

SWS Healthcare Team Report

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(Ordered alphabetically by last name)

Sectors Covered:

Medical Devices

Biotech

Pharmaceutical: Branded

Pharmaceutical: Generics

Healthcare Services

Overview

Healthcare is one of the largest industry in the United States. The industry constitutes 15% of U.S. GDP. Its revenue reached US \$2348.5 billion in 2017, a growth of 4.2% from 2016. Some major sectors within this industry are Medical Devices, Biotech, Pharmaceutical (Branded), Pharmaceutical (Generics), and Healthcare Services. Healthcare has been popular among many investors because consumer needs for healthcare remain stable regardless of economic conditions, while the sectors' growth is often fueled by technology and medical innovations. [1]

R&D plays an essential role in healthcare, especially for Medical Devices, Biotech and Pharmaceutical sectors. Due to the large amount of fundings needed for of research, the industry is dominated by large firms. High R&D costs raise the barrier of entry, and lower the competition and consumers' power in the industry. Below is a more detailed analysis of Porters' Five Forces:

Barriers to entry: The healthcare sector has very high barriers to entry due to the high costs associated with developing new products and getting them approved for sale. As a result, the industry is dominated by a small number of larger firms with frequent mergers and acquisitions. Successful startups and smaller companies usually end up being absorbed into a larger company. This is especially true for Medical Devices, Biotech, and Pharmaceuticals.

Competition: Due to the relatively small number of companies in the industry, competition is not very strong.

Power of Consumers: Healthcare is a necessity for consumers, consumers' demand remain inelastic regardless of economic conditions. Therefore consumers have limited power over healthcare costs. Consumers also have limited power over what are being produced due to the field-specific knowledge needed to understand healthcare products.



Power of

depends more on individual sectors of the Healthcare industry, but overall the power of suppliers is limited. Medical Devices and maybe Biotech would be purchasing components from electronics suppliers, which do tend to be larger. Pharmaceutical companies buy chemical components, which are relatively easy to obtain. Medical Services is supplied mostly from the other Healthcare industry sectors, so they probably experience the strongest forces. On the other hand, they do not rely as much on external industries.

Substitutes: The importance of patents in the industry, especially for Medical Devices, Biotech, and Pharmaceuticals, means that while products are protected consumers do not have access to substitutes. For medical services, consumer's reliance on insurance and preference for longer-term relationships with their medical providers also means that there is not as much switching between providers.

Suppliers:

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Regulations play a significant role in healthcare. Regulations over healthcare costs affect the revenues of pharmaceutical firms and healthcare services providers. Regulations on patents also have a big impact on the profit margins of pharmaceutical or medical devices since their more costly, patented products are usually a major source of revenue. Moreover, policies such as the Affordable Care Act affect the number of consumers, so the industry can be susceptible to political volatility.

Moreover, technological innovation is revolutionizing the industry. Overall, technology is likely to provide better and more accessible products and services. Technologies such as AI and 3D printing are being incorporated into medical and wearable devices to assist with treatment and diagnosis. The rise of digital healthcare and Telemedicine improves the accessibility of healthcare, and medical analysis help make personalized healthcare possible. Technological advancement might mean more startups will emerge, although acquisitions and mergers usually happen frequently.

Overall, healthcare has good potential for growth for the next few years. Trends in digital healthcare and medical breakthroughs are likely to play a large impact. The industry is expected to grow 5.6% annually in the next decade and reach more than 200 billion in 2020 [24].

Sectors

Medical Devices

Descriptions

The medical devices industry consists of instruments, apparatuses, or machines that are used in the prevention, diagnosis or treatment of illness or diseases, or for detecting, measuring, restoring, correcting, or modifying the

structure or function of the body for health purposes. The United States is known for providing high quality products resulted from significant investment in research and development.

Market Overview

With a current market size of \$156 billion, the United States remains the largest medical device market in the world representing over 40 percent of the global market share. The US medical device industry was valued at \$147.7 billion in 2016 and is projected to grow to \$173 billion by 2019. Due to the high value of U.S. dollars, device export to countries with weaker currencies decreased. Growth in medical device manufacturing in other countries has led to decreased exports and increased imports. Continued globalization will influence the composition of the industry over the next five years, as companies increasingly outsource manufacturing, research and development (R&D) and other operations, pressuring the total number of domestic industry operators.

