Equity Report

Becton, Dickinson and Company (NYSE:BDX)

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***Recommendation Date**: Nov 21, 2019*

Company Overview:

Becton, Dickinson and Company is a medical device manufacturer and distributor. The Company sells a broad range of medical supplies, devices, laboratory equipment and diagnostic products which are distributed through independent distribution channels and directly by BD through sales representatives. End-users of the Company's products include healthcare institutions, physicians, life science researchers, clinical laboratories, the pharmaceutical industry and the general public (Company 10K).

BD has acquired two big companies in recent years, Carefusion in Y2015 and C.R. BARD in Y2018. The stock is currently traded at **$253.86 /share** (Nov 25, 2019) with a market cap of **68.53 billion**. The stock is traded at **16.8x** EV/EBITDA ratio and **64.2x** P/E ratio (Diluted Earnings before Extra).

Recommendation

Sell (for next 12 months)

Investment Rationale

- Management has not generated expected synergy via M&A since Y2015 for the two acquisitions. The synergy calculation (see Appendix for details) that appeared in Y2019 is still below the expected synergy forecast of $300MM per year.
- Altman Z-scores have been dropping since Y2009. This is a red flag; it also indicates that the company is in the zone of ignorance of its financial health.
- The company is currently undervalued for **16%** in Base Case-Scenario 1 (using a WACC of 5.8%). But overvalued for **58%** in the Base Case-Scenario 2 using a WACC of 9% based on Duke CFO survey. We recommend a sell based on the option analysis and assumptions on all possible outcomes.
- **Earnings Per Share Forecast:**
- **EPS (2019E): $5.17**

  EPS diluted (2019E): $5.08

  EPS (2020E): $5.25- 5.35

  EPS diluted (2020E): $ 5.16-5.26

  Dividend: $3.08 (Y2019A); $3.17 (Y2020E)

Table of Contents

Introduction

Company Background and Product Segments

Becton Dickinson and Company (BD, also BDX as stock ticker) is a company with a long history. It is the first company to develop the needle and syringes. The company now has three product segments and numerous product lines. Products have also diversified away from syringes and needles. BD is a developer, producer , and sale of the various medical device product lines, including insulin pump, etc.

Financial Analysis

1. Business model and Revenue

BD has three reportable business segments, BD Medical, BD Life Science, and BD Interventional. BDX's Revenue growth rate has shown signs of decreasing from 2003 to 2014. In Y2015, BDX acquired CareFusion Inc. for **$ 14.2B**, which boost up the revenue growth to double-digit growth for the two years post-acquisition. In Y2017, BDX acquired another firm, C.R. BARD, for **$ 25.8B**. The company has announced in analyst call (Q4 2019) that they will not be doing mega-merger for a while, and they also have **divested ~1.0B** assets/product lines in Y2018.

In Q4-2019 company reported revenue growth (yoy) results for the year(presentation source: Ref1. https://seekingalpha.com/article/4302784-becton-dickinson-company-2019-q4-results-earnings-call-presentation). The company reported a few sets of growth rates in the presentation. We calculated the nominal revenue growth rate based on the full-year results reported by management (5.1%). We also used the 5.1% as the base-case scenario in DCF analysis.

Segments	Rev-Q4 2019 ($MM)	Growth (YOY) based on Q4 result	Full Year results
Medical	$ 2, 437	3.9%	5.1%
Life Science	$1,134	2.3%	4.9%
Intervention al	$1,013	6.9%	5.5%
Total	$4, 584	4.2% (weighted)	5.1%(weighted)

Exhibit 1. Author generated Chart, data source -Ref 1.

Notes: We used the FXN% reported value for the full year and used % Growth based on Q4 results as a check to see if there is any surprise between Q4 results and the full year results.

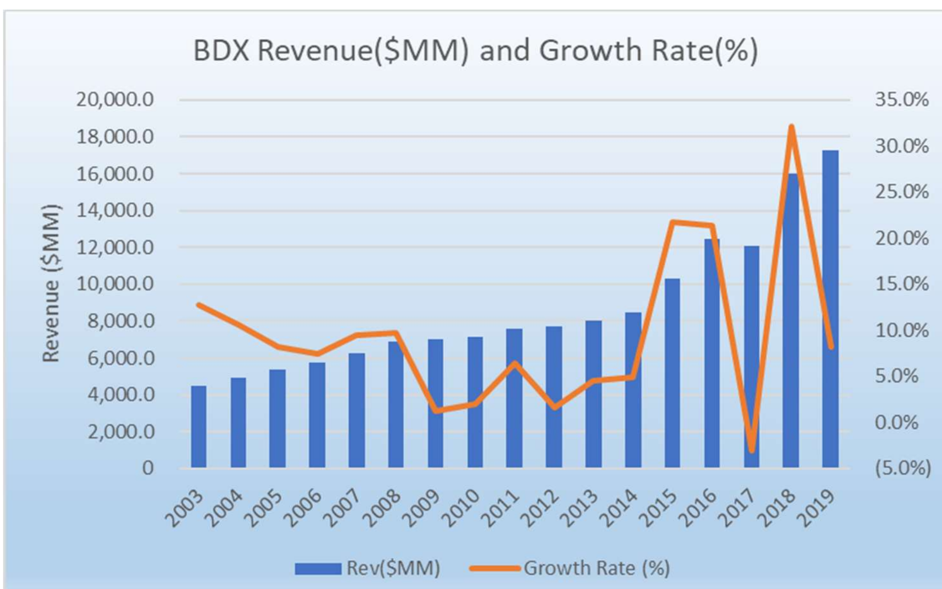
We have the below breakdown forecast for each segment of BD's business listed below. The growth rate assigned for each segment were based on management's own estimation in the Q4 analyst call and our own analysis in this report.

