

# VIDEO GAMES IN THE 21ST CENTURY:

## The 2020 Economic Impact Report

Prepared for: The Entertainment Software Association

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# EXECUTIVE SUMMARY

If we were to envision an industry ideally situated for success in the 21st Century, it would probably have the following characteristics:

- It would be dynamic and fast growing, with robust promise for future growth.
- It would be entrepreneurial, open to entrance by new and expanding innovative companies, as well as supporting the growth and development of existing mid-size and large companies.
- It would create high-paying jobs.
- It would leverage U.S. leadership in advanced technology development, and generate innovations that spill over to benefit other industries.
- It would have a diverse geographic footprint, creating jobs and opportunities in every state.
- It would be an industry of substantial size, generating large-scale economic impacts.

**The U.S. video game industry has all of these characteristics and more.** Building on powerful and long-standing U.S. strengths in advanced technology, entertainment, and creative arts, it has rapidly grown to become home to more than 11,400 individual business establishments with operations present in every state.

This study, *Video Games in the 21st Century: The 2020 Economic Impact Report*, provides an in-depth analysis of the industry and its wide-ranging impacts. Key highlights from these findings include:

- **\$90.3 BILLION IN ECONOMIC OUTPUT.** The industry generated direct economic output in 2019 exceeding \$40.9 billion and, through the multiplier effect, generated a total 2019 output in the U.S. of more than \$90.3 billion.
- **OVER 143,000 DIRECT JOBS.** The U.S. video game industry directly employs 143,045 personnel. When accounting for direct, indirect, and induced economic impacts, a total of 428,646 U.S. jobs are sustained because of the presence and operations of the industry and its associated expenditures.
- **FAMILY-SUSTAINING INCOMES.** Total income (salaries, wages, and benefits) generated across the economy totals \$35.28 billion, including \$17.37 billion in direct compensation to video game industry workers (equivalent to \$121,459 in compensation per worker).
- **OVER \$59 BILLION IN VALUE-ADDED.** Contributed \$59.76 billion in value-added (growth in GDP) within the U.S. economy.

- **\$12.6 BILLION IN TAXES.** Video game industry-related economic activity generated \$12.6 billion in 2019 taxes, comprising \$8.2 billion in taxes for the federal government, and an additional \$4.4 billion for state and local governments.

It is also found that the innovative and technological nature of the industry is generating strong positive spill-over effects for other U.S. industries. Video game industry advancement has, for example, driven innovations in computation speed, graphics rendering, interface design and haptics, mobile systems design, networking, and software engineering. Similarly, innovations pioneered within the video game industry are finding diverse applications in other areas of the economy, with application now found in areas as diverse as medical imaging, medical robotics navigation, military training and simulation, and new educational and training applications using game-based learning. The creative content generated by video game innovators has also crossed over into other forms of entertainment and culture, spurring the development of valuable movie franchises, physical toys, and even expanding sports leagues and spectator events. In effect, the video game industry forms a highly influential core that is at the heart of an expanding ecosystem of advanced industries and applications benefiting the United States.

It is also found that the video game industry shows significant promise for ongoing economic growth and for advancement of new technologies and innovations. Video game companies are in the vanguard of companies advancing promising technologies in virtual reality, augmented reality, and advanced mobile computing, while at the same time being an early adopter of advancements in artificial intelligence.

**For the foreseeable future the video game industry will be an important contributor to the power and promise of the U.S. national economy and the economic development of individual states and regions across the nation. As a convergence point for U.S. leadership in software, hardware, entertainment, and creative industries, the video game industry is generating new wealth for the U.S. critical to the expansion of the economy and the creation of new high-paying family-sustaining jobs. Sustaining policies and regulations conducive to video game industry growth, development, and investment should be considered a priority for all concerned with sustaining American economic leadership and advancing economic opportunity within individual states.**

# I. INTRODUCTION

## In Praise of Advanced Industries

All commerce is important to the economy. However, certain industries are overachievers in terms of the positive impacts they generate. Industries that build upon the nation's investment and expertise in science, advanced technology, innovation, and creativity are high-performance drivers of national economic competitiveness, tending to support high wages and strong levels of growth. The video game industry is one of these high impact "Advanced Industries" for the U.S. economy (see sidebar)<sup>1</sup>.

## Where Technology and Creativity Intersect

While drawing upon U.S. technological strengths, the video game industry is also empowered by the depth of artistic and imaginative capacity that thrives in America's diverse culture. The industry thus represents a rather unique convergence of U.S. global leadership in technology industries (software development, computational systems, advanced graphics systems, etc.) AND its visual arts, creativity, storytelling, and entertainment culture (in the tradition of literature, theater, graphic novels, movies, and television). Video games have emerged as a melding of the two, creating a new form of visual art and entertainment and a new platform for experimentation and innovation in advanced technology development. **The net result has been the extraordinary growth of an Advanced Industry that now has a footprint in every state, generating high-wage jobs and supporting an entrepreneurial culture that builds national and individual wealth.**

The Brookings Institution highlights the importance of what it terms "Advanced Industries," comprising businesses that have deep involvement with technology R&D and a high proportion of STEM workers. As noted by Brookings, "these industries encompass the nation's 'tech' sector at its broadest and most consequential" comprising 50 industries that are crucial to the nation's economic performance, both now and into the future. Software systems and computer systems (industries in which the video game industry predominantly resides) are among the Advanced Industries highlighted by Brookings.

## Spillover Effects of the Video Game Industry

The innovative, technological nature of the video game industry has generated ancillary spillover effects for other industries. The growing sophistication and complexity in games has motivated innovation in a

1 <https://www.brookings.edu/research/americas-advanced-industries-what-they-are-where-they-are-and-why-they-matter/>

broad range of areas such as computation speed, graphics rendering, interface design and haptics, mobile systems design, networking, and software engineering. Applications of advancements rooted in the video game industry have found their way into many other areas of the economy – for example in medical imaging, medical robotics navigation, military training and simulation, and new educational applications in game-based learning. Similarly, creative content generated by video game innovators has crossed over into other forms of entertainment and culture, spurring the development of movie franchises, physical toys, and even sports leagues and spectator events. Also occurring is the parallel development of a “gamification” industry, leveraging the expertise, technologies, and techniques of the entertainment software sector for use in education, training, simulation, and modeling applications in healthcare, K-12 and higher education, scientific exploration, urban planning, public safety, and other sectors.

## A Cultural Phenomenon

Video games are now very much an embedded component of American culture and enjoyed by a large and diverse demographic. Research by the Entertainment Software Association (ESA) finds that, in 2019, 75% of Americans had at least one video game player in their household and 64% of American adults and 70% of American children play video games.<sup>2</sup> Video game players are 59% male and 41% female, with an average age between 35 and 44.

The industry itself is as diverse as its audience, providing a broad variety of genres, game types and hardware platforms to meet customer interests. Modern video game players and the games that they play are increasingly collaborative and social (with 65% of adult players playing games with others, either in person or online).<sup>3</sup> Games are interactive, rather than passive forms of entertainment, and stimulate the imagination. There is no single genre that dominates; rather, there is a universe of entertainment and engagement pathways provided by the industry to meet demands as diverse as imagination allows. In addition to more well-known gaming genres like racing or action-adventures, there are also games focused on societal and scientific topics such as exploring the cosmos, creating cities, simulating societal change, experimenting with evolutionary processes,

**The video game industry’s already high profile rose even more in the U.S. economy and society as the COVID-19 pandemic impacted American life. The industry has been a source of entertainment, stress-relief, and escape for individuals social distancing in their homes, as well as an avenue for much needed social interaction through the networks of multiplayer games. It has also been a refuge for investors as demand for video games and hardware provided one of few positive pathways for financial growth in the crisis. There are even games that help people understand the pandemic, driving enhanced comprehension of epidemiology, the spread of infectious diseases, and strategies to combat them.<sup>4</sup>**

<sup>2</sup> Entertainment Software Association. “2020 Essential Facts About the Computer and Video Game Industry.”

<sup>3</sup> Ibid

<sup>4</sup> Examples include The Chantry for PlayStation VR, which explores Edward Jenner and the discovery of vaccination, and video games such as Pandemic and Plague, Inc.

building economies, understanding foreign cultures, and solving challenging puzzles. Game storylines are increasingly tackling pressing social issues and introducing players to different perspectives and outlooks. They allow participants to put themselves in different shoes to explore simulated worlds and varied situations. Similar to other entertainment mediums like literature, film, and other arts, video games have emerged as a both an entertaining escape and a serious tool for exploring our world and the human experience.

## A Driver for the Future

The industry has shown that it will continue to innovate and be a leader on the frontiers of new technologies through its ongoing R&D and creativity. Video game companies are currently advancing software and hardware systems for the emerging virtual reality (VR) and augmented reality (AR) technology spaces, and the industry is continuing its legacy as an early technology adopter by incorporating and developing artificial intelligence (AI) both as a tool within games for advancing storylines and as a tool to streamline the development of games and their coding. The power of mobile computing, combined with the broadband speeds of expanding 5G networks, is enabling large-scale growth in mobile gaming as an important segment of the market. The merging of technology and creativity presents a powerful force for ongoing innovation and advancement of the U.S. economy.

## An Economic Engine

The video game industry is a dynamic and fast-paced tech-industry that is open to entrepreneurs and new business entrants and becoming more so with the emergence of a thriving independent game development community. The industry has produced large public companies (with industry leaders such as Activision Blizzard and Electronic Arts, for example), but is also experiencing robust levels of access for new business entrants, entrepreneurs, and small business ventures that can occupy niches in the gaming universe and innovate new games.

All of this technological and creative energy driven by the industry creates substantial economic growth and opportunity. Driven at its core by intellectual talent and digital environments, the industry is not limited by traditional infrastructure and supply chain needs to specific locations. There are major geographic clusters of video game companies (notable concentrations are present in California, Washington, Texas, Florida and New York, for example), but the industry has a footprint of businesses in every U.S. state and provides economic development opportunities for urban, suburban, small town and rural communities alike. Today, the video game industry stands among the nation's premier technology sectors and continues to enjoy success and ongoing growth prospects. Market researchers at IBISWorld estimate the U.S. video game industry (comprising activities in the development, production, and sales of video game consoles, accessories, physical games and software, and online games and software) grew 14.4% between 2014 and 2019.<sup>5</sup>

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5 IBISWorld. "IBISWorld Industry Report NN003. Video Games in the US." December 2019. Accessed through TEconomy Partners' subscription to IBISWorld research library.

## Analyzing the Impact of the Video Game Industry

The economic impact of the video game industry across the United States was last explored in the Video Games in the 21st Century: the 2017 Report authored by Stephen E. Siwek for the ESA. The report quantified the basic parameters of the industry and its economic footprint across the U.S. and individual states, providing details on business and establishment numbers, employment volumes, revenues, wages, and other factors. The report used RIMS II multipliers to develop an estimate of indirect impacts generated by the direct output and employment of the industry (again at a nationwide and individual state level).

For the current 2020 report, ESA has sought a somewhat expanded exploration of the impacts of the industry. As before, Input/Output (I/O) analysis is used, this time using the IMPLAN I/O analysis system. The use of IMPLAN I/O impact analysis helps to identify the full employment, personal income, value added, output, and tax revenues associated with the video game industry value-chain and the expenditures of the industry's suppliers and employees. It also allows for investigation of the impacts of the industry on other sectors and the supply chain. The analysis is conducted for the U.S. overall and for each U.S. state and the District of Columbia.

The 2020 report also expands analysis to examine additional areas of impact not considered in the last report. Areas examined include the following:

- Innovation in the U.S. video game industry.
- Venture capital and other capital investments in video game companies.
- Effects of video game technologies and innovation on technological spillover and growth in adjacent sectors (for example: educational technology, training and simulation software, graphics rendering technologies, virtual and augmented reality technologies, etc.).
- Cross-over impacts of video games into other entertainment and media industries (e.g., motion pictures, publishing, etc.).

The net result is an analysis that should be of interest to industry members, policymakers, economic developers, the media, and other parties who seek to understand and communicate the economic and functional impact of this dynamic and fast-growing U.S. industry.

# II. DEFINING AND SIZING THE U.S. VIDEO GAME INDUSTRY

## Definition of the Video Game Industry

To measure something, we first have to define what it is that we are measuring. For the purpose of this study, the video game industry is defined as the following:

- **Video game software** (that may include games for use with console systems, personal computing devices, tablets and mobile phones and software accessed online).
- **Video game hardware and accessories.**

Under this definition, the two primary software sectors include game developers and game publishers.<sup>6</sup> The hardware side of the industry is defined as including gaming consoles and gaming specific portable devices, together with the peripheral devices attached to these systems (and gaming PCs) such as game controllers, joysticks, gaming keyboards, etc. The database developed also includes major retailing operations (where video-game-specific data could be identified).<sup>7</sup>

Unfortunately, a well-defined video game industry is not separately captured within the federal government's North American Industrial Classification System (NAICS) as a distinct industry. Video game software statistics fall, for example, under NAICS 511210 "Software Publishing," but some will also be in NAICS 541511 "Custom Computer Programming Services." In both cases the data for video games software activities are mixed in with data for other categories of software. The hardware side of the industry is even more complex with relevant products falling in multiple categories including, but not limited to, NAICS 339930 "Doll, Toy and Game Manufacturing," NAICS 334118 "Computer Terminal and Other Computer Equipment Manufacturing," (where joysticks, gaming keyboards, etc. reside) and in some instances even NAICS 423920 "Toy and Hobby Goods and Supplies Merchant Wholesalers." Again, the data for hardware components used in running, viewing, or controlling video games are mixed in with computing and other electronic products unrelated to video game applications. These definitional issues, therefore, do not allow the use of published establishment and employment statistics to capture the size and extent of the U.S. video game industry.

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6 Typically, developers are responsible for creating a video game, and publishers are responsible for the marketing, sales, and PR of the game. Developers may be internal to the publishing company or an external/independent company.

7 This includes all GameStop locations and any other identified specialized video game retail establishments, plus allocation of the portion of business related to video games at Best Buy establishments. Specific data for Walmart and Target physical retail could not be identified. The retail impacts included herein thus underestimate the full impact of physical retail locations and should be considered a conservative measure.

## Building the Microfirm Database

For the purposes of the specific impact analysis of the U.S. video game industry herein, **the underlying data for the analysis has instead been built by compiling a custom microfirm database of companies and locations built from multiple data resources**, including game company databases, websites, other publicly accessible and proprietary data resources, and proprietary market research reports. This is a similar approach to that deployed in the 2017 ESA impact report. The task of assembling the microfirm database is complicated by the fact that many companies that have a major influence in the video game industry have diversified business models that extend into non-game industries. Companies such as Microsoft, Sony, and NVIDIA, for example, are central players in the video game industry, but have extensive business activities that are unrelated to video games. The development of the microfirm database has taken this into account and focuses on identification of the portion of these diversified businesses that are video game related (via reference to corporate reports, market research, and other sources). The primary resources used in developing the database are listed in the Appendix.

## Summarizing the Data

Table 1 provides a summary profile for the industry resulting from analysis of the microfirm database, showing the industry to be **a large-scale U.S. employer with 143,045 direct jobs**. There are found to be 11,427 video game industry establishments in the U.S., for an average employment of 12.5 jobs per establishment. Distribution, retail, and arcade/video game establishments logically have relatively small levels of employment per establishment.