Key Players

- Medtronic PLC
Medtronic PLC (Medtronic) develops and manufactures therapeutic medical devices for chronic diseases. The company markets its products to healthcare institutions and physicians in more than 140 countries worldwide. Foreign sales account for more than 40% of the company's total revenue, and this percentage has increased in recent years due to sales growth in emerging markets. The most recent announcement from Medtronic regarding to its medical device sector is that it has received breakthrough device designation from the U.S. FDA for its Personalized Closed Loop (PCL) insulin pump system for diabetes management. The recent acquisition of Nutrino Health accelerated the development of this breakthrough technology.
- General Electric Company
General Electric Company (GE) is a multinational conglomerate with operations that span the healthcare, financial services, energy, industrial manufacturing and media industries. The company's medical device manufacturing division comprises 16% of the company's total revenue. Currently, the major focus of GE's medical device department is on new applications and smart devices built on Edison, which is a platform that facilitates the development of AI technology and empowers its existing AI products.
- Johnson & Johnson



Johnson & Johnson (J&J) is a leading healthcare company that develops, manufactures and markets a diverse portfolio of pharmaceutical, medical-device and consumer-health products. It has a market capitalization of 368,445 billion. Recently, it went through a acquisition of Auris Health, which is privately held developer of robotic technologies. It is expected to have significant breakthroughs in the field on lung cancer with the robotic technology brought in by Auris.

Trends

Future trends in medical device technology include de-centralized tech, invasiveness red tech, organ/tissues & comb prob, and electronic tech, which can be further divided into computerized devices & IT systems, robotic devices, wireless systems. Due to the emerge of 3D-printing, the technology of artificial organs and assists has been making remarkable progresses.

Besides from technological progresses, tax reform is another trend to be aware of. Reductions in overall tax burdens for device companies are likely to be modest. A more immediate effect materialized in the form of a transition tax on corporate cash parked outside the U.S. (for example, Johnson and Johnson reported a one time \$13.6 billion charge related to the new tax law). With a lower tax rate available on deemed repatriation, many corporations will likely have a more direct access to overseas funds.

One of the major drivers in the future demand of medical devices is the aging population. According to a 2015 review by the World Health Organisation (WHO), approximately one in nine people in the United States is aged 60 years or over. Buyer power in the medical device market is assessed to be moderate, as buyers are small in size compared to the key players. The strategy used most commonly by buyers is group purchasing. Economic hardships might cause temporary downfall as buyers' income shrink and become more cost-sensitive, which may result in them shifting preferences from domestic brands to international, cheaper alternatives.

Biotechnology

Description

The biotechnology industry focuses on the usage of biological systems, living organisms, or cellular processes for the development of novel products that can help improve lives or make certain processes more efficient. In the past, humans have relied on the biological processes of microorganisms in agriculture, preservation of dairy products, and the creation of new food products such as bread and cheese. Now, the biotechnology industry focuses on 3 main areas of applications:

Healthcare: Biotechnology is used to further understanding of the human genome and how this knowledge can be used to produce medicines and vaccines.

Energy and industrial: Biotechnology uses processes such as fermentation and harnesses biocatalysts which can be used to produce biofuels that reduces reliance on fossil fuels.

Agriculture: Biotechnology can be used to improve crop resistance to insects or produce GMOs.

Market Overview

The key regions of the global biotechnology industry is the United States and Europe. The United States biotechnology industry had total revenues of \$179B in 2017, which made up around 47% of global revenues during that year. With total revenues of \$105B, the healthcare segment was the most lucrative segment within the industry in 2017, making up about 58.9% of the industry's overall value [39]. Due to the intensive research and development required within the product development process and the industry's heavy reliance on patents, the biotechnology industry has long struggled to achieve aggregate profitability. This means that investors in the biotechnology industry must be willing to tolerate volatile or weak results in the short term [40].