		2018		2019		2020		2021		2022		2023		2024
Sales		15.983,0		17.290,0		18.175,9		18.940,1		19.614,8		20.136,1		20.522,2
BD Medical	53,91%	8.616,0	54%	9.064,0	52%	9.499,1	53%	9.955,0	53%	10.353,2	53%	10.684,5	53%	10.898,2
				5,20%		4,80%		4,80%		4,00%		3,20%		2,00%
BD Life Science	27,09%	4.330,0	27%	4.300,0	24%	4.343,0	23%	4.386,4	23%	4.430,3	22%	4.474,6	22%	4.497,0
				-0,69%		1,00%		1,00%		1,00%		1,00%		0,50%
BD Interventional	19,00%	3.037,0	19%	3.926,0	24%	4.318,6	24%	4.577,7	25%	4.806,6	25%	4.950,8	25%	5.099,3
				29,27%		10,00%		6,00%		5,00%		3,00%		3,00%
% Total Growth				8,18%		5,12%		4,20%		3,56%		2,66%		1,92%

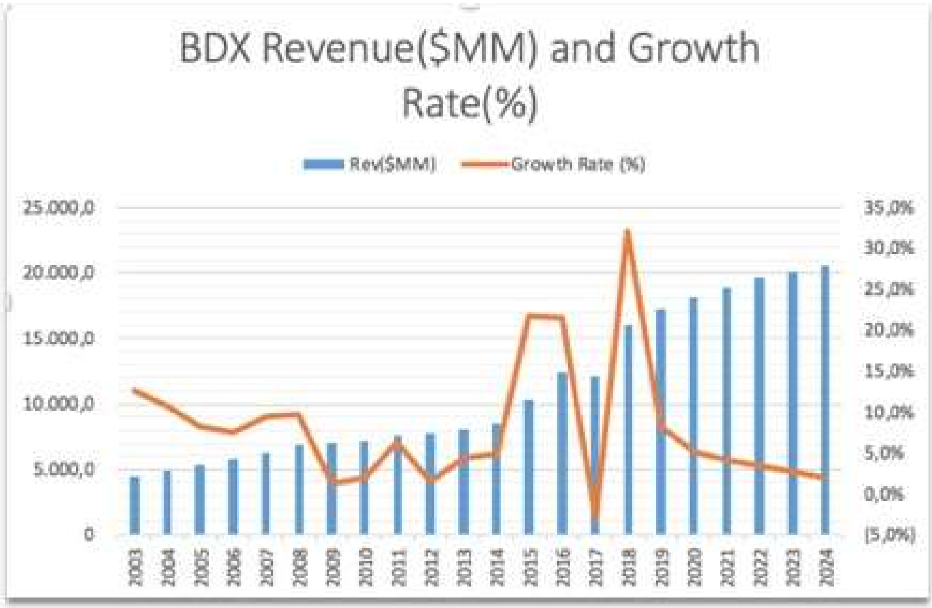
Source: Author generated chart, Data source-Capital IQ

The reasons that we believe there is a downward declining growth rate for BD in the next five years are:

1. We mentioned previously that the two major acquisitions have not provided satisfying topline growth/synergy , we would not expect an increasing growth rate that was previously expected. Also BD is a mature company, higher growth rate is unlikely and so far only showed up in the first year after the recent acquisitions and did not sustain after that year.
2. Medical device sector has had several major deals in recent years, in response to a widespread slowdown in revenue growth, consolidation among healthcare providers, and increased pressure from healthcare payers will put pressure on the healthcare costs for the industry. The intensive competition will only make things worse.

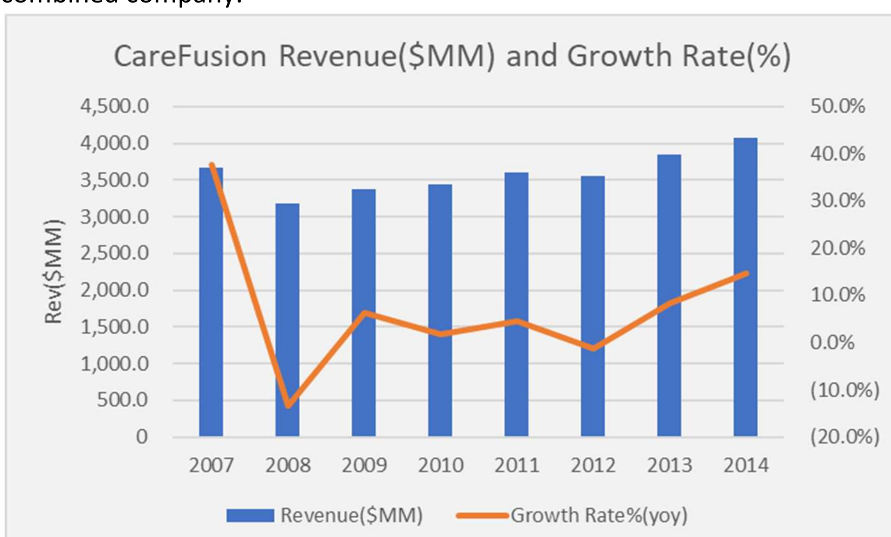


BDX Revenue and Growth
Source: Author generated chart, Data source-Capital IQ

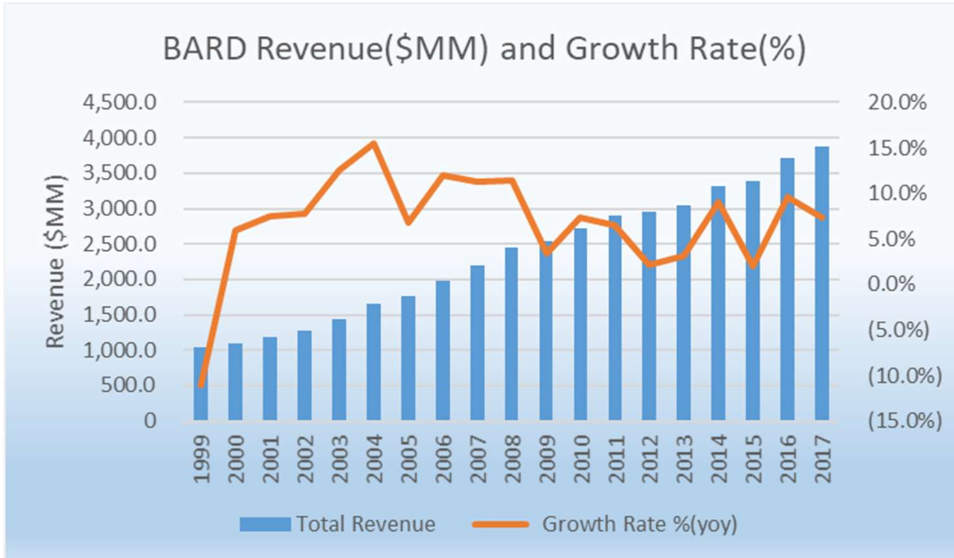


BDX Revenue and Growth with forecast years from Y2020 to Y2024
Source: Author generated chart, Data source-Capital IQ

About the recent M&A activities, as independent companies, Carefusion and BARD both looked attractive, given the nice revenue stream with a steady growth rate. But we don't think the acquisitions have generated any synergies to reflect on the revenue growth since Y2015. See charts below for Carefusion and BARD Revenue and yoy growth rate before the BD acquisitions, respectively. And see Appendix for detailed calculations on Synergy for revenue of the combined company.