**Table 1: Count of Establishments and Employment for the U.S. Video Game Industry and its Principal Sectors.**

Category	Number of Establishments	Employment
<b>Total Video Game Industry</b>	<b>11,427</b>	<b>143,045</b>
Developer	1,518	40,676
Developer/Publisher	86	16,921
Publisher	61	3,633
Interactive Platforms and Media	60	2,263
Hardware	60	27,283
Distribution (Physical)	1,671	5,259
Retail – Brick & Mortar (B&M) and Online Stores	6,002	39,224
Arcades/Video Gaming Establishments	1,886	6,978
All Other	68	808

Source: TEconomy analysis of 2019 Video Game Industry Microfirm Database

**Figure 1: Employment Distribution in the U.S. Video Game Industry and its Principal Sectors.**



Source: TEconomy analysis of 2019 Video Game Industry Microfirm Database

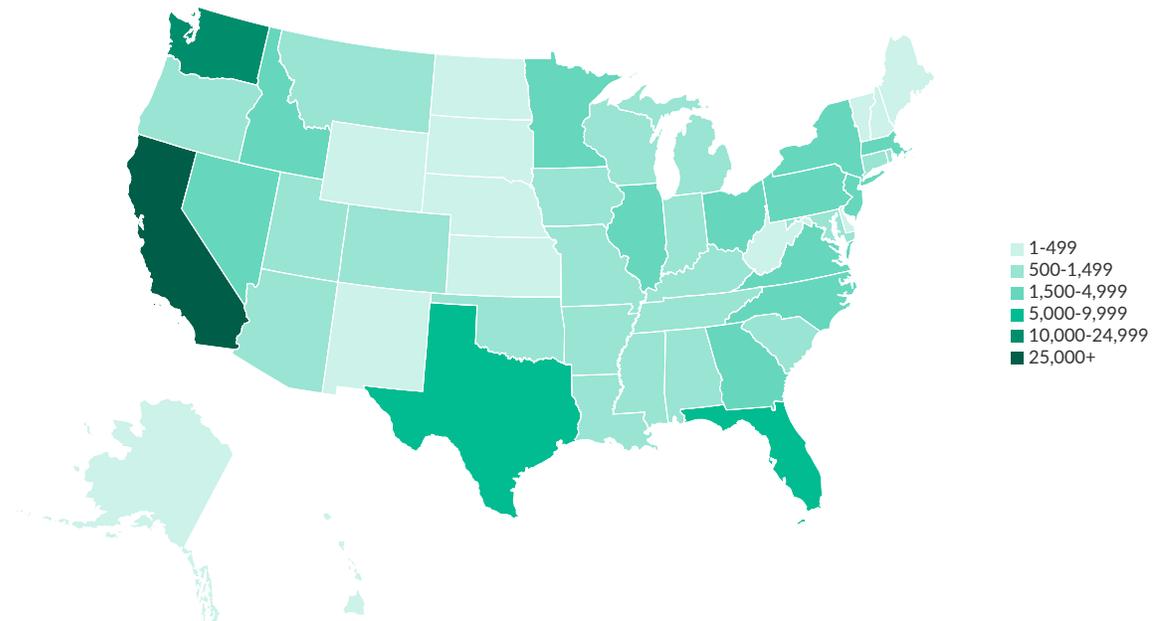
**The software and video game developer and publishing components of the industry account for 61,230 jobs (42.8% of video game industry employment), and hardware accounts for 27,283 jobs (19.1% of industry employment).** The platforms for distributing and retailing games (comprising “Distribution” and “Retail”) include a combined 44,483 jobs (31.1% of employment).

## Distribution of Video Game Industry Employment

A key characteristic of the video game industry is that it is an entrepreneurial industry, open to new business innovations and business entrants. The average size of establishments in the software and software publishing component of the industry is 36.8 employees. As a manufacturing-oriented sector, hardware sees more concentration in larger firms, with the average employment per establishment being 454.7 video game-related jobs. Retail logically has lower levels of employment per establishment, with 39,224 jobs distributed across 6,002 establishments for an average of 6.5 jobs per establishment.

The relatively large number of small business establishments within the video game industry increases the opportunity for wide geographic distribution of company operations. This is certainly seen in the data, with every state in the U.S. having establishments and employment in the industry (Figure 2).

Figure 2: Geographic Distribution of Video Game Industry Employment in the United States.



Source: TEconomy analysis of 2019 Video Game Industry Microfirm Database

## Market Research Projections on Industry Size and Anticipated Growth

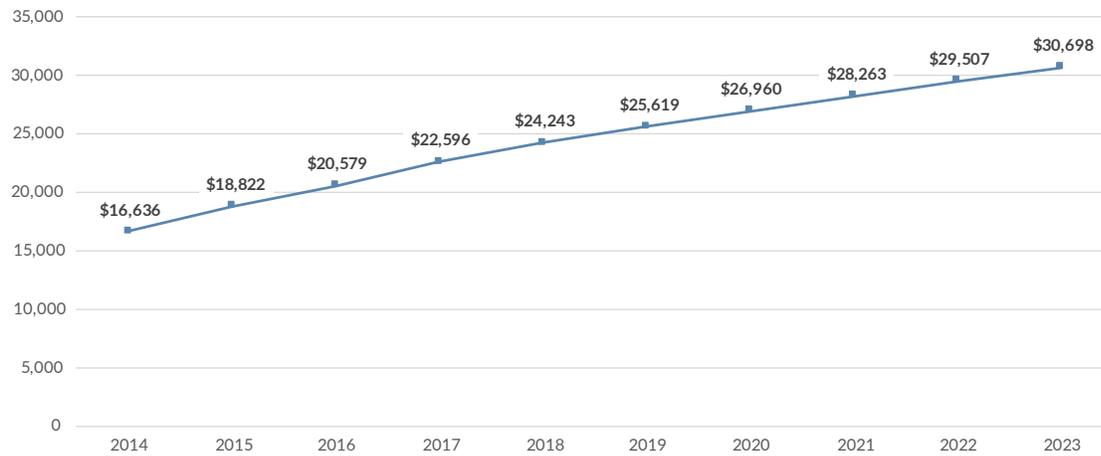
Several market research firms publish projections of the size of the U.S. video game market. With methodologies and included subsectors varying across market research firm projections, deriving a consensus on the size of the U.S. market is challenging.

Global accounting and consulting firm PwC has sustained analysis of the global entertainment and media industry for many years and tracks the size of the U.S. video game and esports sector as a component of this market. PwC defines the video game and esports segment as the following:

*Consumer spending on video games software and services (not hardware or devices) across both traditional and social/casual gaming, as well as revenue from advertising via video games. It also includes revenue from consumer and advertiser spend on esports.<sup>8</sup>*

As shown on Figure 3, PwC places the U.S. market size at \$25.62 billion for 2019, with the industry on a steady upward trajectory in its revenues.

<sup>8</sup> <https://www.pwc.com/gx/en/industries/tmt/media/outlook/segment-definitions.html>

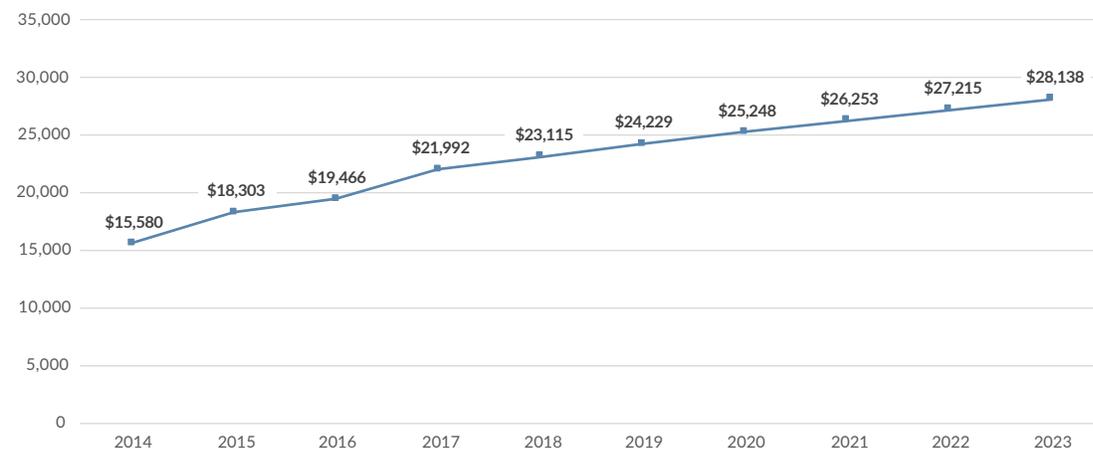
**Figure 3: U.S. Video Game and Esports Market Size (Revenue Projections in US\$ millions)<sup>9</sup>**

Source: Global Entertainment & Media Outlook 2019–2023, PwC, Ovum

IBISWorld produced an August 2019 report specific to the software side of video games in the U.S., titled “Video Game Software in the U.S.”<sup>10</sup> This report primarily covers developers and publishers of video game software, noting that:

*Establishments produce and distribute video games, including design, documentation, installation, and support services. Operators may design, develop, and publish games, or may solely be involved in publishing.*

The IBISWorld report places the U.S. video game software industry having revenues of \$24.23 billion for 2019, and projected 2020 revenues at \$25.25 billion. Time series data from this IBISWorld report are shown on Figure 4. These projections are quite similar to those in the PwC study, with the higher PwC number likely explained by their inclusion of esports.

**Figure 4: IBISWorld U.S. Video Game Software Publishing (Revenue Projections in US\$ millions)**

Source: IBISWorld

<sup>9</sup> <https://www.pwc.com/gx/en/industries/tmt/media/outlook/segment-findings.html>

<sup>10</sup> Dan Cook. “IBISWorld Industry Report 51121e: Video Game Software Publishing in the US” IBISWorld. August 2019. Accessed by TEconomy subscription.

Another market research provider, The Business Research Company (TBRC), published a 2019 report titled “Video Game Software Market Global Briefing”<sup>11</sup> which estimates the North American market to have seen sales of \$18.9 billion. TBRC includes the following in its analysis:

*The video game software market consists of sales of video game software by entities (organizations, sole traders, and partnerships) that produce video game software, including businesses that are involved in design, documentation, installation, and support services, producing and distributing video games. This also includes companies that are solely involved in designing and developing or in publishing only.*

TBRC divides the market into browser games, PC games, smart phone/tablet games, and console games.

The research and advisory firm NPD Group provides detailed data and analytics across multiple industries and includes specialized analysis of the video game industry. NPD data indicate a market size of \$35.4 billion for 2019 U.S. video game consumer spending on entertainment software.<sup>12</sup>

Newzoo is a company specializing in analytics for the video game and esports business sectors. The 2019 “Global Games Market Report” report by Newzoo,<sup>13</sup> places the 2019 game revenues for the U.S. market at \$36.9 billion (up 11% from circa \$33.3 billion in 2018). Newzoo’s data include downloaded/boxed PC games, browser games, console games, tablet, and smartphone games.

Table 2 summarizes these various 2019 market research estimates and calculates an average and median value from the five. **The result is a median estimate for the U.S. entertainment software industry being \$25.62 billion for 2019 and the average being \$28.21 billion.**

**Table 2: Market Research Projections for U.S. Video Game Software Market 2019 (\$ billions)**

Year	PwC	IBISWorld	TBRC**	Newzoo	NPD
2019	\$25.62	\$24.23	\$18.9	\$36.9	\$35.4

\*\* North America not specifically U.S.

<b>Average of Five Projections</b>	\$28.21 billion
<b>Median of Five Projections</b>	\$25.62 billion

Video game software industry revenues are tracked in time series by PwC (Figure 3) and IBISWorld, (Figure 4) in both cases, the projected growth experienced in the industry significantly exceeded growth in software publishing overall (NAICS 511210) over the same time period. Analysis of U.S. Census data show software publishing as an overall industry grew at a compound annual growth rate (CAGR) of 5.37% between 2014

11 The Business Research Company. “Video Game Software Market: Global Briefing 2019.” Accessed via TEconomy subscription to BCC Market Research library.

12 NPD Group, Inc. and the entertainment Software Association. “U.S. Video Game Content Generated \$35.4 Billion in Revenue for 2019.” Accessed online at: <https://www.theesa.com/press-releases/u-s-video-game-content-generated-35-4-billion-in-revenue-for-2019/>

13 Newzoo. “Global Games Market Report 2019: Free Version.” [www.newzoo.com](http://www.newzoo.com)

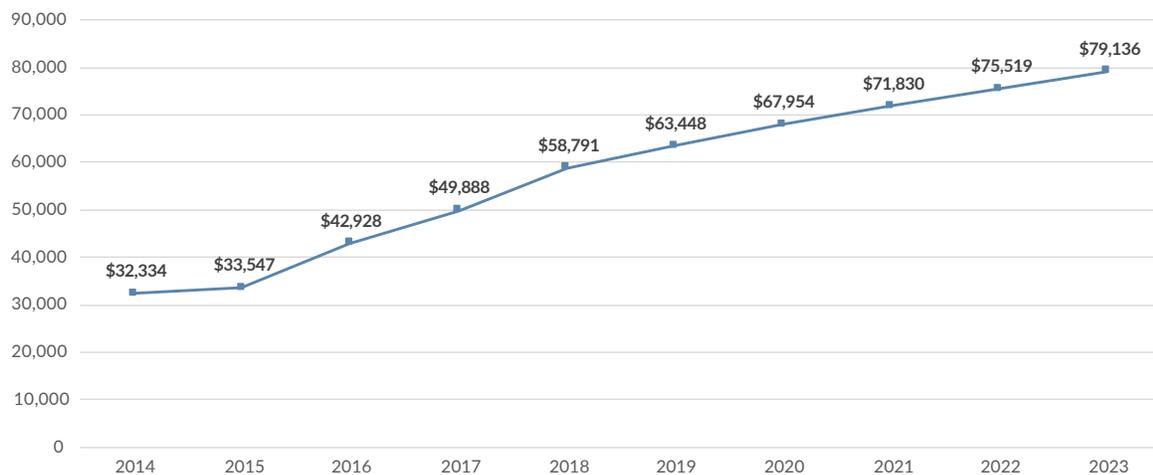
and 2018, whereas the PwC data indicate a CAGR for video games software of 7.82% and the IBISWorld data indicate a CAGR of 8.21% (with the median value between the two estimates being 8.02%).

The above data reference the software side of the video games industry, but the video game industry overall is larger than just the software component. As noted previously, the industry contains developers and manufacturers of video game hardware (e.g., consoles) and game playing accessories. IBISWorld industry reports in a second report titled “Video Games in the US,” published December 2019, examines the size of the video game industry including both software and hardware (including gaming consoles and accessories).<sup>14</sup> IBISWorld defines the sector as follows:

*The Video Games industry includes the broader operations of all video games industries in the United States. Gaming consoles, games made for those consoles and games produced specifically for personal computers make up the retail segment. The development and manufacturing of games, consoles and accessories also constitute a notable share of the market. Moreover, growing revenue from online gaming subscriptions complements industry products.*

It should be noted that this IBISWorld study also includes the specialized retailing of video games, profiling GameStop, for example (which alone had FY2018-19 revenues of \$5.19 billion), and thus takes a much broader view of the industry’s market footprint than software development and publishing alone. The resulting projection for the size of the industry places 2019 revenues in the U.S. at \$63.45 billion. Figure 5 shows the IBISWorld projections for the U.S. market for 2014 through 2023. Again, the industry is projected to sustain a strong upward trajectory in its revenues.

**Figure 5: IBISWorld U.S. Video Games Industry (Revenue Projections in US\$ millions)**



Source: IBISWorld

<sup>14</sup> Nick Masters. “IBISWorld Industry Report NN003: Video Games in the US.” IBISWorld. December 2019. Accessed via TEconomy subscription

NPD Group research places the hardware and accessories component of US video game consumer spending at \$6.1 billion for 2019. Their combined impact for the industry, including content, hardware, and accessories is \$41.5 billion.<sup>15</sup>

## Conclusion

Historically fast-growing (and projected to continue doing so), the video game industry has many of the characteristics of an Advanced Industry for the U.S. and its individual states. Found by TEconomy to be employing 143,045 personnel at 11,427 establishments in 2019, the U.S. video game industry generates employment in every state, and it continues to provide ongoing opportunities for growth and new business development. The industry leverages U.S. strengths in digital technologies and creative content development to innovate new products and services to meet the demands of a diverse and expanding customer base. With the release of new console gaming systems in 2020; ongoing innovation in online distribution platforms; expanding opportunities in mobile platforms; and new growth domains such as esports, VR gaming, and other innovative areas, the video game industry is well-positioned to expand its already considerable economic impacts across the United States. The full-scale of the current impact of the U.S. video game industry is discussed in detail in the next chapter.

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15 NPD Group, Inc. "2019 US VG Prediction Results." Accessed online at: <https://www.npd.com/wps/portal/npd/us/blog/2020/2019-us-vg-predictions-results/>

# III. ECONOMIC IMPACT OF THE VIDEO GAME INDUSTRY

Input/Output analysis is a well-established methodology for measuring the direct, indirect, and induced economic impacts of an industry using direct employment in the industry to drive the model. The direct employment totals identified within the microfirm industry database, shown in Table 1, are used herein to quantify the full economic impacts of the video game industry on both national (U.S.) and individual state economies.

