SIM Equity Research
Merck & Co., Inc.
July 15, 2020

Merck & Co., Inc MRK (NYSE)

Stock Price (as of 7/10/2020)	Target Price	Upside	Recommendation
$76.73	**$97.00**	**26.40%**	**BUY**

Summary

Merck & Co., Inc. (Merck), doing business as Merck Sharp & Dohme outside the United States and Canada, is a global health care company that delivers innovative health solutions through two reportable operating segments, Pharmaceutical and Animal Health.[2] The company is the 3rd largest company per market cap within the Health Care sector of the S&P 500.

Investment Thesis

We commend a BUY rating on MRK with a price target of $97.00, a 26.40% upside to the current stock price, with the following reasons:

- MRK is intrinsically undervalued due to the market volatility introduced by COVID-19 pandemic
- A higher than industry average growth rate is likely to be achieved as a result of strong sales from Keytruda®
- A better product mix and more efficient operation after the spin-off
- Have a good chance in turning pipeline programs into new products (25 programs in Phrase III)
- Global aging, growing cancer population and defensive in nature drive the industry

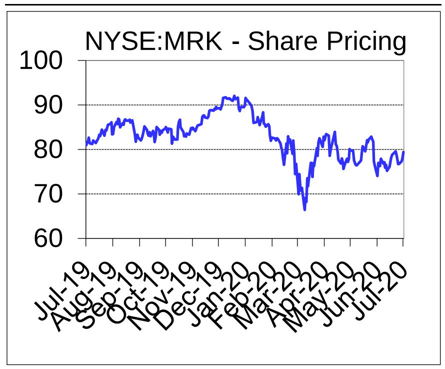
Risks

- Revenues decrease due to COVID-19 pandemic
- Heavily weighted Keytruda® could become problematic if any side effects emerge or a competitor product with similar efficacy in treating cancer is approved before the patent expires in 2028
- Diabetes 2 drug Januvia®/Janumet® sales (11.8% of total revenue) would decline significantly as the patent expires soon in July 2022
- Possible losses in currently engaged litigations and potential future litigations
- Organon spin-off may not achieve the desired outcome

Market Data	
Ticker	**MRK**
Sector	**Health Care**
Industry	**Pharmaceuticals**
Market Cap	**$197.51B**
Shares Out.	**2.52bn**
65d Avg Vol	**10,458,010**
Beta 5Y	**0.49**

Financial Data	
Revenue (2019)	**$46.84B**
Rev. Growth (YoY)	**10.75%**
Earnings (2019)	**$9.84B**
EPS (TTM)	**$3.94**

Performance History	
52 Week High	**$92.64**
52 Week Low	**$65.25**
Dividend Yield	**3.20%**



Analyst/Fund Information	
Fund	**OSU SIM**
Manager	**Royce West**
Analyst	**Vicky Zheng**
Phone	**937-594-7533**
Email	**zheng.1751@osu.edu**

Company Overview

General Overview

Merck & Co., Inc. (Merck) was founded as a subsidiary of the German company the Merck Group in 1891. During World War I, Merck was nationalized by the U.S. government. In 1917, Merck became an independent American company and owns the trade name "Merck" only in the United States and Canada as the original Merck based in Germany holds the rights to "Merck" name everywhere else. Thus Merck operates as Merck Sharp & Dohme (MSD) outside the United States and Canada.[1] Headquartered in Kenilworth, New Jersey, Merck employs approximately 71,000 employees worldwide with operations in more than 140 countries,[2] leading them to be the 3rd largest company per market cap within the healthcare sector of the S&P 500 as of July 1st 2020.[3]

In 2019, Merck generated $46,840 million in revenue, an 11% increase from 2018, and posted the earnings per share as $3.81. As a global health care company, Merck delivers innovative health solutions through four operating segments, which are Pharmaceutical, Animal Health, Healthcare Services and Alliances segments. Merck has recently sold some business in Healthcare Services segment and is in the process of divesting the remaining businesses. Thus the Pharmaceutical and Animal Health segments are the only two reportable segments.[2]

Business segments

In terms of sales by region, United States market topped with $20,325 million (43.4%), trailing with Europe, Middle East and Africa region at $12,707 million (27.1%), Japan at $3,583 million (7.6%), China at $3,207 million (6.8%), Asia Pacific(other than Japan and China) at $2,943 million (6.3%) and Latin America at $2,469 million (5.3%) (Figure 1). Among all the regions, China has been the fastest growing market. Sales in China grew 46.8% from 2018 to 2019, followed by both United States and Japan markets at the same rate of 11.6%.[2]

