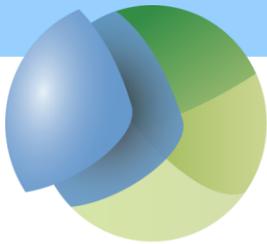


Equity Research

University of Connecticut Foundation
Student Managed Fund 2019
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Biogen Inc. (BIIB)



Biogen

Ying Chen ying.4.chen@uconn.edu
Yizhen Zhou yizhen.zhou@uconn.edu

Biogen

Executive Summary:

We issue a BUY recommendation on Biogen Inc. with a 1-year target price of \$ 303, representing upside potential on the closing price of \$226.39 on April 21, 2019. We believe that the target price will exceed current price no matter in bull or bear market in the future. Our recommendation is based on these reasons:

Currently undervalued compared to history average:

Biogen sharply dropped about 26% on March 21, 2019 due to declaration of discontinuance of Alzheimer's trials, which dragged down its many stats much below history average. But based on its diversified revenue distribution, stable growth, strong R&D strategy and leading position in Biotech sector, it is fair to believe the stock is undervalued.

Pending acquisition with Nightstar:

Biogen has sufficient free cash flow to fund acquisition, and this pending acquisition may bring two ophthalmology gene therapy drugs into Biogen's pipeline.

Extremely strong financial performance:

Biogen has stably increased revenue, around 35% of ROE and 20% of ROA, which easily exceed the estimated WACC of 9.93%. And its low debt to equity ratio can support its R&D expenditure as a solid back up.

Stock Performance



Key Statistics			
Shares	196.71M	Current Price	\$226.39
Market Capital	46.50B	Target Price	\$303
P/E	9.85	Beta	0.97
Recommendation	Buy	Industry	Healthcare

	2014	2015	2016
Revenue (million)	9703.3	10763.8	11448.8
Gross Profit (million)	8532.3	9523.4	9970.1
EBITDA	4660.5	5491.4	5833.1
Net Income (million)	2934.8	3547	3702.8
Net Income Margin	29.77	33.88	36.18
EPS	12.42	15.38	16.96
ROE	30.21	35.15	34.42
ROA	22.42	20.98	17.47
Free Cash Flow	2654.3	3276.4	3971.1
	2017	2018	Last 12M
Revenue (million)	12273.9	13452.9	13452.9
Gross Profit (million)	10643.9	11636.6	11636.6
EBITDA	6426.8	6905.2	6905.2
Net Income (million)	2539.1	4430.7	4430.7
Net Income Margin	32.55	36.53	38.13
EPS	11.94	21.63	21.64
ROE	20.52	34.54	34.54
ROA	10.91	18.11	18.11
Free Cash Flow	3683.6	5417.1	5417.1

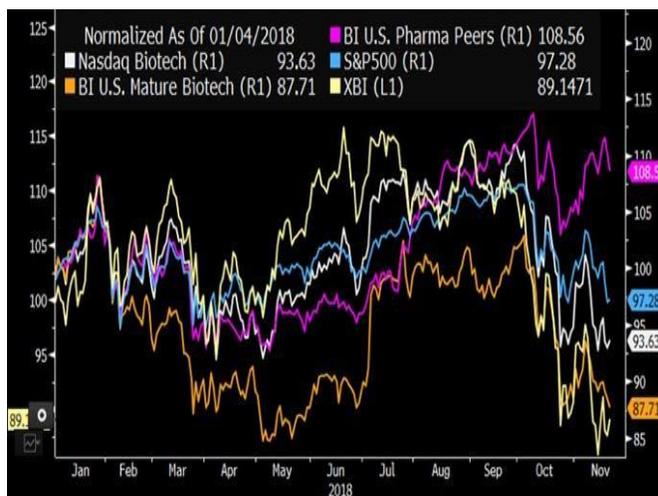
Biogen

Business Description:

Biogen Inc. (previously known as Biogen Idec) is an American multinational biotechnology company based in Cambridge, Massachusetts, specializing in the discovery, development, and delivery of therapies for the treatment of neurodegenerative, hematologic, and autoimmune diseases to patients worldwide. Biogen Inc. develops, manufactures, and commercializes therapies, focusing on neurology, oncology, and immunology. With its pipeline full of biotech drugs, Biogen aims to meet the unmet needs of patients around the world. Biogen has several drug candidates in phase 3 trials in neurology and neurodegenerative diseases and has launched Spinraza with partner Ionis.

