

Gaming Levels Up, and Into the Metaverse

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The U.S. gaming industry engages 164 million users across virtually every social demographic, an increase of nine million new users since 2019.¹ Gaming is driven by ingenious tech innovation that makes experiences deeply immersive, highly accessible, and very customizable. Gamers of all ages are flocking to consoles and cloud streaming services, spurring the industry to continuously level up their technologies to sate the public's appetite for new virtual worlds and challenges.

Beyond entertainment, gaming now shapes how we teach, test, collaborate, and motivate across a variety of industries. Gaming software, platforms, and technologies enable rich experiences that have pushed significant growth in terms of revenue and user populations. Per the latest forecast from the Consumer Technology Association (CTA)[®], gaming revenue will increase to \$54.4 billion in 2023². Additionally, some 73% of 224 million U.S. adults and adolescents now make up the active gaming population, according to CTA's recently released study: *The Future of Gaming 2022*³. These findings illuminate an industry buoyed by diverse and cutting-edge gaming options.

At CES[®] 2023, game publishers, hardware manufacturers, and retailers will have a wealth of creative and technical opportunities to explore this growing market, one that CTA knows uniquely as the convener of innovation at CES. Further, we actively monitor trends in the gaming industry as part of our robust work on the Nasdaq CTA Global Video Games Software Index[™] (PLAYR2[™])⁴.

Here are two key trends to watch as the gaming sector expands.

Gaming Soars to the Cloud

Advancements in cloud computing and gaming streaming services have whetted gamers' appetites for new ways to access and interact with their gaming experiences.

With the similar potential for expansive libraries like audio and video streaming services, cloud gaming promises easier access to a wider range of titles on a singular platform. Further, the improvement of latency and performance in cloud gaming software provides gamers with the flexibility to stream and play games from a variety of compatible devices that include laptops, smart TVs, tablets, and even phones. The ability to capture mobile gamers is critical as it allows cloud gaming providers to tap into the double-digit growth in the adoption rate of mobile gaming in recent years⁵.

Despite the shutdown of Google Stadia in recent weeks, cloud gaming services are charting growth, with Microsoft's Xbox Game Pass, Amazon's Luna, and Nvidia's GeForce Now emerging as leading platforms bolstered by their more expansive catalogs of gaming titles. Consequently, and according to CTA research, nearly half of gamers in the U.S. are paying for a gaming subscription service, in part as a result of heightened awareness of and access to new and varied cloud options.

¹ <https://shop.cta.tech/collections/research/products/the-future-of-gaming-2022>

² <https://www.cta.tech/Resources/Forecasts/Industry-Forecasts>

³ <https://shop.cta.tech/collections/research/products/the-future-of-gaming-2022>

⁴ <https://indexes.nasdaq.com/Index/Overview/PLAYR2>

⁵ <https://shop.cta.tech/collections/research/products/the-future-of-gaming-2022>

Still, while Google Stadia may not continue to operate in its current form, the software behind the platform has already demonstrated success as a white-label product for clients like AT&T⁶. With Google's position as a leader in cloud infrastructure, it is very likely their expertise will be leveraged for another cloud gaming venture or to push the further advancement of this innovative technology into new applications for both consumers and enterprises across the entire industry.

Gearing Up for the Metaverse

Hardcore gamers and young people are also entering new digital realms via the evolution of the metaverse. Specifically, 62 million (37% of gamers) are excited to live out gaming experiences in the metaverse, with 38 million gamers self-identifying as metaverse enthusiasts, as CTA's research has revealed.⁷

In fact, many consumers are experiencing the metaverse for the first time through gaming as their entry point. Fortnite emerged as an early leader in this nascent field through its combination of customization, licensing of major IP brands like Marvel, and the creation of unique in-game experiences such as concerts from artists including Ariana Grande⁸.