Key Players

- Biogen (BIIB)
Biogen, Inc. focuses on the development and delivery of therapies that treat neurodegenerative and autoimmune disorders. It recorded revenues of \$12,000 million in the 2017 fiscal year, a 7.2% increase from the previous year. Its net income was \$2,500 million in fiscal 2017, a decrease from \$3,700 million in the previous year.
- Amgen (AMGN)
Amgen focuses on the discovery and manufacturing of human therapeutics based on research in molecular biology, biochemistry, and recombinant DNA technology. It recorded revenues of \$22,800 million, a 0.6% decrease from the previous year. It recorded a net income of \$1,900 million in fiscal 2017, a decrease from \$7,700 million in fiscal 2016.
- Baxter International Inc. (BAX)
Baxter International Inc. focuses on the treatment of chronic and acute medical conditions and operates in two main areas: hospital products and

renal. It recorded revenues of \$10,500 million in fiscal 2017, a 3.9% increase from the previous year. In the same year, its net income was \$717 million, a decrease from \$4,900 million in fiscal 2016.

Trends

The US biotechnology industry has experienced strong growth, particularly in fiscal 2014 where growth was a 29% increase in value from the previous year. However, overall growth slowed down due to President Trump's election in 2016, when there was uncertainty regarding the pricing and access of products within the industry. Although the industry is expected to continue growing, its performance is forecast to decelerate, with an anticipated compound annual growth rate of 9.4% for the period from 2017 to 2022. By the end of 2022, the United States biotechnology industry is predicted to have a value of \$280.7 billion [39].

The primary regulator of the biotechnology industry in the US is the Food and Drug Administration (FDA). A drug must undergo a strict clearance process established by the FDA before it can be commercialized; as such, the chances that a drug makes it through all required clinical trials are relatively low. For every 5,000 compounds discovered in pre-clinical studies, only about five eventually get approved by the FDA [40]. In addition to the FDA, other agencies that hold authority within the biotechnology industry include the US Department of Agriculture Animal Plant and Health Inspection Service (USDA-APHIS) and the Environmental Protection Agency (EPA). Both of these agencies are responsible for regulating the agricultural segment of the biotechnology industry.

Pharmaceutical (Branded)

Description

The pharmaceutical sector can be divided into two sub-sectors – branded and generic. Branded drugs are usually eligible for 10-15 years of market exclusivity based on the patent approval granted by the U.S. Food and Drug Administration (FDA). Due to the high R&D expenditures in the early stage, branded drugs, once being put into the market, are often sold at a high price in order to enable branded pharmaceutical companies to gain high profit and cover their past costs.

Market Overview

With a market value of \$934.8 billion in 2017, the U.S. pharmaceutical sector occupies 40.7% of the global pharmaceutical market and is among one of the most competitive sectors in its economy [28]. Branded drugs dominate the pharmaceutical market; in comparison to generic sales, the patented sales shared 74% of overall pharmaceutical sales in 2016 [29]. Looking back over the past several years, the branded pharmaceutical sector is still undergoing continued, gradual



growth. Average price for branded drugs and the total revenue of brand prescription medication continuous to increase. For the new emerging medicine brands, overall spending in the U.S. is also growing.

With that being said, the branded pharmaceutical industry is now greatly in need of the development of new products. While the United States has one of the world's most supportive domestic environments for development, with over half of the world's R&D (\$75 billion) in pharmaceuticals [30], the expiration of patents and loss of exclusivity (LOE), together with the increasingly expensive R&D costs, has made pharmaceutical development still very challenging.

Key Players

There are multiple key players within the branded pharmaceutical sector. Ranked by their pure pharmaceutical revenue in 2017, some of the top performers include Pfizer (PFE), Johnson & Johnson (JNJ), and Merck & Co. (MRK), with a revenue of \$52.5 billion, \$36.7 billion, \$36.3 billion, and \$35.4 billion respectively. [31]

- Pfizer (PFE)

Pfizer is one of the largest pharmaceutical companies in the world. It develops and produces medicines and vaccines for a wide range of medical disciplines, including immunology, oncology, cardiology, endocrinology, and neurology. [32]

With a gain of 19.4%, Pfizer was the second-best Dow performer in 2018. [44] Due to the expiration of the company's blockbuster drug Lyrica in mid-2019, Pfizer is predicted to face multi-billion dollar sales blows. However, it still has a strong pipeline, with numerous relatively new drugs including Ibrance, Xeljanz, Xtandi, Tanezumab, and Tafamidis driving growth for the company. [45] Overall, the market is quite optimistic about the company's continuous growth in 2019.

