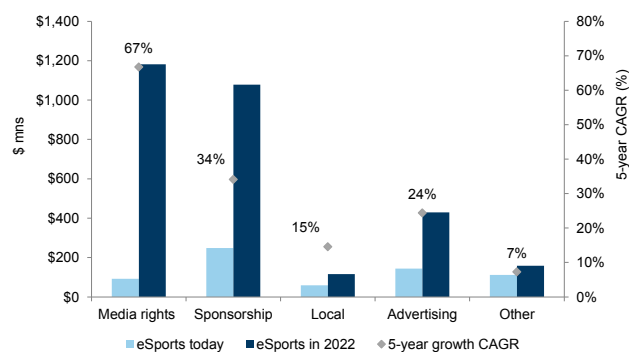
GS eSports revenue growth forecast (2017A to 2022E)



Source: Goldman Sachs Global Investment Research, NewZoo, SuperData

Exhibit 20: We forecast media rights revenue will grow at a 67% 5-year CAGR, driving overall eSports revenue growth

GS eSports revenue growth forecast and 5-year revenue stream growth CAGRs



Source: Goldman Sachs Global Investment Research, NewZoo, Superdata

Activision and Tencent changed the game

Overwatch is a team-based, multi-player, first-person-shooter video game published by Blizzard Entertainment, a subsidiary of Activision Blizzard.

In 2017, Riot Games created the North American and EU League of Legends leagues, while in January of 2018, Blizzard launched the Overwatch League. We believe these leagues helped to create a blueprint for what an eSports league could be, as they created an infrastructure that will allow eSports to finally start to close the monetization gap relative to other established sports leagues. We detail the key attributes of the leagues below.

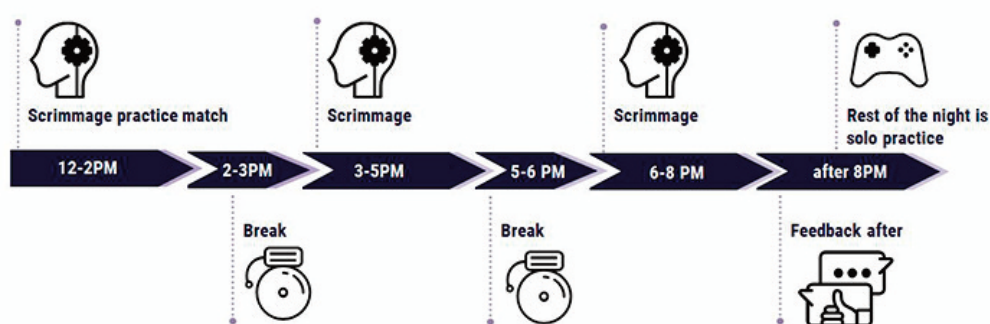
League of Legends is a multi-player online battle arena (MOBA) video game published by Riot Games, which is majority-owned by Tencent.

- IP Ownership. Both Activision and Tencent (through Riot Games) own the IP around which the leagues are formed. This gives them the ability to control the structure of the league and participate in league revenue streams, along with team owners. Also, both Activision and Tencent sold teams to investors - \$20mn / team ([link](#)) for the initial cohort of teams for the Overwatch League and \$10mn / team for LoL North America League - which raised the revenue necessary to build league infrastructure. Generally, both Activision and Tencent targeted team owners that are current owners of other pro sports teams (Robert Kraft, Jeff Wilpon, etc), to leverage their knowledge of how to generate local revenue streams, which along with national distribution / sponsorship revenue can help to generate financial returns.
- No relegation. In past iterations of eSports leagues, teams were not guaranteed a fixed spot in the league; if a team was underperforming, it could be replaced without recourse - a process known as relegation. Importantly, the team sales for OWL and the LoL leagues guaranteed permanent spots in the league for owners, as is true for all major sports leagues in North America. Also, each team has a permanent regional home, which should help generate local fan interest and create opportunities for the local revenue streams that on average represent 53% of major sports league revenue.
- Player salaries. In addition to having teams in fixed locations, players are also guaranteed salaries, which makes it easier for those players to stay with a team and train for gameplay, as opposed to the prior model of just playing for prize money with mixed results. We believe the prospect of salaries will attract more aspiring eSports players to the pro ranks, increasing the quality of gameplay and fan interest.
- Media rights. With the creation of established eSports leagues, we have seen landmark distribution deals. For example, Activision signed a two-year \$90mn deal with Twitch to distribute the Overwatch League in North America. In China, Activision signed non-exclusive deals with ZhanQi TV, Panda TV, and NetEase CC for an undisclosed amount (likely much less than the Twitch deal, given non-exclusive terms).
- Local sponsorship. Overwatch League now has five major sponsors, including Toyota, HP, Intel, T-Mobile, and Sour Patch Kids, while the North American League of Legends League has sponsorship agreements with Geico, Nissan, and Axe. Other than distribution, we believe sponsorship will be the next largest contributor to league-level revenue. About 79% of the eSports audience is below the age of 35, according to data from NewZoo, making it a coveted demographic for brands. We have been very encouraged to see sponsorship move from just endemic brands (e.g. PC/console hardware manufactures) to major consumer brands in key verticals like automotive and consumer products. Increasingly, we believe Chief Marketing Officers (CMOs) will take notice of the growing eSports audience, and will seek out exposure through local and league-level sponsorship deals.
- In-game revenue. Lastly, we believe the leagues will also be able to generate revenue through in-game monetization. Aside from eSports, we expect in-game monetization will reach ~50% of total industry revenue by 2019, as video game publishers have invested in long-term player engagement through regular content

updates, thereby creating opportunities for player investment in game. We believe eSports will be another driver of engagement for players, and for the Overwatch League, we expect Activision will sell virtual items associated with League events, another source of league revenue.

We believe these leagues have done well to build the necessary infrastructure capable of attracting stable sources of revenue over the long-term. Increasingly, we believe more IP owners for top eSports titles will build leagues to better monetize the audiences that they regularly attract. In the next 5 years, we expect to see a handful of discrete eSports leagues for major titles, while for smaller titles, independent tournament organizers like ESL will continue to organize events. We believe publishers of smaller eSports titles can still realize the indirect benefits of free marketing and increased player engagement, without the direct revenue streams from a formal league.

Exhibit 21: A day in the life of a professional gamer



Source: Goldman Sachs Global Investment Research

Pro sports leagues are investing in eSports as well

For sports video games, we expect a slightly different eSports league structure to evolve, since the IP is licensed by the league to the game developer. In this structure, the leagues, the game developers, and the team owners all share the various revenue streams. Because the dollars are split among three parties (not just two), we think the direct monetization opportunity for game developers will be less than it is for other developers that own the IP. Even so, we believe there will be a marketing benefit for the sports league and the game developer. For the league, we believe eSports events can help to keep fans engaged during the offseason, while for the developers, regular eSports tournaments can further grow audience, engagement, and ultimately, monetization.

In the past year, both the NFL and NBA have announced plans to formalize their eSports efforts. In February 2017, the NBA and Take Two announced a partnership to form an eSports league for *NBA 2K*. Under the agreement, the Association's 30 franchises were given the option to form and manage teams, and seventeen teams elected to participate in the inaugural season, consistent with the league's goal of having half the teams participate in the first season before growing to include all thirty teams thereafter.

In April 2017, the NFL announced that in partnership with EA it planned to air exclusive broadcasts of the EA Sports Madden NFL 18 Championship and the Madden NFL 18 Ultimate League on a number of Disney networks. The league ran from February 2nd, 2018 until the start of the NFL draft on April 28th. The games aired on a variety of channels, including ESPNNews, ESPN2 / Deportes, and ESPN2 ([link](#)). Because Madden is a licensed IP, we believe the distribution revenue from the league was split between the NFL and EA, and is unlikely to be meaningful to EA from a financial perspective. However, we believe the Madden league will help to drive audience and engagement, both for the game itself and perhaps for NFL viewership as well. We expect EA will monetize engagement with the league through Ultimate Team, and for the NFL, we believe televised eSports game play helped to promote the NFL brand between the end of the season and before the draft. Indeed, this year's NFL draft had the highest viewership on record at 5.5mn average viewers, and while there were other factors that may have contributed, like controversy around top draft picks, we nevertheless think eSports likely played a part.