Meanwhile, Roblox, another metaverse leader from the gaming space, saw 57.8 million members on its online gaming platform, a 23% jump from last year, according to the company's September 2022 metrics report.⁹

As a result, gamers anticipate that the future of gaming will see the increased incorporation of augmented and virtual reality to build even richer metaverse experiences. Nearly 30% will buy a VR/AR headset in the next 12 months.¹⁰

This is unsurprising, as the 41 million Americans who identify as active and avid gamers are serious investors in technologies that up the challenge and complexity of content. Gamers are emptying retailer inventories of immersive-enabling hardware such as 8K televisions and soundbars. More than half of U.S. gamers already use a TV with 4K or higher quality, with 36% planning to upgrade to an 8K TV in the next 12 months. Some 40% will purchase gaming-caliber headsets with microphones, soundbars or surround-sound speakers, and more to boost their experiences.¹¹

As the metaverse evolves in the coming years from visual perception to a more tactile experience, haptic technologies -- like the vests and gloves on display at CES 2022 from exhibitors Owo and Skinetic -- will also become a key piece of gaming equipment to achieve full immersion. A Ready Player One-like gaming of a sci-fi future may truly be coming closer to our present.

Tracking the Gaming Sector Through the Nasdaq CTA Global Video Games Software Index™ (PLAYR2™)

The Nasdaq CTA Global Video Games Software Index™ (PLAYR2™) is a modified theme-adjusted free-float market capitalization-weighted index designed to track the performance of a selection of Developer/Publisher companies engaged in the global Video Games industry. The companies are selected based on classification by Consumer Technology Association (CTA) and include issuers determined by CTA to be domiciled outside of Russia or China. It is reconstituted semi-annually in March and September and is rebalanced quarterly in March, June, September, and December. The index was launched on August 10, 2022.

Eligibility Criteria

⁶ <https://www.theverge.com/2021/10/21/22738550/arkham-knight-google-stadia-att>

⁷ <https://shop.cta.tech/collections/research/products/the-future-of-gaming-2022>

⁸ <https://techcrunch.com/2021/08/09/fortnite-ariana-grande-concert-metaverse/>

⁹ <https://www.cnbc.com/2022/10/17/roblox-stock-pops-18percent-on-september-user-growth.html>

¹⁰ <https://shop.cta.tech/collections/research/products/the-future-of-gaming-2022>

¹¹ <https://shop.cta.tech/collections/research/products/the-future-of-gaming-2022>

CTA has created a Sector and Subsector classification process to define businesses related to Video Games & Esports. To be eligible for inclusion, a security issuer must be classified by CTA under the Developer/Publisher sector, which CTA defines as:

Developer/Publisher: Game developer refers to the company or organization that designs and executes the creation of video games. Game publisher refers to the company or organization that finances the development and distribution of video games. Games can be developed internally by a publisher or externally by a game developer.

A security issuer must not be classified as a Social Casino Gaming company.

New index additions must have a minimum market cap of \$500MM and a 3-month average daily trading volume (ADTV) of \$1MM. Existing constituents must have a \$300MM minimum market cap / \$0.50MM ADTV. If a security has less than three months of trading history, the ADTV is calculated using the security's entire trading history. Furthermore, new index additions must derive at least 50% of their revenue from Gaming. However, an issuer of a security held in PLAYR2 as of the Reconstitution Reference Date that has 40% of its revenue from Gaming may remain in the Index.

If, at reconstitution, Nasdaq becomes aware that an issuer or security will soon undergo a fundamental change that makes it ineligible, Nasdaq will remove the security from consideration. This includes entering into a definitive merger or acquisition agreement or other pending arrangements that would make it ineligible for Index inclusion, a filing of bankruptcy, or similar protection from creditors. For complete eligibility criteria, please visit the [index methodology](#).