Some of Pfizer's latest developments include its immune therapy Bavencio, whose combination with Inlyta performed well in a recent kidney cancer test. FDA has accepted for priority review the supplemental biologics license application for Bavencio and Inlyta. [46] Yet more follow-up trials are needed to further test the effectiveness of this new combination.

- Merck & Co. (MRK)

Merck & Co. is also one of the largest pharmaceutical companies in the world. The company's research and development effort have led to its approval of more new drugs than that of any other company.

With a surge of 35%, Merck was the best Dow performer in 2018. A key catalyst was Keytruda, one of Merck's drugs for cancer treatment, whose sales grew by at least 80 percent in the first three quarters of 2018. [44] With

the ongoing success of Keytruda and a pipeline of new drugs, the company's strong momentum is likely to be retained in 2019.

Most recently, Merck submitted an application to the FDA for an investigational vaccine, called V920, to fight the Zaire strain of the Ebola virus. [33] More than 63,000 people have already received the v920 vaccine since August 2018. Statistics have shown that the vaccine is quite promising, with 90% efficacious reported in the Democratic Republic of the Congo (DRC). [47] Based on the outstanding performance, the vaccine is predicted to become the first Ebola vaccine approved by the FDA in 2019.

- Johnson & Johnson (JNJ)

Johnson & Johnson is American multinational conglomerate that not only focuses on pharmaceuticals, but also medical devices and consumer packaged goods manufacturing as well. Its major franchises within the pharmaceutical sector include immunology, neuroscience, infectious disease, and oncology. [34]

Compared to the strong performance of the other two key players in the industry, Johnson & Johnson was only slightly above the Dow Jones Industrial Average in 2018. With the loss of exclusivity for Remicade and Zytiga, the company is expected to see a decline in sales in 2019.

The recent approval of Johnson and Johnson's new depression drug Spravato by the FDA is noteworthy. Compared to other existing options in the market, Spravato turns out to be much more fast-acting based on previous test results. It is estimated that the drugs would be provided to hundreds of centers within the first year. However, Spravato has also shown significant side effects and abuse potential, which makes large-scale sales at present time difficult to achieve. While the drug is likely to have commercial success in the future, more trials and test result are still in need. [48]

Trends

As is mentioned earlier, the branded drug sales occupied 74% of overall pharmaceutical sales in 2016. However, this upward trend tends to slow down in recent years. In fact, the proportion of revenue shared by branded drugs over generic drugs has already decreased from 81% in 2005 to now [29]. With President Donald Trump's plans to further control drug prices, the US branded pharmaceutical market is expected to go through some rough times. However, the launch of new products in the future may spur growth. Some of the most highly anticipated products include Ibrance (cancer), Cosentyx (psoriasis) and Cotellic (advanced melanoma) [35]. Meanwhile, a significantly higher number of FDA approvals in recent years has also helped restore some investor confidence in the

market. Compared to 2016 during which only 22 new drugs were approved, the FDA's Center for Drug Evaluation and Research (CDER) approved 46 new drugs in 2017. [35]

While the emergence of new products is expected to bring great profit, the increasing competitive pressure from more generic companies at the same time is another non-negligible threat to the branded pharmaceutical markets. According to statistics, only 25% of branded drugs met patent challenge before their generic entry in 1995, but this figure has surged to 94% as of 2014 [36]. Moreover, the time from launching a brand drug to meeting a patent challenge has also largely decreased from 14.3 years in 1995 to just 5.2 years in 2014 [37]. These trends threaten to reduce the revenues companies can expect from their branded drugs and thus industry profitability, especially given the high upfront R&D costs companies sustain.

Furthermore, new threats are coming over from companies abroad with lower R&D costs. This emerging pharmaceutical market has the potential to reduce competitiveness of the US market if more companies and more funding shifts away from the US. In order to deal with this problem, a growing trend of M&As over the past few years can be seen. Large pharmaceutical companies often purchase smaller, more focused innovator firms for new drugs in order to reduce their R&D costs as much as possible and accelerate the overall R&D process. [38]

Pharmaceutical (Generics)

Description

The Pharmaceutical (Generics) sector includes all generic drugs. Generic drugs are "created to be the same as an already marketed brand-name drug in dosage form, safety, strength, route of administration, quality, performance characteristics, and intended use" [5]. Once a branded drug goes off-patent, other manufacturers are permitted to make generic versions of it. Slight variations are permitted by the FDA but otherwise generics must perform the same [5].