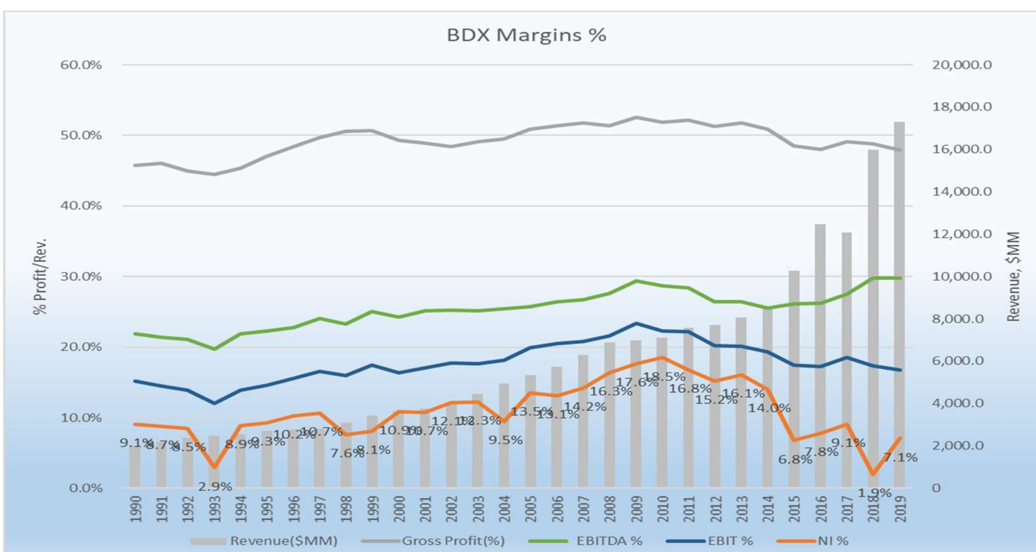
CareFusion Revenue and Growth prior to BD Acquisition
Source: Author generated chart, Data source-Capital IQ



C.R. BARD Revenue and Growth prior to BD Acquisition
Source: Author generated chart, Data source-Capital IQ

2. Profits

The gross profit margin for BDX has been a steady increase since the 1990s and peaked around 2009. After that, the gross profit starts to decrease over time. This is reflected in the net income margin drop significantly since Y2009 from double-digit to single-digit with Y2018 being the lowest (1.9%). Even though EBITDA margin has been increasing in the recent two years, EBIT margin is not gaining an upward trend yet. This indicates that business competitiveness (organic growth) has losing momentum over the years. Recent M&A activities are seen as management is seeking external inorganic growth.



Percentage of Profits by Revenue for BDX (Y1990-Y2019)
Source: Author generated chart, Data source-Capital IQ

3. Costs

COGS

The % Cost of Goods to Revenue is 52% for Y2019. This value has been consistent at 51% to 52% level since Y2015. We used **52% COGS as a percentage of Revenue** for future year forecast in the DCF. This value grows with revenue.

SG&A cost

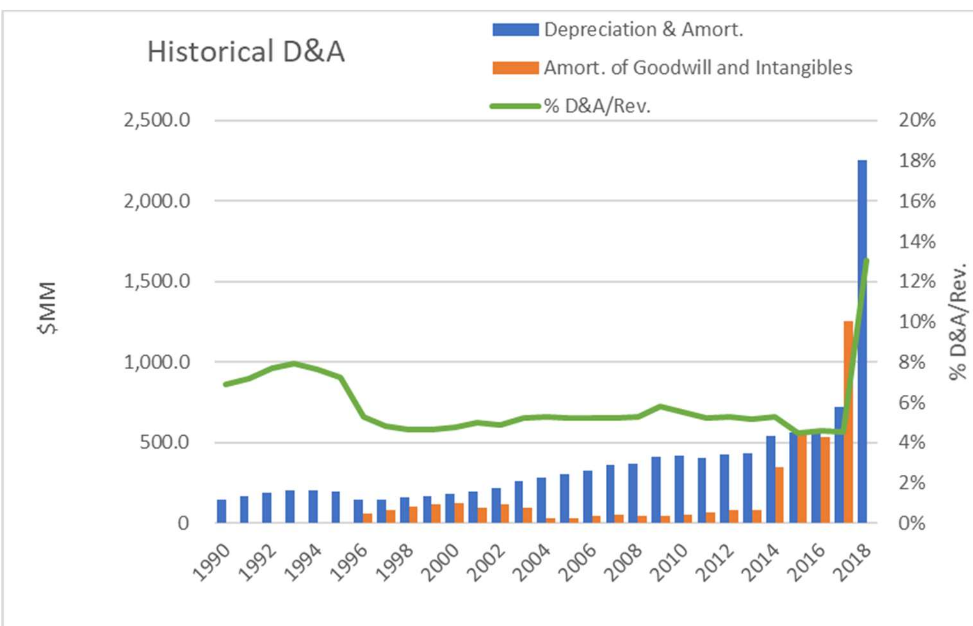
The % SG&A cost to Revenue is 25% for Y2019. This value has also been consistent at 24% to 25% since Y2015. We used **25% SG&A cost as a percentage of Revenue** for future year forecast in the DCF. This value grows with revenue.

R&D cost

The **% R&D cost to Revenue is 6%** for Y2019. This value has been consistent at 6% since Y2015. We used 6% for future year forecast in the DCF. This value grows with revenue.