## A. National Economic Impact of the Video Game Industry

The video game industry, with 143,045 direct jobs (from Table 1), allocated to each relevant IMPLAN industry sector, drives a large-scale economic impact for the United States. Table 3 contains the results of the input/output analysis, showing an industry that generated the following impacts for the most recently completed year:

- Support of **428,646 total jobs** across the U.S. economy.
- Generation of total income (salaries, wages, and benefits) for U.S. workers of \$35.28 billion, including \$17.37 billion in direct income to video game industry workers (equivalent to an **average total compensation value of \$121,459 per industry worker**).
- Contribution of **\$59.76 billion in value-added** within the economy (generating growth in GDP).
- **\$90.34 billion in total economic output** (the usual figure cited as “economic impact”).
- **\$12.6 billion in taxes generated**, comprising almost \$8.2 billion in taxes generated for the federal government, and an additional \$4.4 billion generated for state and local taxing bodies.

## Overview of Input/Output Analysis

Input/Output (I/O) analysis models the interrelationships and financial transactions between economic sectors. I/O multipliers are based on the flow of commodities between industries, consumers, and institutions in a state or regional economy. The analysis uses national and state specific I/O models developed by IMPLAN. The IMPLAN model, used by TEconomy, is the most widely deployed model in the nation and is based on the U.S. Bureau of Economic Analysis (BEA) national accounts data, supplemented with state level employment data from the U.S. Bureau of Labor Statistics (BLS) and other economic data from the U.S. Bureau of the Census. The resulting analysis calculates three types of impacts:

- **Direct Impacts** – the specific impact of the direct expenditures of video game industry companies
- **Indirect Impacts** – the impact of national or in-state suppliers to these companies
- **Induced Impacts** – the additional economic impact of the spending of employees and supplier employees
- **Total Impact** = the sum of the three above impact types.

The I/O analysis effectively models multiplier effects (also known as “ripple effects”) that originate from video game company expenditures in the U.S. and individual state economies.

The IMPLAN I/O model is used to derive estimates for five impact metrics:

- **Output** (also known as production, sales, or business volume) is the total value of the goods and services produced in the economy.
- **Employment** is the total number of jobs created and includes the direct employment at industry operations.
- **Labor Income** is the total amount of income, including salaries, wages, and benefits, received by employees, owners, and others in the related supply-chain.
- **Value-Added** is the contribution to growth in GDP.
- **Government Revenues** includes estimates of revenues generated for federal and state/local governments through the economic activity measured.

**Table 3: The Economic Impact of the Video Game Industry on the U.S. Economy, 2019**

Impact Type	Employment	Values in Millions of Dollars				
		Labor Income	Value-Added	Output	State/Local Tax Revenue	Federal Tax Revenue
Direct	143,045	\$17,374.1	\$29,156.2	\$40,913.9	\$1,578.0	\$4,056.6
Indirect	88,552	\$7,050.6	\$11,032.3	\$17,340.8	\$776.0	\$1,552.9
Induced	197,050	\$10,842.9	\$19,572.0	\$32,083.8	\$2,047.2	\$2,568.3
<b>Total Impact</b>	<b>428,646</b>	<b>\$35,267.7</b>	<b>\$59,760.5</b>	<b>\$90,338.5</b>	<b>\$4,401.2</b>	<b>\$8,177.7</b>
<b>Multiplier</b>	<b>3.00</b>	<b>2.03</b>	<b>2.05</b>	<b>2.21</b>		

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database (Numbers may not sum due to rounding).

In part because the industry supports high-paying jobs, the direct employment impact has a strong multiplier effect on additional job creation in the economy. The national employment multiplier of 3.0 indicates that for each individual direct job in the video game industry an additional two jobs are generated within the broader U.S. economy. In terms of economic output, the multiplier of 2.21 means that for every \$1.00 in direct output generated by the video game industry, an additional \$1.21 is generated across the U.S. economy.

The positive impacts of the video game industry are felt widely across sectors of the U.S. economy. Table 4 shows 20 of the leading sectors of the U.S. economy that benefit from the presence and operations of the video game industry and the demand it generates. The “real estate” sector, for example, is not a direct component of the video game industry, but as shown on Table 4, activities and demand generated by the video game industry generate \$1.08 billion in annual real estate industry revenues, plus a further \$1.87 billion in “induced” economic impacts generated in real estate through the expenditures of employees and other individuals across the supply chain. Combined, the real estate sector benefits from \$2.95 billion in output generated because of the presence and operations of the video game industry in the U.S. Many of the sectors experiencing strong indirect and induced impacts generated by the video game industry can also be seen to contain direct output by the video game industry. Using the “Software Publishers” category, for example, this may be read across the table as \$20.7 billion in direct impacts generated by video game software publishers and an additional \$1.16 billion in indirect outputs generated through other software publishers (publishers that may be supplying general business software, programming language software, etc. servicing video game companies and their supply chain).

**Table 4: Top 20 Sectors of the U.S. Economy in Terms of Indirect Output Impacts Generated by the U.S. Video Game Industry, 2019 (\$ millions).**

IMPLAN Sector Name	Direct Output Impact	Indirect Output Impact	Induced Output Impact	Total Output Impact
Total	\$40,913.9	\$17,340.8	\$32,083.8	\$90,338.5
Software publishers	\$20,702.9	\$1,164.5	\$110.2	\$21,977.6
Real estate	-	\$1,082.2	\$1,868.8	\$2,951.0
Wholesale trade	\$1,371.4	\$1,027.1	\$1,323.3	\$3,721.8
Management of companies and enterprises	\$8,005.8	\$687.0	\$535.7	\$9,228.5
Advertising, public relations, and related services	\$80.5	\$663.1	\$200.5	\$944.1
Employment services	-	\$605.3	\$292.3	\$897.6
Management consulting services	\$25.2	\$491.8	\$192.5	\$709.5
Semiconductor and related device manufacturing	\$2,904.3	\$472.8	\$79.7	\$3,456.9
Internet publishing and broadcasting and web search portals	\$1,391.8	\$428.7	\$139.9	\$1,960.4
Monetary authorities and depository credit intermediation	-	\$409.3	\$803.1	\$1,212.4
Legal services	-	\$370.5	\$342.3	\$712.8
Lessors of nonfinancial intangible assets	-	\$329.3	\$93.3	\$422.6
Radio and television broadcasting	-	\$296.7	\$100.4	\$397.0
Accounting, tax preparation, bookkeeping, and payroll services	-	\$294.8	\$174.4	\$469.1
Computer storage device manufacturing	\$1,647.2	\$292.0	\$13.8	\$1,953.0
Electric power transmission and distribution	-	\$277.2	\$401.7	\$678.9
Wired telecommunications carriers	-	\$254.7	\$362.8	\$617.4
Wireless telecommunications carriers (except satellite)	-	\$253.8	\$511.5	\$765.3
Data processing, hosting, and related services	-	\$234.4	\$113.3	\$347.7
Computer systems design services	-	\$224.3	\$61.8	\$286.2

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database. Note column will not sum to values in Total row.

Table 4 above only shows the top 20 sectors of the U.S. economy in terms of indirect impacts of the video game industry. The expenditures of the industry, and the economic activity created within the U.S. economy, are actually found, through the I/O analysis, to generate indirect output impacts in 494 individual industry sectors.<sup>16</sup>

## B. State Economic Impacts of the Video Game Industry

The video game industry has a physical business presence in every state, with industry establishments located in all 50 U.S. states and the District of Columbia. The research results (presented on Tables 5 through 10 on the subsequent pages) provide two distinct sets of measures of impacts being generated by the video game industry at a state level:

1. The first set of metrics measures the impacts generated in the state by video game industry establishments that are physically located in each state. Thus, the impacts measured (labeled columns A through E on Tables 5 through 8) are the states' "domestic" (intra-state) video game industry impacts.<sup>17</sup>
2. The second set of measures (shaded in grey on the Tables and labeled F and G) are the impacts within each state that are generated by the nationwide video game industry (including the intra-state industry impacts shown in column D and additional inter-state impacts). This is, by definition, a larger number because it includes the impact in each state of the expenditures of both in-state and out-of-state video game industries and the expenditures of associated parties. In effect, this second measure represents the "share" of the total U.S. video game industry impacts that are captured in each state.

For example: in the case of Alabama on Table 5, Column D shows the total intrastate impact on employment, and Column E is the intrastate multiplier (i.e., Alabama's domestic video game industry impact on Alabama is 749.7 jobs). The impact of the whole U.S. video game industry (including the impacts from the industry in other states spending money within Alabama) in Alabama is 844.7 jobs.

State impact tables are provided for employment (Table 5), total employment compensation (Table 6), value added (Table 7), economic output (Table 8), state and local taxes (Table 9), and federal taxes (Table 10).

**Table 5: State Employment Impacts of Video Game Industry. State Impact of In-State Video Game Industry (Columns A through E) and State Impact of U.S. Industry Overall (Columns F & G).**

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Industry Impact	G. Industry Multiplier
Alabama	566.0	80.1	103.7	749.7	1.32	844.7	1.49
Alaska	106.0	11.6	18.2	135.8	1.28	151.5	1.43
Arizona	1,262.0	569.6	794.2	2,625.9	2.08	3,335.5	2.64
Arkansas	590.0	117.5	158.0	865.4	1.47	1,008.3	1.71
California	57,434.0	33,844.2	70,331.1	161,609.2	2.81	218,090.5	3.80

<sup>16</sup> As measured by IMPLAN industry sectors. A total of 494 out of 536 IMPLAN sectors have indirect economic output generated by video game industry and related population originated demand.

<sup>17</sup> It should be noted that the sum of individual state in-state impacts will not equal the total national impacts shown in Table 3.

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Colorado	1,425.0	787.4	1,120.3	3,332.7	2.34	4,327.6	3.04
Connecticut	633.0	98.1	175.8	906.9	1.43	1,053.3	1.66
Delaware	221.0	41.8	57.4	320.3	1.45	371.7	1.68
District of Columbia	116.0	24.8	29.2	170.0	1.47	197.6	1.70
Florida	6,314.0	2,527.7	3,990.6	12,832.3	2.03	16,270.0	2.58
Georgia	2,195.0	710.6	1,123.2	4,028.9	1.84	4,996.1	2.28
Hawaii	269.0	36.6	51.9	357.5	1.33	403.6	1.50
Idaho	1,629.0	1,651.0	2,024.0	5,303.9	3.26	7,189.1	4.41
Illinois	3,491.0	1,078.0	1,933.8	6,502.8	1.86	8,112.3	2.32
Indiana	1,052.0	169.2	247.7	1,468.9	1.40	1,687.0	1.60
Iowa	556.0	96.4	147.0	799.4	1.44	927.3	1.67
Kansas	421.0	88.9	95.3	605.2	1.44	698.2	1.66
Kentucky	908.0	162.0	197.6	1,267.6	1.40	1,452.0	1.60
Louisiana	1,270.0	309.0	368.0	1,947.0	1.53	2,293.1	1.81
Maine	139.0	23.8	36.1	198.9	1.43	230.4	1.66
Maryland	1,491.0	344.7	596.3	2,432.0	1.63	2,933.0	1.97
Massachusetts	1,971.0	568.8	1,335.0	3,874.8	1.97	4,918.7	2.50
Michigan	1,478.0	293.2	499.8	2,271.0	1.54	2,692.6	1.82
Minnesota	1,747.0	1,346.1	1,854.0	4,947.1	2.83	6,610.1	3.78
Mississippi	528.0	95.0	101.6	724.6	1.37	823.9	1.56
Missouri	1,042.0	224.0	348.7	1,614.6	1.55	1,916.3	1.84
Montana	629.0	160.2	170.4	959.6	1.53	1,126.4	1.79
Nebraska	358.0	82.7	117.9	558.6	1.56	663.2	1.85
Nevada	4,211.0	1,689.7	2,375.7	8,276.4	1.97	10,393.9	2.47
New Hampshire	381.0	62.9	135.6	579.5	1.52	687.5	1.80
New Jersey	1,774.0	333.1	763.0	2,870.1	1.62	3,469.8	1.96
New Mexico	297.0	44.2	57.1	398.3	1.34	450.6	1.52
New York	4,985.0	1,482.8	2,487.0	8,954.8	1.80	11,061.8	2.22
North Carolina	3,078.0	1,086.7	1,801.3	5,966.0	1.94	7,496.9	2.44
North Dakota	151.0	17.2	28.6	196.9	1.30	221.1	1.46
Ohio	2,184.0	398.0	679.8	3,261.8	1.49	3,834.9	1.76
Oklahoma	753.0	147.6	169.6	1,070.2	1.42	1,231.7	1.64
Oregon	837.0	222.6	361.4	1,421.0	1.70	1,729.9	2.07
Pennsylvania	2,557.0	524.1	1,046.3	4,127.4	1.61	4,975.6	1.95
Rhode Island	1,142.0	484.0	872.5	2,498.5	2.19	3,223.8	2.82
South Carolina	733.0	115.9	151.9	1,000.8	1.37	1,139.2	1.55
South Dakota	130.0	16.4	26.1	172.5	1.33	194.9	1.50
Tennessee	1,158.0	170.2	255.5	1,583.7	1.37	1,807.0	1.56

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Texas	9,806.0	3,577.5	6,312.1	19,695.6	2.01	24,971.8	2.55
Utah	675.0	225.2	400.3	1,300.5	1.93	1,634.5	2.42
Vermont	69.0	17.2	27.4	113.7	1.65	137.1	1.99
Virginia	1,608.0	309.1	474.0	2,391.0	1.49	2,802.8	1.74
Washington	15,030.0	7,188.1	14,725.1	36,943.2	2.46	48,807.8	3.25
West Virginia	365.0	40.6	53.9	459.5	1.26	508.4	1.39
Wisconsin	1,162.0	285.1	503.2	1,950.3	1.68	2,370.9	2.04
Wyoming	118.0	20.0	15.1	153.1	1.30	170.1	1.44
<b>Grand Total</b>	<b>143,045.0</b>	<b>64,001.2</b>	<b>121,749.3</b>	<b>328,795.4</b>	<b>86.29</b>	<b>428,646.1</b>	<b>104.88</b>

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database.