Generics are usually sold at a steep discount to their branded equivalents, estimated at 80-85% by the FDA [5]. This is not only because they avoid the substantial R&D costs of new drugs, but also because sellers face more market competition with potentially several other manufacturers making generics of the same drug.

Market Overview

Market size was \$210 billion in 2017 and it is forecasted to reach \$450 billion USD by 2025 [6]. The market is heavily dominated by NA, Europe, and India, with about 20-30% revenue market share each, NA the leader of the trio. On average, margins on generic drugs are decreasing and are expected to continue their



downward trend. They are currently around the 43-45% range [6]. This could be a sign that the market is becoming more competitive as it expands.

According to investopedia, profit margins on generic drugs are actually higher than their branded equivalents [7]. This is due to the high costs of bringing new drugs to market. However, total profits are usually higher for branded drugs in comparison to generics. This is because of the highly profitable period of time when a drug is on-patent and the manufacturer essentially has a legal monopoly on the market.

Key Players

- Teva
Multinational pharmaceutical company headquartered in Israel [14]. Largest generics manufacturer in the world with an 18.5B market cap. Has recently suffered setbacks from increased competition for one of its branded drugs, Copaxone, and from continued struggles to reduce its huge outstanding debt (currently almost \$29 billion) [43].
- Mylan
Multinational pharmaceutical company headquartered in Pennsylvania, USA. Produces generics and specialty drugs [13]. Has a 13.4B market cap. Became infamous for Epipen pricing controversy. Has recently struggled with lowered revenue forecasts and issues with the FDA, but some believe this has resulted in the company becoming undervalued.
- Novartis
Formed from merger of Ciba-Geigy and Sandoz. Among largest pharmaceutical companies in the world, headquartered in Switzerland. It produces generics through its subsidiary, Sandoz [12]. Market cap of 232.8B. Novartis is planning a big restructuring that will make Sandoz more independent. Like others, has recently struggled with lower market outlook.
- Pfizer
- Allergan

(The top 3, Teva, Mylan, and Novartis, dominate the market)

Trends

The generics market is also expected to experience strong growth thanks to various trends. First, many drugs are actually set to go off patent in the near future, which could cause strong growth in the generics market as manufacturers begin to introduce more generic equivalents. This is known as the “patent-cliff” within the industry, with an estimated \$251 Billions worth of sales at risk between 2018 and 2024 [15]. Some major “blockbuster” drugs that are slated to go off patent in this period are Humira and Stellara.



Another industry trend that could benefit generics is increasing public pressure to reduce drug costs. The generic drugs market represents a way for consumers to obtain cheaper drugs. Knowing this, the industry's lobbying group has made signals that they could be pursuing this angle more strongly in the near future by renaming themselves to the Association for Accessible Medicines [10]. Their site promotes legislation and other policies aimed at benefiting the generics industry but spun in a way that argues for cheaper prescriptions and lower drug prices [11].

More recently, the FDA has taken steps to allow for drugs known as biosimilars to be given a similar abbreviated approval process as generics [15]. Biosimilars are drugs that are functionally equivalent to their counterpart biologic drugs, which are drugs created from biological sources [8][9]. An example of a biologic is insulin. This could result in more growth in the Generics sector if more manufacturers begin to introduce biosimilars under the new guidelines.

Healthcare Services

Description

Healthcare Services includes all types of care and services for any medical or remedial care. Concrete examples range from doctors evaluating medical conditions to antibiotic prescriptions to painkillers. The industry here is wide and affects nearly everyone as healthcare is universal within America. Healthcare Services is expected to grow as more affordable, sustainable, and accessible health care options become available. Some key players in creating this change are governments, health care providers, and consumers. All three are pushing for preventative care that services the customer and works towards a future where technology is highly impactful in the healthcare services industry. Looking into the future, healthcare services have a number of goals including maintaining and recruiting top talent, investing in electronic healthcare, digital healthcare security as the marketplace becomes increasingly technology based, adapting to customer needs in regards to technology and patient welfare, and finally continuing to make the market stable and reliable as an uncertain health economy (22).