4. D&A

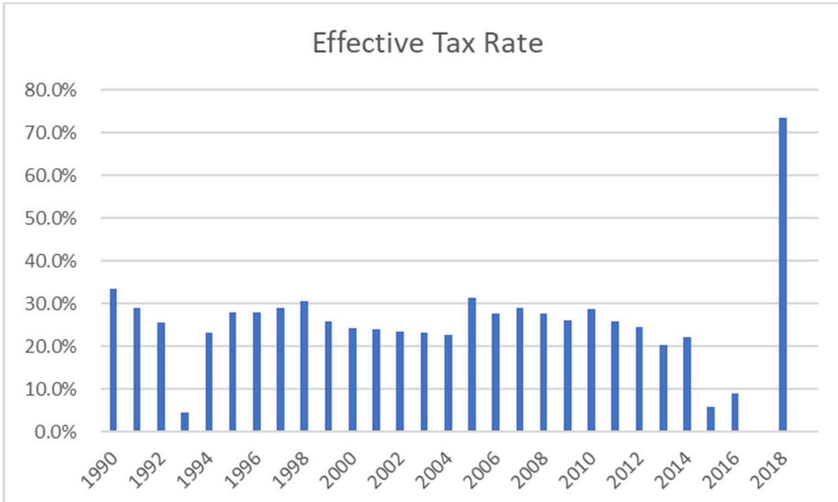
The D&A ratio to Revenue has been very consistent for this company except for Y2019. See chart below. Historical D&A ratio to Revenue has always been 5%-6% (average 5.1%) from Y1997 to Y2018. In Y2019, the D&A jumped up to 13%. We think this jump in D&A is related to the BD's acquisitions as the amortization of goodwill and intangibles also increased significantly since Y2015 (Carefusion acquisition in Y2015 and BARD acquisition in Y2017). Based on management's estimation that they will not be doing big-ticket M&A for a while, we believe it is reasonable to use 5.1% D&A/ Rev. ratio for the DCF calculation.



Historical D&A (Left Axis, $MM) and % D&A/Rev. (Right Axis, %)
Source: Author generated chart, Data source-Capital IQ

5. Effective Tax Rate

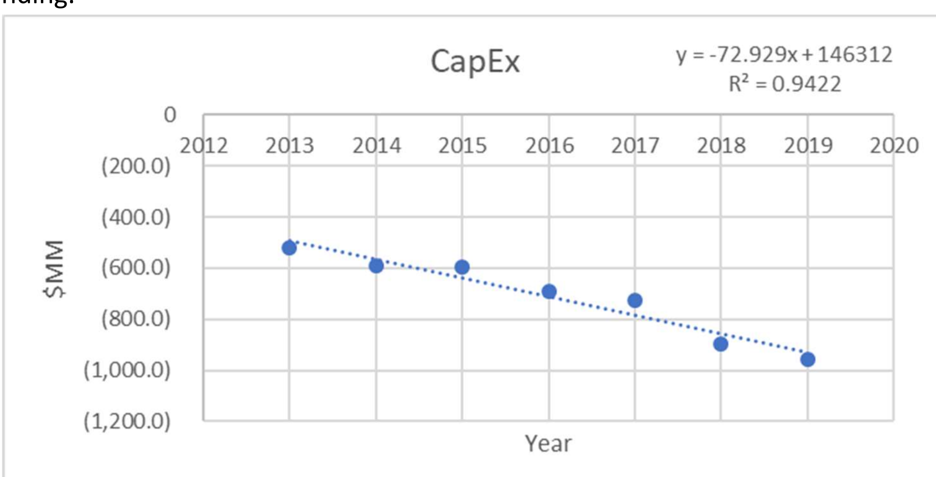
The effective tax rate for BD is around 25% on the years with a positive EBT (Y2005-Y2012). Given there was a tax code change in Y2018, we used a **21%** for the effective income tax rate in the Cost of Debt calculation.



Historical Effective Tax Rate
Source: Author generated chart, Data source-Capital IQ

6. Capital Expenditure (CapEx)

Capital Expenditure for BD has been predictive. See CapEx in the past five years. Given that the CapEx spending has been steadily growing over the years. We used the linear equation shown in the chart below to forecast the future CapEx spending.



Source: Author generated chart, Data source-Capital IQ

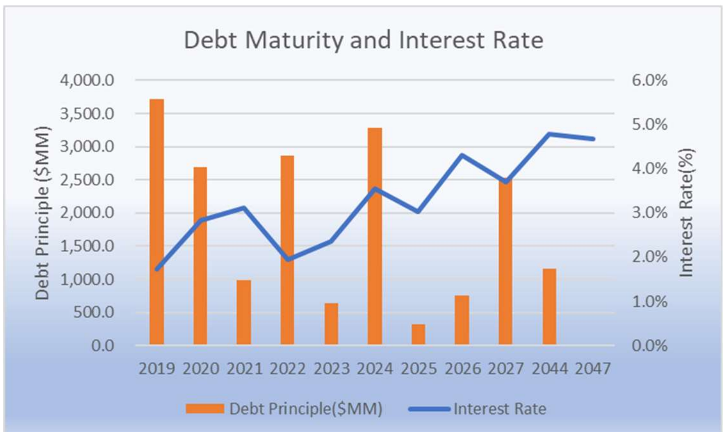
7. Change in Net Working Capital (Chg in NWC)

Overall, changes in net working capital for past years has been low. The observed value of Chg in NWC against Revenue has an average value of 0.4% with minimum of -3% and maximum of 4% since Y2011(Avg= 0.4%, Min = -3 % and Max = 4% of Revenue level).

We used an average value of 56 million observed in the change in NWC since Y 2011. We keep this value constant for the future forecast given that the levels have been consistently low.

8. Cost of Debt

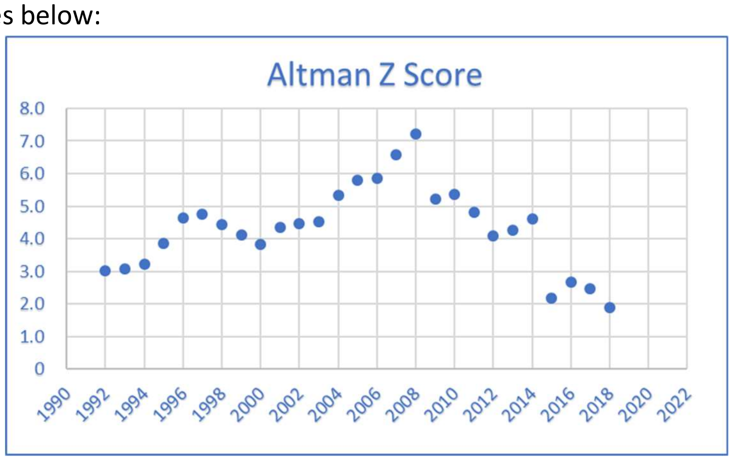
The debt interest payment for the company is below. The average cost of debt is calculated to be 3.3% based on the interest paid and total debt outstanding for Y2019.