Exhibit 22: On average, total TV viewership for Madden eSports events has been around 313k

Madden eSports TV ratings (2017A-1Q18A)

Date	Network	Program	Total Viewers ('000s)
4/28/2018	ESPN2	Madden Bowl	128
2/1/2018	ESPN2	Madden Club Championship	265
12/27/2017	CW	Madden Challenge	670
2/3/2017	NFL Network	Madden Bowl	190
Average viewership			313

Source: The Next Level, data compiled by Goldman Sachs Global Investment Research

Exhibit 23: The 2018 NFL Draft had the highest average viewership of any draft on record

Average NFL Draft viewership - 2014 to 2018

NFL Draft	2014	2015	2016	2017	2018
Average viewers (mns)	5.4	4.1	4.3	4.6	5.5
y/y growth%		-24%	5%	6%	20%

Source: CNN, Nielson, Bleacher Report

Fortnite and the “Moneymaker Effect”

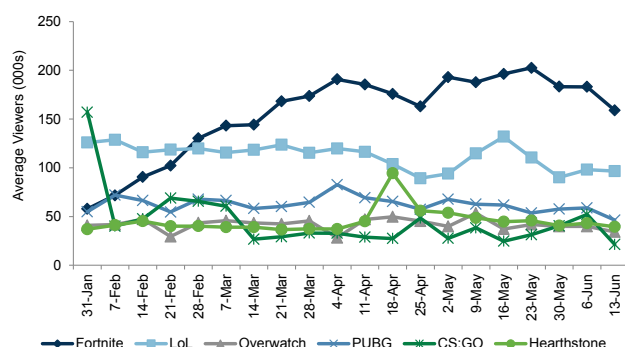
The Fortnite phenomenon has been well-documented, but by way of background, the title has reached more than 125mn players on across console, PC, and mobile. According to SuperData, as of April, the game generated \$296mn of revenue across platforms, an annual run rate of \$3.6bn — more annual revenue than any major console or PC game today. We believe there are many reasons for why Fortnite has reached such an enormous scale. First and foremost, the game is part of the immensely popular battle royale genre, a survival-based game mode that appeals to a broad set of gamers, both skilled and amateur. Second, there is a building feature in the game, something that has already proven to be very popular among younger demographics in games like Minecraft, the 2nd best selling video game of all time. Third, the game is free-to-play, breaking the mold from most console games that have an upfront retail price of \$60. By eliminating the upfront cost, we believe the title was able to reach a far larger audience than a paid game could ever reach, and in particular, appealed to younger demographics without the disposable income of older gamers.

However, we believe there is a fourth, and under-appreciated, explanation for Fortnite's rise: live-streaming. In addition to being the largest fully cross-platform game in the world, Fortnite is currently the most popular game on the live-streaming site Twitch, and as engagement grew on Twitch, so too did the number of players and monthly revenue. In addition to the mechanics of the game, we believe Fortnite was particularly adept at

integrating pop culture features and tributes into gameplay to drive mass market interest. Popular dance move emotes in the game include Vine-derived “Best Mates,” the Robot dance, Carlton’s dance from ‘The Fresh Prince of Bel-Air’, and Turk’s famous dance from ‘Scrubs.’ Also, Fortnite gameplay was regularly streamed by top Twitch personality, Ninja, whose feed of Fortnite streams broke the record for the most concurrent viewers ever on an individual’s channel.

Exhibit 24: Fortnite is currently the most popular game on Twitch

Weekly average viewership for Fortnite, LoL, Overwatch, PUBG, CS:GO, and Hearthstone on Twitch (1/31/18 to 6/13/18)



Source: TwitchMetrics.net, data compiled by Goldman Sachs Global Investment Research

Exhibit 25: Ninja's stream of Fortnite is the highest ever for an individual's channel

Top 10 peak concurrent streams of all time on Twitch

Rank	Streamer	Peak Concurrents ('000s)	Game association
1	ninja	628	Fortnite
2	lolitofoz	418	League of Legends
3	loltyler1	382	League of Legends
4	DrDisrespectLive	365	PUBG / Fortnite
5	DreamHackCS	214	CS:GO
6	FernanFloo	202	Fortnite
7	Dota2RuHub	197	Dota 2
8	LoganPaulWastaken	193	Fortnite
9	Epicenter_RU	192	Fortnite / CS:GO
10	PGL_Dota2RU	189	Dota 2

Source: TwitchStats.net, data compiled by Goldman Sachs Global Investment Research

Fortnite is very much a live game, with weekly updates to gameplay that drive consistent player engagement. As players look to complete a challenge, often they will go to Twitch or YouTube and check out how an influencer like Ninja was able to do it. Most recently, Epic hosted a Fortnite Celebrity Pro-Am Tournament at E3, featuring 50 teams of two (one Pro, one Amateur celebrity per team) competing for a \$3 million dollar charity prize pool. The 3-hour long event included popular game streamers, athletes, musical artists, and actors. At its peak, the tournament attracted 700,000 concurrent viewers on Twitch, surpassing Ninja's record live-stream with Drake a couple months ago. While there were many reasons for Fortnite's initial success, we believe streaming has clearly helped to sustain interest in the title and further grow the audience. Therefore, we see streaming — and really eSports in general — as something that can amplify the success of a game.

The Moneymaker Effect

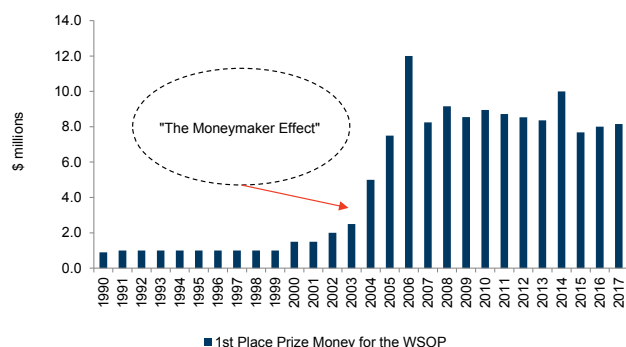
In 2003, Chris Moneymaker, an accountant and amateur poker player from Tennessee, outlasted a field of 839 players to win the World Series of Poker. Making his victory even more improbable, Moneymaker initially qualified through an online satellite tournament with an \$86 buy-in, well less than the typical \$10,000 entry fee for the main event. Up until that point, the WSOP champion was typically a well-established professional player, but with Moneymaker's victory, he gave hope to amateur players that they too could win the World Series of Poker and (at the time) a \$2.5mn first place prize. We believe the “anyone can win” mentality reverberated across the online poker community and sparked the meteoric rise of both online and live poker across the world. After his victory, the first place prize money for the WSOP increased exponentially, reaching

\$12mn in 2006, just 3 years after his victory. We believe the relevant lesson here is that Moneymaker elevated poker's profile as a sport to the mainstream.

We believe Fortnite is doing the same thing for video games and eSports. Many competitive video games can be very difficult to play and even intimidating for new gamers to participate in multiplayer formats. But with Fortnite, we believe the game format of battle royale is actually quite appealing to amateur gamers who can still enjoy playing against more talented players by hiding out in the map, or being part of a team that can support them. Not only is the gameplay of Fortnite appealing to the mainstream, we believe Epic is using eSports to attract the widest possible audience. The company recently announced the Fortnite World Cup in 2019, a series of eSports tournaments with an unprecedented prize pool of \$100mn. For context, the total eSports prize pool in 2017 was \$113mn. The World Cup will feature tournaments that Epic is making accessible to all types of players, not just pros, in an effort to maximize interest in the game. Therefore, we see Fortnite as having a similar effect on video games that Moneymaker's victory had on poker: an inflection in audience growth that moves video games and eSports into the mainstream. As eSports audiences continue to grow, we believe monetization should follow.