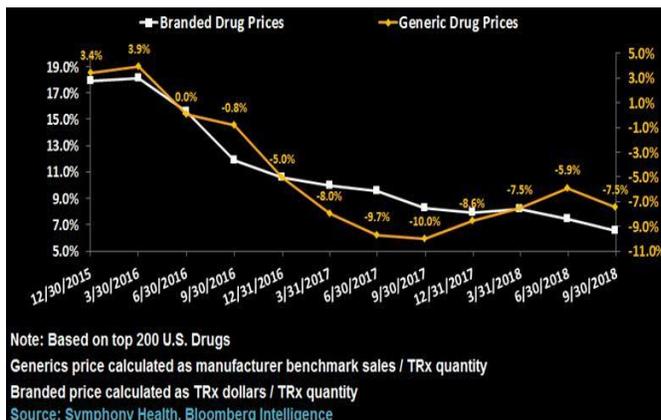
Industry Outlook:

According to Bloomberg Intelligence, biotech sector enters 2019 with headroom, after U.S.-China trade tensions, many risk-averse investors step out of this sector. For big cap companies, this will not be a big problem if they can overcome the challenge to generate enough revenue, and it may benefit them in terms of M&A because new company or product will be undervalued due to the whole industry trend. So, more M&A deals are expected to complete in the sector in 2019. Sarepta, BioMarin, Spark and Nightstar stand out as leaders and desirable target companies across the various indications.



Industry particularly in the fields of cell and gene therapy will advance from a catalyst perspective in 2019. With a U.S. Food and Drug Administration regulatory framework set up and several key data readouts across diseases such as hemophilia, 2019 is prone to be a great year for gene therapies. That Spark's Luxturna has been firstly approved by FDA may accelerate other companies to head towards and chase up in this area.

In 2019, a big challenge for both Pharmaceutical and biotech companies is the increase of drug prices. Market may have uncertain response to the rising price, and sales may be influenced by the demand and supply change. Therefore, there is still much unknowns of how to deal with the price pressure, but drug makers are expected to spare no efforts on cost reduction and outperform in this price war.



Biogen

Investment Thesis:

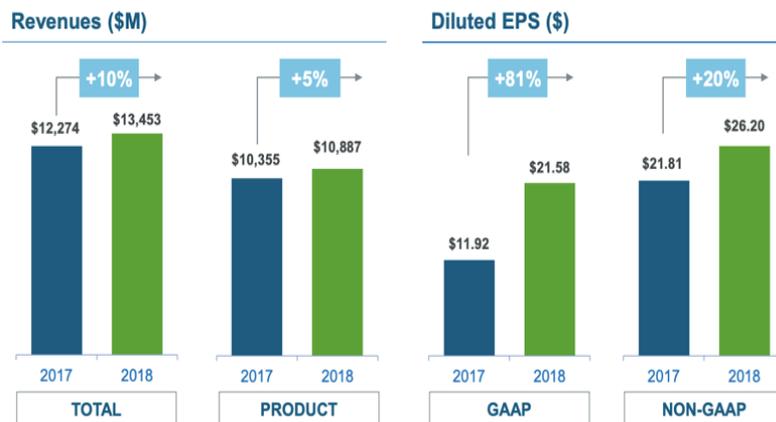
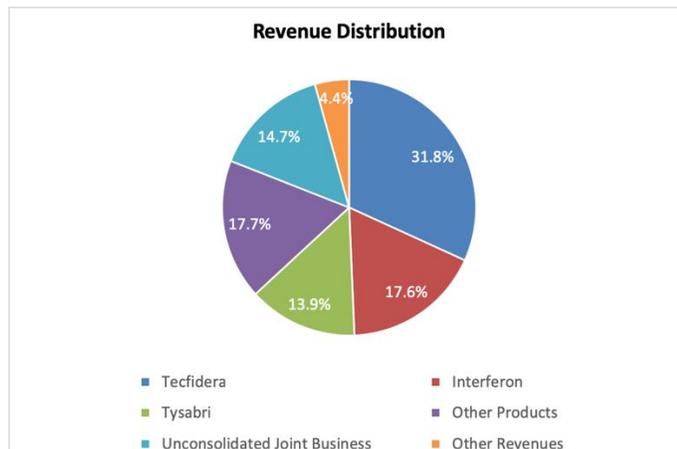
Biogen is much undervalued in several stats compared to the history average data:

Biogen experienced a sharp drop of 26% on March 21, 2019 due to declaration of discontinuance of Alzheimer's trials, which is a vital and broadly-concerned trial. The news aroused much attention and discussion in social media, leading to people's passive reaction towards the stock. The decrease of stock price also dragged down many statistics to much below history average level, such as price to earnings ratio, price to book value ratio and enterprise value to EBIT etc. Therefore, the current price is undervalued compared to its intrinsic value and is a good time to step into following the value investment strategy.

Metric	Current vs 2Yr Average Historical Premium				2Yr Historical Premium Range		
	Current	Hist Avg	Diff	# SD	3M Trend	Low	High
Current Price							
1) BF P/E	-16%	4%	-20%	-3.4	~~~~~	-20%	17%
12) BF EV/EBITDA	-18%	2%	-20%	-3.6	~~~~~	-23%	14%
13) BF EV/EBIT	-17%	2%	-19%	-3.6	~~~~~	-22%	13%
14) BF EV/Rev	-17%	0%	-17%	-3.0	~~~~~	-22%	13%
15) LF P/BV	-37%	-1%	-36%	-2.3	~~~~~	-40%	24%

Stable and Organic Growth

Biogen has a highly diversified revenue distribution, that its total revenue is contributed from multi-pipeline products, not relying on single area, nor from certain market, the dispersive geographic distribution can also mitigate risks from regulation and market fluctuation in certain areas. Also, based on its historical performance, Biogen has a stable growth that revenue and EBIT keep healthy increasing trends. And company has strong process guiding strategy to maximize the resilience of core business, accelerate progress in spinal muscular atrophy, develop and expand neuroscience portfolio, re-Prioritize the capital allocation efforts and create a leaner and simpler operating model. In addition, Biogen does not pay dividends to stockholders, so that revenue can be used to reinvestment and research & development of new products. Its low debt to equity ratio can also support its R&D expenditure as a solid back up. Therefore, it keeps a stable and organic cycle to transform research and development expenditure into new pipelines to generate more revenue.

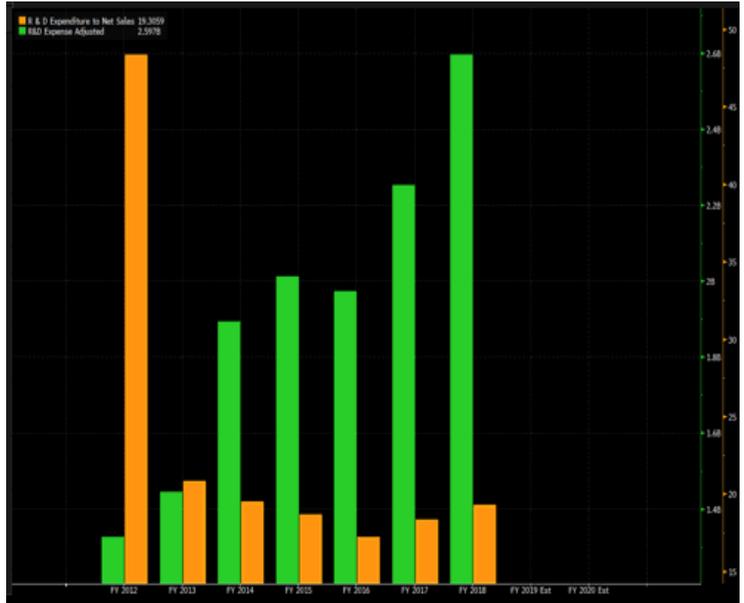


Biogen

Biogen announces agreement to acquire Nightstar Therapeutics:

Nightstar Therapeutics (NST; Nasdaq: NITE) is a gene therapy company based in London, United Kingdom, focused on developing novel treatments for patients suffering from rare inherited retinal diseases that would otherwise lead to blindness. Nightstar has two potentially first-in-class mid- to late-stage clinical assets as well as preclinical programs.