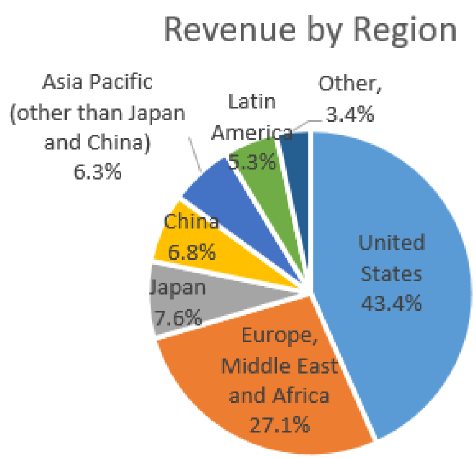


Figure 1

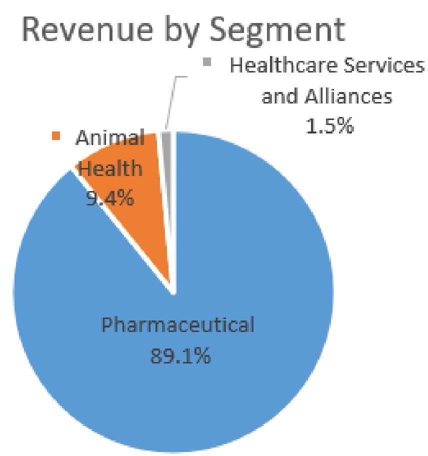


Figure 2

Pharmaceutical segment

Merck's pharmaceutical segment drives the most revenues within the company and the 2019 **growth rate is 11.07%**.[2] Pharmaceutical segment contributed $41,751 million to the total $46,840 million revenue, **89.1%** of total sales (Figure 2). This segment includes human health pharmaceutical and vaccine products. Human health pharmaceutical products include oncology, hospital acute care, immunology, neuroscience, virology, cardiovascular, and diabetes, generally sold by prescription, for the treatment of human disorders.[2] Human health vaccine products consist of preventive pediatric, adolescent and adult vaccines, primarily administered at physician offices.[2] Among all the pharmaceutical products, oncology products revenues increased the most at a rate of 53.4%, followed by vaccine products growth at 16.8%(Figure 3).

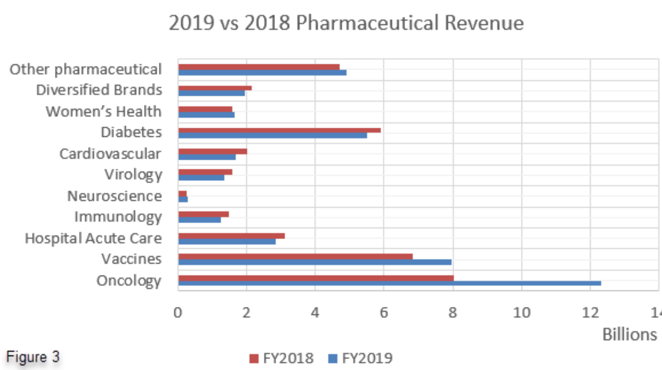


Figure 3

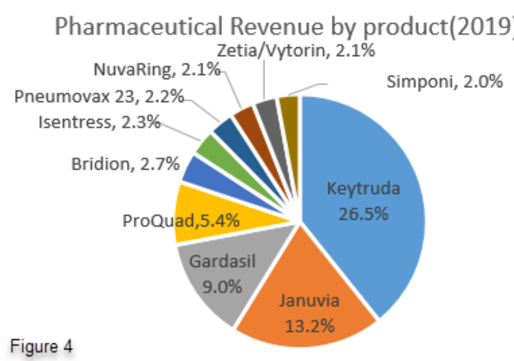


Figure 4

Merck's pharmaceutical products are as follows[2]:

Oncology

- **Keytruda**®: Merck's anti-PD-1 therapy, as monotherapy for the treatment of melanoma, lung cancer, head and neck cancer, Hodgkin lymphoma, esophageal cancer, cervical cancer, and stomach cancer etc. It's also used for the treatment in combination with other cancel chemotherapies. It's administrated by slowly pushing into a vein. Keytruda® is a star product with $11,084 million sales in 2019. It comprised **26.5%** of Pharmaceutical segment (Figure 4).
- Lynparza®: owned by UK pharmaceutical AstraZeneca, an oral poly polymerase inhibitor, for certain types of advanced ovarian, breast and pancreatic cancers. The combo of Keytruda® and Lynparza® shows positive results for certain cancer patients. In 2017, Merck allied with AstraZeneca in an $8.5 billion deal and Merck recognize half of the Lynparza® revenue.
- Lenvima®: an anti-cancer drug for certain types of thyroid cancer, hepatocellular carcinoma, renal cell carcinoma, and endometrial carcinoma. In 2018, Merck allied with Japanese drug maker Eisai on co-development and co-commercialization of Lenvima®. Merck and Eisai share the gross profit equally in cases where Lenvima® and Keytruda® are sold in combination.
- Emend®: an oral drug used for the prevention of chemotherapy-induced and post-operative nausea and vomiting.

Hospital Acute Care

- **Bridion®** Injection: a medication for the reversal of two types of neuromuscular blocking agents used during surgery. Bridion® comprised 4% of Pharmaceutical sales in 2019(Figure 4).
- Noxafil®:for the prevention of invasive fungal infections
- Primaxin®: an anti-bacterial product; Invanz®: for the treatment of certain infections; Cubicin®: an I.V. antibiotic for complicated skin and skin structure infections or bacteremia; Cancidas®: an anti-fungal product.

Immunology

- Simponi®: a once-monthly subcutaneous treatment for certain inflammatory diseases; Remicade: a treatment for inflammatory diseases, which Merck markets in Europe, Russia and Turkey.

Neuroscience

- **Isentress®**: an HIV integrase inhibitor for use in combination with other antiretroviral agents for the treatment of HIV-1 infection. Its sales increased 2.3% in 2019(Figure 4).
- Belsomra®: an orexin receptor antagonist indicated for the treatment of insomnia Virology
- Zepatier®: for the treatment of adult patients with chronic hepatitis C virus (HCV) genotype1 or GT4 infection.

Cardiovascular

- **Zetia®**: marketed as Ezetrol® in most countries outside the United States. Vytorin®: marketed as Inegy® outside the United States (Figure 4). Since 2020, both products belong to the new subsidiary company Organon & Co., wholly owned subsidiary by Merck. Refer the Recent Stock News section for more details.
- Atozet® and Rosuzet® are cholesterol modifying medicines, both marketed outside of the United States.
- Adempas®, a cardiovascular drug for the treatment of pulmonary arterial hypertension.

Diabetes

- **Januvia®** and **Janumet®** are for the treatment of type 2 diabetes. Januvia® sales in 2019 increased 9% from those of 2018(Figure 4).