Exhibit 26: The "Moneymaker effect" caused an inflection in growth for poker

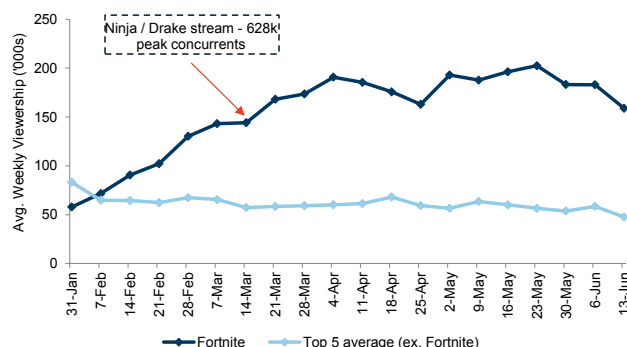
1st place prize money for the WSOP (1990 to 2017A)



Source: World Series of Poker

Exhibit 27: The Ninja / Drake live-stream coincided with accelerating growth for Fortnite

Average weekly Twitch viewership for Fortnite and top PC games



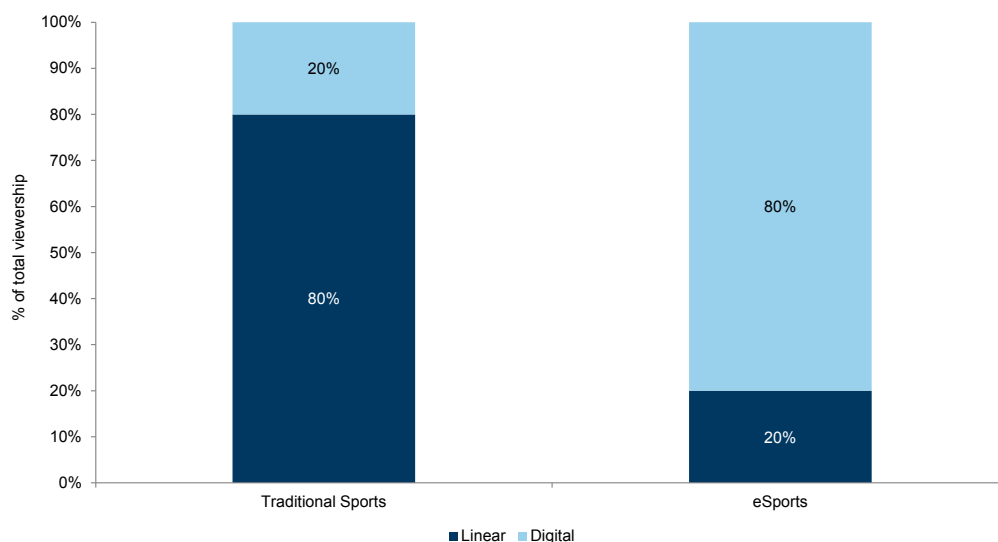
Note: The Top 5 Average includes League of Legends, Overwatch, PUBG, CS:GO, and Hearthstone

A New Paradigm for Distribution

Unlike traditional sports, the vast majority of eSports viewership is online, the same medium where multiplayer game play takes place and through which the eSports audience consumes media content. According to [Nielsen](#), more than 80% of eSports fans watch online. For this user base, online media platforms like Twitch and YouTube in the West and Douyu and Huya in the East serve as the key distribution point for eSports content. Also, we believe these platforms elicit strong and uninterrupted user engagement through chat features that inhibit second screen distractions, as are common with TV viewership. For traditional sports viewership, on the other hand, viewership is 80% linear and just 20% digital, based on a Business Insider survey from

3Q17. We believe traditional sports audiences may want to consume more content digitally over time, but a business model shift away from linear-first to OTT-digital is complicated by outsized economics from TV rights fees that make up 40% of league revenue on average. Still, we believe eSports distribution can lay a blueprint for other leagues keen to pursue a distribution model that is over-the-top and global, and a viewing experience that is social, interactive, and highly-engaging.

Exhibit 28: Only ~20% of viewership for traditional sports is digital, vs. ~80% for eSports
Linear and Digital Viewership - Professional Sports vs. eSports



Source: Business Insider, Goldman Sachs Global Investment Research, Mediapost

In the coming years, we believe eSports content (particularly live) will continue to grow in value, not only due to its audience reach but also the engagement it commands, creating an opportunity for advertisers to target a captive and young demographic. As a result, we believe the media rights paid by online video platforms to video game IP owners will also grow in value as formalized leagues are created. We estimate that media rights, which are 14% of eSports revenue today, will reach 40% of total by 2022, similar to the current average of 37% for major western sports leagues today. See the section on “League Infrastructure Will Create Opportunities for Monetization” for more detail.

How eSports distribution is monetized by leading OTT platforms

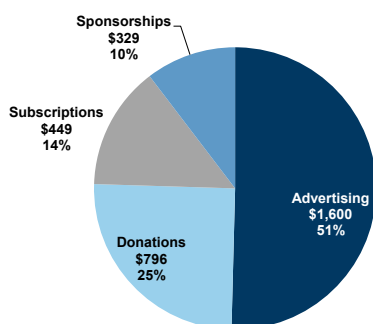
According to SuperData, the gaming video content market, or “online videos and live-streams related to all things gaming,” generated \$3.2bn in gross revenue (before payouts to affiliates) in 2017. There are four main sources of monetization, including advertising, donations, online subscriptions, and sponsorship. Currently, advertising is the largest source of revenue at \$1.6bn, or ~50% of total, followed by donations, or “tipping,” which generated nearly \$800mn in revenue in 2017, or 25% of total.

The advertising opportunity. Online video platforms with eSports content generated 51% of gross revenue from advertising, or \$1.6bn in 2017A, according to SuperData. Of

this \$1.6bn, Twitch generated the most gross revenue from advertising at \$708mn, more than 1.5x the gross ad revenue generated by YouTube (gaming only), despite a much smaller audience. eSports advertising today allows streamers to monetize their activity, either by charging a flat fee, employing affiliate marketing where streamers earn commissions on product sales, or via partnership / revenue sharing programs on YouTube/Twitch ([link](#)). On Twitch, for example, pro streamers earn an average of \$250 in advertising revenue per month per 100 subscribers as of May 2016, according to CNBC ([link](#)). We believe that eSports audience growth will continue to drive growth in the advertising opportunity as well. And given our belief that eSports audiences are growing at a 5-year CAGR of 14% between 2017 and 2022, we see significant runway for the eSports advertising opportunity.

Exhibit 29: Advertising represented 51% of overall Gaming Video Content gross revenue in 2017A

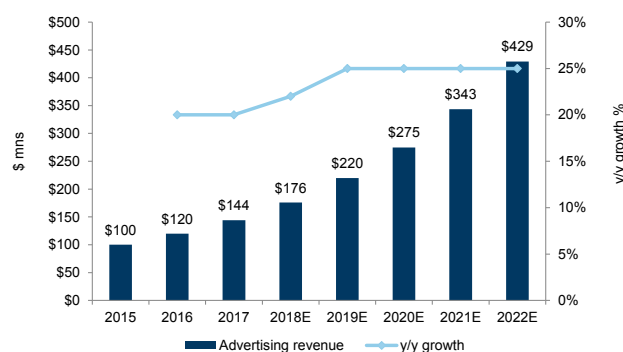
Gaming Video Content gross revenue breakdown by category - 2017A



Source: SuperData, Goldman Sachs Global Investment Research

Exhibit 30: We expect eSports gross advertising revenue will grow at a 25% CAGR from 2018E to 2022E

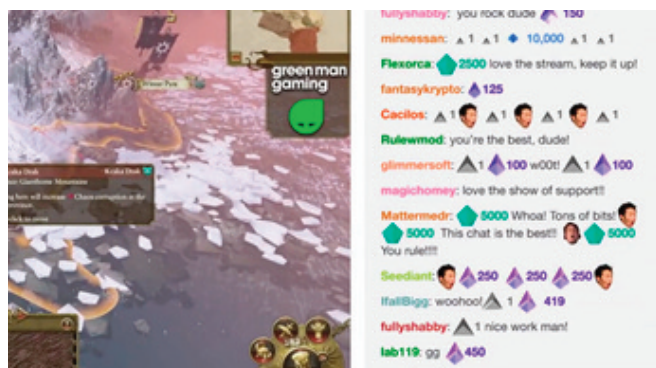
eSports gross advertising revenue growth forecast (2015A to 2022E)



Source: Goldman Sachs Global Investment Research, SuperData, NewZoo

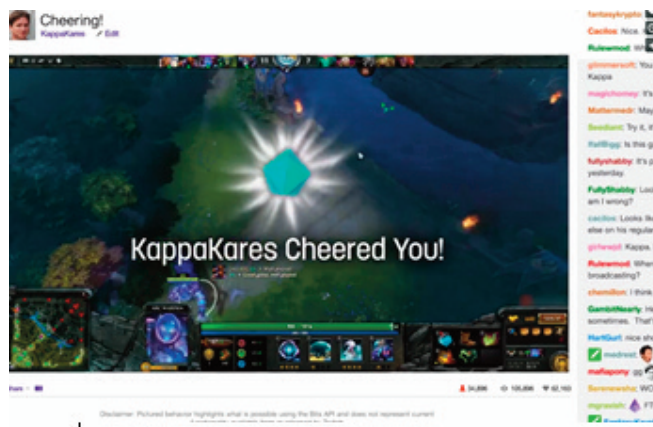
The tipping opportunity. In June 2016, Twitch added a “cheering” feature to its platform called Twitch Bits service. More specifically, the “cheering” feature allows a fan streaming gaming content to offer praise to a live streamer in the form of a virtual good (Exhibit 31 below). The streamer, in the midst of competition, will receive notification (Exhibit 32) that he/she has received a bit. Streamers then can utilize third-party tools to automatically thank people for their support.