9. Altman Z-score

The Altman Z-score for this company has been dropping into the zone of ignorance region. (Z-score < 1.8- bankruptcy likely; 1.81<Z-score<3 – Zone of ignorance; Z-score > 3- Healthy, source Link) . BD's Z-score has been below 3 in the past four years and recently just dropped to 1.8.

See BD's historical Z-scores below:



10. Risks

There are a few risks worth noting about the company.

1. **Medical Device Tax in US**

   There is a 2.3% tax imposed on the medical device per Affordable Care Act. It was suspended in Y2019, but will reinstate in Y2020(Per company 10K), which will negatively impact on US sales in Y2020.

2. **Currency Exchange Rate Risk**

   Significant portion of the Revenue (44%) is from the international market, which is affected by foreign currency exchange rate changes. Currency had a negative impact of 90 basis points on gross profit margin in Y2019, which was greater than anticipated by management. Operating margin declined 150 basis points in the 4th quarter of 2019 or 50 basis points on a currency neutral basis. This is going to be an ongoing risk for this company.

3. **Regulatory/Quality/Compliance Risks (EU and US)**

   In Y2017 and Y2018, FDA has issued two warning letters to BD's site in Franklin Lakes, New Jersey, on various products, this indicates the company has quality and compliance concerns on products.

   Stricter EU regulation will negatively impact company's performance starting in Y2020. (The European Union ("EU") has adopted the EU Medical Device Regulation (the "EU MDR") and the In Vitro Diagnostic Regulation (the "EU IVDR"), each of which impose stricter requirements for the marketing and sale of medical devices, including in the area of clinical evaluation requirements, quality systems and post- market surveillance. Manufacturers of currently approved medical devices will have until May 2020 to meet the requirements of the EU MDR and until May 2022 to meet the EU IVDR. Complying with the requirements of these regulations will incur significant expenditures. Failure to meet these requirements could adversely impact our business in the EU and other regions that tie their product registrations to the EU requirements. From company 10K)

Valuation-DCF analysis

To perform a DCF analysis, we used the current D/V (51%) and E/V (49%) ratio based on the company capital structure. We calculated **levered equity beta (1.1)** for BD (Accessed on Nov 25, 2019 from Yahoo Finance). Using CAPM model assuming 6.5% market risk premium and 1.95% risk-free rate, we calculated **Cost of Equity 9%.** We also used company senior note **cost of debt of 3.3%** and adjusted with the effective tax rate of 21% to obtain the after-tax cost of debt (3%). We got a **WACC of 5.8%** (WACC-1)for the company. We used this WACC in DCF Analysis-Scenario 1(Base Case-Scenario1).

Given the low-interest-rate environment that we are in right now, we believe the low level may not sustain. Therefore the Terminal value calculated in DCF model is skewed to an un-realistically high level. Consequently, we also used another source for WACC. Duke CFO survey (Ref 2, page 140) reported that the **WACC used by CFOs are at around 9%**(WACC-2). We used this 9% WACC in DCF Analysis-Base Case-Scenario 2(Scenario 2).

Duke CFO Corporate Decision-Making - North America (US and Canada)- Survey 1 - Quarter 1, 2019

19. Consider the following about your company's weighted average cost of capital (WACC) and hurdle rate.

	Mean	SD	95% CI	Median	Minimum	Maximum	Total
What is your company's WACC?	9.56	5.41	8.90 - 10.21	9	0	55	262
What is the hurdle rate that your company uses to evaluate investment projects? (The "hurdle rate" is typically the minimum rate of return a project is required to earn in order for a company to pursue the project.)	14.04	9.59	12.87 - 15.21	12	0	75	258

Hurdle Rate - WACC: (Both Hurdle Rate and WACC need to be answered to calculate these averages)

	Mean	SD	95% CI	Median	Minimum	Maximum	Total
Subtract WACC from HURDLE	4.43	9.76	3.21 - 5.64	2	-52	70	248

Ref 2: https://www.cfosurvey.org/wp-content/uploads/2019/04/Wave1-Toplines_USCan_CFOSS.pdf, page 140

Scenario 1. Base Case Scenario 1-Use 5.8% WACC

In the Base case Scenario, we used model forecasted revenue growth rate from Y2020 to 2023 for revenue forecast, as reported by the management (5.1 % revenue weighted growth rate in Y2020 and gradually drop in 5 years to terminal growth rate of 2%), when using WACC of 5.8%, BDX stock is currently **16% undervalued** comparing to the estimated value.