Market Overview

In order to understand this market, the publicization of healthcare and the effect of political instability in America; the uncertainty regarding the future of healthcare policy in the US makes this market more volatile. In a 2015 study by the Commonwealth Fund it was found that after Obamacare there was an expected increase of primary care visits by 3.8% and hospital visits by 2.6%, these numbers may begin to decrease as the Affordable Care Act is being repealed in part (21). This is an important trend to look into when investing in healthcare services.

However, despite the uncertainty of the market healthcare services is expected to increase 5.4% between 2017 and 2022, an increase from \$7.724 trillion dollars to \$10.059. Healthcare is a necessity and will continue to rise as it's correlated with technology, accessibility, and liberal policies. It's evident that the healthcare services market is extremely large and is growing quickly.

Key Players

The U.S. Government's publicization of healthcare services and insurance affects the market and what people believe about it including many myths (23). Particularly, public opinion of the Government's actions can affect the market both by actual policy and popular beliefs. State government also partially regulate the healthcare services industry, however it is so complex that it often affects providers but not patients as they do not understand this regulation.

Healthcare providers are generally huge companies while the actual services given are by practices, hospitals, and pharmacies (23). Healthcare providers are often nationwide such as UnitedHealth Group services over 50 million Americans and has \$1 billion in prescription claims per year. Blue Cross Blue Shield is a competitor of United as it groups together 37 separate organizations and is the primary healthcare provider for 106 million Americans (19 and 20). However, both of these companies are facing rivalry with Aetna which was recently bought by CVS Health (18). Combining the two nation wide brands will expand their customer base.

This is a regulation to look for in the future as most healthcare services companies that provide insurance and long term care are large companies and could face anti-trust regulation. Similarly, the government has recently been pushing back against higher health care prices and this is cited as a reason for concern in the market. Similarly, public healthcare is a tension point here due to the uncertainty of the Affordable Care Act (21) and funding for medicare and medicaid.

Patients are also a key player as they're the ones that demand services. They require healthcare and are willing to pay insurance, premiums, and more in order to ensure good quality of service as this is essential to their well being (23).

Industry Trends

Healthcare constitutes about 15% of U.S. GDP and is likely continue to make large contributions in the future. According to a report released by the Centers for Medicare & Medicaid Services(CMS), U.S. annual spending in healthcare is expected to grow 5.6% annually over the next decade.

Healthcare services is a necessity for American consumers. There has been an increase in primary care visits after Affordable Care Act (ACA), but recent political trend to partly repeal ACA might lead to a decrease in these numbers in the future.

The Medicare Access and CHIP Reauthorization Act (MACRA) also has encouraged collaborations between health plan providers and the healthcare system. The number of adopters of this plan accelerated since it was introduced in 2015 and is likely to continue growing.

Technological innovations play an increasingly important role in the industry. One area with good growth potential is digital healthcare. Digital technologies are being incorporated into wearable, mobile-based devices. For example, AI technology such as computer vision can also be incorporated into other medical devices to support medical operations such as surgeries. Another area with growth potential is medical analytics which uses big data to improve the accuracy of diagnosis. Moreover, development of Telemedicine also makes healthcare specialists more accessible to patients. The development of health analytics and digital health also means that data management and cybersecurity will become essential.

On the other hand, the more traditional medical and biological research takes greater time and efforts. The Biotech and Pharmaceutical sectors are dominated by a few large companies due to the significant amount of resources needed for research. Startups with good potential are usually quickly acquired by the larger firms. This dominance of larger firms is likely to continue.

Regulations play a significant role in healthcare, ranging from regulations over healthcare cost to R&D and patent. Regulations are likely to tighten in the future, especially over healthcare costs. Healthcare firms and providers will need to reduce cost and improve price transparency to meet regulators' and patients' demands. For example, prices of generic drugs have decreased in recent years and the downward trend is likely to continue. Companies such as some medical devices companies also increasingly outsource manufacturing, research and development (R&D) to countries with lower costs.

Valuation

In addition to general financial ratios and multiples, valuation about the healthcare industry should include analysis about research and development, expenditures, and revenue growth.