Vaccines

- **Gardasil®**/Gardasil® 9 Vaccine: help prevent certain diseases caused by certain types of HPV. Its sales increased 13.2% in 2019(Figure 4).
- **ProQuad®**: a pediatric combination vaccine to help protect against measles, mumps, rubella and varicella. The sales raised 5.4% in 2019(Figure 4).
- **Pneumovax®** 23: help prevent pneumococcal disease. Its revenue grew 2.2% in 2019(Figure 4).
- M-M-R II®: help prevent measles, mumps and rubella
- Varivax®: help prevent chickenpox (varicella)
- RotaTeq®: help protect against rotavirus gastroenteritis in infants and children
- Vaqta®: help prevent disease caused by hepatitis A virus in persons 12 months of age and older.

Animal Health segment

The animal health segment comprised 9.4% of total revenue in 2019(Figure 2), a 4.3% increase from 2018. This segment discovers, develops, manufactures and markets a wide range of veterinary pharmaceutical and vaccine products. Besides, it prevents, treats and controls disease in all major livestock and companion animal species by offering health management solutions and services. Lastly, Merck also offers an extensive suite of products that can identify, trace and monitor live stocks. This segment sales are categorized into livestock and companion animals.[2]

Sustained Competitive Advantages

Differentiated Product. In 2014, Keytruda® was the first immunotherapy drug approved for use based on the genetic mutations of the tumor rather than the site of the tumor.[4] Since then, Keytruda® has obtained 28 approvals in various cancer treatments in the United States alone and many more worldwide. It has become the most successful anti-PD-1 therapy in the world and Merck continue researching Keytruda®'s efficacy with new drug combinations, on various cancer types, and obtaining cancer treatment approvals globally. This particular differentiated product yields a great first-mover competitive advantage for Merck in oncology space. The competitive advantage is sustainable unless a competitor develops a new product having similar efficacy in various cancers as Keytruda® does before the patent expires at 2028.[5]

Innovation. Merck evolve progressively during their 129 years of history. In 2014, Merck divested the consumer care line of business to Bayer and realigned their strategy to stay focus on oncology innovation.[2] It increased Research and Development investment by 51% to $10B in 2016 and has been maintaining the R&D investment at a close to $10B level since then, equivalent to 21%-26% of yearly revenue.[2] The success of the first PD-1 inhibitor discovery and development and a robust pipeline holding 44 programs in phase II, III and under review stages[16] demonstrate Merck's solid Research and Development capabilities over their peers and competitors.

Market Landscape

Merck rank the third in terms of market cap among the total eight pharmaceutical companies in the industry. Although healthcare sector has performed well relative to S&P 500 benchmark historically, pharmaceuticals industry has dropped back consistently. In the past ten years, the S&P 500 Health Care Sector (HCX) index has experienced a 268.03% increase, compared to a 165.9% return rate in pharmaceuticals industry (Figure 5). Pharmaceuticals industry usually faces challenges from growing competition in generic drugs, revenue losses due to patent cliffs and pricing pressure from legislations. Nonetheless, the defensive nature makes pharmaceuticals industry, or healthcare sector in general, attractive to investors, particularly during the late phase economic cycle or recession period.

	10 Year	5 Year	3 Year	1 Year	3 Month	YTD
Health care	268.03%	38.17%	29.57%	10.25%	18.35%	0.69%
S&P500	210.95%	53.11%	30.72%	6.33%	27.77%	-1.58%
Pharmaceuticals	165.90%	16.32%	14.27%	2.16%	8.13%	-3.24%

Figure 5 (Source: NetAdvantage)

Growth drivers

Merck have a competitive product mix and a best-in-class pipeline. In 2019, Keytruda® received 16 approvals from U.S. FDA, Japanese Ministry of Health, Labour and Welfare, European Commission, and China National Medical Products Administration, compared to 11 approvals in 2018.[2] With the expectation of acquiring more approvals at a global level, Keytruda® will keep its momentum in the coming several years. Besides, the recently released spin-off (See Recent Stock News section), representing about 15% of Merck's human health revenues based on 2020 forecast, reduces the number of products by 50% and the number of SKUs by 60%.[6] In Merck's Pipeline, there are 17 programs at phrase II, 25 programs at phrase III and 2 programs pending review, and 70% of them are for oncology drugs.[16] As a result of a more optimized product mix and a robust pipeline, Merck will achieve superior operating margins over time, generating additional resources to invest in innovation, the key to their long-term growth and value creation.[6] Meanwhile, Merck control the bottom line by streamlining the cost structure. In the past ten years, Merck had went through two global restructuring programs and the third one just started in early 2019.[2]

Recent Stock News

- On May 26th, Merck announced acquiring a privately held Austrian company Themis Bioscience to obtain one experimental vaccine, and working on a second vaccine in a form of partnership with NY-based non-profit IAVI. Both vaccines are at Pre-Clinical stage and intended for coronavirus. Besides, Merck is licensing the rights to an experimental COVID-19 drug that is at mid-stage testing.[7]
- Between March 4th 2020 and March 23rd 2020, S&P 500 dropped 28.52% due to coronavirus fears and the consequences caused by country lock down. Merck's share price declined by 19.97% to $65.88, the lowest value since the 2018 financial crisis. The stock has rebounded to a price range between $75 and $82 as investors remain hopeful with government stimulus plans so far and potential vaccine release for general use.[8]
- On Feb 5th 2020, Merck announced to spin-off products worth $6.5B from the women's health, selective cardiovascular products including Zetia and Vytorin, and diversified brands franchise into Organon & Co. (Organon), a new, independent and publicly traded company, through a distribution of Organon's publicly traded stock to Merck shareholders.[2] The distribution is expected to qualify as tax-free to the Company and its shareholders for U.S. federal income tax purposes. The Spin-Off is expected to be completed in the first half of 2021.[2] The spin-off allows Merck to focus on faster-growing cancer drugs, vaccines and animal-health products, however, it exposes more risk to Merck as the total revenue will be highly dependent on its star product Keytruda®. Shareholders didn't favor this news and the stock was down 3% on the day.[8]

Investment Thesis

Fundamental drivers

The health care demand is increasing due to the aging population in U.S. and other countries, particularly in oncology drugs. According to American Cancer Society, an estimated 80% of all cancers in the world are diagnosed in people at age 50 or older and approximately 39% of the population globally will develop cancer by the age of 75.[9] In very high Human Development Index (HDI) countries such as the United States, 60% of all newly diagnosed cancer cases occur at age 65 or older (Figure 6).[9] A very high (0.8-1.0) or a high HDI (0.7-0.79) score represents a country has a high life expectancy and gross national income per capita.[10] Figure 7 shows that mean HDI scores for Asia, North America and South America continents are in the high HDI range and Europe has a very high HDI score.[11] In other words, global demand in cancer treatment will steadily increase along with the aging demographic trend and many people in Europe, Asia, North America and South America can afford such expense due to their high HDI scores. In fact, this study resonates with Merck's sales by region from Figure 1.