Exhibit 31: Cheering's functionality is embedded in Twitch's chat function...



Source: Twitch

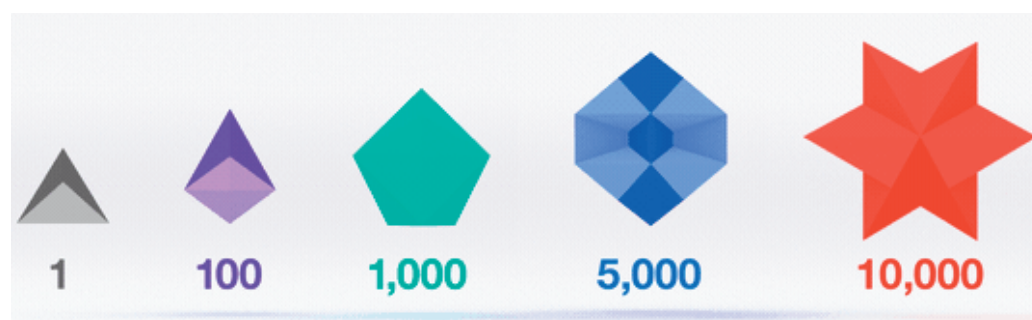
Exhibit 32: ...and allows players to receive "cheers" in the midst of play



Source: Twitch

The cost of bits ranges from \$1.40 for 100 to \$308 for 25,000. An individual can cheer any amount he or she chooses, and the emotes get larger and larger the more the individual spends (see the progression in Exhibit 33 below). According to Twitch CEO Emmett Shear: "If channel subscriptions are the equivalent to holding season tickets for your favorite sports team" then "cheering is like getting a crowd wave started during the game." Thus far, user reception of this feature on Twitch has been largely positive, and, according to *Variety*, users sent more than 1 billion bits from June 2016 to April 2017.

Exhibit 33: Twitch bit emotes

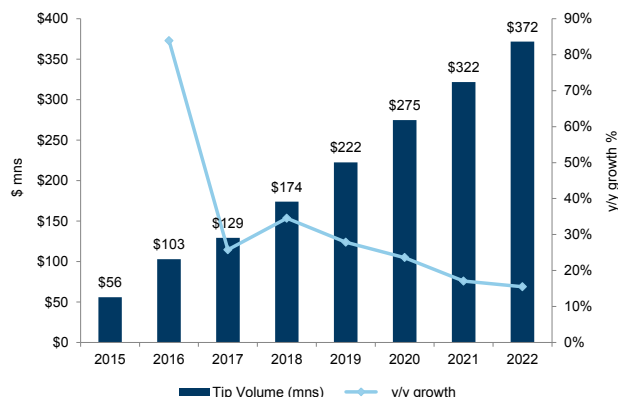


Source: Twitch

In the U.S., we estimate the total tipping market is roughly \$129mn, and as of 2017 was growing 26% y/y. In China, however, we believe the tipping market is far larger, and extends well beyond gaming to other forms of live-streaming. Based on the strength of user engagement with live-streaming — and for gaming in particular — we think tipping will continue to be one of the primary monetization mechanisms for live-streaming platforms like Twitch. According to data from Streamlabs, a service that allows Twitch streamers to collect tipping revenue on the platform, the annual average revenue per follower generated by live streamers on Twitch grew 93% y/y in 2016. We expect revenue per follower to grow at a more modest 8% 5-year CAGR from 2017 to 2022E, due to improving engagement. We expect followers on Twitch to grow in-line with our eSports audience 5-year CAGR estimate of 14%. The product of these estimates yield our forecast for the overall tipping market, which we think will grow at a 24% CAGR over the next 5 years to reach \$372mn by 2022E.

Exhibit 34: We expect the tipping market in the U.S. will reach \$372mn in 2022E

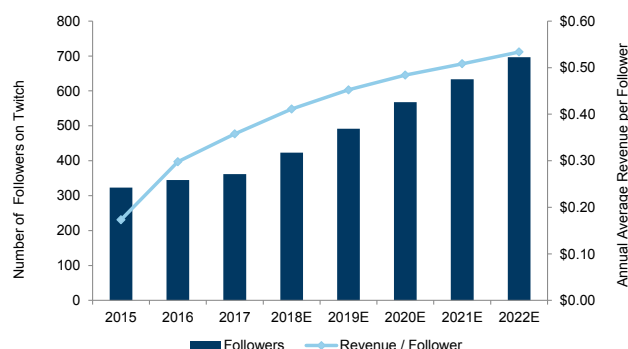
U.S. Annual tipping revenue (2015-2017A) and GS forecast (2018 to 2022E)



Source: Streamlabs, Goldman Sachs Global Investment Research

Exhibit 35: We expect annual revenue per follower to rise due to improving engagement

Annual Average Revenue per Follower and Followers on Twitch (2015 to 2022E)



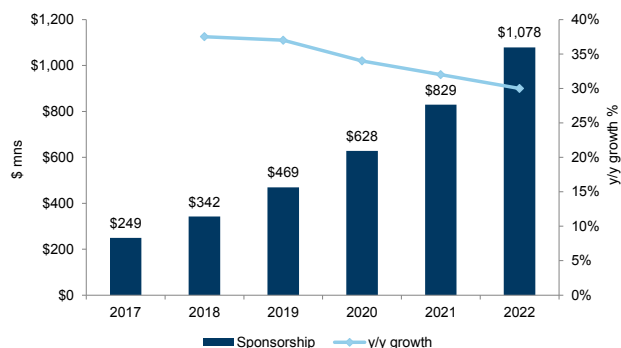
Note: 2015 and 2016 data is from Streamlabs; 2017 data is GSe

Source: Streamlabs, Goldman Sachs Global Investment Research

The sponsorship opportunity. In 2017, we estimate that 38% of eSports gross revenue (before payouts to affiliates) came from sponsorships, or nearly \$250mn. While historically eSports sponsors have been limited to closely related industries such as technology hardware, in the past several years we have seen more mainstream sponsors such as insurance, beverage, and car companies enter the fray. As an example, the North American League of Legends League and the Overwatch League count Toyota, T-Mobile, Sour Patch Kids, Coca-Cola, American Express, and others as non-endemic sponsors. Importantly, we believe the presence of non-endemic sponsors in eSports only started to become prevalent after Riot and Blizzard created established eSports leagues. Nevertheless, the \$250mn we estimate in 2017 revenue pales in comparison to the NFL, for example, which earned \$1.25bn in sponsorship revenue in the 2016-2017 season according to IEG ([link](#)). But we believe that continued progress in the establishment of eSports structured leagues, reinforced by continued double-digit y/y audience growth, will drive sponsorship revenue growth to over \$1bn by 2022, at which point we expect the eSports audience will reach 275mn, comparable to what the NFL has today.

Exhibit 36: We believe sponsorship revenue will grow to over \$1bn by 2022...

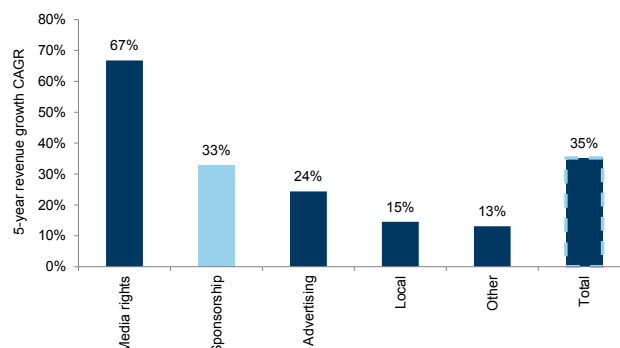
eSports sponsorship revenue and y/y revenue growth % (2017 to 2022E)



Source: Goldman Sachs Global Investment Research, New Zoo

Exhibit 37: ...and will grow at the second fastest CAGR among eSports revenue streams

5-year eSports revenue stream growth CAGRs (2017 to 2022E)

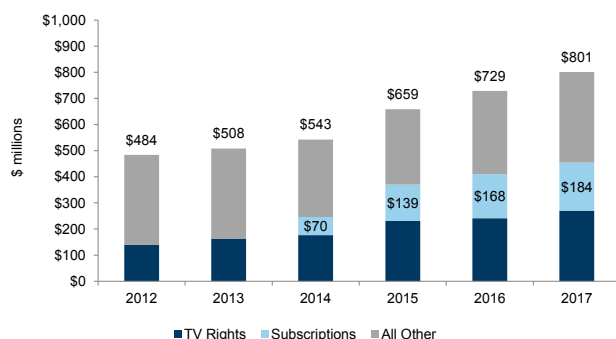


Source: Goldman Sachs Global Investment Research, New Zoo, Superdata

The direct-to-consumer subscription opportunity. Over time, we believe some eSports leagues may migrate to a freemium model, where tournaments are still live-streamed for free on online video platforms, but where viewers can pay for subscriptions that include premium content. The WWE has started to shift to a direct-to-consumer subscription model outside of the pay TV ecosystem, where fans can sign up and watch WWE content for \$9.99 / month. Since it was rolled out in 2015, subscriptions have been the fastest growing part of WWE's business, and contributed 23% of league revenue in 2017. We believe WWE has blazed the trail for a new way of consuming sports content that is fully separated from the TV bundle, which we think insulates them from future cord-cutting risk while also giving them access to a younger demographic that may never sign up for pay TV. We estimate that by 2022 media rights will make up 40% of total eSports revenue, or \$1.2bn, though it's possible that some portion of that is revenue stream could instead be part of a direct-to-consumer subscription.