**Table 6: State Labor Income (Total Compensation) Impacts of Video Game Industry (\$ millions). State Impact of In-State Video Game Industry (Columns A through E) and State Impact of U.S. Industry Overall (Columns F & G).**

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Alabama	\$ 15.7	\$ 3.5	\$ 4.2	\$ 23.4	1.49	\$ 27.4	1.74
Alaska	\$ 3.4	\$ 0.7	\$ 0.9	\$ 5.0	1.46	\$ 5.8	1.70
Arizona	\$ 83.2	\$ 33.4	\$ 37.2	\$ 153.9	1.85	\$ 189.8	2.28
Arkansas	\$ 25.1	\$ 5.3	\$ 6.3	\$ 36.7	1.46	\$ 42.6	1.70
California	\$ 10,090.5	\$ 3,053.6	\$ 4,102.3	\$ 17,246.4	1.71	\$ 20,955.0	2.08
Colorado	\$ 121.5	\$ 59.7	\$ 54.6	\$ 235.8	1.94	\$ 292.5	2.41
Connecticut	\$ 29.5	\$ 7.3	\$ 10.4	\$ 47.2	1.60	\$ 56.5	1.91
Delaware	\$ 9.3	\$ 2.5	\$ 2.8	\$ 14.6	1.57	\$ 17.2	1.85
District of Columbia	\$ 17.4	\$ 2.9	\$ 2.1	\$ 22.4	1.29	\$ 24.9	1.43
Florida	\$ 415.1	\$ 148.6	\$ 177.0	\$ 740.6	1.78	\$ 907.0	2.19
Georgia	\$ 128.8	\$ 45.7	\$ 50.3	\$ 224.8	1.75	\$ 273.5	2.12
Hawaii	\$ 8.5	\$ 1.9	\$ 2.5	\$ 13.0	1.53	\$ 15.3	1.80
Idaho	\$ 260.2	\$ 90.6	\$ 81.4	\$ 432.2	1.66	\$ 517.3	1.99
Illinois	\$ 234.5	\$ 77.1	\$ 101.7	\$ 413.3	1.76	\$ 505.8	2.16
Indiana	\$ 32.5	\$ 9.2	\$ 11.5	\$ 53.2	1.64	\$ 63.9	1.97
Iowa	\$ 21.8	\$ 4.8	\$ 6.0	\$ 32.6	1.49	\$ 38.2	1.75
Kansas	\$ 13.6	\$ 4.0	\$ 4.1	\$ 21.7	1.59	\$ 25.7	1.89
Kentucky	\$ 27.0	\$ 7.8	\$ 8.4	\$ 43.1	1.60	\$ 51.3	1.90
Louisiana	\$ 47.8	\$ 15.1	\$ 15.1	\$ 78.0	1.63	\$ 93.2	1.95
Maine	\$ 4.6	\$ 1.1	\$ 1.5	\$ 7.2	1.58	\$ 8.6	1.88
Maryland	\$ 90.9	\$ 24.8	\$ 31.3	\$ 147.1	1.62	\$ 176.0	1.94

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Massachusetts	\$ 198.9	\$ 47.9	\$ 80.5	\$ 327.2	1.65	\$ 395.3	1.99
Michigan	\$ 62.1	\$ 16.7	\$ 23.1	\$ 101.9	1.64	\$ 122.6	1.98
Minnesota	\$ 179.4	\$ 111.6	\$ 95.2	\$ 386.2	2.15	\$ 487.8	2.72
Mississippi	\$ 15.3	\$ 3.7	\$ 3.7	\$ 22.6	1.48	\$ 26.3	1.72
Missouri	\$ 40.6	\$ 12.3	\$ 15.4	\$ 68.3	1.68	\$ 82.6	2.03
Montana	\$ 20.8	\$ 7.7	\$ 6.9	\$ 35.4	1.70	\$ 42.6	2.05
Nebraska	\$ 16.5	\$ 4.6	\$ 5.1	\$ 26.2	1.58	\$ 31.1	1.88
Nevada	\$ 368.0	\$ 92.6	\$ 106.8	\$ 567.4	1.54	\$ 669.0	1.82
New Hampshire	\$ 19.5	\$ 3.9	\$ 6.9	\$ 30.4	1.56	\$ 36.2	1.85
New Jersey	\$ 126.4	\$ 24.0	\$ 43.8	\$ 194.2	1.54	\$ 230.5	1.82
New Mexico	\$ 8.5	\$ 1.8	\$ 2.2	\$ 12.6	1.48	\$ 14.7	1.72
New York	\$ 420.0	\$ 136.6	\$ 152.2	\$ 708.8	1.69	\$ 855.4	2.04
North Carolina	\$ 237.2	\$ 64.6	\$ 80.2	\$ 382.0	1.61	\$ 456.4	1.92
North Dakota	\$ 5.0	\$ 0.9	\$ 1.3	\$ 7.3	1.45	\$ 8.4	1.69
Ohio	\$ 81.2	\$ 21.2	\$ 30.9	\$ 133.3	1.64	\$ 160.5	1.98
Oklahoma	\$ 23.4	\$ 7.6	\$ 7.2	\$ 38.1	1.63	\$ 45.5	1.95
Oregon	\$ 48.6	\$ 13.3	\$ 17.2	\$ 79.1	1.63	\$ 94.9	1.95
Pennsylvania	\$ 126.3	\$ 39.4	\$ 54.0	\$ 219.8	1.74	\$ 268.3	2.12
Rhode Island	\$ 118.7	\$ 29.5	\$ 42.7	\$ 190.9	1.61	\$ 228.6	1.93
South Carolina	\$ 20.9	\$ 5.3	\$ 6.1	\$ 32.4	1.55	\$ 38.2	1.82
South Dakota	\$ 3.8	\$ 0.8	\$ 1.2	\$ 5.8	1.51	\$ 6.8	1.78
Tennessee	\$ 35.7	\$ 9.5	\$ 13.5	\$ 58.7	1.64	\$ 70.7	1.98
Texas	\$ 778.5	\$ 230.6	\$ 314.6	\$ 1,323.7	1.70	\$ 1,606.7	2.06
Utah	\$ 49.8	\$ 12.7	\$ 17.2	\$ 79.6	1.60	\$ 95.1	1.91
Vermont	\$ 3.8	\$ 0.9	\$ 1.2	\$ 5.9	1.55	\$ 6.9	1.84
Virginia	\$ 70.6	\$ 19.6	\$ 22.3	\$ 112.5	1.59	\$ 133.8	1.90
Washington	\$ 2,537.2	\$ 558.0	\$ 810.8	\$ 3,906.0	1.54	\$ 4,621.6	1.82
West Virginia	\$ 8.3	\$ 1.9	\$ 2.2	\$ 12.4	1.49	\$ 14.5	1.74
Wisconsin	\$ 64.8	\$ 16.2	\$ 22.8	\$ 103.7	1.60	\$ 124.0	1.91
Wyoming	\$ 3.3	\$ 0.9	\$ 0.6	\$ 4.7	1.43	\$ 5.4	1.64
<b>Grand Total</b>	<b>\$ 17,374.1</b>	<b>\$ 5,095.9</b>	<b>\$ 6,699.4</b>	<b>\$ 29,169.4</b>	<b>82.21</b>	<b>\$ 35,267.7</b>	<b>98.18</b>

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database.

**Table 7: State Value-Added Impacts of Video Game Industry (\$ millions). State Impact of In-State Video Game Industry (Columns A through E) and State Impact of U.S. Industry Overall (Columns F & G).**

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Alabama	\$ 20.4	\$ 6.4	\$ 7.7	\$ 34.6	1.69	\$ 41.9	2.05
Alaska	\$ 4.3	\$ 1.2	\$ 1.6	\$ 7.2	1.67	\$ 8.7	2.01
Arizona	\$ 136.6	\$ 53.4	\$ 67.2	\$ 257.3	1.88	\$ 319.3	2.34
Arkansas	\$ 56.3	\$ 9.5	\$ 11.6	\$ 77.4	1.38	\$ 88.2	1.57
California	\$ 16,634.1	\$ 4,649.0	\$ 7,422.8	\$ 28,705.9	1.73	\$ 35,080.2	2.11
Colorado	\$ 297.2	\$ 98.8	\$ 99.3	\$ 495.3	1.67	\$ 594.6	2.00
Connecticut	\$ 43.9	\$ 12.5	\$ 17.8	\$ 74.3	1.69	\$ 90.1	2.05
Delaware	\$ 13.9	\$ 4.6	\$ 5.2	\$ 23.7	1.70	\$ 28.6	2.06
District of Columbia	\$ 29.7	\$ 4.2	\$ 3.2	\$ 37.1	1.25	\$ 40.7	1.37
Florida	\$ 731.2	\$ 242.3	\$ 327.0	\$ 1,300.5	1.78	\$ 1,595.6	2.18
Georgia	\$ 226.5	\$ 76.6	\$ 93.2	\$ 396.3	1.75	\$ 483.4	2.13
Hawaii	\$ 15.7	\$ 3.4	\$ 4.9	\$ 24.0	1.53	\$ 28.3	1.80
Idaho	\$ 378.2	\$ 136.3	\$ 143.5	\$ 658.0	1.74	\$ 799.1	2.11
Illinois	\$ 365.5	\$ 122.3	\$ 180.6	\$ 668.4	1.83	\$ 827.0	2.26
Indiana	\$ 48.0	\$ 14.9	\$ 19.8	\$ 82.7	1.72	\$ 100.6	2.09
Iowa	\$ 34.4	\$ 8.5	\$ 11.0	\$ 54.0	1.57	\$ 64.0	1.86
Kansas	\$ 19.5	\$ 6.8	\$ 7.3	\$ 33.6	1.72	\$ 40.7	2.09
Kentucky	\$ 44.5	\$ 12.8	\$ 14.5	\$ 71.8	1.61	\$ 85.7	1.93
Louisiana	\$ 92.4	\$ 26.5	\$ 28.3	\$ 147.2	1.59	\$ 174.8	1.89
Maine	\$ 6.6	\$ 2.0	\$ 2.7	\$ 11.3	1.71	\$ 13.7	2.09
Maryland	\$ 151.9	\$ 40.1	\$ 57.0	\$ 248.9	1.64	\$ 299.6	1.97
Massachusetts	\$ 357.8	\$ 77.8	\$ 130.5	\$ 566.1	1.58	\$ 676.6	1.89
Michigan	\$ 96.7	\$ 28.2	\$ 40.1	\$ 165.0	1.71	\$ 200.6	2.08
Minnesota	\$ 421.5	\$ 176.7	\$ 161.5	\$ 759.7	1.80	\$ 927.3	2.20
Mississippi	\$ 28.3	\$ 6.8	\$ 7.1	\$ 42.2	1.49	\$ 49.2	1.74
Missouri	\$ 64.3	\$ 20.6	\$ 26.8	\$ 111.7	1.74	\$ 136.1	2.12
Montana	\$ 23.8	\$ 12.0	\$ 11.5	\$ 47.4	1.99	\$ 59.1	2.48
Nebraska	\$ 27.7	\$ 7.8	\$ 9.2	\$ 44.6	1.61	\$ 53.3	1.92
Nevada	\$ 693.1	\$ 154.5	\$ 207.7	\$ 1,055.3	1.52	\$ 1,243.0	1.79
New Hampshire	\$ 26.3	\$ 6.8	\$ 11.7	\$ 44.7	1.70	\$ 54.6	2.08
New Jersey	\$ 169.4	\$ 38.7	\$ 75.6	\$ 283.6	1.67	\$ 345.2	2.04
New Mexico	\$ 13.6	\$ 3.6	\$ 4.2	\$ 21.5	1.58	\$ 25.5	1.87
New York	\$ 680.3	\$ 213.8	\$ 267.6	\$ 1,161.7	1.71	\$ 1,409.2	2.07
North Carolina	\$ 430.6	\$ 109.3	\$ 147.5	\$ 687.4	1.60	\$ 820.5	1.91
North Dakota	\$ 6.6	\$ 1.7	\$ 2.3	\$ 10.6	1.61	\$ 12.6	1.92
Ohio	\$ 110.6	\$ 37.8	\$ 55.3	\$ 203.6	1.84	\$ 252.3	2.28

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Oklahoma	\$ 35.5	\$ 12.9	\$ 12.8	\$ 61.2	1.73	\$ 74.1	2.09
Oregon	\$ 80.8	\$ 22.6	\$ 29.8	\$ 133.2	1.65	\$ 160.3	1.99
Pennsylvania	\$ 197.5	\$ 60.9	\$ 90.4	\$ 348.8	1.77	\$ 428.1	2.17
Rhode Island	\$ 248.5	\$ 49.9	\$ 76.6	\$ 375.0	1.51	\$ 441.5	1.78
South Carolina	\$ 28.7	\$ 9.3	\$ 11.2	\$ 49.2	1.71	\$ 59.6	2.08
South Dakota	\$ 5.3	\$ 1.4	\$ 2.0	\$ 8.7	1.64	\$ 10.4	1.98
Tennessee	\$ 55.7	\$ 15.8	\$ 22.0	\$ 93.6	1.68	\$ 113.3	2.03
Texas	\$ 1,244.8	\$ 368.0	\$ 551.4	\$ 2,164.2	1.74	\$ 2,646.4	2.13
Utah	\$ 87.1	\$ 22.4	\$ 32.1	\$ 141.6	1.63	\$ 170.1	1.95
Vermont	\$ 6.4	\$ 1.6	\$ 2.1	\$ 10.0	1.57	\$ 11.9	1.86
Virginia	\$ 109.2	\$ 33.7	\$ 41.9	\$ 184.8	1.69	\$ 223.6	2.05
Washington	\$ 4,424.5	\$ 913.9	\$ 1,490.5	\$ 6,828.9	1.54	\$ 8,101.4	1.83
West Virginia	\$ 11.5	\$ 3.4	\$ 3.9	\$ 18.8	1.63	\$ 22.5	1.95
Wisconsin	\$ 112.4	\$ 28.1	\$ 40.2	\$ 180.6	1.61	\$ 216.3	1.92
Wyoming	\$ 7.1	\$ 1.6	\$ 1.2	\$ 9.8	1.39	\$ 11.1	1.57
<b>Grand Total</b>	<b>\$ 29,156.2</b>	<b>\$ 7,973.6</b>	<b>\$ 12,092.8</b>	<b>\$ 49,222.6</b>	<b>84.47</b>	<b>\$ 59,760.5</b>	<b>101.73</b>

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database.

**Table 8: State Output Impacts of Video Game Industry (\$ millions). State Impact of In-State Video Game Industry (Columns A through E) and State Impact of U.S. Industry Overall (Columns F & G).**

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Alabama	\$ 33.0	\$ 11.5	\$ 13.8	\$ 58.2	1.77	\$ 71.2	2.16
Alaska	\$ 7.0	\$ 2.1	\$ 2.8	\$ 11.9	1.69	\$ 14.4	2.04
Arizona	\$ 238.3	\$ 93.3	\$ 116.2	\$ 447.8	1.88	\$ 555.5	2.33
Arkansas	\$ 77.7	\$ 16.6	\$ 20.7	\$ 115.0	1.48	\$ 134.2	1.73
California	\$ 22,521.1	\$ 7,107.2	\$ 11,996.3	\$ 41,624.6	1.85	\$ 51,770.3	2.30
Colorado	\$ 567.5	\$ 171.7	\$ 169.5	\$ 908.8	1.60	\$ 1,079.5	1.90
Connecticut	\$ 61.6	\$ 19.2	\$ 27.9	\$ 108.7	1.76	\$ 133.3	2.16
Delaware	\$ 21.7	\$ 6.9	\$ 8.3	\$ 37.0	1.70	\$ 44.8	2.06
District of Columbia	\$ 36.2	\$ 5.8	\$ 4.8	\$ 46.8	1.29	\$ 52.0	1.44
Florida	\$ 1,186.8	\$ 416.6	\$ 569.7	\$ 2,173.2	1.83	\$ 2,685.4	2.26
Georgia	\$ 370.0	\$ 126.3	\$ 158.6	\$ 654.9	1.77	\$ 801.4	2.17
Hawaii	\$ 23.4	\$ 5.9	\$ 8.1	\$ 37.4	1.60	\$ 44.6	1.91
Idaho	\$ 849.9	\$ 266.9	\$ 260.8	\$ 1,377.7	1.62	\$ 1,641.4	1.93
Illinois	\$ 553.1	\$ 192.8	\$ 297.1	\$ 1,043.0	1.89	\$ 1,300.7	2.35
Indiana	\$ 77.5	\$ 25.4	\$ 34.1	\$ 137.0	1.77	\$ 167.9	2.17
Iowa	\$ 52.4	\$ 14.6	\$ 19.3	\$ 86.3	1.65	\$ 103.9	1.99
Kansas	\$ 32.3	\$ 12.1	\$ 13.2	\$ 57.6	1.78	\$ 70.3	2.17
Kentucky	\$ 71.6	\$ 22.7	\$ 26.1	\$ 120.3	1.68	\$ 145.2	2.03
Louisiana	\$ 152.6	\$ 45.1	\$ 49.3	\$ 247.0	1.62	\$ 294.8	1.93
Maine	\$ 10.5	\$ 3.5	\$ 4.7	\$ 18.8	1.78	\$ 23.0	2.18
Maryland	\$ 216.6	\$ 61.7	\$ 92.3	\$ 370.5	1.71	\$ 451.2	2.08
Massachusetts	\$ 455.6	\$ 115.7	\$ 209.2	\$ 780.5	1.71	\$ 954.2	2.09
Michigan	\$ 142.3	\$ 46.6	\$ 69.7	\$ 258.7	1.82	\$ 319.6	2.25
Minnesota	\$ 946.8	\$ 319.3	\$ 275.6	\$ 1,541.7	1.63	\$ 1,834.7	1.94
Mississippi	\$ 44.6	\$ 12.6	\$ 13.1	\$ 70.3	1.58	\$ 83.2	1.87
Missouri	\$ 99.7	\$ 35.5	\$ 47.2	\$ 182.4	1.83	\$ 225.2	2.26
Montana	\$ 76.5	\$ 23.4	\$ 21.2	\$ 121.0	1.58	\$ 143.1	1.87
Nebraska	\$ 43.2	\$ 13.4	\$ 16.0	\$ 72.5	1.68	\$ 87.5	2.02
Nevada	\$ 1,020.7	\$ 255.9	\$ 351.6	\$ 1,628.2	1.60	\$ 1,943.9	1.90
New Hampshire	\$ 37.3	\$ 10.7	\$ 19.2	\$ 67.2	1.80	\$ 83.2	2.23
New Jersey	\$ 223.1	\$ 59.3	\$ 121.9	\$ 404.3	1.81	\$ 502.5	2.25
New Mexico	\$ 23.1	\$ 6.6	\$ 7.5	\$ 37.2	1.61	\$ 44.3	1.92
New York	\$ 976.4	\$ 312.5	\$ 407.8	\$ 1,696.7	1.74	\$ 2,068.8	2.12
North Carolina	\$ 594.8	\$ 177.5	\$ 255.2	\$ 1,027.5	1.73	\$ 1,253.5	2.11
North Dakota	\$ 10.0	\$ 3.0	\$ 4.0	\$ 17.0	1.70	\$ 20.6	2.07
Ohio	\$ 170.6	\$ 62.6	\$ 94.4	\$ 327.6	1.92	\$ 410.1	2.40