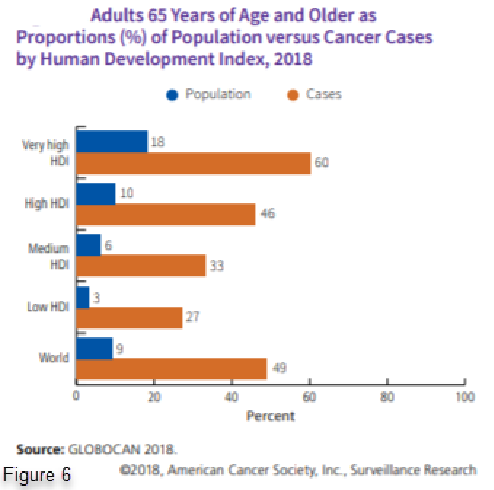


Figure 6

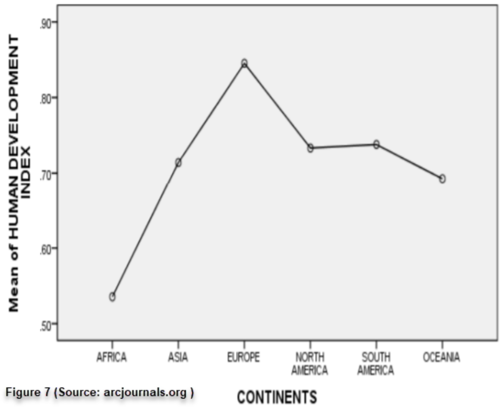


Figure 7 (Source: arcjournals.org)

Unlike oncology's high correlation with age, diabetes 2 can be caused by obesity and lack of exercise and is more common among general population. According to National Diabetes Statistics Report, 34.2 million people of all ages, or 10.5% of the U.S. population had diabetes and an estimated 34.5% of the adult U.S. population (88 million people) had prediabetes in 2018.[12] Typically, type 2 diabetes accounts for 90% to 95% of all diabetes cases.[12] This study indicates that the demand for diabetes 2 drugs is substantial.

Merck's two top selling products are in oncology and diabetes lines. Keytruda® and Januvia® contributed $11,084 million and $5,524 million in 2019, representing 23.7% and 11.8% of total sales, respectively.[2] The aforementioned strong demand in oncology and diabetes will drive Merck's revenue growth in the long run.

Economic sector

Though the nature of healthcare sector is defensive, its performance is still impacted by unemployment rate. Apparently, high unemployment rate generates high number of people losing employer-sponsored health insurance, and consequently the revenues in healthcare industries decrease because people without insurance coverage will have challenges to afford healthcare bills and may choose not to go through elective procedures or fill prescriptions.

Financials

Merck is a financially healthy company. Merck's 2019/2014 Compound Annual Growth Rate (CAGR) is at 13%, much higher than their peers (9%) and slightly higher than that of S&P 500 (12%).[2] Merck's revenues grow steadily year by year, with 2020 Q1 revenues raising 10.7% from 2019 Q1 and nearly doubling that of industry average.[13] Merck not only strives to increase revenue, but also is committed to maintain the cost at a stabile level so that a reasonable profit margin can be achieved. SG&A expense has been declining in the last five consecutive years as a result of the continuous restructuring programs that Merck has launched since 2010. R&D expenditure has increased sharply in 2016 and then been declining starting 2018(Figure 9)[2]. As listed in Figure 10, Merck's SG&A expense to revenue ratio (21.1%) in 2019 is smaller than the average ratio 24.1% from major competitors, and the R&D cost to revenue ratio (18.7%) is almost at par with the industry average (18.3%).

	JNJ	MRK	PFE	NVS	LLY	BMY	ABBV	Average
Growth %	0.6	10.7	3.5	5.6	3.8	15.9	1.44	5.93

Figure 8 (Source: NetAdvantage)

The last twelve months (LTM) current ratio (1.1) is at par with that of PFE, LLY and slighter lower than JNJ (Figure 10). This smaller than the industry average current ratio implies that Merck have fewer current assets readily available to be converted into cash. It could be due to recent acquisitions in coronavirus development opportunities.[7] The LTM long term debt-to-capital ratio 39.8% indicates that Merck are less burdened than industry average companies in terms of debt services (Figure 10). Merck maintain this ratio high, but not over industry average (52.0%), in order to enlarge company equity value and keep cost of equity at a low value with a reasonable financial leverage. Overall, Merck is a well-managed company.