Exhibit 38: Subscriptions have risen steadily to 23% of total revenue for the WWE in 2017

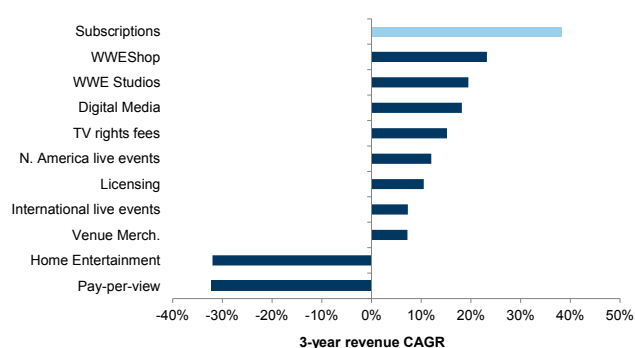
WWE revenue by type (2012A-2017A)



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 39: Subscriptions are the WWE's fastest source of revenue growth

3-year revenue CAGR (16-19) for WWE revenue by type



Source: Company data, Goldman Sachs Global Investment Research

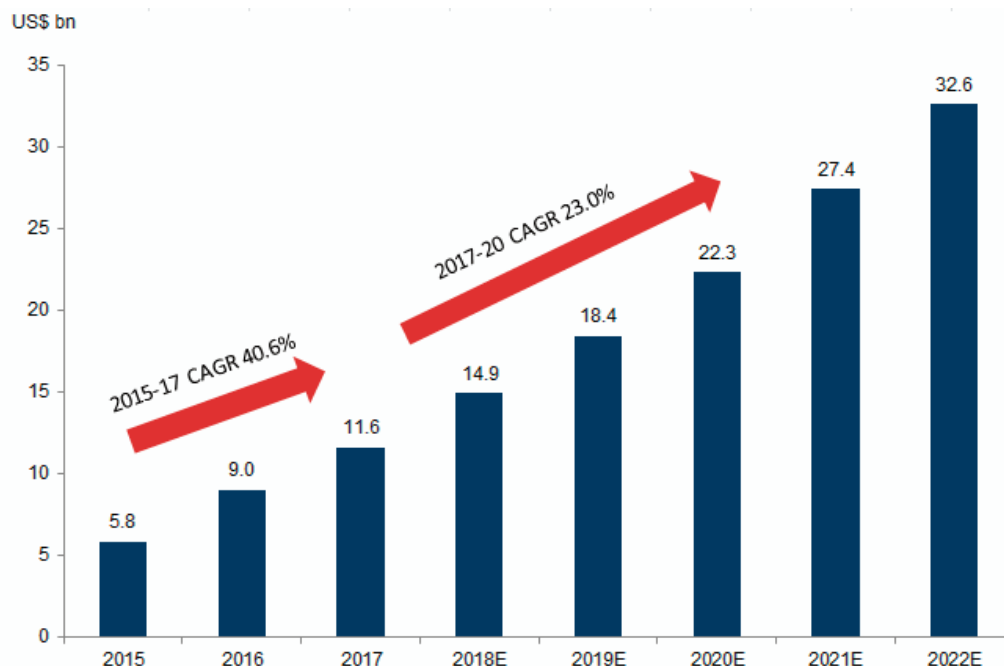
Asia is Leading the Way for eSports Globally

China - The Largest eSports market in the world

China's booming eSports market is built upon the largest gamer base in the world, with approximately 442 million gamers by the end of 2017 and a 57.2% penetration rate of China internet users, according to CNNIC. According to NewZoo, China by 2018 will contribute one third of global game industry's total revenue, and will remain the number one gaming market by revenues and by players. A robust user base has contributed to the rise of eSports in China. With mobile gaming popularity growing rapidly, more mobile eSports titles (e.g Honor of Kings) have emerged in China, driving a step-up of in eSport market size with a 2015 to 2017 CAGR of 40.6%.

China's online gaming and eSport sector has moved from a niche market into the mainstream due to the range of games and the engagement. As the gaming industry has matured, perceptions towards online gaming and eSports has gradually changed. In 2016, China's NDRC (National Development and Reform Commission) issued a policy to "encourage national and international eSport tournaments, on the premise of protection over IP and minors." The Ministry of Education has also recognized eSports as a major of study for higher education. Under this benign policy environment, more capital has flowed into the Chinese eSport ecosystem, yielding more professional leagues, tournament producers, content distributors and specialized stadiums. The positive investment thesis is further backed by local governments' support by way of infrastructure (e.g. providing real estate) and has resulted in multiple brick-and-mortar hubs across China and even an "eSport town."

Chinese professional eSports leagues have also gained recognition in the global arena: most recently, Chinese team RNG won the 2018 LoL MSI world championship, with 60mn unique viewers watching the final between RNG and a Korean team. Korea helped to create the eSports industry 16 years ago and it has since evolved into a national pastime - but China's eSports industry is still nascent. We expect further growth of China's eSports industry driven by more tournament IPs, enhanced distribution channels (e.g. live-streaming platforms), infrastructure development and inbound capital across the eSports ecosystem. The industry in China is expected to grow at 23% CAGR during 2017-22E according to Frost & Sullivan.

Exhibit 40: The China eSports market is expected to grow at a CAGR of 23% from 2017-22E

Source: Frost & Sullivan

Japan has specific issues for eSports

Japan has acquired a sizable presence in global gaming, as its console / mobile / PC gaming market is now worth ¥1.3tn. Japan's presence is even greater in console gaming, as supplier of two of the three big-name consoles. But while the global eSports market has grown to \$660mn (2017), Japan's eSports market has registered negligible growth. Japan is clearly lagging in establishing a presence in eSports, particularly when compared with its high profile in console and mobile gaming. In our view this is due to the existence of Japan-specific challenges, including legislative constraints (the Act against Unjustifiable Premiums and Misleading Representations puts a cap on cash prizes for eSports tournaments), and a lack of cohesion within the gaming industry (as evidenced by the plethora of eSports-related industry organizations that existed until recently). This year, though, the wind seems to be altering direction. We think 2018 potentially could become the year in which eSports really takes off in Japan.

Spread of eSports stymied by cash prize limits imposed under Act against Unjustifiable Premiums and Misleading Representations

The Act against Unjustifiable Premiums and Misleading Representations has significantly slowed the spread of eSports in Japan. Companies organizing eSports tournaments and offering cash prizes to top finishers run the risk of breaching the above law; for this reason, cash prizes are limited to ¥100,000. We think this law is one factor behind the sluggish spread of eSports in Japan, as compared with other countries where eSports tournaments can offer prize money in the hundreds of millions of yen. Domestic regulatory organizations are taking an increasingly proactive stance on establishing the framework necessary for an eSports market in Japan. For example, in March 2018, the Ministry of Internal Affairs and Communications (MIC) published a

research report on the eSports industry, suggesting that the private sector needed to work together with authorities on finding a consensus interpretation of the Act against Unjustifiable Premiums and Misleading Representations. The report proposes that experts from the public and private sectors engage in debate over how the existing law is best interpreted—whether this means permitting tournaments with cash prizes, or limiting the number of participants—and even extends the discussion to potentially amending the Act.