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Multiplier	F. Total Indus- try Impact	G. Industry Multiplier
Oklahoma	\$ 64.6	\$ 23.1	\$ 23.3	\$ 111.0	1.72	\$ 134.2	2.08
Oregon	\$ 115.5	\$ 36.4	\$ 50.5	\$ 202.4	1.75	\$ 247.5	2.14
Pennsylvania	\$ 291.6	\$ 93.3	\$ 150.9	\$ 535.7	1.84	\$ 664.8	2.28
Rhode Island	\$ 332.4	\$ 78.7	\$ 125.0	\$ 536.1	1.61	\$ 643.7	1.94
South Carolina	\$ 45.8	\$ 16.3	\$ 19.8	\$ 81.9	1.79	\$ 100.4	2.19
South Dakota	\$ 8.3	\$ 2.6	\$ 3.5	\$ 14.4	1.73	\$ 17.5	2.11
Tennessee	\$ 83.3	\$ 27.1	\$ 37.4	\$ 147.9	1.78	\$ 181.4	2.18
Texas	\$ 1,783.6	\$ 596.8	\$ 953.6	\$ 3,334.0	1.87	\$ 4,152.7	2.33
Utah	\$ 118.7	\$ 37.2	\$ 57.3	\$ 213.2	1.80	\$ 262.9	2.21
Vermont	\$ 9.7	\$ 2.7	\$ 3.5	\$ 15.9	1.64	\$ 19.1	1.98
Virginia	\$ 161.9	\$ 53.3	\$ 69.7	\$ 284.9	1.76	\$ 348.5	2.15
Washington	\$ 5,682.8	\$ 1,428.4	\$ 2,443.5	\$ 9,554.6	1.68	\$ 11,613.8	2.04
West Virginia	\$ 20.1	\$ 5.9	\$ 6.8	\$ 32.7	1.63	\$ 39.2	1.95
Wisconsin	\$ 159.1	\$ 46.3	\$ 69.2	\$ 274.6	1.73	\$ 335.2	2.11
Wyoming	\$ 10.9	\$ 2.8	\$ 2.1	\$ 15.8	1.44	\$ 18.1	1.66
<b>Grand Total</b>	<b>\$ 40,913.9</b>	<b>\$ 12,533.2</b>	<b>\$ 19,823.3</b>	<b>\$ 73,270.4</b>	<b>87.21</b>	<b>\$ 90,338.5</b>	<b>105.95</b>

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database.

**Table 9: State and Local Tax Impacts of Video Game Industry (\$ millions). State Impact of In-State Video Game Industry (Columns A through D) and State Impact of U.S. Industry Overall (Column E).**

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Total Industry Impact
Alabama	\$ 3.6	\$ 0.4	\$ 0.8	\$ 4.9	\$ 5.5
Alaska	\$ 0.6	\$ 0.1	\$ 0.1	\$ 0.7	\$ 0.8
Arizona	\$ 12.5	\$ 3.6	\$ 6.4	\$ 22.5	\$ 27.9
Arkansas	\$ 5.8	\$ 0.7	\$ 1.3	\$ 7.8	\$ 8.9
California	\$ 811.7	\$ 323.6	\$ 787.5	\$ 1,922.8	\$ 2,534.0
Colorado	\$ 23.6	\$ 6.8	\$ 9.3	\$ 39.7	\$ 48.0
Connecticut	\$ 5.9	\$ 1.0	\$ 1.9	\$ 8.7	\$ 10.2
Delaware	\$ 1.9	\$ 0.4	\$ 0.4	\$ 2.7	\$ 3.1
District of Columbia	\$ 1.9	\$ 0.2	\$ 0.3	\$ 2.4	\$ 2.7
Florida	\$ 45.6	\$ 17.8	\$ 31.0	\$ 94.5	\$ 120.5
Georgia	\$ 16.8	\$ 5.0	\$ 8.4	\$ 30.3	\$ 37.5
Hawaii	\$ 4.0	\$ 0.3	\$ 0.6	\$ 4.8	\$ 5.3
Idaho	\$ 23.9	\$ 12.7	\$ 14.4	\$ 51.0	\$ 64.7
Illinois	\$ 31.4	\$ 8.3	\$ 17.8	\$ 57.5	\$ 71.7
Indiana	\$ 9.4	\$ 1.0	\$ 1.8	\$ 12.2	\$ 13.7
Iowa	\$ 5.5	\$ 0.7	\$ 1.1	\$ 7.3	\$ 8.2
Kansas	\$ 3.4	\$ 0.4	\$ 0.8	\$ 4.6	\$ 5.2
Kentucky	\$ 7.7	\$ 0.9	\$ 1.5	\$ 10.1	\$ 11.3
Louisiana	\$ 11.3	\$ 1.8	\$ 2.9	\$ 16.1	\$ 18.6
Maine	\$ 1.1	\$ 0.2	\$ 0.3	\$ 1.6	\$ 1.9
Maryland	\$ 13.9	\$ 3.1	\$ 6.1	\$ 23.1	\$ 28.1
Massachusetts	\$ 20.8	\$ 4.7	\$ 10.5	\$ 36.0	\$ 44.3
Michigan	\$ 12.5	\$ 1.9	\$ 4.0	\$ 18.3	\$ 21.5
Minnesota	\$ 27.3	\$ 15.4	\$ 16.8	\$ 59.5	\$ 75.7
Mississippi	\$ 6.7	\$ 0.6	\$ 0.9	\$ 8.2	\$ 9.0
Missouri	\$ 7.6	\$ 1.2	\$ 2.3	\$ 11.1	\$ 13.0
Montana	\$ 1.9	\$ 1.1	\$ 1.0	\$ 4.0	\$ 5.0
Nebraska	\$ 2.8	\$ 0.5	\$ 0.8	\$ 4.1	\$ 4.8
Nevada	\$ 25.8	\$ 10.5	\$ 23.5	\$ 59.9	\$ 78.5
New Hampshire	\$ 1.6	\$ 0.5	\$ 1.0	\$ 3.1	\$ 3.9
New Jersey	\$ 21.7	\$ 3.3	\$ 8.1	\$ 33.1	\$ 39.4
New Mexico	\$ 1.9	\$ 0.3	\$ 0.4	\$ 2.6	\$ 3.0
New York	\$ 75.4	\$ 18.8	\$ 31.8	\$ 125.9	\$ 152.8
North Carolina	\$ 25.4	\$ 7.0	\$ 13.2	\$ 45.6	\$ 56.5
North Dakota	\$ 1.1	\$ 0.1	\$ 0.2	\$ 1.4	\$ 1.5
Ohio	\$ 18.8	\$ 2.7	\$ 5.3	\$ 26.8	\$ 31.1

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Total Industry Impact
Oklahoma	\$ 6.1	\$ 0.9	\$ 1.2	\$ 8.2	\$ 9.3
Oregon	\$ 7.4	\$ 1.5	\$ 2.5	\$ 11.4	\$ 13.6
Pennsylvania	\$ 21.0	\$ 4.5	\$ 8.4	\$ 33.9	\$ 40.8
Rhode Island	\$ 10.3	\$ 3.8	\$ 8.1	\$ 22.2	\$ 28.6
South Carolina	\$ 5.5	\$ 0.6	\$ 1.2	\$ 7.4	\$ 8.3
South Dakota	\$ 1.1	\$ 0.1	\$ 0.2	\$ 1.4	\$ 1.5
Tennessee	\$ 12.5	\$ 1.0	\$ 2.1	\$ 15.6	\$ 17.3
Texas	\$ 72.4	\$ 21.8	\$ 49.0	\$ 143.2	\$ 181.9
Utah	\$ 6.4	\$ 1.3	\$ 2.9	\$ 10.6	\$ 12.8
Vermont	\$ 0.5	\$ 0.1	\$ 0.2	\$ 0.9	\$ 1.1
Virginia	\$ 12.9	\$ 2.1	\$ 4.1	\$ 19.2	\$ 22.5
Washington	\$ 115.3	\$ 63.1	\$ 166.0	\$ 344.4	\$ 471.2
West Virginia	\$ 2.5	\$ 0.3	\$ 0.4	\$ 3.2	\$ 3.6
Wisconsin	\$ 8.4	\$ 2.1	\$ 4.0	\$ 14.4	\$ 17.7
Wyoming	\$ 2.8	\$ 0.1	\$ 0.1	\$ 3.0	\$ 3.2
<b>Grand Total</b>	<b>\$ 1,578.0</b>	<b>\$ 560.9</b>	<b>\$ 1,264.9</b>	<b>\$ 3,403.7</b>	<b>\$ 4,401.2</b>

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database.

**Table 10: Federal Tax Impacts of Video Game Industry (\$ millions). State Impact of In-State Video Game Industry (Columns A through D) and State Impact of U.S. Industry Overall (Column E).**

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Total Industry Impact
Alabama	\$ 3.3	\$ 0.8	\$ 1.0	\$ 5.0	\$ 5.9
Alaska	\$ 0.7	\$ 0.1	\$ 0.2	\$ 1.0	\$ 1.2
Arizona	\$ 19.3	\$ 7.4	\$ 8.7	\$ 35.4	\$ 43.7
Arkansas	\$ 6.2	\$ 1.2	\$ 1.4	\$ 8.8	\$ 10.1
California	\$ 2,327.4	\$ 663.1	\$ 969.8	\$ 3,960.2	\$ 4,814.4
Colorado	\$ 33.4	\$ 13.8	\$ 13.1	\$ 60.3	\$ 73.7
Connecticut	\$ 6.8	\$ 1.7	\$ 2.5	\$ 11.0	\$ 13.1
Delaware	\$ 2.0	\$ 0.5	\$ 0.6	\$ 3.2	\$ 3.8
District of Columbia	\$ 3.1	\$ 0.5	\$ 0.4	\$ 3.9	\$ 4.3
Florida	\$ 98.7	\$ 33.7	\$ 42.3	\$ 174.7	\$ 213.7
Georgia	\$ 28.8	\$ 9.8	\$ 11.4	\$ 50.0	\$ 60.8
Hawaii	\$ 2.0	\$ 0.4	\$ 0.6	\$ 2.9	\$ 3.5
Idaho	\$ 57.9	\$ 19.5	\$ 18.3	\$ 95.7	\$ 114.5
Illinois	\$ 52.3	\$ 16.8	\$ 23.5	\$ 92.7	\$ 113.7
Indiana	\$ 7.3	\$ 1.9	\$ 2.5	\$ 11.7	\$ 13.9
Iowa	\$ 4.8	\$ 1.0	\$ 1.3	\$ 7.2	\$ 8.4
Kansas	\$ 2.9	\$ 0.9	\$ 0.9	\$ 4.7	\$ 5.6
Kentucky	\$ 6.3	\$ 1.6	\$ 1.8	\$ 9.7	\$ 11.5
Louisiana	\$ 11.0	\$ 3.1	\$ 3.3	\$ 17.3	\$ 20.6
Maine	\$ 0.9	\$ 0.2	\$ 0.3	\$ 1.5	\$ 1.8
Maryland	\$ 20.9	\$ 5.3	\$ 7.3	\$ 33.5	\$ 40.0
Massachusetts	\$ 47.1	\$ 10.8	\$ 18.2	\$ 76.1	\$ 91.4
Michigan	\$ 13.9	\$ 3.7	\$ 5.3	\$ 22.9	\$ 27.6
Minnesota	\$ 47.0	\$ 24.9	\$ 21.8	\$ 93.7	\$ 116.6
Mississippi	\$ 3.7	\$ 0.8	\$ 0.8	\$ 5.3	\$ 6.2
Missouri	\$ 8.9	\$ 2.6	\$ 3.4	\$ 15.0	\$ 18.1
Montana	\$ 4.0	\$ 1.6	\$ 1.5	\$ 7.1	\$ 8.7
Nebraska	\$ 3.7	\$ 1.0	\$ 1.1	\$ 5.7	\$ 6.8
Nevada	\$ 93.3	\$ 22.0	\$ 27.6	\$ 142.9	\$ 168.4
New Hampshire	\$ 4.1	\$ 0.9	\$ 1.6	\$ 6.6	\$ 7.9
New Jersey	\$ 26.2	\$ 5.6	\$ 10.6	\$ 42.4	\$ 51.1
New Mexico	\$ 1.8	\$ 0.4	\$ 0.5	\$ 2.8	\$ 3.2
New York	\$ 94.1	\$ 29.4	\$ 35.0	\$ 158.4	\$ 191.3
North Carolina	\$ 55.8	\$ 14.5	\$ 18.8	\$ 89.0	\$ 106.1
North Dakota	\$ 1.0	\$ 0.2	\$ 0.3	\$ 1.5	\$ 1.8
Ohio	\$ 16.2	\$ 4.6	\$ 6.8	\$ 27.6	\$ 33.6

State	A. Direct Impact	B. Indirect Impact	C. Induced Impact	D. Total Impact	E. Total Industry Impact
Oklahoma	\$ 5.1	\$ 1.6	\$ 1.5	\$ 8.3	\$ 9.8
Oregon	\$ 11.3	\$ 3.0	\$ 4.0	\$ 18.3	\$ 22.0
Pennsylvania	\$ 28.1	\$ 8.1	\$ 12.1	\$ 48.3	\$ 59.0
Rhode Island	\$ 30.3	\$ 6.8	\$ 10.2	\$ 47.3	\$ 56.2
South Carolina	\$ 4.8	\$ 1.2	\$ 1.4	\$ 7.4	\$ 8.7
South Dakota	\$ 0.8	\$ 0.2	\$ 0.3	\$ 1.2	\$ 1.5
Tennessee	\$ 8.4	\$ 2.0	\$ 2.9	\$ 13.3	\$ 15.9
Texas	\$ 167.9	\$ 48.2	\$ 68.9	\$ 285.1	\$ 346.2
Utah	\$ 11.2	\$ 2.8	\$ 4.0	\$ 18.0	\$ 21.5
Vermont	\$ 0.8	\$ 0.2	\$ 0.3	\$ 1.3	\$ 1.5
Virginia	\$ 16.4	\$ 4.5	\$ 5.4	\$ 26.3	\$ 31.4
Washington	\$ 636.7	\$ 133.3	\$ 205.7	\$ 975.6	\$ 1,154.0
West Virginia	\$ 1.8	\$ 0.4	\$ 0.5	\$ 2.7	\$ 3.1
Wisconsin	\$ 15.0	\$ 3.7	\$ 5.2	\$ 23.9	\$ 28.5
Wyoming	\$ 1.1	\$ 0.2	\$ 0.1	\$ 1.4	\$ 1.6
<b>Grand Total</b>	<b>\$ 4,056.6</b>	<b>\$ 1,122.4</b>	<b>\$ 1,586.8</b>	<b>\$ 6,765.8</b>	<b>\$ 8,177.7</b>

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database.