Column1	Colu	Column	Base2	*Forecast Years*	Column3	Column4	Column5	Column56	*Terminal Year*
$MM		0	0	1	2	3	4	5	6
		2018	2019	2020	2021	2022	2023	2024	*Terminal Year*
Revenues		$ 15,983	$ 17,290	$ 18,172	$ 18,953	$ 19,615	$ 20,144	$ 20,547	$ 20,547
Revenue growth rate			*8.2%*	*5.1%*	*4.3%*	*3.5%*	*2.7%*	*2%*	2%
COGS		$ 8,185	$ 9,002	$ 9,461	$ 9,868	$ 10,212	$ 10,488	$ 10,698	
%			*52%*	*52%*	*52%*	*52%*	*52%*	*52%*	
SG&A		$ 4,015	$ 4,332	$ 4,553	$ 4,749	$ 4,914	$ 5,047	$ 5,148	
%		*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	
R&D Costs		$ 1,006	$ 1,062	$ 1,116	$ 1,164	$ 1,205	$ 1,237	$ 1,262	
%		*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	
EBITDA		$ 2,777	$ 2,894	$ 3,042	$ 3,172	$ 3,283	$ 3,372	$ 3,439	
%			*17%*	17%	17%	17%	17%	17%	
(-)D&A			$ 865	$ 909	$ 948	$ 981	$ 1,007	$ 1,027	
% of Rev.			*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	
EBIT			$ 2,030	$ 2,133	$ 2,225	$ 2,302	$ 2,365	$ 2,412	
Taxes			$ 426	$ 448	$ 467	$ 484	$ 497	$ 506	
EBIT (1-t) or EVA			$ 1,603	$ 1,685	$ 1,758	$ 1,819	$ 1,868	$ 1,905	
(+)D&A			$ 865	$ 909	$ 948	$ 981	$ 1,007	$ 1,027	
(-)Capex		$ (895.0)	$ (957)	$ (946)	$ (1,018)	$ (1,092)	$ (1,165)	$ (1,238)	
%PP&E									
(-)Chg NWC			$ 50	$ 50	$ 50	$ 50	$ 50	$ 50	
FCF			$ 3,375	$ 3,490	$ 3,673	$ 3,842	$ 3,990	$ 4,121	$ 4,121
Terminal Value perpetuity growth)									$ 110,186
Equity Value									
Discounted FCF			$ -	$ 3,490	$ 3,471	$ 3,431	$ 3,368	$ 3,287	$ 110,186
Discount Factor				1.00	0.95	0.89	0.84	0.80	0.75
PV of FCF		$ 17,047							
PV of TV		$ 83,061							
EV		$ 100,108							
Plus Cash & ST Inv.		$ 566							
Less Debt		$ 19,390							
Less (Minority Interest)		$ -							
Estimated Equity Value		$ 81,284							
Current market cap adj.		$ 67,459							
Total share outstanding (Millions)		269.90							
Estimated Share price ($/Share)		$ 301.16							
Current Share Price($/Share)		$ 253.86							
Undervalued		**16%**							

Assumptions	
D/V	51%
E/V	49%
Cost of Debt	3.3%
Effective Tax Rate	21%
After-tax CoD	3%
RFR	2.0%
MRP	6.5%
Levered Beta	1.1
Cost of Equity	9%
WACC-1	**5.8%**
Terminal Growth Rate	2%
TV (perpetuity)	$ (210,154)
PV of FCF	$ 17,047
PV of TV(perpetuity)	$ (167,632)
Market Cap/Estimated EV	83%

Scenario 2. Base Case Scenario 2- use 9% WACC

Given that the low interest rate environment can skew Terminal Valuation significantly. Also based on revenue growth rate of the Base Case Scenario, if we assume that the recent CFO survey provided an accurate WACC of 9%. Then we can see BDX stock is **over valuated for 58%.**

Column1	Colu	Column	Base2	Forecast Years	Column3	Column4	Column5	Column56	Terminal Year
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Revenue growth rate			*8.2%*	*5.1%*	*4.3%*	*3.5%*	*2.7%*	*2%*	2%
COGS		$ 8,185	$ 9,002	$ 9,461	$ 9,868	$ 10,212	$ 10,488	$ 10,698	
%			*52%*	*52%*	*52%*	*52%*	*52%*	*52%*	
SG&A		$ 4,015	$ 4,332	$ 4,553	$ 4,749	$ 4,914	$ 5,047	$ 5,148	
%		*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	
R&D Costs		$ 1,006	$ 1,062	$ 1,116	$ 1,164	$ 1,205	$ 1,237	$ 1,262	
%		*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	
EBITDA		$ 2,777	$ 2,894	$ 3,042	$ 3,172	$ 3,283	$ 3,372	$ 3,439	
%			*17%*	17%	17%	17%	17%	17%	
(-)D&A			$ 865	$ 909	$ 948	$ 981	$ 1,007	$ 1,027	
% of Rev.			*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	
EBIT			$ 2,030	$ 2,133	$ 2,225	$ 2,302	$ 2,365	$ 2,412	
Taxes			$ 426	$ 448	$ 467	$ 484	$ 497	$ 506	
EBIT (1-t) or EVA			$ 1,603	$ 1,685	$ 1,758	$ 1,819	$ 1,868	$ 1,905	
(+)D&A			$ 865	$ 909	$ 948	$ 981	$ 1,007	$ 1,027	
(-)Capex		$ (895.0)	$ (957)	$ (946)	$ (1,018)	$ (1,092)	$ (1,165)	$ (1,238)	
%PP&E									
(-)Chg NWC			$ 50	$ 50	$ 50	$ 50	$ 50	$ 50	
FCF			$ 3,375	$ 3,490	$ 3,673	$ 3,842	$ 3,990	$ 4,121	$ 4,121
Terminal Value perpetuity growth)									$ 60,044
Equity Value									
Discounted FCF			$ -	$ 3,490	$ 3,471	$ 3,431	$ 3,368	$ 3,287	$ 60,044
Discount Factor				1.00	0.95	0.89	0.84	0.80	0.75
PV of FCF		$ 17,047							
PV of TV		$ 45,263							
EV		$ 62,310							
Plus Cash & ST Inv.		$ 566							
Less Debt		$ 19,390							
Less (Minority Interest)		$ -							
Estimated Equity Value		$ 43,486							
Current market cap adj.		$ 67,459							
Total share outstanding (Millions)		269.90							
Estimated Share price ($/Share)		$ 161.12							
Current Share Price($/Share)		$ 253.86							
Overvalued		**58%**							

Assumptions	
D/V	51%
E/V	49%
Cost of Debt	3.3%
Effective Tax Rate	21%
After-tax CoD	3%
RFR	2.0%
MRP	6.5%
Levered Beta	1.1
Cost of Equity	9%
WACC-1	**5.8%**
WACC-2	9.00%
Terminal Growth Rate	2%
TV (perpetuity)	$ 60,044
PV of FCF	$ 17,047
PV of TV(perpetuity)	$ 47,895
Market Cap/Estimated EV	155%

Scenario 3. Best Case Scenario

Based on revenue growth rate of 7% yoy on BDX's best product line, if we assume that the new management team can do wonders and all of the product revenue would grow the same rate as the best product line. And also, if we assume the WACC of 5.8%. Then we have BDX is currently **undervalued 25%.** We think this scenario is unlikely based on the management assessment of the product growth rates (Ref. 1) are unlikely to reach 7%. The kind of level is just not sustainable in the long term.