Biogen announced that it has entered into an agreement to acquire Nightstar Therapeutics with \$25.50 in cash for each NST share. The total value of this transaction will be approximately \$800 million on a fully diluted basis.



With this proposed acquisition, it can bring two ophthalmology gene therapy drugs into Biogen’s pipeline. Ophthalmology is an emerging growth area for Biogen, this deal will create opportunity for the talented employees at Nightstar to advance potentially transformative gene therapy programs for rare retinal diseases, and Biogen could continue its strategy to develop and expand a multi-franchise neuroscience pipeline across complementary modalities. In the long run, the synergy effect will be transformed into stockholder values.

And since Biogen has sufficient free cash flow on its financial statements to fund its acquisition, it won’t influence its other financial statistics pretty much like debt to asset ratio, liquidity ratio etc. Biogen expects to complete the acquisition by mid-year 2019.

Extremely strong financial performance:

Biogen has stably increased revenue, around 35% of ROE and 20% of ROA, which easily exceed the estimated WACC of 9.93%. And its low debt to equity ratio can support its R&D expenditure as a solid back up.

Financial Analysis:

In the past five years, Biogen’s revenue increased very fast and then gradually tended to stable, in the next several years, we expect the growth of revenue will pace slower influenced by the whole industry and macro environment. Therefore, we consider 1% to 2% growth rate as a conservative assumption for the following years. But due to the strong progressive strategy of Biogen, we believe that it will continue to effectively reduce the cost of operation and transform its R&D into new products to keep Net Income growth.

Biogen

And Biogen also has relatively low P/E and P/B ratio compared to its competitors and industry median, which implies its current price is undervalued in terms of its own earning and book value. And the debt to asset ratio is about 24%, which is nearly half of comparable companies, showing that its capital structure is strong enough to support its operating activity and acquisitions without too much lending risks.

Name	BIOGEN INC	CELGENE CORP	GILEAD SCIENCES INC	AMGEN INC	Median
Mkt Cap	46498.02	66242.18	82880.99	118220.38	74561.59
P/E	9.85	14	12.29	14.48	13.14
P/B	3.57	10.72	3.9	9.57	6.73
Debt/Assets	23.47	57.13	42.91	51.09	47

Investment Risks

Competition: Healthcare industry has relatively high entrance barrier, but there will still be much competition in current market. There may be new drugs appear with strong efficacy, and new patients could opt for competing gene therapy, therefore, we assume sales will peak in 2019, but begin to decline (rather than plateau) in 2020. However, the introduction of new products from the firm's growing late-stage pipeline should offset new competition for established drug.

Regulations: There exists much uncertainty of drugs approval from FDA, but the stringent regulation makes this industry high threshold from outside. And relevant laws and rules are gradually systemized in place, so that the market is going to be better regulated and standardized.

Fail of drug trials: The fail of Alzheimer's trial entails sharp price drop within a day, because Alzheimer's has got broad social attention and Biogen has inputted large money on research trials. The fail of a trial means not only the in-process Research & Development Expense is bailed out and cannot be capitalized to patents and assets, but also people may have negative impression on company's future trial and experiment. The uncertainty of will always exist even when trial has entered phase 3, there is still large chance that certain pivotal problems cannot be overcome eventually

Valuation and Forecast

Due to the headwind in healthcare sector from the beginning of the year and the influence of fail of Alzheimer's trails, the market is lacking confidence of Biogen currently and many people assume this company will slowly go on a downward slope. Taking these factors into consideration, we decided to build a worst-case scenario valuation model estimating the price of this stock.