Table 11 lists the Top 10 states in rank order by total in-state video game industry output and employment impacts. It is interesting to note that each of the major geographic regions of the U.S. have at least one state on this list.

**Table 11: Top 10 States Ranked by Total In-State Video Game Industry Related Economic Output, 2019.**

State	Direct In-State Video Game Industry Output (\$ millions)	Total Output Impact of the In-State Video Game Industry (Direct + Indirect + Induced) (\$ millions)	Direct In-State Video Game Industry Employment	Total Employment Impact of the In-State Video Game Industry (Direct + Indirect + Induced)
1. California	\$22,521.1	\$41,624.6	57,434	161,609.2
2. Washington	\$5,682.8	\$9,554.6	15,030	36,943.2
3. Texas	\$1,783.6	\$3,334.0	9,806	19,695.6
4. Florida	\$1,186.8	\$2,173.2	6,314	12,832.3
5. New York	\$976.4	\$1,696.7	4,985	8,954.8
6. Nevada	\$1,020.7	\$1,628.2	4,211	8,276.4
7. Minnesota	\$946.8	\$1,541.7	1,747	4,947.1
8. Idaho <sup>18</sup>	\$849.9	\$1,377.7	1,629	5,303.9
9. Illinois	\$223.1	\$1,043.0	3,491	6,502.8
10. North Carolina	\$594.8	\$1,027.5	3,078	5,966.0

Source: TEconomy IMPLAN analysis of 2019 Video Game Industry Microfirm Database

## Conclusion

While the direct impacts of the video game industry on key factors such employment and business output are substantial, these direct impacts are significantly multiplied as the spending of industry suppliers and workers who receive income related to the industry ripples through the economies of the nation and its individual states. Input/Output analysis demonstrates that **the total economic output impact generated by the video game industry in the U.S. is over \$90 billion dollars, and business activity generated by the industry supports more than 428,000 jobs across the U.S.**

<sup>18</sup> Idaho is atypical among these leading states in that its employment and output figures are largely concentrated in one company, Micron Technology, which is a very large developer and manufacturer of hardware used in video game applications (primarily memory and storage products).



# IV. FUNCTIONAL BENEFITS OF THE VIDEO GAME INDUSTRY

As shown in the previous chapter, the video game industry is a powerful economic engine for the U.S. The industry has experienced significant growth in economic output and continues to expand high paying jobs for American workers. These positive economic impacts are being realized in every state, creating wide-spread economic opportunity, and continued promise for the future.

The development, technical, and business activities of the video game industry are producing multiple additional impacts of importance to the U.S. economy and society that also warrant discussion. Chief among these additional impacts are those shown in Figure 6:

**Figure 6: Additional Functional Impact Domains of the Video Game Industry**

<b>Innovation</b>	<b>Innovation and Technology Advancement</b>
<p>Technological R&amp;D and creativity drive direct innovations in software development and video game platform and hardware development. The video game industry has a significant stimulus effect on advancements in a wide-range of important technologies that underpin the development and delivery of games and enhance the consumer experience. The growth of the video game industry is driving innovation in areas such as high-speed processors, high-resolution graphics, human-machine interface design and haptics, VR and AR technologies, and high-speed broadband and mobile technologies (such as 5G) that find application across many sectors of the U.S. economy.</p>	
<b>Wealth Generation</b>	<b>Capital Attraction and Wealth Development</b>
<p>Open to new entrants and entrepreneurs, the video game industry presents a diverse and dynamic market for capital and wealth generating events. The industry is a breeding ground for developing tech entrepreneurs and for personnel skilled in the management of fast-growth technology and creative content industries. Opportunities in the industry have attracted large volumes of early stage capital, created significant wealth enabling a virtuous cycle of re-investment, and built an expanding base of public companies presenting investment opportunities for broader institutional and individual investors.</p>	
<b>Application Spillover</b>	<b>Gamification in Other Industries</b>
<p>Technologies, creative content and methods of content delivery pioneered in the entertainment software sector have had pervasive spill-over effects into other industries—sparking the development of “serious games” (for K-12 and higher education and for formal skills training). Advancements in high-performance 3D rendering and simulation capabilities in games have spurred advanced applications in design-heavy industries such as architecture and engineering, boosting industry productivity.</p>	
<b>Cross-Over Entertainment</b>	<b>Game Content Ported to Adjacent Industries</b>
<p>The video game industry both builds-upon and contributes to other leading entertainment industries. The content of leading video game franchises has crossed-over into movies, television shows, comic books, novels and physical toys. Similarly, video games have become an additional income stream engine and cross-marketing asset for other creative industries who seek to expand their intellectual assets (such as characters) into a video game format.</p>	

These additional functional impacts of the video game industry are explored further in this chapter.

## A. Innovation and Technology Advancement Impacts of the Video Game Industry

As an R&D intensive industry that requires both technological and creative content development to produce new and improved products, the video game industry is a hotbed of innovation. The stimulus effect of the video game industry occurs along two principal pathways:

1. Video game companies, in both the entertainment software and hardware segments of the industry, directly engage in innovation processes seeking to improve their productivity and produce content that enhances the experience and engagement of consumers.
2. The large-scale demand of the video game industry spurs innovation in enabling technologies that power and improve the gaming experience. Demand from the video game sector has been a major driver of innovations in graphics chips, computer processors, display technologies, interactive control systems, and broadband communications technology, for example.

### The Fundamental Importance of Innovative Industries to the U.S. Economy

The importance of innovation and innovative industries to the U.S. economy is hard to overstate. Recent empirical evidence has shown that innovation is a major contributor to steady rates of economic growth and rising per capita incomes.<sup>19</sup> Increased awareness of the economic force of innovation has given rise to a movement in economics called “Innovation Economics” that seeks to elucidate the link between innovation and economic performance, though generally speaking it is not a new concept. The concept was highlighted, for example, in the early 20th Century by Joseph Schumpeter who noted that entrepreneurs, evolving institutions, and technological change were central to economic growth—writing that “capitalism can only be understood as an evolutionary process of continuous innovation and creative destruction.”<sup>20</sup>

Innovations have always been at the heart of U.S. economic progress, developing and expanding industries into a major force of income and job generation. The mass-produced automotive industry, the aerospace industry, the information technology industry, and the motion picture and television industries are each a product of American innovation and a culture that supports it. Robert Rubin puts it well when he notes that:

*America has long had a culture and an economic system that has spurred innovation and scientific advance that in turn created vast new industries, enormous numbers of jobs, and a powerful competitive position in the global economy.*<sup>21</sup>

Economist William Baumol has noted that:

*Virtually all of the economic growth that has occurred since the eighteenth century is ultimately attributable to innovation.*<sup>22</sup>

19 Alhlstrom, D. 2010. “Innovation and Growth: How Business Contributes to Society.” *Academy of Management Perspectives*. 24 (3): 11-24.

20 Schumpeter, J. A. 1943. “Capitalism, Socialism, and Democracy (6th Edition).” Routledge.

21 Robert E. Rubin, Co-Chair, Council on Foreign Relations and Former U.S. Treasury Secretary. Cited in: Michael Greenstone and Adam Looney. “A Dozen Economic Facts About Innovation.” The Hamilton Project. Brookings Institution. [https://www.brookings.edu/wp-content/uploads/2016/06/08\\_innovation\\_greenstone\\_looney.pdf](https://www.brookings.edu/wp-content/uploads/2016/06/08_innovation_greenstone_looney.pdf)

22 Baumol, W. J. 2014. “The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism.” Princeton University Press.

The U.S. video game industry is one of the latest major growth industries to be derived from the ongoing tradition of ingenuity and innovation in the U.S. It is an industry that builds upon two core U.S. strengths, information technology and creative content development, leveraging these core competencies to build an industry that is a signature success story for the national economy.

### Innovation in the U.S. Video Game Industry

While many of the numerous hardware and accessory innovations in the video game industry lend themselves to patenting – which is a more traditional measure of “innovation” – the video game industry also develops “creative content” intellectual property (IP), which is protected through copyright mechanisms rather than patents.

Thus, a meaningful indicator of innovation and creative activity in the industry overall must include the vast number of individual games produced. These range from simple mobile games released online through avenues such as Apple’s App Store and Google Play, through to big-budget studio games. Jacob Sobolev at Gaming Shift undertook the complex task of trying to generate an estimate of the number of video game titles produced. His estimates are not only focused on U.S. produced games, but they do serve to give the innovation and creativity of the industry context. In his online article “How Many Video Games Exist?”<sup>23</sup> Sobolev concludes:

*Our total comes out to 1,181,019 [games]. This includes 33,554 games on Steam, 199 games on Uplay, 3,125 games on GoG, 327,491 games on Google Play, 811,911 games on the App Store, 1,893 games for the PS4, 1,760 games for the Xbox One, and 2,330 games for the Nintendo Switch.*

Given that this estimate only captures digitally-released games and is limited to then-current generations in its estimation of console games (i.e., games available for the Nintendo Switch, PS4, and Xbox One), this is likely an underestimation of creative innovation within the industry. With creative content being an intrinsic component of video games, and the large volume of games produced, the industry clearly represents a core innovative and creative engine for the U.S. economy.

### R&D and the Video Game Industry

Innovation in the video game industry predominantly occurs through commercial R&D and the development of commercial video game products, but it also stimulates and draws from academic R&D (via both early-stage fundamental research and applied research). Fundamental discoveries in physics, chemistry, electrical and electronic engineering, materials science, etc. have contributed to the technologies that underpin video games, and **the demand for video games has in turn driven applied industry and academic R&D in computer science, computer vision, human-machine interaction, sensor systems, and a broad range of scientific and technological applied fields.**

To investigate the areas of formal scientific and technological inquiry with content related to video games, TEconomy used the Web of Science database to access scholarly publications published between 2010 and 2020 in which the key terms directly associated with video games appeared. A significant scientific literature was identified comprising 483 journal articles. The resulting word cloud (Figure 7) shows that the topic of video games is stimulating scientific and technological research across a broad range of disciplines and fields.

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23 Jacob Sobolev. “How Many Video Games Exist?” Gaming Shift. Accessed online at: <https://gamingshift.com/how-many-video-games-exist/>



## Video Games as a Driver of Technological Innovations in Associated Industries

As the U.S. video game industry has grown, so too have the many industries that supply services and technologies that support the industry. The video game industry comprises a major customer for multiple large and strategically important advanced industries in the U.S., industries providing products and services in:

- software coding and programming,
- software development tools and kits,
- central processing units (CPUs) and computer memory (RAM/ROM),
- graphics chips and control boards,
- solid state data storage devices,
- high resolution and fast refresh displays,
- network and communications chipsets,
- sensors (e.g., accelerometers, capacitive touch sensors, magnetometers, and gyroscopes),
- virtual reality headsets,
- audio systems,
- haptic feedback technologies, and
- game testing and quality assurance services.

GPU's are specialized processors designed to handle complicated and repetitive calculations related to 2D and 3D graphics. Video game demand has been a key driver of their ongoing development, but they are also now finding important uses in other applications. Examples of deployment for other common uses include image modification, video editing, and playing high resolution video (e.g., Netflix 4K). The processing horsepower of GPU's is also being deployed to accelerate processes in general purpose software (e.g., Adobe Creative Suite) and for use in applications as diverse as deep learning and artificial intelligence and cryptocurrency mining.

Because of its size, the video game industry represents a key target for major U.S. technology development companies. U.S.-headquartered computer and graphics processor companies have large-scale R&D and production programs focused on serving video game console manufacturers and providing components for high-end personal computers used by video game players. California-based AMD is the leader in developing processors for video game consoles (used in both the Microsoft Xbox One and the Sony PlayStation 4). Intel is the largest supplier of CPUs for video-game oriented PC's, and AMD is a major player there also. NVIDIA, also headquartered in California, is the leading developer of high-performance graphics processors (GPUs) and cards used in gaming PCs (AMD is also a major supplier, as is Intel), while Micron Technology (located in Boise, Idaho) is a leading supplier of memory and storage technologies for the industry. The demand generated by video games is particularly intensive in its impact on GPUs and associated video components. Modern video games place a premium on high performance graphics, using 3D imaging, rendering of polygons, texture mapping, and sophisticated light ray tracing, which have been a key driver of graphics component and associated software advancements. Game applications are also a core driver of advancements in virtual reality headsets, where U.S. based Oculus (a subsidiary of Facebook) and Taiwan-based HTC VIVE are major innovators.

## B. Video Games and Wealth Generation in the U.S. Economy

Entrepreneurs, and the new businesses they create, are national assets to be cultivated. Through innovation, creativity, and risk taking, entrepreneurs create new jobs and generate economic growth. The actions of entrepreneurs can also seed entirely new business sectors, giving rise to dramatic growth in new industries, especially in technology sectors.

Like many U.S. technology industries, the video game industry has its roots in a convergence of both scientific research and entrepreneurship. In 1958, William Higinbotham leveraged a large analog computer and oscilloscope screen and created a novel video game called *Tennis for Two* for the annual visitor's day at Brookhaven National Laboratory. In 1962, Steve Russell at MIT developed *Spacewar!*, a combat video game for the Programmed Data Processor-1 (PDP-1) research computer system mostly used at universities. These, and other early proofs of concept for a new application of computers to entertainment, paved the way for the entrance of visionary entrepreneurs.

One of the acknowledged video game business pioneers was the late Ralph Baer (now frequently referred to as the Father of Video Games), who in 1967, at Sanders Associates, Inc., led the development of the "Brown Box" prototype video game system that connected to a television. Able to run multiple game programs, the Brown Box may be described as the first video game console. The concept was licensed to Magnavox, which launched the "Odyssey" console in 1972 with an initial selection of 12 game cards. This effectively launched an entirely new industry—an industry which expanded rapidly in the 1970's, with the launch of other companies, such as Atari, Inc., founded in California in 1972 by Nolan Bushnell and Ted Dabney.

Entrepreneurship and new business development have continued to be signature features of the video game industry. The industry's pioneers in the U.S., and also in Japan (where Nintendo was founded), innovated new and upgraded products, both spurring and leveraging parallel advancements in computer processors, displays, software engineering, and other enabling technologies. The net result for the U.S. has been the growth of a \$40.9 billion industry which, as shown in this report, now comprises over 11,000 establishments employing over 143,000 personnel. The U.S. industry comprises large multinationals, such as Microsoft, Activision Blizzard, and Electronic Arts, yet is also a hotbed for new companies and small "indie gaming" enterprises. Open to new entrants and entrepreneurs, the video game industry presents a diverse and dynamic market for capital and wealth generating events. The industry is an energetic breeding ground for developing tech entrepreneurs and personnel skilled in the management of fast-growth technology and creative content industries—a class of skills that is crucial to the future success of the U.S. economy. Opportunities in the industry have attracted large volumes of early stage capital, created significant concentrations of wealth that enable a virtuous cycle of re-investment, and have built an expanding base of public companies presenting investment opportunities for broader institutional and individual investors. The video game industry, in effect, epitomizes what technology-based economic development seeks to achieve in its mission of growing national and individual state economies and high-paying jobs.