Index Composition

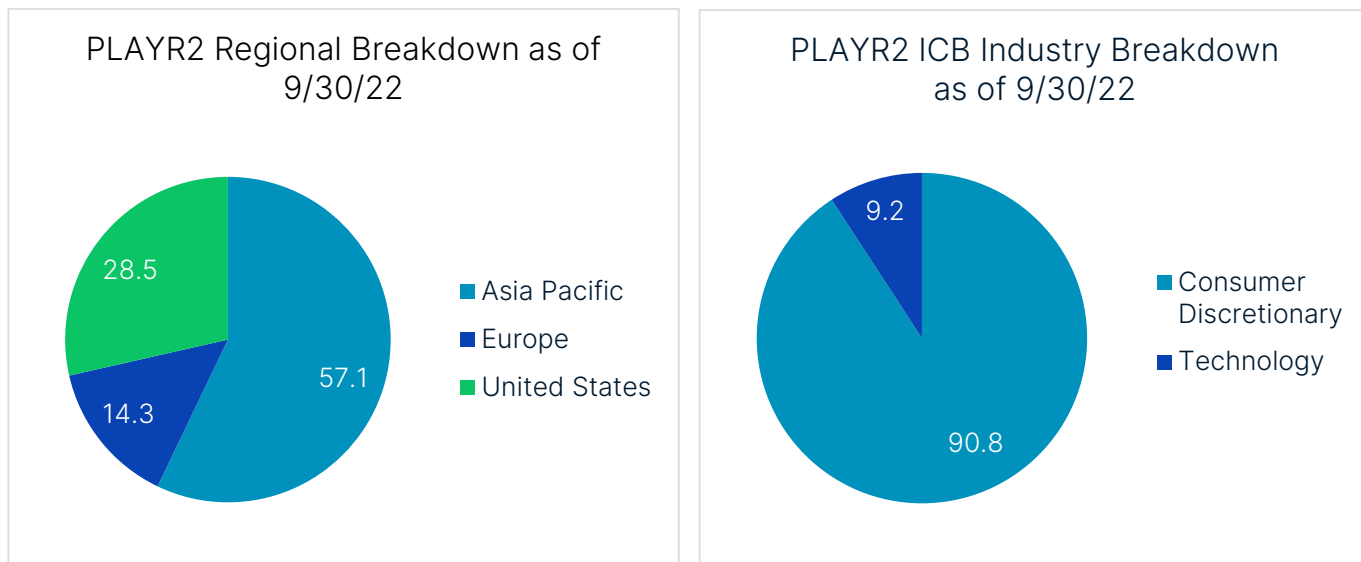
As of September 30, 2022, PLAYR2 comprises 38 gaming Developer/Publisher stocks based on CTA's classification system. From a CTA subsector breakdown, 58% of PLAYR2 consists of Consoles, 20% Digital/Online, 14% Mobile/Portable, and 7% PC. The top 10 companies by weight make up 59.8% of the total index weight, with Nintendo, Electronic Arts, Roblox, Take-Two Interactive, and Bandai Namco Holdings rounding out the top five largest names as of September 30, 2022.

Top 10 Constituents

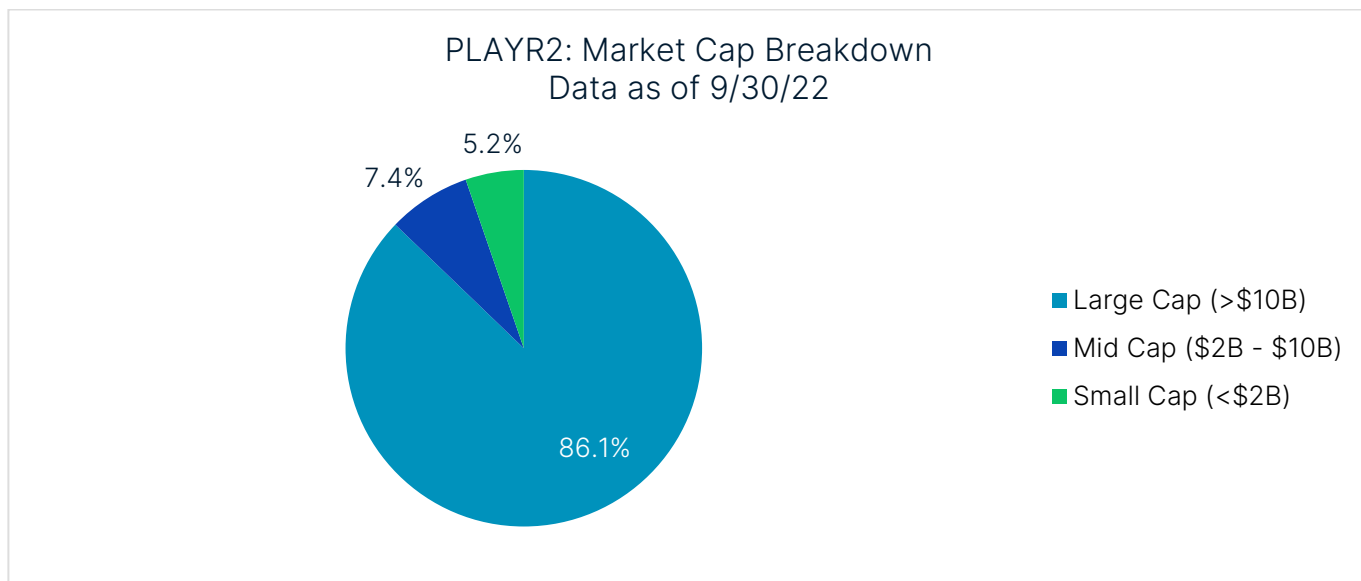
Name	Weight (%)	CTA Subsector	ICB Industry
Nintendo Co	18.1	Consoles	Consumer Discretionary
Electronic Arts Inc	10.7	Consoles	Consumer Discretionary
Roblox	6.7	Digital/Online	Consumer Discretionary
Take-Two Interactive Software	6.5	Consoles	Consumer Discretionary
Bandai Namco Holdings	3.5	Consoles	Consumer Discretionary
Nexon Co	3.4	PC	Consumer Discretionary
Unity Software	2.9	Digital/Online	Technology
Capcom	2.7	Consoles	Consumer Discretionary
Embracer Group	2.7	Consoles	Consumer Discretionary
Krafton	2.6	Digital/Online	Consumer Discretionary