We assume Biogen would have negative revenue growth and EBIT growth for five years. Terminal growth rate is 2%, below the risk-free rate. Given these conditions, Biogen still has \$303 under DCF model perpetuity approach and \$271.43 under EBITDA multiples approach. Both of the prediction results show that Biogen is undervalued now.

Biogen

Current share price	226.39							
Current shares outstanding	197.2							
Current market cap.	44644							
Total debt outstanding	5936.5							
Cash plus marketable securities	3538							
Discount rate input								
Debt ratio	12%							
Equity ratio	88%							
Levered beta	1.44							
Treasury rate	2.6%							
Market risk premium	5.7%							
Cost of equity (CAPM)	10.7%							
Cost of debt	5.2%							
Size premium	0%							
Tax rate	24%							
WACC	9.93%							
Terminal growth rate	2.00%							
Historical period								
Input	2016	2017	2018	2019	2020	2021	2022	2023
Revenue	11,449	12,274	13,453	13,722	13,269	12,964	12,795	12,629
EBIT	5,150	5,346	5,889	6,637	6,232	6,045	5,864	5,805
Net working capital	-277	397	-12	274	-265	-259	-256	-253
CAPEX	-616	867	-771	-601	-694	-683	-689	-691
Depreciation & amortization	683	1,081	1,017	1,083	1,048	1,024	1,010	997
Cash flow								
EBIT			5,889	6,637	6,232	6,045	5,864	5,805
- Tax on EBIT			-1,423	-1,604	-1,506	-1,461	-1,417	-1,403
+/- change in NWC			409	-286	540	-6	-3	-3
+/- CAPEX			-771	-601	-694	-683	-689	-691
+ Depreciation & Amortization			1,017	1,083	1,048	1,024	1,010	997
Free cash flow			5,121	5,230	5,620	4,919	4,765	4,706
Discount factor (based on WACC)								
Discounted free cash flow			5,121	4,758	4,651	3,703	3,263	2,931
Perpetuity approach								
Terminal value	37,700							
Enterprise Value	62,126							
Add: Book value of cash & mkt sec	65,664							
Less book value of debt	59,727							
Equity Value per Share	303							
EBITDA Multiple approach								
Terminal year EBITDA	7,224							
Terminal year EBITDA multiplier	7							
Terminal value	31497.77							
Enterprise Value	55924.09							
Add: Book value of cash & mkt sec	59462.09							
Less book value of debt	53525.59							
Equity Value per Share	271.43							

Biogen

Comparable Company Analysis

Valuation Analysis							
Ticker	Name	Mkt Cap(Million)	Current Price	P/E	EV / EBITDA Adj		
				2018	2019 Est	2018	2019 Est
Median	Median	73071.76	135.62	12.71	8.53	8.04	6.50
BIIB US Equity	BIOGEN INC	45329.57	226.39	9.61	7.76	6.13	6.50
CELG US Equity	CELGENE CORP	65672.09	93.76	13.87	7.38	11.43	-
GILD US Equity	GILEAD SCIENCES INC	80471.44	62.95	11.93	9.30	7.06	-
AMGN US Equity	AMGEN INC	108936.81	177.47	13.48	11.78	9.03	-
Ticker	Name	P/FCF		P/B		P/S	
		2018	2019 Est	2018	2019 Est	2018	2019 Est
Median	Median	10.99	8.00	6.35	3.11	4.04	3.68
BIIB US Equity	BIOGEN INC	8.68	6.59	3.48	2.64	3.51	3.30
CELG US Equity	CELGENE CORP	13.53	7.54	10.63	-	4.37	3.70
GILD US Equity	GILEAD SCIENCES INC	10.96	8.46	3.78	3.11	3.70	3.66
AMGN US Equity	AMGEN INC	11.02	10.69	8.91	7.45	4.91	4.78