### Risk Capital Investment in Video Game Sector Companies

As a fast-moving technology sector, the video game industry provides active opportunities for angel and venture capital investors. Table 12 provides analysis of PitchBook venture capital data for early-stage video game companies that completed financing deals between January 2017 and May 2020. The data show a dynamic market for risk capital in the industry, with 475 companies receiving early-stage capital. **In total, these 475 companies attracted \$9.8 billion in financing** (an average of \$20.6 million in investment per firm) from an average of 7

investors (individual angels or organized VC firms) per company. **12,109 personnel were employed at these early-stage video game companies as of May 2020, for an average of 25.5 employees per firm.**

**Table 12: Angel and Venture-Backed Video Game Industry Companies with Completed Financing Deals (January 2017 through May 2020)**

Category	Description	Number of Funded Companies	Employees	Capital Raised (millions)	Average Number of Investors
Video Game Developer	Companies developing video games	179	4,591	\$3,490.73	4
Esports	Esports, professional gaming, tournaments, monetization, ratings etc.	148	2,574	\$3,064.16	6
Portal/Platform	Online platforms, social gaming networks, chat platforms, curated content, online retail of games, cloud services	46	459	\$180.73	5
Inputs to Video Game Development	Engines, services, design software, management systems etc.	34	1,461	\$1,186.25	7
Accessories	Headsets, controllers, haptics, etc.	21	1,546	\$805.88	6
Gamification	Ed tech games, serious games, training, military	16	63	\$36.16	5
Healthcare Video Games	Games with specific application to healthcare and health improvement	15	510	\$326.06	6
Advertising	In-game advertisements, marketing services, etc.	6	23	\$12.36	3
Video Game Publisher	Companies publishing video games, not developing	5	867	\$663.08	27
Video Gaming Venue	Physical game playing spaces	3	9	\$40.89	2
Hardware	Consoles, video cards etc.	2	6	\$2.0	4
		<b>475</b>	<b>12,109</b>	<b>\$9,808.3</b>	<b>Average = 7</b>

Source: PitchBook data with classification and analysis by TEconomy

These early-stage video game companies are located in 35 out of the 50 U.S. States, and two are located in the District of Columbia. The top five states for early stage companies are California with 213 (45.4%), New York with 48 (10.2%), Texas with 32 (6.8%), Washington with 28 (6%) and Massachusetts with 20 (4.3%). In terms of the four major U.S. Census Regions, 262 of the early-stage video game companies are in the West (56%), 90 (19.2%) in the South, 85 (18.2%) in the Northeast, and 30 (6.4%) in the Midwest. It should be noted, that these counts do not take into account a very active part of the indie gaming sector that comprises many one- or two-person game development ventures that may not have accessed institutional risk capital and, rather, are funded through bootstrapping and friends and family finance. This broader base of very early stage ventures likely has a presence in every U.S. state.

**Table 13: Headquarters State for Angel and Venture-Backed Video Game Industry Companies with Completed Financing Deals (January 2017 through May 2020)—Ranked by Number of Companies**

Headquarters State	Census Region	Number of Companies	Percent of Company HQ's in this State
California	West	213	45.4%
New York	Northeast	48	10.2%
Texas	South	32	6.8%
Washington	West	28	6.0%
Massachusetts	Northeast	20	4.3%
Florida	South	14	3.0%
Pennsylvania	Northeast	12	2.6%
North Carolina	South	11	2.3%
Delaware	South	8	1.7%
Georgia	South	8	1.7%
Illinois	Midwest	8	1.7%
Ohio	Midwest	8	1.7%
Nevada	West	6	1.3%
Oregon	West	5	1.1%
Virginia	South	5	1.1%
Colorado	West	4	0.9%
Indiana	Midwest	4	0.9%
Tennessee	South	4	0.9%
Missouri	Midwest	3	0.6%
New Jersey	Northeast	3	0.6%
Utah	West	3	0.6%
Arizona	West	2	0.4%
District of Columbia	*	2	0.4%
Louisiana	South	2	0.4%
Maryland	South	2	0.4%
Michigan	Midwest	2	0.4%
Minnesota	Midwest	2	0.4%
Oklahoma	South	2	0.4%
Connecticut	Northeast	1	0.2%
Iowa	Midwest	1	0.2%
Kansas	Midwest	1	0.2%
Kentucky	South	1	0.2%
Mississippi	South	1	0.2%
New Hampshire	Northeast	1	0.2%
New Mexico	West	1	0.2%
Wisconsin	Midwest	1	0.2%
		<b>469</b>	<b>100%</b>

Source: PitchBook data with classification and analysis by TEconomy

In terms of liquidity events, the number of initial public offerings in the video game industry is quite small, and the number of companies publicly traded on the major NASDAQ and NYSE markets relatively compact (see Table 14). The preferred pathway in the industry for achieving liquidity events through venture-backed deals is via acquisition of an expanding company by a larger video game company. An active acquisition market creates wealth for the stockholders in the acquired companies and for the early-stage investors, creating a virtuous cycle whereby these investors are able to reinvest their capital and profits in further early-stage companies. Acquisitions are also a frequent pathway for experienced entrepreneurial management and technology personnel to exit the acquired company to engage in start-up ventures with new firms.

### Stock Market Value of Public Video Game Companies

The video game industry has spurred the development of several large public companies that present institutional and individual investors with investment opportunities. Publicly traded video game stocks in the United States include both domestic companies and companies located overseas whose stocks are listed on the New York Stock Exchange (NYSE) or NASDAQ, or available in the over the counter (OTC) market. There is considerable market capitalization (market cap) presently in major U.S. video game companies, with the largest shown on Table 14:

**Table 14: Market Capitalization of U.S. Based Publicly Traded Core Video Game Industry Companies**

Company	HQ State	Market	Market Capitalization <sup>24</sup>
Activision Blizzard, Inc.	California	NASDAQ	\$64.9 billion
Electronic Arts	California	NASDAQ	\$41.1 billion
Take-Two Interactive Software	New York	NASDAQ	\$19.9 billion
Zynga Inc	California	NASDAQ	\$9.7 billion
Glu Mobile	California	NASDAQ	\$1.4 billion
GameStop Corp.	Texas	NYSE	\$336.1 million
Turtle Beach	California	NASDAQ	\$285.8 million
Allied Esports Entertainment	California	NASDAQ	\$50.0 million

Source: Yahoo Finance

Video game hardware and software are also, of course, major components of the business of several more broadly diversified large U.S. technology and media companies, including:

- Microsoft, with a market cap of \$1.7 trillion;
- NVIDIA Corp., with a market cap of \$314 billion; and
- AT&T (home to Warner Brothers Games), with a market cap of \$213.4 billion.

There are also substantial U.S. based video game sector operations sustained by large international public companies, including, for example, Sony and Nintendo.

<sup>24</sup> Market cap accessed on 8/27/2020 via Yahoo Finance.

## C. Application Spillover Effects of the U.S. Video Game Industry

The development of an industry and its associated innovations and technologies may have a stimulus effect on development and growth of other industries. This typically occurs through what are termed “spillover effects,” which may take the form of technology spillovers and knowledge spillovers. A technology spillover refers to the unintentional technological benefits to firms or industry sectors that come from the research and development efforts of other firms or industry sectors without the costs being shared. For example, a lightweight material may be developed by the aerospace industry but then spillover into applications in car manufacturing. Similarly, knowledge can spillover whereby the intellectual capacity and knowhow in one industry finds application within another. For example, knowledge in artificial intelligence or advanced statistical analysis algorithms developed for scientific research may find application in financial analysis, or expertise in cryptocurrency development may find application in other implementations of blockchain.

The U.S. video game industry can be seen to be generating technology and knowledge spillovers within both adjacent and non-adjacent industries (Figure 8).

**Figure 8: Examples of Video Game Industry Spillover Effects on Other Industries**



Source: TEconomy Partners

### Improving Education and Workforce Skills – Spillover of Video Game Knowledge and Technology into Education and Job Skills Training

At present and into the foreseeable future, it is hard to overstate the importance of education to economic and societal progress in the United States. In a modern, knowledge-driven economy, the most valuable asset the nation and its individual states can possess is a well-educated and skilled populace. Investment in education has a strong return—for individuals, for the economy, and for society overall.

Technology and software have increasingly been integrated into advancing education and training performance and outcomes. A new technology sector called Educational Technology (or “EdTech”) has emerged as a dynamic high-growth industry, with a global market projected to reach an estimated \$111 billion by 2022,<sup>25</sup> and the U.S. is at the forefront of this industry.<sup>26</sup>

25 BCC Research. October 2017. Educational Equipment and Software: Global Markets. BCC Report Code IAS118A.

26 Jake Williams. February 2020. “U.S. edtech market is biggest globally.” Edscoop. <https://edscoop.com/u-s-edtech-market-biggest-globally-report-says/>

Covering technology used in pre-K, K-12, higher education, continuing education, and job skills training activities, EdTech is part of the ongoing digital technology revolution, combining pedagogy and digital technologies to provide new and better ways to provide enhanced learning for students and efficiencies in education, training delivery, and assessment. Technology and knowledge spillovers from the U.S. video game industry have played, and continue to play, a significant role in advancing EdTech, with new terminology such as “game-based learning” and “serious games” describing the phenomenon.

Video games immerse the player in a dynamic, engaging, and interactive environment, and it is found that these same game structures and technologies can be used to similarly engage child and adult learners. A game-based learning, or serious games approach, creates increased pedagogical value by increasing student motivation and enjoyment, and also provides immediate performance feedback and adaptive learning opportunities (whereby the content adjusts to the demonstrated learning levels being achieved by the student).

The use of video game technology and approaches in education brings numerous advantages for educators and students, including the following:

- Enables a student to pace their movement through content, rather than having to “keep-up” with a teacher’s classroom presentation or lecture. Students can pause, go back and review, and then progress once they comprehend.
- Creates the ability to deliver the educational content remotely and at any time.
- Builds motivation through gamification by adding levels and building rewards.
- Assesses progress and provides content adaptability through the use of quizzes and questions until competency is achieved and demonstrated.
- Brings content to life through animations, videos, other visual elements, and virtual field trips.
- Facilitates student interaction and inquisitiveness within the game without disrupting the class or causing pauses in the experience of others.
- Allows for the performance of virtual lab tasks, art projects, etc. without expensive consumption of physical resources.
- Provides for analytical insight by educators using data from the student’s engagement and progress in the game.

In K-12 education serious games are being deployed across the curriculum, with large scale existing game libraries now available together with sophisticated platforms that enable teachers to modify, customize, and create serious game content to meet their pedagogical goals.

In addition to K-12 applications, higher education has similarly embraced serious games as a component of undergraduate and graduate student education. One of the frequently used platforms for educational serious games content, Kahoot!, notes that it is used by 87% of Top 500 Global Universities.<sup>27</sup>

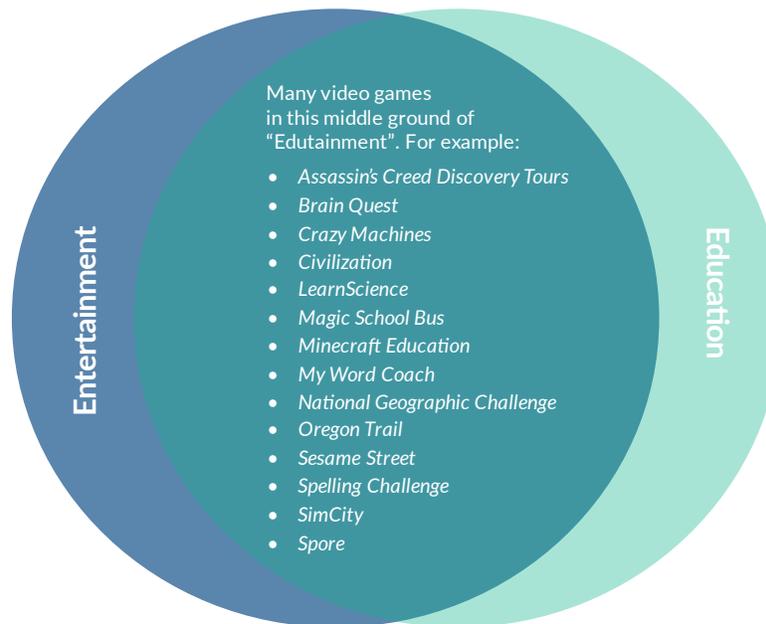
While educational games have emerged as a stand-alone sector under the EdTech industry, it is also the case that there is actually a continuum of content from entertainment to education that sees participation by many video game companies and entertainment software enterprises. As Figure 9 illustrates, the line between

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27 <https://kahoot.com/schools/higher-ed/>

entertainment and education blurs for many video games, and the full library of entertainment-oriented video games with significant educational content would run into the thousands, if not tens-of-thousands of titles.

**Figure 9: Continuum of Content Across Video Games for Entertainment and Education**



Source: TEconomy Partners

Another area where video game technology and know-how have substantial influence is in skills training. Video game technology allows for sophisticated simulation of tasks and skills, and one of the first widely used applications in this genre of game was Microsoft's Flight Simulator game launched in 1982. Simulation games exist as a large and defined entertainment software genre, but the capability of modern gaming systems to render environments, machinery and controls, and situations has proven to be a valuable competency for integration into formal skills training for jobs and professions. For example, the influence of video games can be seen in advanced training applications in the following areas:

- **Job skills training for frontline healthcare workers**, such as emergency medical technicians, nurses and physicians. Simulations allow healthcare workers to be introduced to rare events and symptoms they may only occasionally see, test themselves in simulated emergency or operating room environments, and practice specific skills from diagnostics through manipulation of surgical instruments and advanced medical technologies. The 3D MRI and CAT scan visualization software used by surgeons to prepare for surgeries, *BodyViz*, uses Xbox controllers to manipulate the view of the display.<sup>28</sup> Another example is *Pulse!!*, a video game based simulator that reproduces a hospital ER where nurses in training can practice application of their theoretical learning in simulated hands-on situations.
- **Military training**, with the U.S. military using video game technologies for simulated combat training, battlefield strategic training for officers and NCOs, and language skills development for deploying

28 Peter Ray Allison. 2014 "The surprising uses of games controllers." Futures. BBC. <https://www.bbc.com/future/article/20141212-press-x-press-y-fire-laser>

troops.<sup>29</sup> In some instances, video game technology is not just influencing military applications but is directly used, for example, to pilot military drones, to control periscopes on submarines<sup>30</sup> and in some bomb disposal robots.<sup>31</sup>

### Entertainment Cross-Over Effects of the Video Game Industry

In the context of an industry, “entertainment” may be defined as “business activities involving the provision of live or non-live content for pleasurable occupation of the mind, diversion, or amusement.” Under this definition a very broad-range of activities and products fall under the rubric of entertainment, with the main sectors being:

- **exhibition** entertainment (e.g., museums, art galleries, amusement parks, festivals, etc.),
- **live** entertainment (e.g., theater, concerts, spectator sports, etc.),
- **mass media** entertainment (e.g., motion pictures, television shows, recorded music, novels, comic books, etc.),
- **electronic** entertainment (e.g., video games), and
- **physical** toys, games, and puzzles.

In reality, the line between art and entertainment is blurred, as are the boundaries between each of the entertainment sectors bulleted above. There is also significant sharing of content between sectors and participation by companies across multiple sectors. Disney, for example, has a footprint in every one of the bulleted sectors.

The video game industry both leverages traditions and structure from other entertainment industries and contributes to them. Many video games contain complex storylines (in the tradition of literature and theater), they are inherently visual (in the tradition of art and movies), and they use displays (in the tradition of television). Video games are also immersive and intrinsically interactive, engaging the participant (the player) directly in their entertainment (somewhat in the tradition of amusement parks and physical games).

The video game industry has grown from its nascent beginnings in the 1970’s into a U.S. industry that is now larger than both the recorded music and box office movie industries combined.<sup>32</sup> As it has grown, so has its influence on other entertainment sectors. Today the video game industry both builds-upon and contributes to other leading entertainment industries. The content of leading video game franchises has crossed-over into movies, television shows, comic books, novels, physical toys, and action figures. Similarly, video games have become an additional income stream engine and cross-marketing asset for other creative industries seeking to expand their intellectual property assets (such as characters) into the dynamic and fast-growing video game format.

29 Blake Stilwell. 2016. “6 Military Video Games Used to Train Troops on the Battlefield.” Military.com. <https://www.military.com/undertheradar/2016/05/6-military-video-games-used-to-train-troops-on-the-battlefield>

30 Brock Vergakis. 2017. “Navy’s Most Advanced Subs Will Soon Use Xbox Controllers.” Military.com. <https://www.military.com/daily-news/2017/09/17/navys-most-advanced-subs-will-soon-use-xbox-controllers.html>

31 Peter Ray Allison. 2014 “The surprising uses of games controllers.” Futures. BBC. <https://www.bbc.com/future/article/20141212-press-x-press-y-fire-laser>

32 Andrew Beattie. 2020. “How the Video Game Industry Is Changing.” Investopedia. Updated May 7, 2020. <https://www.investopedia.com/articles/investing/053115/how-video-game-industry-changing.asp>

Video games have grown to become an iconic component of American culture and the creativity and innovation of the industry has now found expression in other entertainment industries. Measuring the full effect of video games on other entertainment sectors is extremely challenging, requiring tracing-back of the origins of characters, storylines, visuals and other elements of the product, but Figure 10 serves to illustrate several key examples of the cross-over effect.