Several eSports organizations merged into single entity, JeSU, in 2018

The Japan eSports Union (JeSU) was established on February 1st, 2018, and began operating immediately. Previously, Japan had an abundance of eSports-related industry organizations, including the Computer Entertainment Supplier's Association (CESA), the Japan Online Game Association (JOGA), and the Japan eSports Association (JeSPA), as well as the eSports Promotion Organization, and Japan eSports Federation (JeSF). Now, though, these five organizations have combined to form Japan's first unified eSports body, partly because only such a united organization would be able to send teams to compete in international tournaments, and to apply for membership of the Japanese Olympic Committee (JOC). We think the establishment of JeSU marks the commencement of public-private cooperation on getting an eSports industry up and running, and believe 2018 could prove a critical juncture in the development of eSports in Japan.

Japanese game companies active in eSports space overseas

In light of the aforementioned legislative hurdles domestically, Japanese game companies have been active in the eSports field internationally. Capcom, for example, has been holding Capcom Pro Tour tournaments around the world since 2014, inviting the top 32 finishers from each tournament to participate in the Capcom Cup at year's end. The Capcom Pro Tour features Street Fighter V as its only game, and as of May 2018 the company had held 92 eSports tournaments, handing out a total of US\$1.95mn in prize money. Capcom had delayed full-scale expansion of its eSports business in Japan because of the aforementioned legislative obstructions, but in a press release on February 13th the company announced plans to officially enter the eSports market in Japan, holding a high-level event called the Capcom Pro Tour Japan Premier Tournament at the 2018 Tokyo Game Show.

Plenty of potential in Japanese IP, especially in fighting games

Among eSports genres, multiplayer online battle arena (MOBA) and first-person shooter (FPS) games are by far the most popular, but in Japan it seems that fighting games have particularly large potential. The exhibit below ranks the top games on Twitch based on number of hours watched (as of December 2017). Games at the top of the list include the MOBA titles Dota 2 and League of Legends, along with FPS games such as Counter-Strike and Call of Duty. Both of the Japanese titles on this list—Street Fighter V from Capcom and Super Smash Bros. from Nintendo—fit into the fighting genre. In addition, at the JeSU-certified tournament Game Party Japan 2018, held in February 2018, professional licenses were issued for players that play six titles competitively,

including Street Fighter V (Capcom) and Tekken 7 (Bandai Namco). Besides fighting games, there are prominent titles from a number of other genres including sports and puzzle games, among them Winning Eleven 2018 (Konami), selected by the Olympic Committee of Asia as one of the eSports titles for the “18th Asian Games Jakarta-Palembang 2018,” and Monster Strike (Mixi), which has racked up over 45mn cumulative global downloads.

Exhibit 41: Japanese games such as Street Fighter ranked in the top 10 games on Twitch as measured by eSports hours watched in December 2017

Top 10 games on Twitch by eSports hours watched - global - December 2017

Game Title	Total Hours (mns)	Esports Hours (mns)	Share Esports (%)
Dota 2	32.4	11.8	36%
CS: GO	18.8	6.8	36%
League of Legends	69.6	6.2	9%
Hearthstone	43.2	4.5	10%
CoD: WWII	6.9	1.6	24%
Street Fighter V	2.7	1.4	54%
StarCraft II	3.7	1	26%
Overwatch	17.9	0.7	4%
Rocket League	2.3	0.6	26%
Super Smash Bros.	0.9	0.6	68%

Source: NewZoo

New Platforms for eSports

Today, PC is the primary platform for eSports worldwide. Currently, the top 10 eSports titles as measured by prize money are primarily or exclusively PC-based titles. This is especially true in China, the largest market for eSports, where PC contributed 56% of total games revenue in 2016, according to [NewZoo](#). However, we believe eSports will increasingly migrate to other platforms like console & mobile, as eSports continues to grow in Western markets where console gaming is more popular, and as mobile games continue to grow in popularity and attract the interest of a more mainstream audience.

Exhibit 42: The top 5 all-time eSports are predominantly PC titles

Top 10 eSports titles by prize money - lifetime to date

Top eSports titles awarding prize money - lifetime to date					
Rank	Title	Prize \$ awarded (\$ mns)	Players	Tournaments	Primary Platform
1	Dota 2	\$143.8	2,528	931	PC
2	Counter-Strike: Global Offensive	\$55.8	9,859	3,282	PC
3	League of Legends	\$53.5	5,513	2,074	PC
4	StarCraft II	\$26.7	1,752	4,846	PC
5	Heroes of the Storm	\$13.5	1,028	408	PC
6	Hearthstone: Heroes of WarCraft	\$12.2	1,745	711	PC/Mobile
7	Counter-Strike	\$11.0	2,633	589	PC
8	SMITE	\$8.4	472	88	PC
9	StarCraft: Brood War	\$7.6	623	508	PC
10	Overwatch	\$7.0	2,397	581	PC

Source: eSportsearnings.com

According to data from eSportsearnings.com, console games today represent about 7% of the prize pool for eSports; Call of Duty World League is the single largest contributor

with \$17mn in prize money awarded in 2017. Over time, we think console will continue to grow in popularity as a platform for eSports events, particularly in Western markets. With sports titles, like Madden and NBA 2K, EA and TTWO have both partnered with the NFL and NBA, respectively. Next, we think Activision will likely create a structured league for Call of Duty that more closely resembles what has already been created for Overwatch. We would expect to see all the same features — team sales, fixed regional team locations, player salaries, digital distribution deals — which we think will help to formalize Call of Duty as an eSports and continue to grow the popularity of console as an eSports platform.

Exhibit 43: Console eSports prize money represents only 7% of the total to date

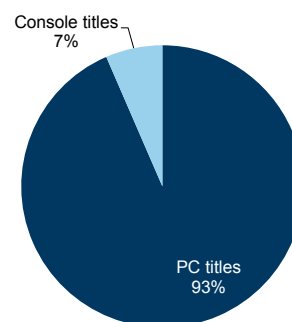
Console eSports prize money to date

Title	Prize money (\$ mns)
FIFA	\$4.6
Madden	\$1.4
CoD World League	\$17.4
All other console titles combined	\$4.5
Total console eSports prize money	\$27.9
Total eSports prize money	\$428.6
Console eSports as % of total	7%

Source: eSportsearnings.com, data compiled by Goldman Sachs Global Investment Research

Exhibit 44: ...while PC titles represent the other 93%

Console vs. non-console eSports prize money to date; \$mns



Source: eSportsearnings.com, data compiled by Goldman Sachs Global Investment Research

In Asia, mobile eSports have started to grow in popularity: Supercell's Clash Royale was the most popular mobile-only game on YouTube and Twitch as of 4Q17, and has attracted over 22mn viewing hours across both platforms, according to NewZoo. For mobile eSports, we think China may be a unique market, given the seamless integration of gaming and chat in Tencent's WeChat app, and the massive mobile gaming audience in the market. At peak, mobile game Honor of Kings had roughly 200mn users — more than the entire gaming population in the U.S. of 160mn.

For mobile eSports, we are seeing increased venture investment in the space. Skillz is a platform for mobile eSports that raised \$25mn of venture funding in December 2017. Skillz partners with mobile publishers like Zynga and Blizzard to host cash tournaments for games like *Candy Crush*. Also, Skillz provides a platform for casual contests among friends (or strangers), matching players through a ranking system of their scores. Interestingly, Skillz was named to the top spot in Inc's 5000 [list](#) for 2017, which tracks the fastest growing companies in the U.S., and Liberty Global (the largest international cable company by revenue) led the Series C round. According to Bloomberg, Skillz hosts more than 1 million tournaments per day and has doubled its monthly revenue to \$16mn in the last nine months ([link](#)).



An interview with Andy Miller, co-founder of NRG eSports

Andy Miller is co-founder of NRG eSports, an eSports holding company founded in 2015, as well as co-owner of the Sacramento Kings. Prior to NRG, Mr. Miller was the Vice President of Mobile Advertising at Apple. NRG has an investor list that includes Shaquille O'Neal, Alex Rodriguez, Michael Strahan, Tiesto, and many others. NRG owns the San Francisco Shock, one of 12 eSports franchises in Overwatch League (OWL), and also owns teams competing in other games such as Counter-Strike: Global Offensive, Rocket League, Hearthstone, and Fortnite.

CHRIS MERWIN: Andy, you have a background in sports through your ownership stake in the Sacramento Kings. Can you talk about how you first came across eSports, and ultimately what attracted you to the space as an investor?

ANDY MILLER: Three or four years ago I started looking at eSports — I just had an investment with my business partner Jeff Glass, and I felt like I uncovered this giant audience, this unknown audience. But the reality was it was there the whole time, and we just weren't looking. When I started looking at the size of the audience, the demographic breakdown, and started to compare it to what we have with the Kings, it was insanely compelling with this Millennial base cohort, and incredibly passionate fans across all these different games, which are considered different sports. So it really got me enthused and I started to talk to one of my co-owners, Mark Mastrov, about it, and Shaquille O'Neal, both with the Kings. The three of us had done some businesses before, and said we should really just do this ourselves. We jumped in and bought a team, and two years later now we've announced our tenth team.