Medical Devices:

| Sector Name | EV/Revenue | EV/EBITDA | EBITDA Margin | LTM P/E | Forward P/E | Revenue Growth (from LTM) | EBITDA Growth (from LTM) |
|-----------------|------------|-----------|---------------|---------|-------------|---------------------------|--------------------------|
| Medical devices | 4.7 | 19.6 | 23.70% | 40.2 | 26.2 | 7.60% | 9.10% |

Source: Mercer Capital

MedTech Report [27]

Biotech:

| Sector Name | Current PE | Forward PE | EV/EBITDA R&D | EV/EBITDA | ROE (adjusted for R&D) | PEG |
|-------------|------------|------------|---------------|-----------|------------------------|------|
| Biotech | 32.19 | 43.88 | 10 | 22.53 | 0.92% | 0.77 |

Source: NYU Stern Market Data [26]

Because research and development is a major cost of biotech firms, the ratio ROE adjusted for R&D is included to indicate the financial return of R&D expenditures.

In addition to PE ratios, the PEG(Price-Earning-Growth) ratio is also included. This ratio is suited for analyzing biotech firms because it ratio accounts for growth rate, which is an important indicator for biotech stocks[25](), and provides a more comprehensive picture of a company's value. Generally speaking, a stock can be considered as fairly valued if PEG ratio is around 1.

Pharmaceutical:

| Sector Name | Current PE | Forward PE | EV/EBITDA R&D | EV/EBITDA | ROE (adjusted for R&D) | PEG | Aggregate Mkt Cap/ Net Income (all firms) |
|----------------|------------|------------|---------------|-----------|------------------------|-----|---|
| Pharmaceutical | 69.2 | 27.44 | 9.77 | 16.09 | 8.27% | 2.8 | 48.96 |

Source: NYU Stern Market Data [26]

Health Services

The valuation metrics for healthcare services can be further divided into those of healthcare support services and healthcare information technology

| Sector Name | Current PE | Forward PE | EV/EBITDA R&D | EV/EBITDA | ROE (adjusted for R&D) | PEG | Aggregate Mkt Cap/ Net Income (all firms) |
|---------------------------------------|------------|------------|---------------|-----------|------------------------|------|---|
| Healthcare Support Services | 234.53 | 20.1 | 10.67 | 10.7 | 16.60% | 1.38 | 21.47 |
| Healthcare Information and Technology | 84.08 | 35.22 | 14.9 | 19.33 | 9.47% | 2.12 | 54.81 |

Source: NYU Stern Market Data [26]

References

- [1] <https://www.investopedia.com/articles/active-trading/082015/key-financial-ratios-analyze-healthcare-industry.asp>
- [2] <https://www.selectusa.gov/medical-technology-industry-united-states>
- [3] https://www.trade.gov/topmarkets/pdf/Medical_Devices_Top_Markets_Report.pdf
- [4] https://www.oregonlaws.org/glossary/definition/health_care_services
- [5] <https://www.fda.gov/drugs/resourcesforyou/consumers/questionsanswers/ucm100100.htm>
- [6] <https://www.medgadget.com/2018/11/global-generic-drugs-market-2018-trends-high-demand-quality-analysis-safety-dosage-and-future-growth-opportunity-till-2025.html>
- [7] <https://www.investopedia.com/ask/answers/062215/how-does-profit-margin-compare-generic-drug-versus-brand-name-drug.asp>
- [8] <https://en.wikipedia.org/wiki/Biosimilar>
- [9] <https://en.wikipedia.org/wiki/Biopharmaceutical>
- [10] <https://www.fiercepharma.com/special-report/top-15-generic-drugmakers-2016>
- [11] <https://accessiblemeds.org/>
- [12] <https://en.wikipedia.org/wiki/Novartis>
- [13] <https://en.wikipedia.org/wiki/Mylan>
- [14] https://en.wikipedia.org/wiki/Teva_Pharmaceutical_Industries
- [15] <http://info.evaluategroup.com/rs/607-YGS-364/images/WP2018.pdf>
- [16] <https://www.emergobyul.com/resources/market-united-states>
- [17] <https://clients1.ibisworld.com/reports/us/industry/majorcompanies.aspx?entid=764#MP9054>
- [18] <https://www.businessinsider.com/cvs-health-and-aetna-will-close-69-billion-merger-2018-11>
- [19] <https://www.investopedia.com/articles/health-insurance/091416/top-5-health-insurance-providers-selfemployed-hum-aet.asp>
- [20] <https://www.investopedia.com/articles/markets/030916/worlds-top-10-health-care-companies-unh-mdt.asp>
- [21] https://www.commonwealthfund.org/sites/default/files/documents/media_files_publications_issue_brief_2015_feb_1804_glied_how_will_aca_affect_use_hlt_care_svcs_ib_v2.pdf
- [22] <https://www2.deloitte.com/global/en/pages/life-sciences-and-healthcare/articles/global-health-care-sector-outlook.html>
- [23] <http://www.mahesh-vc.com/blog/understanding-whos-paying-for-what-in-the-healthcare-industry>