Growth Analysis						
Ticker	Name	Total Revenue(Million)	Revenue Growth		EBITDA Growth	
			2018	2019 Est	2018	2019 Est
Median	Median	18704	6.77%	-	5.49%	4.35%
BIIB US Equity	BIOGEN INC	13452.9	9.61%	2.17%	9.63%	11.44%
CELG US Equity	CELGENE CORP	15281	17.52%	11.97%	11.58%	6.12%
GILD US Equity	GILEAD SCIENCES INC	22127	-15.24%	-1.46%	-31.40%	-31.40%
AMGN US Equity	AMGEN INC	23747	3.93%	-4.16%	1.35%	2.58%
Ticker	Name	Total Revenue(Million)	EPS Growth		FCF Growth	
			2018	2019 Est	2018	2019 Est
Median	Median	18704	-3.68%	4.17%	-1.05%	0.00%
BIIB US Equity	BIOGEN INC	13452.9	42.34%	9.26%	47.06%	0.00%
CELG US Equity	CELGENE CORP	15281	-25.10%	20.67%	-2.54%	0.00%
GILD US Equity	GILEAD SCIENCES INC	22127	-22.40%	-0.93%	-33.89%	0.05%
AMGN US Equity	AMGEN INC	23747	15.05%	-1.65%	0.43%	0.00%

Return Analysis							
Ticker	Name	Total Assets(Million)	ROIC	ROE		ROA	
				2018	2019 Est	2018	2019 Est
Median	Median	49577.5	18.49%	41.97%	52.29%	13.47%	12.90%
BIIB US Equity	BIOGEN INC	25288.9	27.12%	38.31%	34.74%	20.08%	-
CELG US Equity	CELGENE CORP	35480	19.73%	76.09%	55.66%	15.17%	17.88%
GILD US Equity	GILEAD SCIENCES INC	63675	13.94%	33.10%	48.92%	10.34%	12.08%
AMGN US Equity	AMGEN INC	66416	17.26%	45.63%	58.24%	11.77%	12.90%

Profitability Analysis										
Ticker	Name	Net Income(Million)	Gross Margin		EBITDA Margin	Operation Margin		Profit Margin		FCF Margin
			2018	2019 Est	2018	2018	2019 Est	2018	2019 Est	2018
Median	Median	5949.46	84.62%	86.03%	47.42%	43.32%	50.28%	34.42%	40.15%	37.03%
BIIB US Equity	BIOGEN INC	4916.98	86.50%	86.04%	51.33%	47.70%	50.05%	36.52%	39.84%	40.27%
CELG US Equity	CELGENE CORP	4975.93	96.16%	96.14%	38.13%	41.67%	56.42%	32.57%	43.43%	31.68%
GILD US Equity	GILEAD SCIENCES INC	6923	78.06%	86.03%	43.52%	42.31%	50.25%	31.29%	38.12%	33.79%
AMGN US Equity	AMGEN INC	8735.62	82.73%	85.76%	51.41%	44.33%	50.31%	36.26%	40.47%	44.46%

Leverage Analysis						
Ticker	Name	Debt/Equity	Debt/Cap	EBITDA / Interest Expense	Debt/EBITDA	Assets/Equity
Median	Median	199.16%	64.50%	9.74	2.81	4.14
BIIB US Equity	BIOGEN INC	45.55%	31.30%	37.06	0.86	1.94
CELG US Equity	CELGENE CORP	329.01%	76.69%	9.45	3.48	5.76
GILD US Equity	GILEAD SCIENCES INC	126.88%	55.92%	10.02	2.84	2.96
AMGN US Equity	AMGEN INC	271.43%	73.08%	8.96	2.78	5.31

Biogen

Liquidity Analysis						
Ticker	Name	Mkt Cap(Million)	Cash per Share		Current Ratio	Quick Ratio
			2018	2019 Est		
Median	Median	73071.76	12.15	14.52	2.55	2.22
BIIB US Equity	BIOGEN INC	45329.57	30.20	34.34	2.32	1.67
CELG US Equity	CELGENE CORP	65672.09	7.22	12.43	2.23	2.00
GILD US Equity	GILEAD SCIENCES INC	80471.44	6.47	7.44	3.38	3.15
AMGN US Equity	AMGEN INC	108936.81	17.09	16.61	2.79	2.44

Please review:

Workbook: BIIB_Valuation.xls for discounted cashflow model