CM: The global eSports audience is already bigger than some major sports leagues, like the MLB and NHL, but over half of that audience is in Asia. How do you think about the audience opportunity for eSports over time, and geographically where are the biggest opportunities for growth?

AM: I think China is still just incredible, the opportunity there, especially when you start talking about local franchises like we have with Overwatch League. So just the potential expansion, the cities in China that have twenty, thirty million people are incredible. I think the US is still going to be the best opportunity for lots of reasons, because I think that at some point it will mirror the ad market and brand market — and those are challenging throughout Europe and Asia. But friends, and partners, and money have woken up to eSports and obviously the effect of gaming — and are super interested in getting involved in the North American scene.

CM: Historically, eSports have been a bit like the Wild West — anyone can start a team and enter a tournament. But in the last couple of years it has started to change. You're an owner of the San Francisco Shock, one of the teams in the Overwatch League. Can you talk about what the Overwatch League has done for eSports, and how the league structure can help to drive audience and monetization over time?

AM: Yeah, I think it's a template. I hope it is — it has changed everything really fast. eSports in the [beginning started with just] players, and now teams are run and owned by Robert Kraft or Comcast, so it

has really professionalized super-fast. The Overwatch League is wonderful. It creates enterprise value based on the city franchises, it has predictability in its schedule, in its broadcasts, obviously there is revenue sharing and profit sharing amongst the league and teams, but most importantly it is incredibly professionally run. The contracts are standardized, and there is a full understanding with the players who are represented as to what their expectations are.

CM: In traditional sports, the largest revenue stream is media rights, and that's largely because of TV rights deals. But in eSports the vast majority of viewership takes place online. What do you think will be the largest revenue stream for eSports over time — will it be media rights, advertising, sponsorship, or something else?

AM: I think it'll be media rights.

CM: And why do you think that?

AM: Well just because it's so global, and the numbers are so big. I look at the different opportunities we have with Overwatch League, where we sold the rights for the Twitch deal in North America, and there's other folks who are carrying this on terrestrial, and streaming in Korea and China, and I think we've just scratched the surface. Plus, streaming is where it's going to — away from cable and pre-determined channel lineups. So I think it's going to end up being really radical.

CM: What do you think about the viewing experience of eSports today? Are there certain genres that are better suited for eSports than others? How can camera angles and replay help to enhance the viewing experience?

AM: That's the big question. Something like Overwatch is hard to track. It's fun, it's kinetic, and if you know the game, you can just sit there and listen to the oohs and aahs with every little minor move. So if you play the game, you get it. But, how do you break out to more of the casual fan? I think Overwatch is really starting to show the world that anybody can be interested in eSports and watching professional video gaming even if you don't play it. I never played football but I religiously watch football every Sunday. So I think that's a big opportunity, but there's definitely an education and a slowdown. Instant replays are important, top-down views are really important for the maps, just the meta, and the style of play as well. Right now the style of play in Overwatch is dive composition, which is just a bombardment of activity, and many team fights versus other games where it's slower, so I think that's really important. And then you see games that are just really easy to follow, like Rocket League. We're kicking a soccer ball with a car, and you watch it, and you get it within a few seconds — and you love it. Every publisher has a journey to get to the point where they don't break the kind of core tenets of their game, but obviously make it more viewable.

CM: What do you think about driving local attendance for eSports events. Now that Overwatch League and League of Legends have regional teams, do you think we'll start to see more in-person attendance of league play, and can eSports end up like traditional pro sports leagues in that regard?

AM: I hope so. The local aspect is really, really important. I think it's working, as far as our fan base [is concerned]. I look at it for the [San Francisco] Shock so far, I look at where our merch is being bought from and it's Northern California. When we host viewing parties up here they're all sold out, and pretty good

numbers of people. The enthusiasm is there, but the question is, how many people can we get at an arena, a stadium, at a theater, and how often for Overwatch, or for different matches as well? There is definitely an appetite for gaming — it's super fun. Even our viewing parties where we're in a club, or bar, or theater, watching a match taking place in Los Angeles are rockets. It feels like game seven of the playoffs. So it's a great experience — people haven't had that ability to interact with their community. But I'm an Overwatch fan, and I love Overwatch. Maybe I have some friends who play, but there's a whole world out here of hundreds of thousands of people in the San Francisco area, and I want to hang out with them — we have a shared interest. And that's never really been possible before, unless they wanted to spend a lot of money and fly out to some major tournament somewhere in the world.

CM: For traditional sports like football or basketball, the sports themselves, in theory, aren't as exposed to decay risk as video game IP. But what do you think about the lifecycle of video game content, and the sustainability of certain eSports, particularly those that you're invested in for the long term?

AM: I'm not super worried about it. The games that are backed by big publishers that have a big player base I'm sure will last a long time. There is no real slowdown so far in Counter-Strike or Dota or League of Legends, and those have been around for ten, twenty-plus years. I'm sure Overwatch will be around for a long time — just the fact that you have big publishers putting a lot of time, effort, and money behind these titles, I think means that they'll last. It's no different from watching Star Wars movies — we're still watching Raiders of the Lost Ark movies. They just get rebooted and updated.

CM: Today most of the eSports in the world are on PC, but do you think console and mobile eSports will become as popular in time, and which franchises will be best positioned?

AM: I do think it will be big. I have a mobile background myself — NRG entered the founding franchise into the Clash Royale League. Mobile is more here in gaming than you think, because what are the biggest games people are playing right now? Fortnite, PUBG? They're on mobile. Clash [of Clans]? Mobile. Hearthstone and games like that have been around for a while. So the question is — will they translate into good eSports? I think that's probably more a function of the game than the fact that it's on mobile, so we'll see. There will definitely be breakout games. I think the touch screens are capable now — there is a lack of latency, so I think the opportunity is definitely there.

The Venture Landscape



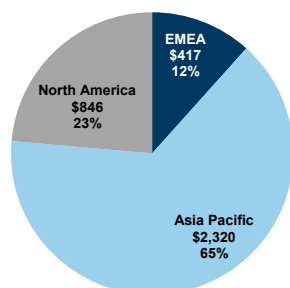
Venture investments in eSports are accelerating

Since 2013, there has been \$3.3bn of venture capital investment in eSports-related start-ups. In 2018 YTD, we have already seen \$1.4bn of investment, a nearly 90% y/y increase from the total amount of funding in 2017. The uptick was largely driven by two outsized investments made by Tencent in Chinese online video platforms Douyu

and Huya of \$630mn and \$461mn, respectively. We believe these investments in particular underscore two key trends: 1) the opportunity for live-streaming to monetize the growth in eSports in a way that few other eSports-related businesses can, and 2) the popularity of eSports in Asia in particular.

Exhibit 45: APAC dominates the eSports venture landscape...

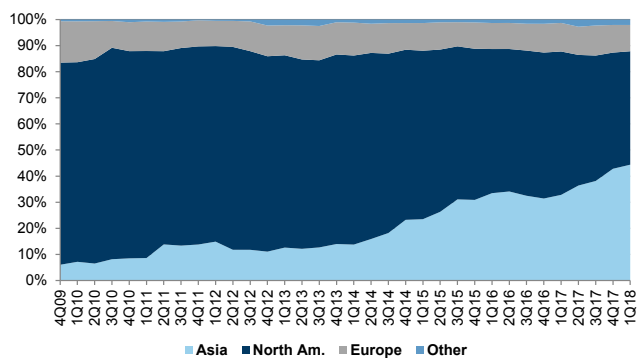
Total eSports venture funding by geography since 2013 (\$ bns)



Source: CB Insights, data compiled by Goldman Sachs Global Investment Research

Exhibit 46: ...consistent with APAC growing as a % of overall total global VC investment

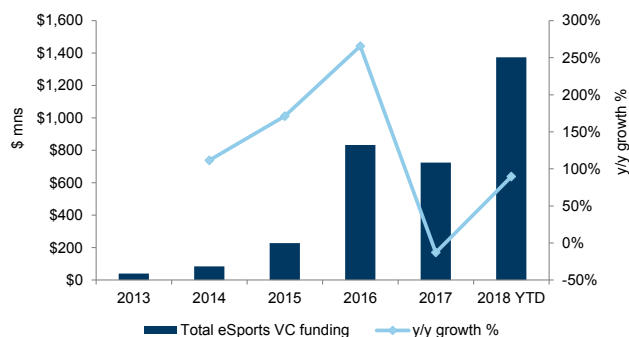
Share of total global VC investment by region (\$ mns per deal)



Source: CB Insights, data compiled by Goldman Sachs Global Investment Research

Exhibit 47: eSports vc funding has grown 90% y/y in 2018 YTD...