Column1	Colu	Column	Base2	Forecast Years	Column3	Column4	Column5	Column56	Terminal Year
$MM		0	0	1	2	3	4	5	6
		2018	2019	2020	2021	2022	2023	2024	Terminal Year
Revenues		$ 15,983	$ 17,290	$ 18,500	$ 19,795	$ 21,181	$ 22,664	$ 23,570	$ 24,513
Revenue growth rate			8.2%	7.0%	7.0%	7.0%	7.0%	4.0%	2%
COGS		$ 8,185	$ 9,002	$ 9,632	$ 10,306	$ 11,028	$ 11,800	$ 12,272	
%			52%	52%	52%	52%	52%	52%	
SG&A		$ 4,015	$ 4,332	$ 4,635	$ 4,960	$ 5,307	$ 5,678	$ 5,906	
%		25%	25%	25%	25%	25%	25%	25%	
R&D Costs		$ 1,006	$ 1,062	$ 1,136	$ 1,216	$ 1,301	$ 1,392	$ 1,448	
%		6%	6%	6%	6%	6%	6%	6%	
EBITDA		$ 2,777	$ 2,894	$ 3,097	$ 3,313	$ 3,545	$ 3,793	$ 3,945	
%			17%	17%	17%	17%	17%	17%	
(-)D&A			$ 865	$ 925	$ 990	$ 1,059	$ 1,133	$ 1,179	
% of Rev.			5%	5%	5%	5%	5%	5%	
EBIT			$ 2,030	$ 2,172	$ 2,324	$ 2,486	$ 2,660	$ 2,767	
Taxes			$ 426	$ 456	$ 488	$ 522	$ 559	$ 581	
EBIT (1-t) or EVA			$ 1,603	$ 1,716	$ 1,836	$ 1,964	$ 2,102	$ 2,186	
(+)D&A			$ 865	$ 925	$ 990	$ 1,059	$ 1,133	$ 1,179	
(-)Capex		$ (895.0)	$ (957)	$ (946)	$ (1,018)	$ (1,092)	$ (1,165)	$ (1,238)	
%PP&E									
(-)Chg NWC			$ 50	$ 50	$ 50	$ 50	$ 50	$ 50	
FCF			$ 3,375	$ 3,537	$ 3,793	$ 4,065	$ 4,350	$ 4,552	$ 4,552
Terminal Value Perpetuity growth)									$ 121,724
Equity Value									
Discounted FCF			$ -	$ 3,537	$ 3,585	$ 3,631	$ 3,671	$ 3,631	$ 121,724
Discount Factor				1.00	0.95	0.89	0.84	0.80	0.75
PV of FCF		$ 18,055							
PV of TV		$ 91,759							
EV		$ 109,814							
Plus Cash & ST Inv.		$ 566							
Less Debt		$ 19,390							
Less (Minority Interest)		$ -							
Estimated Equity Value		$ 90,990							
Current market cap adj.		$ 67,459							
Total share outstanding (Millions)		269.90							
Estimated Share price ($/Share)		$ 337.13							
Current Share Price($/Share)		$ 253.86							
Undervalued		25%							

Assumptions	
D/V	51%
E/V	49%
Cost of Debt	3.3%
Effective Tax Rate	21%
After-tax CoD	3%
RFR	2.0%
MRP	6.5%
Levered Beta	1.1
Cost of Equity	9%
WACC-1	**5.8%**
Terminal Growth Rate	2%
TV (perpetuity)	$ 121,724
PV of FCF	$ 18,055
PV of TV(perpetuity)	$ 97,095
Market Cap/Estimated EV	74%

Scenario 4. Worst Case Scenario

We used a 2% growth rate and 9% WACC for the worst case scenario analysis. In this scenario, we assume the company growth rate is already at 2% as a mature company and no further higher growth for the next five years. We used a WACC(WACC-2) from the CFO survey. We obtained that the stock is **69%** overvalued in this Scenario.

Column1	Colu	Column	Base2	Forecast Years	Column3	Column4	Column5	Column56	Terminal Year
$MM		0	0	1	2	3	4	5	6
		2018	2019	2020	2021	2022	2023	2024	Terminal Year
Revenues		$ 15,983	$ 17,290	$ 17,636	$ 17,989	$ 18,348	$ 18,715	$ 19,089	$ 19,471
Revenue growth rate			*8.2%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2%*	2%
COGS		$ 8,185	$ 9,002	$ 9,182	$ 9,366	$ 9,553	$ 9,744	$ 9,939	
%			*52%*	*52%*	*52%*	*52%*	*52%*	*52%*	
SG&A		$ 4,015	$ 4,332	$ 4,419	$ 4,507	$ 4,597	$ 4,689	$ 4,783	
%		*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	
R&D Costs		$ 1,006	$ 1,062	$ 1,083	$ 1,105	$ 1,127	$ 1,150	$ 1,173	
%		*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	*6%*	
EBITDA		$ 2,777	$ 2,894	$ 2,952	$ 3,011	$ 3,071	$ 3,133	$ 3,195	
%			*17%*	17%	17%	17%	17%	17%	
(-)D&A			$ 865	$ 882	$ 899	$ 917	$ 936	$ 954	
% of Rev.			*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	
EBIT			$ 2,030	$ 2,070	$ 2,111	$ 2,154	$ 2,197	$ 2,241	
Taxes			$ 426	$ 435	$ 443	$ 452	$ 461	$ 471	
EBIT (1-t) or EVA			$ 1,603	$ 1,635	$ 1,668	$ 1,701	$ 1,735	$ 1,770	
(+)D&A			$ 865	$ 882	$ 899	$ 917	$ 936	$ 954	
(-)Capex		$ (895.0)	$ (957)	$ (946)	$ (1,018)	$ (1,092)	$ (1,165)	$ (1,238)	
%PP&E									
(-)Chg NWC			$ 50	$ 50	$ 50	$ 50	$ 50	$ 50	
FCF			$ 3,375	$ 3,413	$ 3,536	$ 3,661	$ 3,786	$ 3,913	$ 3,913
Terminal Value perpetuity growth)									$ 57,012
Equity Value									
Discounted FCF			$ -	$ 3,413	$ 3,341	$ 3,270	$ 3,196	$ 3,121	$ 57,012
Discount Factor				1.00	0.95	0.89	0.84	0.80	0.75
PV of FCF		$ 16,341							
PV of TV		$ 42,978							
EV		$ 59,318							
Plus Cash & ST Inv.		$ 566							
Less Debt		$ 19,390							
Less (Minority Interest)		$ -							
Estimated Equity Value		$ 40,494							
Current market cap adj.		$ 67,459							
Total share outstanding (Millions)		269.90							
Estimated Share price ($/Share)		$ 150.03							
Current Share Price($/Share)		$ 253.86							
Overvalued		**69%**							