- [24] <https://www.statista.com/statistics/387867/value-of-worldwide-digital-health-market-forecast-by-segment/>
- [25] <https://www.investopedia.com/articles/active-trading/082015/key-financial-ratios-analyze-biotech-companies.asp>
- [26] http://people.stern.nyu.edu/adamodar/New_Home_Page/datacurrent.html
- [27] https://mercercapital.com/assets/Mercer-Capital_MedTech_1H17.pdf
- [28] <https://www.statista.com/statistics/245473/market-share-of-the-leading-10-global-pharmaceutical-markets/>
- [29] <https://www.statista.com/statistics/205036/proportion-of-brand-to-generic-prescription-sales/>
- [30] <https://www.selectusa.gov/pharmaceutical-and-biotech-industries-united-states>
- [31] <https://www.statista.com/statistics/281306/major-global-pharmaceutical-companies-based-on-pharma-revenue-2012/>
- [32] <https://en.wikipedia.org/wiki/Pfizer>
- [33] https://en.wikipedia.org/wiki/Merck_%26_Co
- [34] https://en.wikipedia.org/wiki/Johnson_%26_Johnson
- [35] <https://drive.google.com/drive/u/1/folders/1rL85dl-OT07SPle1NgeqsVHy2SlcYUgp>
- [36] <https://www.statista.com/statistics/886455/drug-launch-and-generic-patent-challenges-us/>
- [37] <https://www.statista.com/statistics/886455/drug-launch-and-generic-patent-challenges-us/>
- [38] https://www.trade.gov/topmarkets/pdf/Pharmaceuticals_Executive_Summary.pdf
- [39] <https://drive.google.com/open?id=1mzgmH8L3vXHCu5KB8EQyB9lpWTs015MB>
- [40] http://www.valueline.com/Stocks/Industries/Industry_Overview_Biotechnology.aspx#.XHtP9MBKjE
- [41] <http://www.biotech-now.org/food-and-agriculture/2018/03/the-state-of-biotech-regulations-in-2018%E2%80%8A-%E2%80%8Aan-ag-policy-experts-perspective>
- [42] http://www.valueline.com/Stocks/Industries/Industry_Overview_Biotechnology.aspx#.XHgK8_ZFfw
- [43] <https://finance.yahoo.com/news/why-teva-pharmaceutical-industries-stock-150000623.html>
- [44] <https://www.cnbc.com/2018/12/31/merck-surges-more-than-30percent-in-2018-taking-the-crown-as-biggest-dow-winner.html>
- [45] <https://www.forbes.com/sites/greatspeculations/2019/01/31/pfizers-q4-earnings-and-what-lies-ahead-for-the-company-in-2019/#7ab9c4485ffa>



- [46] <https://www.bloomberg.com/news/articles/2019-02-17/merck-kkaa-pfizer-s-new-therapy-effective-in-kidney-cancer-test?from=singlemessage&isappintalled=0>
- [47] <https://www.precisionvaccinations.com/merck%E2%80%99s-rvsv-zebov-recombinant-replication-competent-vesicular-stomatitis-virus-based-candidate>
- [48] <https://www.bloomberg.com/opinion/articles/2019-03-06/j-j-ketamine-like-spravato-depression-drug-isn-t-a-surefire-hit?from=singlemessage&isappintalled=0>