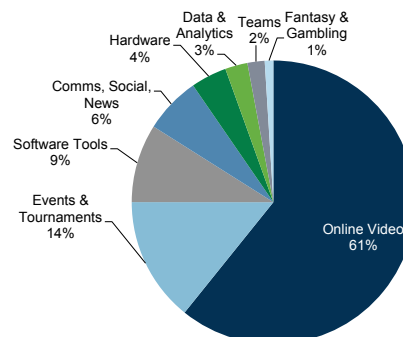
Total eSports VC funding (2013 to 2018 YTD)



Source: CB Insights, Goldman Sachs Global Investment Research

Exhibit 48: Online Video is the largest funding category to date

Total eSports VC funding by category (2013 to 2018 YTD)



Source: Goldman Sachs Global Investment Research, CB Insights

Methodology. Consistent with the updated methodology used in the Venture Capital Horizons reports, we define VC funding as Convertible note, seed, angel, Series A, Series B, Series C, Series D, Series E+, unattributed VC, corporate VC, "other VC," private equity, growth equity, and "other" funding to Venture-backed companies, as defined by CB-Insights. Unless otherwise indicated, data has been updated as of 6/5/18.

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Disclosure Appendix

Reg AC

We, Christopher D. Merwin, CFA, Masaru Sugiyama, Piyush Mubayi, Toshiya Hari, Heath P. Terry, CFA, Alexander Duval, Heather Bellini, CFA, Drew Borst, Lisa Yang, Donald Lu, Ph.D., Garrett Clark, Charles Long, Wendy Chen, Yusuke Noguchi, Jacqueline Morea, Michael Ng, CFA, Daniel Powell and Hameed Awan, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our coverage universe) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

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Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

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Disclosures

Coverage group(s) of stocks by primary analyst(s)

Christopher D. Merwin, CFA: America-Select Internet, America-Video Games. Masaru Sugiyama: Japan Internet and Games, Japan-Consumer Electronics, Japan-Media. Piyush Mubayi: Asia Internet. Toshiya Hari: America-Semiconductor Capital Equipment, America-Semiconductors. Heath P. Terry, CFA: America-Internet. Alexander Duval: Europe-Communications Technology, Europe-Semiconductor & Tech Hardware. Heather Bellini, CFA: America-Software. Drew Borst: America-Media and Entertainment. Lisa Yang: Europe-General Retail, Europe-Media. Donald Lu, Ph.D.: A-share Telecoms and Technology, Greater China Telecoms and Technology. Michael Ng, CFA: America-Media and Entertainment, America-Toys.

A-share Telecoms and Technology: Accelink Technologies, China United Network Comm, Dahua Technology, Fiberhome Telecom Tech, Goodix, Hikvision Digital Technology, Hytera Communications Corp., SG Micro Corp., Wangsu Science & Technology Co., Zhongji Innolight Co., ZTE Corp. (A).

America-Internet: Amazon.com Inc., Blue Apron Holdings, Booking Holdings Inc., CarGurus Inc., Criteo SA, eBay Inc., Etsy Inc., Expedia Group, GrubHub Inc., LendingClub Corp., Netflix Inc., Pandora Media Inc., PayPal Holdings, Redfin Corp., Snap Inc., Spotify Technology S.A., TripAdvisor Inc., Trivago N.V., Twitter Inc., Zillow Group.

America-Media and Entertainment: AMC Entertainment Holdings, AMC Networks Inc., CBS Corp., Cinemark Holdings, Discovery Inc., IMAX Corp., Interpublic Group of Co., Lamar Advertising Co., Liberty Formula One Group, Liberty Formula One Group, Lions Gate Entertainment Corp., Live Nation Entertainment Inc., Omnicom Group, Outfront Media Inc., Tribune Media Co., Twenty-First Century Fox Inc., Twenty-First Century Fox Inc., Viacom Inc., Walt Disney Co..

America-Select Internet: ANGI Homeservices Inc., Groupon Inc., IAC/InterActiveCorp, Match Group, Shutterfly Inc., Stitch Fix Inc., TrueCar, Yelp Inc..

America-Semiconductor Capital Equipment: Applied Materials Inc., Entegris Inc., Keysight Technologies Inc., KLA-Tencor Corp., Lam Research Corp., Teradyne Inc., Versum Materials Inc..

America-Semiconductors: Advanced Micro Devices Inc., Analog Devices Inc., Broadcom Inc., Integrated Device Technology Inc., Intel Corp., Maxim Integrated Products, Nvidia Corp., NXP Semiconductors NV, Qorvo Inc., Skyworks Solutions Inc., Texas Instruments Inc., Xilinx Corp..

America-Software: Adobe Systems Inc., Akamai Technologies Inc., Alphabet Inc., Atlassian Corp., Autodesk Inc., Citrix Systems Inc., Dropbox Inc., Endurance International Group, Facebook Inc., GoDaddy.com Inc., Microsoft Corp., MongoDB Inc., Okta Inc., Oracle Corp., Pivotal Software Inc., Red Hat Inc., RingCentral, Salesforce.com Inc., Twilio, VMware Inc., Wix.com, Workday Inc..

America-Toys: Funko Inc., Hasbro Inc., Mattel Inc..

America-Video Games: Activision Blizzard Inc., Electronic Arts Inc., Take-Two Interactive Software Inc., Ubisoft Entertainment SA, Zynga Inc..

Asia Internet: 58.com Inc., Alibaba Group, Aurora Mobile Ltd., Baidu.com Inc., Ctrip.com International, Gridsum, Huya Inc., Info Edge India Ltd., iQIYI Inc., JD.com Inc., Jianpu Technology Inc., MakeMyTrip Ltd., NetEase Inc., Pinduoduo Inc., Qeeka Home (Cayman) Inc., Sea Ltd., SINA Corp., Sogou Inc., Tencent Holdings, Uxin Ltd., Vipshop Holdings, Weibo Corp., Xiaomi Corp., YY Inc..

Europe-Communications Technology: Ericsson, Ericsson, Gemalto, Nokia, Nokia, Spirent Communications Plc, Technicolor.

Europe-General Retail: adidas, ASOS Plc, Associated British Foods, B&M European Value Retail SA, CECONOMY, Dixons Carphone Plc, Europris ASA, Hennes & Mauritz, Home24 SE, Inditex, Kingfisher, Maisons du Monde SAS, Marks & Spencer, Next, OVS SpA, Pets at Home Group, Puma, Rocket Internet SE, SMCP, Ted Baker, Tokmanni Group, XXL ASA, Zalando SE.

Europe-Media: Ascential Plc, Atresmedia, Auto Trader Group, Axel Springer AG, Daily Mail and General Trust, Emerald Expositions Events Inc., Informa, ITV Plc, JCDecaux, Lagardere, M6 - Metropole Television, Mediaset, Mediaset Espana, Modern Times Group, Naspers Ltd., Pearson, ProSiebenSat.1, Publicis, RELX Plc, RELX Plc, Rightmove Plc, RTL Group, Schibsted ASA, Scout24 AG, Sky Plc, TF1, Vivendi, Wolters Kluwer, WPP Plc.

Europe-Semiconductor & Tech Hardware: ASML Holding, Infineon, Ingenico SA, Logitech, STMicroelectronics, STMicroelectronics.

Greater China Telecoms and Technology: China Communication Services, China Mobile (HK), China Mobile (HK) (ADR), China Telecom (ADR), China Telecom (H), China Tower Corp., China Unicom (ADS), China Unicom (H), Hua Hong Semiconductor Ltd., Mediatek, Parade Technologies Ltd., Silergy Corp., SMIC (ADR), SMIC (H), TSMC, TSMC (ADR), United Microelectronics Corp., United Microelectronics Corp. (ADR), ZTE Corp. (H).

Japan Internet and Games: Bandai Namco Holdings, Capcom, CyberAgent, DeNA Co., Kakaku.com, Konami, LINE Corp., Nexon, Nintendo, Rakuten, Recruit Holdings, Sega Sammy Holdings, Square Enix Holdings, Yahoo Japan, ZOZO.

Japan-Consumer Electronics: Panasonic Corp., Sony.

Japan-Media: Dentsu, Hukuhodo DY Holdings.

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Goldman Sachs Investment Research global Equity coverage universe

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	Buy	Hold	Sell	Buy	Hold	Sell
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