Data as of 9/30/22. Source: Nasdaq.

When broken down by geographical exposure, Asia Pacific accounts for over half of the index at 57.1% (24 stocks). Within the Asia Pacific region, Japan represents 42.2% (13 stocks), making it the largest single country weighting, while South Korea represents 12.5% (9 stocks). The United States represents 28.5% of PLAYR2 (5 stocks).



The Nasdaq CTA Global Video Games Software Index has a large-cap tilt, with 86.1% of the total index weight coming from 30 companies with a market cap greater than \$10 billion. Out of the 38 stocks currently held in the index, just four are newer companies that have IPO'd within the last five years that account for approximately 7% of the index.



Competitor Overlap Analysis

There are currently 38 stocks held in PLAYR2. The Solactive Video Games & Esports Index (SOLHERO) consists of 50 stocks, while the MVIS Global Video Gaming and eSports Index (MVESPO) holds 25. As of September 30, 2022, a total of 14 names overlap between the three gaming indexes, including well-known gaming brands like Roblox, Nintendo, and Electronic Arts. The majority of the 14 companies that overlap are classified as Consoles by CTA and come from a diverse mix of countries, including the US, Japan, Poland, Sweden, South Korea, and France. Between

just PLAYR2 and SOLHERO, there are 28 names in common, while MVESPO and PLAYR2 hold 14 of the same names. It is also worth noting what PLAYR2 *doesn't* own. MVESPO has exposure to Nvidia and Advanced Micro Devices, both of which are semiconductor producers. While these companies undoubtedly play an important role in manufacturing video game hardware and gaming consoles, their businesses are not solely focused on the video gaming industry, and thus their performance is not a true representation of such. Similarly, SOLHERO includes Turtle Beach, a sound technology company that designs and markets audio for video game consoles, personal computers, and mobile devices. Turtle Beach also markets audio solutions outside of the gaming industry, including products that have applications in digital signage and kiosks (casinos), consumer electronics, and healthcare. PLAYR2's methodology provides investors with a "thematic purity" approach, honing in on those, as determined by CTA, with at least 50% of their revenue tied to gaming. PLAYR2's unique methodology results in a portfolio that sets itself apart, with approximately 64% of the index weight overlapping with either competitor index.