Assumptions	
D/V	51%
E/V	49%
Cost of Debt	3.3%
Effective Tax Rate	21%
After-tax CoD	3%
RFR	2.0%
MRP	6.5%
Levered Beta	1.1
Cost of Equity	9%
WACC-1	**5.8%**
WACC-2	9.00%
Terminal Growth Rate	2%
TV (perpetuity)	$ 57,012
PV of FCF	$ 16,341
PV of TV(perpetuity)	$ 45,476
Market Cap/Estimated EV	167%

Valuation Rationale and Recommendations

Our valuation suggests that this stock is undervalued at **16%** in the Base Case Scenario-1 and overvaluated at **59%** in the Base Case Scenario-2. In Best Case Scenario, BDX is undervalued for **25%.** In the Worst-Case Scenario, the firm is overvalued at **69%**.

We believe that both the Base-Case Scenario 1 and 2 are equally valid with the WACC being used by CFO reflects the real-world situation and the WACC calculated by CAPM model with strong academic support. If we use an option analysis approach and assume it's equally likely to have a WACC of 5.8% or WACC of 9% in the valuation options, we can arrive at the following conclusion of that the option of buying BDX stock will result a **net loss of $24.5/share**.

	Probability	Possible gain/loss
Base Case-Scenario 1	50%	+$45
Base Case-Scenario 2	50%	-$94
Total Expected Value	-$24.5	

Since the recent acquisitions have not panned out to provide the synergies as expected. The company financial health status (based on Altman Z-score) has deteriorated over the recent three years. As well as that BDX's P/E ratio is currently traded in 66x while the rest of the S&P 500 companies traded at 23x P/E ratio on average so the pressure to sell BDX will build up (Chart below).

Author generated Chart- Source Capital IQ

Therefore, we think it is likely that this stock may go higher to about 16% more than the current price. However, the downside loss is currently out weighting the potential upside gain, when the economic conditions become less favorable for the company. Based on this analysis, we recommend a sell for the next 12 months.

Recommendation: Sell

Investment Horizon: next 12 months

Appendix

Merger Synergies on Revenue Streams

We analyzed the revenue synergies of the combined company by summing up the individual revenues from each firm (before the acquisition) and comparing it to the actual reported income as a whole by BDX. We found that the purchase of CareFusion did not generate any revenue synergy since deal time Y2015. There were significant revenue losses post the acquisition. If we use both company's revenue at Y2014 as a benchmark, the revenue loss from Y2015-Y2017 was totaled$ 2.7Billion (see orange sections of the CareFusion acquisition numbers). Similarly, there was no synergy realized in Y2018 post-BARD acquisition.

Symbol	Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A	CareFusion Alone($MM) (A)	3,598.0	3,550.0	3,842.0	4,081.0	4,081	4,081	4,081	4,081	4,081	4,081	4,081	4,081
	CF Growth Rate(%)	*4.6%*	*(1.3%)*	*8.2%*	*14.8%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
B	BDX alone (B)	7,584.0	7,708.0	8,054.0	8,446.0	8,446.0	8,446.0	8,446.0	8,446.0	8,800.7	9,170.4	9,555.5	9,956.8
	BDX growth rate(%)	*6.5%*	*1.6%*	*4.5%*	*4.9%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*4.2%*	*4.2%*	*4.2%*	*4.2%*
A+B (Exp)	BDX +CF(Exp)				12,527.0	12,527	12,527	12,527	12,527	12,882	13,251	13,637	14,038
Actual-Exp	Synergy on Rev. Gain(Loss) $MM					(2,245)	(44)	(434)					
C	BARD Rev($MM) (C)	2,896.4	2,958.1	3,049.5	3,323.6	3,389.1	3,714.0	3,875.4	3875	4143	4429	4734	5061
	BARD growth rate(%)	*6.5%*	*2.1%*	*3.1%*	*9.0%*	*2.0%*	*9.6%*	*7.3%*	*0.0%*	*6.9%*	*6.9%*	*6.9%*	*6.9%*
A+B+C	BDX+CF+BARD(Exp)								16,402	17,025	17,680	18,371	19,099
Actual	BDX +CF+BARD(Actual)	7,584.0	7,708.0	8,054.0	8,446.0	10,282.0	12,483.0	12,093.0	15,983.0	17,290.0	17,680	18,371	19,099
Actual-Exp	Synergy on Rev. Gain(Loss) $MM								(419.40)	265.47	-	-	-

Revenue Synergey and growth analysis for the Past two BD acquisitions(Carefusion and BARD)
Source: Author generated charts, Data from CIQ.

For the BARD acquisition, Combined revenue reported in Y2018 ($15.983MM) was also lower than two individual revenue streams combined ($ 4,116MM for BARD, assume a 6.9% revenue growth reported by management; $12,527 MM for BDX alone with 0% revenue growth from Y2017. Therefore, combined revenue should be $4,116MM+$12,527 MM= $16,643MM). In Y2019, the combined revenue is finally showing a positive gain of $12MM, which reflects a 4.5% yoy growth rate for BDX business alone (prior to acquisition).

If we assume the trend on revenue growth on each product line from these three companies will continue for the next three years (2020-2022), we have expected revenue grow to $ 19,388MM by Y2022.

It is apparent to see that these two mergers did not generate topline synergy in the years right after. Whether management can realize synergy in the long term, remains to be seen. Since the market is highly competitive and from management's estimation in recent analyst call (Q4 2019, Ref 1.) that the estimated growth rate in Y2020 should be around 5%. We used a growth rate of 4.2% for Y2020 and a perpetuity growth rate of 2% for Terminal Value estimation in 5 years in DCF (Base Case Scenario).

References:

1. https://seekingalpha.com/article/4302784-becton-dickinson-company-2019-q4-results-earnings-call-presentation
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