**Figure 10: Video Game Cross-Overs: Examples of Cross-Overs to Other Entertainment Forms**



Source: TEconomy Partners

In many instances, large-scale entertainment media franchises have been generated based on original video games. Several case study examples (Table 15) illustrate this intensive cross-over effect.

Table 15: Examples of Major Video Game Franchises Crossing Over to Other Entertainment Platforms

Video Game	Primary Movie Crossover	Other Entertainment Crossovers
<b>Mortal Kombat.</b> Originated as a video game, first produced in 1992 by U.S. company Midway Games and now published by Warner Brothers Games. There are now more than 20 games in the franchise.	<i>Mortal Kombat</i> was adapted into two motion pictures, <i>Mortal Kombat</i> (1995) and <i>Mortal Kombat: Annihilation</i> (1997). Worldwide combined box office for the two movies totaled \$173.6 million. Distributed by New Line Cinema.	Additional elements of the franchise have included two animated movies, live action and animated television series, comic books, novels and music, a live theatrical show tour, and physical card games.
<b>Pokémon.</b> Originated as a video game first published by Nintendo in 1996. There are now more than 30 games in the franchise.	The box office release of the 2019 movie <i>Pokémon Detective Pikachu</i> , distributed by Warner Bros. Pictures, grossed \$433 million worldwide. A sequel movie has been announced.	<i>Pokémon</i> has also been incorporated into dozens of animated movies, a TV show, a popular trading card game, comics, toys, and more.
<b>Tomb Raider.</b> Originated as a video game series created by UK gaming company Core Design. First released 1996. 18 games are now included in the franchise.	2001 movie adaptation <i>Lara Croft: Tomb Raider</i> grossed \$275 million. Subsequent movie <i>Lara Croft: Tomb Raider—The Cradle of Life</i> was released in 2003 grossing \$156 million. Distributed by Paramount Pictures.	The first Tomb Raider comic book issue was the bestselling comic book of 1999.
<b>Resident Evil.</b> Originated as the video game <i>Resident Evil</i> , released in 1996, created by Japanese company Capcom under the original title <i>Biohazard</i> .	The 2002 movie <i>Resident Evil</i> started a movie franchise encompassing 6 movies with a combined worldwide box office of \$1.23 billion. Distributed by Screen Gems.	In addition to the live-action films the franchise includes animated films, together with comic books, novels, audio dramas, and merchandise.
<b>Prince of Persia.</b> A video game franchise created by American Jordan Mechner, produced by multiple companies, and now by Ubisoft, the series contains upwards of 15 video game titles.	<i>Prince of Persia: The Sands of Time</i> was released in 2010 by Walt Disney Studios and generated a worldwide box office of \$336.4 million.	The franchise has spurred development of a graphic novel and <i>Prince of Persia</i> Lego sets.
<b>Assassin's Creed.</b> First released in 2007, <i>Assassin's Creed</i> was developed by Ubisoft. The franchise contains 11 video games. The series and its characters also appear in other Ubisoft video games.	The movie <i>Assassin's Creed</i> was released in 2005 with a worldwide box office of \$240.6 million. Distributed by 20th Century Fox.	A wide-ranging entertainment franchise, <i>Assassin's Creed</i> has generated three short films, 11 comic books, nine novels, two board games, and a live music tour with visual effects.
<b>Angry Birds.</b> Originally released in 2009, and developed by Finnish company Rovio Entertainment, <i>Angry Birds</i> now has an 18 video games in its franchise.	2016's animated <i>The Angry Birds Movie</i> was distributed by Sony Pictures and achieved a worldwide box office of \$352.3 million. A sequel to the film has a box office totaling \$154.7 million.	The franchise has generated many additional products, including TV series, toys, board games, books, and comic books. Characters have been licensed to soft drink companies and theme parks, and other attractions have been developed using the franchise.

Characters and other video game elements have also been used in a wide-range of additional value adding business applications, including for example:

- children's play costumes, adult cos-play costumes, and Halloween outfits.
- clothing lines, backpacks, etc..
- promotional items in fast food and other advertising applications.
- promotional characters used in media advertising.

### Video Game Hardware and Crosscutting Content

Game franchises have clearly become a source of, and beneficiary of, crosscutting content in other media forms. The same holds true for the hardware side of the video game industry, where the latest generation of leading video game consoles have the ability to access a wide-range of entertainment and communications content beyond games themselves. The computation, graphics, storage, and connectivity horsepower contained in the latest generation of consoles allows them to effectively serve multiple functions. Capabilities include, for example:

- Playing of CD-based game media and connecting to online sources for game downloads, allowing both online and offline game playing.
- Ability to connect via broadband to online game streaming services for accessing content-on-demand and for live streaming of games.
- Serving as a communications device, allowing online text (chat) and voice/video communication options (such as Skype).
- Download and execution of a broad range of apps (similar in functionality to a smart phone or tablet).
- Web browsing.
- Streaming of music, movies, and TV (with direct connections to services such as Netflix, Amazon Prime, Hulu, and YouTube for video content and to services such as Pandora and Spotify for music).
- Storage of personal music, video, photographs, and other media.
- Playback of Blu-Ray discs and DVDs.
- Wireless connectivity to smartphones, tablets, and other PCs for inter-device functionality and control.

The modern video game console is a high-performance multimedia access device and electronic media hub able to serve a broad range of functions for user entertainment and other applications. Gaming-oriented personal computers provide similar multi-function capability, plus all the additional personal productivity, work and other functionality of laptop or desktop computers.

## Conclusion

As an inherently creative, high-tech industry, rooted in scientific and technological knowledge, the U.S. video game industry is a key innovative industry for the United States. As a large and growing business and entertainment sector, the video game industry is a large-scale performer of R&D and a key driver of a “convergence phenomena” with digital technologies and creative traditions coming together to advance new industry growth. Through entrepreneurship and its provision of opportunities for risk capital investment, and through the ongoing expansion and diversification of existing businesses, the video game industry is generating new wealth for the U.S. critical to the expansion of the economy and the creation of new high-paying family-sustaining jobs. The importance of the industry in U.S. commerce and culture can be also be seen in innovation statistics and in academic literature, and the industry is having robust spillover effects in other high-growth technology development spaces and entertainment media forms of notable importance to the nation.



# APPENDIX

## Development and Use of 2020 Video Game Industry Microfirm Database to Estimate Industry Economic Impacts

The development of the Video Game Industry microfirm database used for this analysis and report was a two-step process.<sup>33</sup> The first step was to develop a “master list” of video game industry firms active in 2019. The second step was to connect, assign, and/or develop employment and location information for these firms. A review and discussion of each of these steps is provided below. Once the microfirm database was complete, TEconomy used industry classification information and other firm-level information to assign each record to both a video game industry classification (e.g., developer, publisher, etc.) and to the appropriate sector for IMPLAN modeling.

### Developing a Master List of Core and Extended Video Game Industry Firms

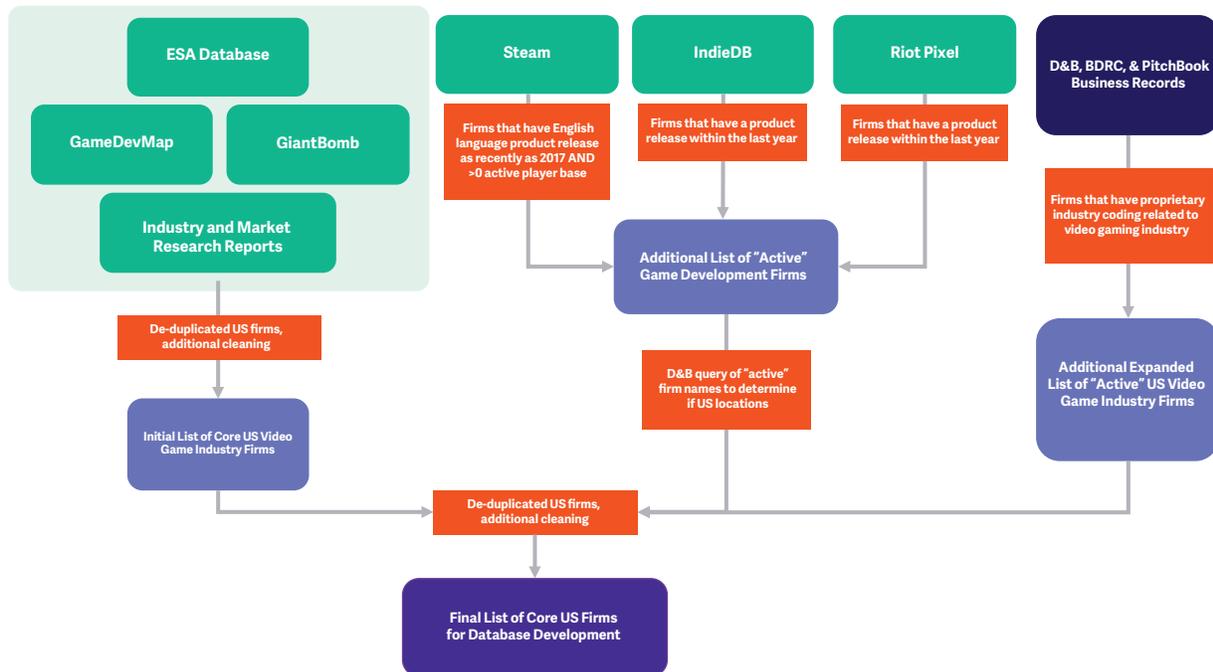
A principal focus required while developing this master list was to include firms that were active in 2019. The decision to focus on firms “active in 2019” is required as there is always a one-year lag in microfirm information sources (i.e., 2020 data will not be available until 2021). Though this characteristic was primarily achieved, there may be some firms that actually went “out of business” prior to 2019 that have games still available in 2019 through one of the “publishers.” The second critical component was to determine the U.S. location or locations of each firm. The development of this list attempted to include any U.S.-based operations even if the firm’s headquarter operations were located outside of the U.S.

### Sources of Video Game Firms

The development of this master list is graphically depicted in Figure 11. The following industry-specific sources were used, in whole or in part, to provide input to the 2019 active list of video game industry firms.

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<sup>33</sup> Note: from a data perspective, any dataset that identifies and provides information regarding specific firms or establishment-level data is considered to be a microfirm-level database.

Figure 11. Approach to Developing the List of Core and Extended Video Game Industry Firms<sup>34</sup>

Source: TEconomy Partners

Developer and Publisher data from Steam were collected by accessing game data via the SteamSpy API. The GiantBomb API was used to retrieve their database of developer and publisher information. Lists of companies from Indie DB, Riot Pixel, and GameDevMap were downloaded using a web scraping tool. Additionally, a small number of companies were manually incorporated from a variety of additional sources, including various industry and market research reports.

The inclusion of video game industry firms from these sources often yielded names of firms but little additional information—typically limited, if any, locational information, and no employment information. Where some locational information was available, these data were typically limited in geographic scope for individual firms (e.g., one record for all of Activision Blizzard with a single California location).

Beyond these industry-specific sources, key proprietary data sources were also used for developing the master list and ultimately for securing company employment and location: Dun & Bradstreet/Hoovers (D&B) and the Youreconomy Time-Series (YTS) data from Business Dynamics Research Consortium (BDRC), a longitudinal dataset built off of Infogroups' InfoUSA company records.

These two sources were also used to extend and develop a more comprehensive video game industry master list by including firms based on proprietary industry classification schemes. Both proprietary sources have industry classification schemes that attempt to go beyond the limited structure of NAICS codes. TEconomy used these additional codes to broaden, enhance, and further define the entire video game-related industry landscape (to include areas such as gaming/gambling software and equipment vendors, video game arcades, and retailers).

<sup>34</sup> "ESA Database" refers to the 2017 database of U.S. video game sector companies previously compiled by ESA.

Finally, a third proprietary data source, the PitchBook venture capital database, was queried to find any additional, emerging companies involved in the video game industry that may be in the nascent or pre-revenue stage of development. This third source added approximately 250 additional firms to the overall list of nearly 11,500 records.

### Developing the Microfirm-level Data

The master list created in step one became the starting point for developing the ultimate microfirm-level database for this effort in step two. From this list, employment and locational specific information was added in a number of ways. These include:

- **Matching to the master list**
  - Used matching algorithms to match list to records within BDRC (difficult due to the lack of corresponding information with the list records). Also developed similar approach with D&B to match records.
  - For video game firms from the curated list that had a strongly correlated matching data record (or records in the case of multi-establishment firms) those records were brought into the microfirm database.
  - Though matching records worked in part, some stray matches, due to the algorithms and lack of corresponding information, did occur that had to be removed.
  - Many records had to be matched in a manual lookup process due to slight variations in names, etc. that did not allow for successful algorithmic matching within the D&B and BDRC systems.
- **Developing data records for existing, but non-matched firms**
  - Due to the nature, update cycles, and other issues inherent in the two proprietary company information providers there were a significant number of existing video game firms (e.g., firms with active websites and new games in 2019) for which no record could be found within the D&B and BDRC data.
  - For these firms, TEconomy estimated their employment (and locations, if required) by using company and employee information from websites and various social media pages (e.g., LinkedIn, Twitter, Facebook).
- **Consideration for multi-location video game firms**
  - Many of the larger developer and developer/publisher firms have multiple locations, often due to the location of key developer studios. For these firms, website information (as well as annual reports of public firms) were used to identify the active (as of 2019) locations. To the extent possible these were matched with specific records from D&B or BDRC.
  - If a key location record was not included with these proprietary datasets, TEconomy estimated the employment at these locations using company and employee information from annual reports, websites, and company LinkedIn pages.
- **Developing video game industry shares for multi-industry firms**
  - A certain segment of firms, primarily within the hardware category, are significant players in the video game industry that also have substantial, if not the majority, of their operations and revenue tied to non-video game-related markets.
  - To the extent possible, TEconomy worked to isolate that share of a company's revenue that corresponds with their connection to the video game market and their U.S. sales. Given the importance of the market, many companies have a market segmentation within their annual reports that strongly

align with the video game market. For these firms we applied the video game-related market's revenue share to the company's U.S. employment (either from the same corporate report or from D&B) or to their U.S. sales (if U.S. employment was not available) to generate an employment estimate. While applying a revenue share to employment does have certain drawbacks, it is the only viable mechanism to represent such important and critical firms' employment, geography, and ultimately economic impact within this effort.

- For firms in the general computer hardware and peripheral space that did not have a viable revenue-based market segmentation to use to estimate U.S.-based video-game related employment, TEConomy used an estimated 16.7% share of new PC purchases for video game purposes. This operational share specifically related to the video game industry was then applied to a firm's U.S. employment (e.g., if a firm had 1,000 U.S. employees, 167 would be counted as related to the video game industry).
  - This estimate was developed by combining data from the International Data Corporation (IDC) on the total number of global gaming related PC units sold in 2019 (43.7 million) by data from Gartner on the total number of global PC units sold in 2019 (261.2 million). This PC-gaming share of 16.7% was used as a surrogate value across various types of hardware and peripheral companies under a working assumption that PC-peripherals sales will mimic PC sales.

While this likely captures the principal games market, it likely under-represents the overall market that includes family PCs where video games are potentially a key use of a family computer.

- **Retail establishments selling video games**

- For certain video game-specific retail establishments, (e.g., GameStop and other video game-oriented local proprietor stores identified by D&B and/or BDRC) we included 100% of their employment as video game related even though some items they sell are ancillary to the core video game market.
- For Best Buy, a key retail channel for video game-related retail sales, we used U.S. corporate level data (from SEC 10K 2019 annual report) on their market segmentation for "entertainment" which includes gaming consoles and video games. While this segment also includes movies and music, it does not include personal computers and related peripherals used for gaming as these are grouped in a "computing and mobile phones segment" that TEConomy could not disaggregate. This "entertainment" revenue share was 5.5% for 2019. Similar to multi-industry firms, this share was applied to the employment captured within the BDRC data for every U.S. Best Buy location active in 2019.
- For other significant retail channels, such as Walmart and Target, it was determined that no viable option for using corporate revenue figures to share employment at individual stores was available. Hence, the economic impacts of these retail channels are underrepresented in the overall impact metrics.





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