Name	Symbol	Country	CTA Subsector	% PLAYR2	% SOLHERO	% MVESPO
CAPCOM CO	9697	Japan	Consoles	2.7	4.4	3.1
CD PROJEKT	CDR	Poland	Consoles	1.8	1.8	1.3
ELECTRONIC ARTS	EA	United States	Consoles	10.7	7.4	5.7
EMBRACER GROUP	EMBRACB	Sweden	Consoles	2.7	3.4	2.3
KONAMI GROUP	9766	Japan	Consoles	2.3	4.3	2.6
NCISOFT	036570	South Korea	Digital/Online	2.2	4.4	2.6
NETMARBLE	251270	South Korea	Mobile/Portable	1.1	0.7	0.5
NEXON	3659	Japan	PC	3.4	4.4	4.5
NINTENDO	7974	Japan	Consoles	18.1	6.5	6.9
ROBLOX	RBLX	United States	Digital/Online	6.7	7.5	5.5
SQUARE ENIX	9684	Japan	Consoles	2.0	3.9	1.7
TAKE-TWO INTERACTIVE SOFTWARE	TTWO	United States	Consoles	6.5	7.2	5.3
UBISOFT ENTERTAINMENT	UBI	France	Consoles	1.7	2.9	2.2
UNITY SOFTWARE	U	United States	Digital/Online	2.9	4.6	3.8
Total Weight				64.8	63.4	48.1

PLAYR2 Fundamentals

Going into 2022, PLAYR2 was unreasonably priced – in fact, the index couldn't be valued because most of the index's 38 underlying constituents possessed negative price-to-earnings (P/E) ratios due to negative earnings. Those stocks with P/E data, including EA Sports, Take-Two Interactive, and Team 17 group, saw valuations fall 28% on average between December 31, 2021, and September 30, 2022. As of September 30, 2022, the Nasdaq CTA Global Video Games Software Index has a P/E ratio of 20.4, which aligns with the broader market. For reference, the S&P 500 Index has a P/E of 19.2.

Using data from FactSet, companies tracked by PLAYR2 experienced strong double-digit year-over-year revenue growth in 2020, rising 21% on average. Growth slowed in 2021, with the pandemic-driven boost to demand fading somewhat, but still up 9% year-over-year. In 2022, however, revenue growth fell by 5%. Regarding forecasted

revenue growth, 63% of the index constituents are forecasted to fall, while 37% are forecasted to rise. Those stocks that are forecasted to rise to include Embracer Group, Roblox, and Take-Two Interactive. On the other hand, the growth forecasts for names like GungHo Online, Colopl, Nintendo, and Square Enix are much weaker, relatively speaking. In a recent earnings announcement¹¹, Nintendo, arguably the most recognizable brand name in the gaming industry, attributed its Q2 2022 decrease in sales to the global semiconductor shortage. Nintendo develops, manufactures, and sells gaming equipment, including portable devices and consoles, as well as software. Semis are a crucial element in the hardware production process for the Nintendo Switch gaming unit. Nintendo noted that they are hopeful for improvements in semiconductor procurement from late summer into early fall. Upticks during this time will give a clearer outlook into production for the rest of the year, including in preparation for the holiday season. To make up for the delay in production, Nintendo noted that they plan to leverage appropriate means of shipment and work to deliver as many Nintendo Switch gaming systems in as many regions as possible for the holidays. While hardware decreased, digital sales increased by 16%, accounting for 53% of total software sales. Additionally, Nintendo saw expense increases across its research and development, shipping, and advertising categories. The global chip shortage increased expenses, and R&D investment seems to have caused some drag on revenue and earnings.¹²