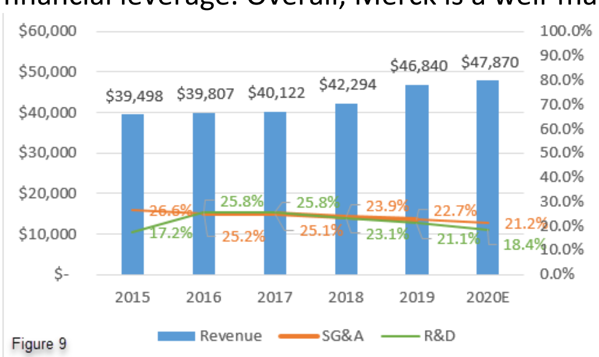


Figure 9

	FY2019 R&D %	FY2019 SG&A %	LTM Current ratio	LTM LT Debt/Capital ratio
JNJ	13.8%	27.0%	1.3	28.6%
MRK	**18.7%**	**21.1%**	**1.1**	**39.8%**
PFE	15.4%	27.3%	1	30.8%
NVS	17.3%	29.4%	0.7	29.1%
LLY	25.1%	26.9%	1.1	69.1%
AMGN	17.6%	22.0%	1.4	68.2%
BMY	22.5%	18.5%	1.7	44.6%
ABBV	16.2%	20.3%	3.1	106.1%
Average	**18.3%**	**24.1%**	**1.43**	**52.0%**

Figure 10 (Source: NetAdvantage)

Income Statement Projections

As Keytruda® expands significantly faster than other products, its sales has to be estimated separately during forecasting. Keytruda® sales in 2019 grew 54.6% from 2018, and its Q1 growth was 45% in 2020 even with the negative forces from COVID-19 disruption, hence a **55% growth** for the whole year is rational and it brings the estimated Keytruda® sales to $17,132 million for 2020. Assuming the same YoY% applies to the remaining products in 2020, the total estimated revenue will be $54,276 million. However, due to the spin-off, $6.5B worth of sales from women's health (NuvaRing®), cardiovascular products including Zetia® and Vytorin®, and part of the product sales in "*Remaining Pharma Products*" will be excluded from FY2020 sales,[2] therefore the final FY2020 estimated sales is $47,776 million. The FY2021 sales is calculated with the same YoY% for all the products with the exception of Keytruda® growth, reducing to a 10% from the prior 55%. I believe Keytruda® sales will slow down when its yearly sales approaches $20B. In FY2022 estimate, the Januvia® sales is only 30% of those in FY2021 as a result of the patent expiration in July 2022 and potential biosimilar products emerging before July(Figure 11).

All products	2018	2019	YoY %	**2020E**	**2020E**	2021E	2022E
Keytruda	$ 7,171	$ 11,084	54.6%	$ 17,132	$ 17,132	$ 18,845	$ 20,353
Januvia/Janumet	$ 5,914	$ 5,524	-6.6%	$ 5,160	$ 5,160	$ 4,819	$ 1,446
Gardasil/Gardasil	$ 3,151	$ 3,737	18.6%	$ 4,432	$ 4,432	$ 5,256	$ 6,234
ProQuad/M-M-R II/Varivax	$ 1,798	$ 2,275	26.5%	$ 2,879	$ 2,879	$ 3,642	$ 4,608
Bridion	$ 917	$ 1,131	23.3%	$ 1,395	$ 1,395	$ 1,720	$ 2,122
Isentress/Isentress HD	$ 1,140	$ 975	-14.5%	$ 834	$ 834	$ 713	$ 610
Pneumovax 23	$ 907	$ 926	2.1%	$ 945	$ 945	$ 965	$ 985
NuvaRing	$ 902	$ 879	-2.5%	$ 857		$ -	$ -
Zetia/Vytorin	$ 1,355	$ 874	-35.5%	$ 564		$ -	$ -
Simponi	$ 893	$ 830	-7.1%	$ 771	$ 771	$ 717	$ 666
Remaining Pharma Products	$ 13,541	$ 13,516	-0.2%	$ 13,491	$ 8,411	$ 8,396	$ 8,380
Livestock	$ 2,630	$ 2,784	5.9%	$ 2,947	$ 2,947	$ 3,120	$ 3,302
Companion animal	$ 1,582	$ 1,609	1.7%	$ 1,636	$ 1,636	$ 1,664	$ 1,693
other	$ 393	$ 696	77.1%	$ 1,233	$ 1,233	$ 2,183	$ 3,866
Total Revenues	$ 42,294	$ 46,840		**$ 54,276**	**$ 47,776**	**$ 52,042**	**$ 54,266**
				-6.5B spin off			
Figure 11				**$ 47,776**			

Additionally, the $6.5B asset spin-off reduces the FY2020 depreciation and amortization and I assume it will be 2% of yearly sales. They are deducted explicitly before calculating net income for the forward estimates. Merck have a better product mix after the spin-off and their operations will be more optimized, therefore I estimate the SG&A expense will be 2.7% lower in FY2020 and decrease by 1% in each of subsequent years. Another assumption is the 17.8% tax rate and it could change after the upcoming presidential election. If a Democrat is elected as president, most likely the corporate tax would increase, in order to fund the tremendous cost introduced by Democrat's favorability in expanding Affordable Care Act.[13] My EPS estimate for FY2021 is around the consensus, and those of FY2020 and FY2022 are within 20 cents discrepancy from the consensus. Review the attached income statement projection in appendix for more details.

Valuation Analysis and Price Target

With the aforementioned financial and income projections, I am positive that Merck will keep the momentum and continue their near two digits growth in the coming several years, therefore the Discounted Cash Flow (DCF) Model is an appropriate model to determine Merck's intrinsic stock value. Additionally, DCF isn't affected by short-term market volatility. Thus I have assigned a **70% weight to the DCF based valuation**. On the other hand, multiples are dynamic and fluctuated with market conditions change. The current stock price $76.73 reflects the market disruption created by COVID-19 pandemic. Hence, I have assigned a **30% weight to relative valuation model based on multiples**.

Relative Valuation Model

Figure 13 tells that healthcare sector is currently trading at a higher pricing ratio (29.03) compared to their median (24.03) over the past 10 years and they generally trade at a premium multiple to the market as a whole. However, the current relative pricing multiple is only 0.97, representing healthcare sector is relatively cheap. It is because the increasing postponed and cancelled elective procedures amidst COVID-19 pandemic decrease healthcare sector revenues. At the same time, S&P 500 is trading at a historically high pricing ratio of 30.03 (Figure 12) due to the enormous growth brought in by those large market cap companies in Information Technology sector.