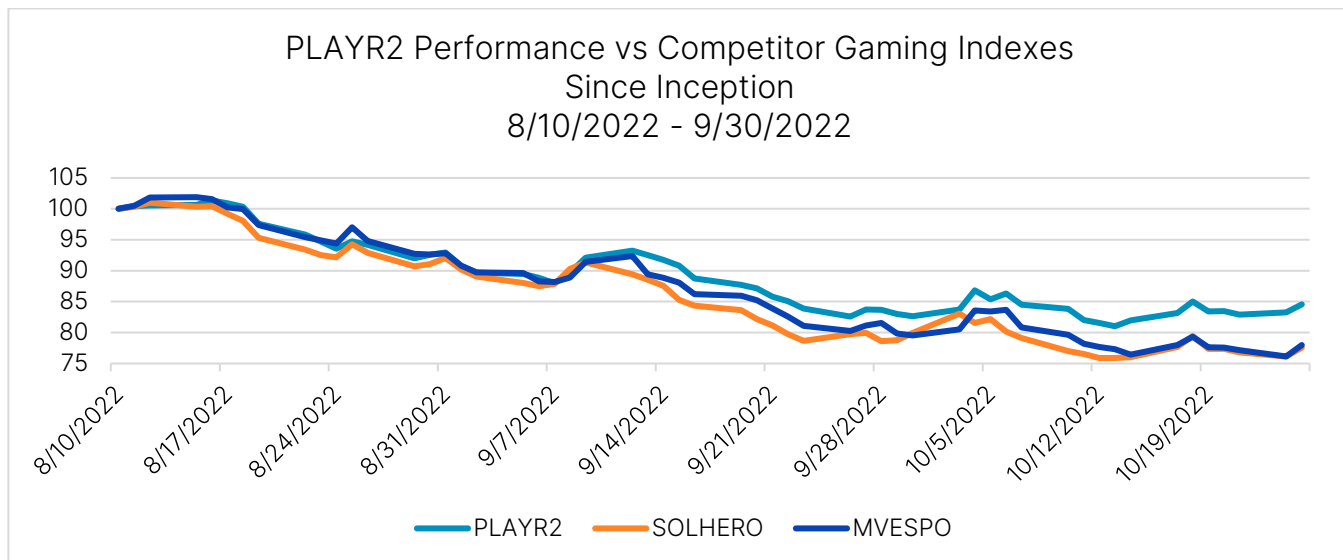
Company Name	Symbol	12/31/21 P/E	9/30/22 P/E	% Change
Electronic Arts	EA	45.5	28.3	-38%
Take-Two Interactive Software	TTWO	57.9	48.7	-16%
Keywords	KWS	77.4	42.7	-45%
Frontier	FDEV	49.3	54.4	-10%
Team17 Group	TM17	42.8	23.1	-46%
Ubisoft Entertainment	UBI	62.0	42.6	-31%
	Average:	55.8	40.0	-28%

Source: Nasdaq Global Indexes, Bloomberg. Data as of 9/30/2022.

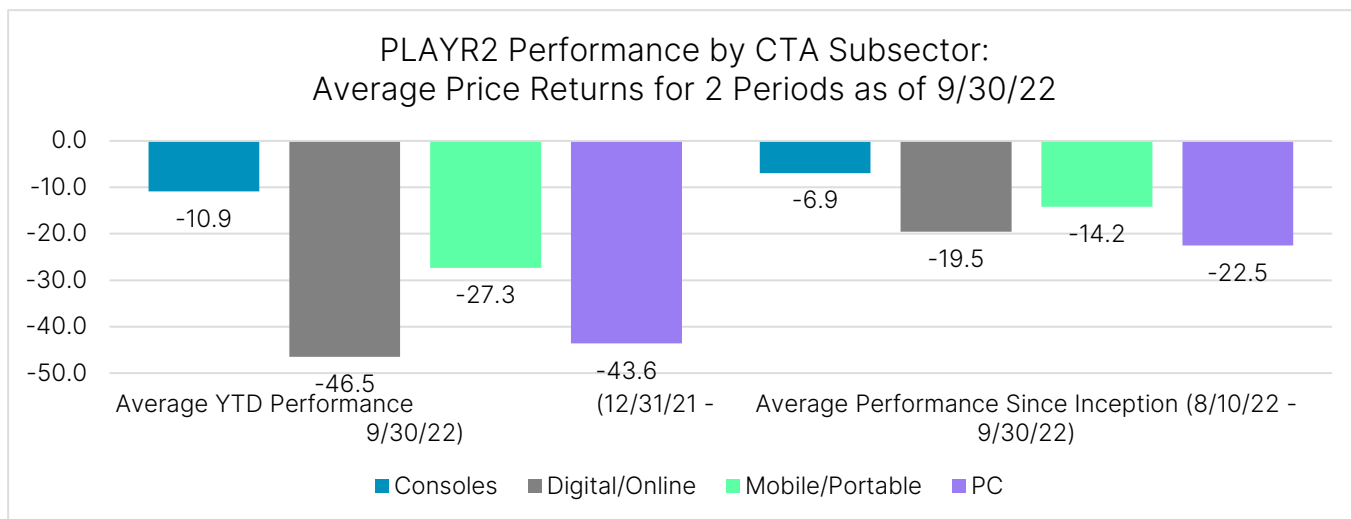
Index Performance

Since index inception in early August 2022 through September 30, 2022, the Nasdaq CTA Global Video Games Software Index has fallen 17.3%. This negative performance is consistent with what we've seen across similar indexes, such as the Solactive Video Games & Esports Index (SOLHERO) and the MVIS Global Video Gaming and eSports Index (MVESPO), which lost 21.2% and 20.4%, respectively, over the same timeframe. Major market indexes also struggled during this time, with the tech-heavy Nasdaq Composite (COMP) falling 17.7% since August 10, 2022.