Absolute basis	High	Low	Median	Current
P/E	30.51	14.06	21.77	**30.03**
P/B	3.75	1.79	2.75	3.64
P/S	2.8	1.34	2.03	2.63
P/EBITA	14.73	7.3	10.56	14.46

Figure 12 (Source: NetAdvantage)

Healthcare Absolute Valuation (10 Years)

	High	Low	Median	Current
P/E	31.38	14.27	24.03	29.03
P/B	4.72	2.12	3.54	4.58
P/S	2.31	1.12	1.8	2.03
P/EBITA	15.07	6.94	11.69	14.66

Healthcare Sector Relative Valuation (10 Years)

	High	Low	Median	Current
P/E	1.03	1.01	1.10	0.97
P/B	1.26	1.18	1.29	1.26
P/S	0.83	0.84	0.89	0.77
P/EBITA	1.02	0.95	1.11	1.01

Figure 13 (Source: NetAdvantage)

Merck's valuation ratios are below the average among their major competitors (Figure 14). Merck's 2019 growth rate of 10.7% is much higher than the industry average 5.93% (See Financial Section) and it's acceptable to assume that Merck is not far off from the average multiples that their peers demonstrate. Weighing each ratio equally draws in a target price of **$103.64**(Figure 15).

	P/E LTM	P/B	P/S	P/FCF	EV/EBITA
JNJ	22.2	6.1	4.5	18.8	14.4
MRK	19.3	7.4	4.5	14.5	13.2
PFE	12.4	2.9	3.7	11.7	9.4
NVS	26.7	3.9	4	12.4	16.4
LLY	27.4	50.7	6.8	20.7	17.6
AMGN	19.5	15.4	6.1	14.7	13.4
BMY	86.1	2.6	4.2	18.9	20.4
ABBV	17.1	NEG	4.2	9.5	15.1
Average	**28.84**	**12.71**	**4.75**	**15.15**	**14.99**

Figure 14 (Source: Thomas ONE)

Absolute Valuation	Current Stock Price	Current Multiple	Target Multiple	Target / Current	Target Price
P/E	$ 76.73	19.3	28.84	1.49	$ 114.66
P/B	$ 76.73	7.4	12.71	1.72	$ 131.79
P/S	$ 76.73	4.5	4.75	1.06	$ 80.99
P/EBITDA	$ 76.73	13.2	14.99	1.14	$ 87.14
Equal Weighted Valuation					$ 103.64

Figure 15

Discounted Cash Flow Model

Merck has a current pricing ratio of 19.3(Figure 14) and I estimate a **discount rating of 8.75%** and a **terminal growth rate of 3.5%** (Figure 16). The LTM long term debt-to-capital ratio 39.8% (Figure 10) implies Merck fund their operations with a certain degree of long-term debts and a cost of equity at 8.75% seems legitimate.

Terminal Growth Rat		8.25%	8.50%	8.75%	9.00%	9.25%	9.50%	9.75%	10.00%
	2.50%	17.8	17.1	16.4	15.8	15.2	14.6	14.1	13.7
	2.75%	18.7	17.9	17.1	16.4	15.8	15.2	14.7	14.2
	3.00%	19.6	18.7	17.9	17.2	16.5	15.8	15.3	14.7
	3.25%	20.7	**19.7**	18.8	18.0	17.2	16.5	15.9	15.3
	3.50%	21.8	20.7	**19.7**	18.8	18.0	17.3	16.6	15.9
	3.75%	23.1	21.8	20.8	**19.8**	18.9	18.0	17.3	16.6
	4.00%	24.5	23.1	21.9	20.8	19.8	18.9	18.1	17.3
	4.25%	26.1	24.5	23.2	21.9	20.9	19.9	19.0	18.1
	4.50%	27.9	26.1	24.6	23.2	22.0	20.9	19.9	19.0
	4.75%	29.9	27.9	26.2	24.6	23.3	22.1	21.0	20.0
	5.00%	32.3	30.0	28.0	26.3	24.7	23.3	22.1	21.0

Figure 16 (Source: Class Note)

The stock valuation from the DCF model (See Appendix) is **$94.1(22.7% upside)**. Notably, if an **8.5%** discount rate were used, the valuation would increase to **$95.8 (24.8% upside)**. The DCF valuation prices and upside/downside percentages are listed in Figure 17 and 18 based on various combinations of terminal growth rate and weighted average cost of capital rate.

	8.25%	8.50%	8.75%	9.00%	9.25%	9.50%	9.75%	10.00%
2.50%	91.9	87.9	84.3	80.9	77.8	75.0	72.3	69.8
2.75%	94.6	90.3	86.5	82.9	79.6	76.6	76.7	71.1
3.00%	97.5	92.9	88.8	85.0	81.5	78.3	75.3	72.5
3.25%	100.7	95.8	91.3	87.3	83.6	80.2	77.0	74.1
3.50%	104.2	98.9	**94.1**	89.8	85.8	82.2	78.8	75.7
3.75%	108.1	102.4	97.2	92.5	88.3	84.4	80.8	77.5
4.00%	112.5	106.2	100.6	95.5	90.9	86.8	83.0	79.5
4.25%	117.5	110.6	104.4	98.9	93.9	89.4	85.3	81.6
4.50%	123.1	115.4	108.6	102.6	97.2	92.3	87.9	83.9
4.75%	129.5	120.9	113.3	106.7	100.8	95.5	90.7	86.4
5.00%	136.9	127.2	118.7	111.3	104.8	99.0	93.8	89.2