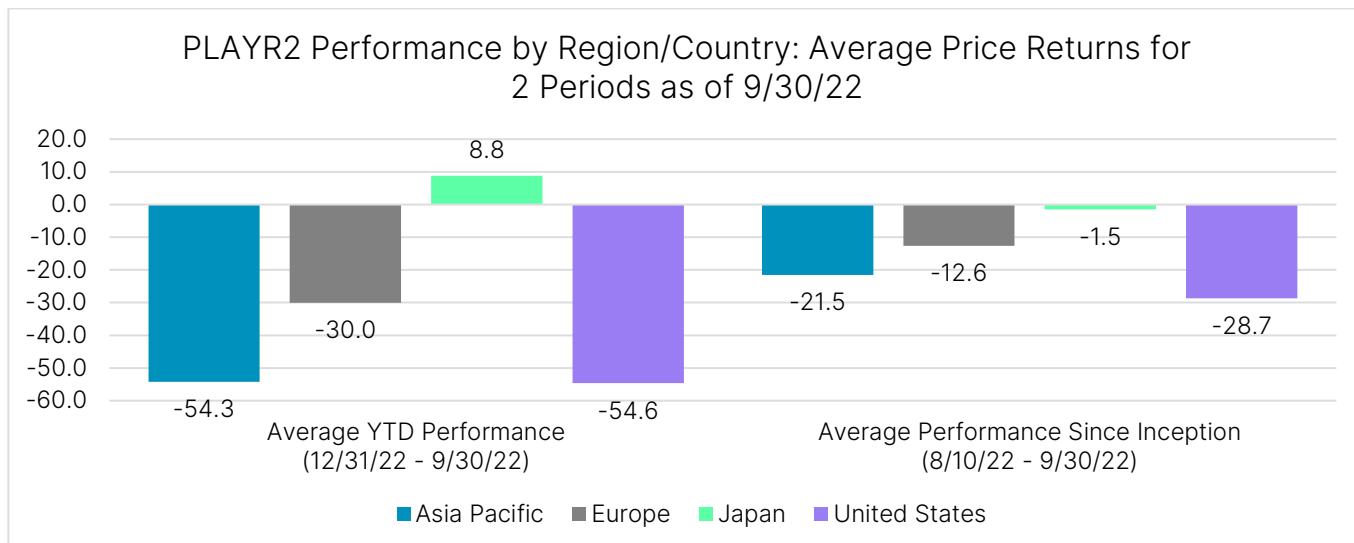
¹² https://www.nintendo.co.jp/ir/pdf/2022/220803_2e.pdf¹² Nintendo Financial Results Explanatory Material - August 3, 2022 (https://www.nintendo.co.jp/ir/pdf/2022/220803_2e.pdf)