Figure 17

	8.25%	8.50%	8.75%	9.00%	9.25%	9.50%	9.75%	10.00%
2.50%	19.8%	14.6%	9.9%	5.5%	1.4%	-2.3%	-5.8%	-9.0%
2.75%	23.2%	17.7%	12.7%	8.0%	3.7%	-0.2%	0.0%	-7.3%
3.00%	27.0%	21.1%	15.7%	10.8%	6.2%	2.0%	-1.9%	-5.5%
3.25%	31.2%	24.8%	19.0%	13.7%	8.9%	4.5%	0.4%	-3.5%
3.50%	35.8%	28.9%	22.7%	17.0%	11.8%	7.1%	2.7%	-1.3%
3.75%	40.9%	33.4%	26.7%	20.6%	15.0%	10.0%	5.3%	1.0%
4.00%	46.7%	38.5%	31.1%	24.5%	18.5%	13.1%	8.1%	3.6%
4.25%	53.1%	44.1%	36.0%	28.8%	22.4%	16.5%	11.2%	6.3%
4.50%	60.4%	50.4%	41.5%	33.7%	26.6%	20.3%	14.5%	9.3%
4.75%	68.8%	57.5%	47.7%	39.0%	31.3%	24.4%	18.2%	12.6%
5.00%	78.4%	65.7%	54.7%	45.1%	36.6%	29.1%	22.3%	16.2%

Figure 18

Final Target Price

The final target price is **$97.0** after summing up 70% weight to DCF implied price $94.1 and 30% weight to relative valuation implied price $103.64 (Figure 19). It's a **26.4% upside** to current stock price (Figure 20).

	8.25%	8.50%	8.75%	9.00%	9.25%	9.50%	9.75%	10.00%
2.50%	95.4	92.6	90.1	87.8	85.6	83.6	81.7	79.9
2.75%	97.3	94.3	91.6	89.1	86.8	84.7	84.8	80.9
3.00%	99.3	96.1	93.2	90.6	88.1	85.9	83.8	81.9
3.25%	101.6	98.1	95.0	92.2	89.6	87.2	85.0	82.9
3.50%	104.0	100.3	97.0	93.9	91.2	88.6	86.3	84.1
3.75%	106.8	102.8	99.1	95.8	92.9	90.2	87.7	85.4
4.00%	109.9	105.5	101.5	98.0	94.8	91.8	89.2	86.7
4.25%	113.3	108.5	104.2	100.3	96.8	93.7	90.8	88.2
4.50%	117.3	111.9	107.1	102.9	99.1	95.7	92.6	89.8
4.75%	121.7	115.7	110.4	105.8	101.6	97.9	94.6	91.6
5.00%	126.9	120.1	114.2	109.0	104.5	100.4	96.8	93.5

Figure 19

	8.25%	8.50%	8.75%	9.00%	9.25%	9.50%	9.75%	10.00%
2.50%	24.4%	20.7%	17.4%	14.4%	11.5%	8.9%	6.5%	4.2%
2.75%	26.8%	22.9%	19.4%	16.1%	13.1%	10.4%	10.5%	5.4%
3.00%	29.4%	25.3%	21.5%	18.1%	14.9%	11.9%	9.2%	6.7%
3.25%	32.4%	27.9%	23.8%	20.1%	16.8%	13.6%	10.8%	8.1%
3.50%	35.6%	30.8%	26.4%	22.4%	18.8%	15.5%	12.4%	9.6%
3.75%	39.2%	33.9%	29.2%	24.9%	21.0%	17.5%	14.2%	11.3%
4.00%	43.2%	37.4%	32.3%	27.7%	23.5%	19.7%	16.2%	13.0%
4.25%	47.7%	41.4%	35.7%	30.7%	26.2%	22.1%	18.3%	14.9%
4.50%	52.8%	45.8%	39.6%	34.1%	29.2%	24.7%	20.7%	17.0%
4.75%	58.7%	50.8%	43.9%	37.9%	32.5%	27.6%	23.3%	19.3%
5.00%	65.4%	56.5%	48.8%	42.1%	36.1%	30.9%	26.1%	21.9%

Figure 20

Risks

- Revenue decreases due to COVID-19 pandemic.
  - A high number of uninsured people caused by an unprecedented high unemployment rate reduces healthcare sector revenues in general.
  - According to British Journal of Surgery, 28.4 million elective procedures worldwide could be cancelled or postponed in a three months period of peak disruption caused by COVID-19.[14]
  - Majority cancer chemotherapies are treated as elective procedures.

- Keytruda® sales weigh 23.7% in total revenues, which could become problematic if any side effects emerge or a competitor product with similar efficacy in treating cancer is approved before the patent expires in 2028.
  - Roche Holding AG (RHHBY) is developing a new immunotherapy blocking TIGIT and PD-L1, a related ligand of PD-1, together would result in great tumor control than Keytruda that blocks PD-1 alone.[15]
  - Drug pipeline needs to generate successful new products quickly, in order to alleviate the risk of concentrating sales in one single product.

- Diabetes 2 drug Januvia®/Janumet® sales (11.8% of total revenue) would decline significantly as the patent expires in July 2022.
  - Biosimilar products could emerge in market in early 2020.
  - Filing patent infringement lawsuits against such generic companies is costly and may not be able to reverse the damage

- Possible losses in currently engaged litigations and potential future litigations
  - Merck doesn't obtain an insurance to mitigate the risk from most Product liability litigations. Merck is a defendant in 3,750 cases involving Fosamax®, approximately 1,430 claims related to Januvia®/Janumet® and one case from the Attorney General of Utah for Vioxx®.[2]
  - Merck is a defendant in two Governmental Proceedings in U.S. and one inquiry in China.[2]
  - Merck is involved in five commercial litigations and a few patent and other litigations.[2]

- Organon spin-off may not achieve the desired outcome.
  - The distribution of Organon's publicly traded stock to Merck shareholders could incur cost to Merck and shareholders, although Merck expect the spin-off qualify as tax-free.
  - The spin-off could take longer than the planned timeline of June 2021 and incur additional cost.