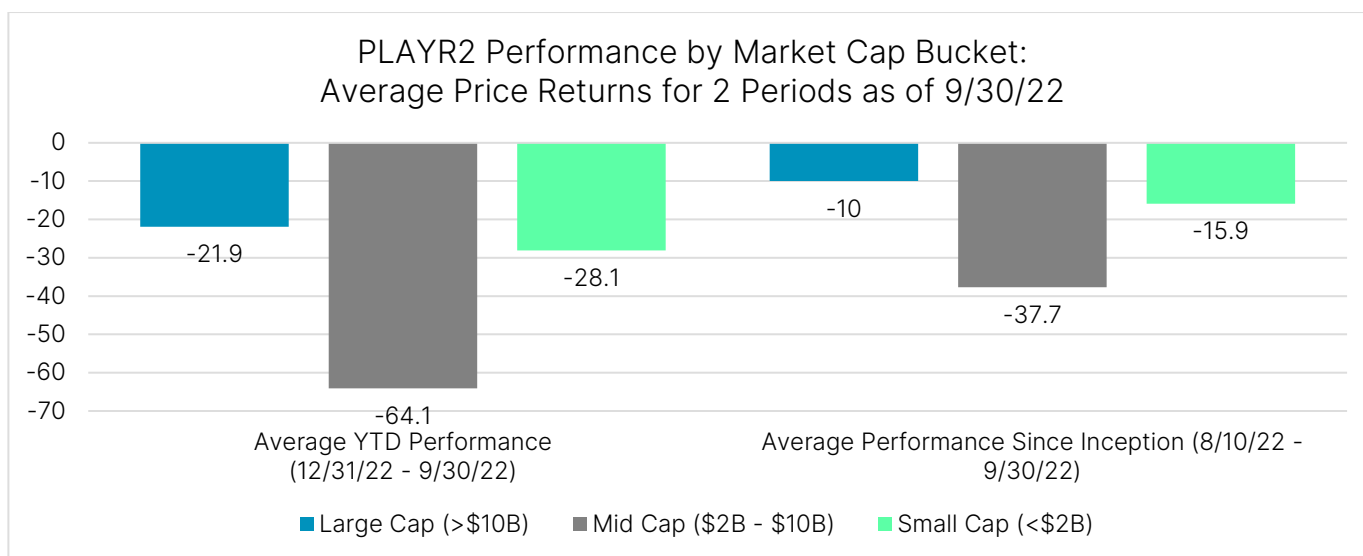
Since index inception through September 30, 2022, all four CTA subsector classifications have experienced price weakness, with PC stocks taking the biggest hit, falling on average by more than 22%. Although still technically in the red since inception, the Consoles subsector has been the most resilient, falling by approximately 7% on average. Since its inception, CD Projekt has been the top performer within PLAYR2, gaining just under 9%! Per CTA, CD Projekt is classified as a Developer/Publisher within the Consoles subsector and operates out of Poland. On a YTD basis, PLAYR2 constituents classified as Consoles have significantly outperformed the other subsectors, on average.



When we dissect the index performance on a country-by-country basis, we find that on average, all areas represented are in the red since inception. The United States has shown exceptional price weakness since August 8, falling 28% on average, while Asia Pacific (ex-Japan) has fallen by 21.5%. With an average loss of only 1.5%, Japan has been the most resilient region/country within PLAYR2 since its inception. On a year-to-date basis, Japan's constituents have gained 9% on average, making it the only region/country to post a positive return. On the other hand, the United States has lost 54.6% while Asia Pacific (ex-Japan) and Europe lost 54.3% and 30.0%, respectively.



From a market-cap breakdown, we have seen PLAYR's large-cap constituents significantly outpace their mid-cap counterparts since inception, down 10% and 37.7% on average, respectively. Small caps have lost 15.9% since inception. When we look at the same universe of stocks on a year-to-date basis, all areas are in the red. Mid-caps remain the laggard on the year with an average loss of 64.1%, while large caps have fallen 21.9% and small caps have lost 28.1%.



Conclusion

Two-thirds (65%) of gamers expect gaming to become more social in the next five years because gaming is becoming more virtual, driven by the metaverse. This expectation underscores that gaming has truly transformed from just an entertaining means of personal escape into a multifaceted platform where consumers can find social connections and even enterprises can foster collaboration.

Ultimately, the gaming industry, through its hardware, software, and other innovations, has a chameleonic potential to mold rich and immersive experiences for consumers and enterprises alike. Despite the recent performance, gaming remains a fast-growing industry on the way to maturity. While it may be difficult for individual investors to pick out a handful of winners, an index-based approach that values thematic purity may offer a better pathway to

gain meaningful exposure to its long-term upside potential. Leveraging the unique partnership of Nasdaq and CTA in its development, PLAYR2 offers investors the ability to do just that.

The Roundhill Video Games ETF (Ticker: NERD) tracks the Nasdaq CTA Global Video Games Software Index.

Sources: Nasdaq Global Indexes, CTA, Bloomberg, FactSet.

Find out more about what gaming trends are moving to the fore – they'll be showcased at CES 2023. Major names in the industry will be exhibiting, among them Microsoft, Sony, AMD, Razer, Intel, Qualcomm, and HyperX. Be there, and be first, to see what's next. Register today.

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