Conclusion

I recommend to **BUY** Merck & Co., Inc. (NYSE: **MRK**) with a price target of **$97.00,** a **26.40%** upside to the current stock price $76.73.

The anti-PD-1 market leader Keytruda® proves its efficacy in various cancers and is widely recognized by cancer patients worldwide. The robust pipeline, particularly in oncology area, provides Merck a competitive advantage over their peers. Consequently, Merck has been and will continue enjoying a higher than industry average growth rate in the coming several years before losing the Keytruda® market exclusivity in 2028. Additionally, the spin-off provides a better product mix and will lead to operation optimization for Merck.

Merck is currently intrinsically undervalued due to market volatility introduced by COVID-19 pandemic. However, coupling Merck's promising pipeline with the fundamental drivers such as global aging, growing cancer population and defensive in nature, Merck will continue their success for the foreseeable future.

Appendix

Merck Pipeline[16]

Updated May 1, 2020

PHASE 2 | PHASE 3 | UNDER REVIEW

- Islatravir (MK-8591) – HIV-1 Infection
- MK-8189 – Schizophrenia
- V937 – Melanoma
- KEYTRUDA® (MK-3475) – Advanced Solid Tumors
- LENVIMA® (MK-7902)[1,2] - Advanced Solid Tumors
- LYNPARZA® (MK-7339)[1,3] – Advanced Solid Tumors
- MK-1026 – Hematological Malignancies
- MK-1308[2] - Melanoma
- MK-1308[2] – Non-small Cell Lung Cancer
- MK-1454[2] – Head and Neck Cancer
- MK-4280[2] – Hematological Malignancies
- MK-4280[2] – Non-small Cell Lung Cancer
- MK-5890[2] – Non-small Cell Lung Cancer
- MK-7684[2] – Non-small Cell Lung Cancer
- MK-7075 – Overgrowth Syndrome
- MK-1654 – Respiratory Syncytial Virus
- V160 – Cytomegalovirus Vaccine

THERAPEUTIC AREAS KEY

- Cardiovascular Diseases
- Diabetes and Endocrinology
- Infectious Diseases
- Neurosciences
- Oncology
- Respiratory and Immunology
- Vaccines
- Women's Health

PHASE 2 | PHASE 3 | UNDER REVIEW

- vericiguat (MK-1242)[1] – Heart Failure
- MK-8591A (Doravirine/Islatravir) - HIV-1 infection
- KEYTRUDA® (MK-3475) – Biliary Tract Cancer
- KEYTRUDA® (MK-3475) – Breast Cancer
- KEYTRUDA® (MK-3475) (EU) – Cervical Cancer
- KEYTRUDA® (MK-3475) – Colorectal Cancer
- KEYTRUDA® (MK-3475) (EU)– Cutaneous Squamous Cell Carcinoma
- KEYTRUDA® (MK-3475) (EU) – Endometrial Cancer
- KEYTRUDA® (MK-3475) (EU) – Esophageal Cancer
- KEYTRUDA® (MK-3475) (EU) – Gastric Cancer
- KEYTRUDA® (MK-3475) (EU) – Liver Cancer
- KEYTRUDA® (MK-3475) – Mesothelioma
- KEYTRUDA® (MK-3475) – Nasopharyngeal Cancer
- KEYTRUDA® (MK-3475) – Ovarian Cancer
- KEYTRUDA® (MK-3475) – Prostate Cancer
- KEYTRUDA® (MK-3475) (EU) – Small Cell Lung Cancer
- LENVIMA® (MK - 7902)[1,2] – Bladder Cancer
- LENVIMA® (MK-7902)[1,5] (EU) – Endometrial Cancer
- LENVIMA® (MK-7902)[1,2] – Head and Neck Squamous Cell Carcinoma
- LENVIMA® (MK-7902)[1,2] – Melanoma
- LENVIMA® (MK-7902)[1,5] – Non-Small Cell Lung Cancer
- LYNARZA® (MK-7339)[1,2] – Non-Small Cell Lung Cancer
- MK-6482 – Renal Cell Carcinoma Cancer
- gefapixant (MK-7264) – Cough
- V114 – Pneumoconjugate Vaccine

PHASE 2 | PHASE 3 | UNDER REVIEW

- KOSELUGO® MK-5618[2] (EU) – Pediatric neurofibromatosis type-1
- V503 (JPN) – Human Papillomavirus 9-valent Vaccine, Recombinant

Income Statement Projections

MRK	FY	FY	FY	FY	FY	FY	FY	FY
Millions	2022E	2021E	2020E	2019	2018	2017	2016	2015
Sales	54,266	52,043	47,777	46,840	42,294	40,122	39,807	39,498
Cost of sales	14,272	13,687	12,565	14,112	13,509	12,912	14,030	15,043
Gross Profit	39,994	38,356	35,212	32,728	28,785	27,210	25,777	24,455
Selling, general and administrative	9,768	9,888	9,555	10,615	10,102	10,074	10,017	10,508
Research and development	10,039	9,628	8,839	9,872	9,752	10,339	10,261	6,796
Restructuring costs	814	1,041	1,194	638	632	776	651	619
Operating Income	19,373	17,799	15,623	11,603	8,299	6,021	4,848	6,532
Other (income) expense	(380)	(364)	(382)	(480)	(831)	(869)	(176)	748
Interest Expense	977	937	860	893	772	754	693	672
Interest Income	326	208	191	274	343	385	328	289
Other (income) expense, net	271	364	287	139	(402)	(500)	189	1,131
Income before taxes	19,101	17,434	15,336	11,464	8,701	6,521	4,659	5,401
Taxes on income	3,400	3,103	2,730	1,687	2,508	4,103	718	942
D&A	1,085	1,041	956	3,652	4,519	4,676	5,441	6,375
% of Sales	2.0%	2.0%	2.0%	7.8%	10.7%	11.7%	13.7%	16.1%
Net Income	14,616	13,290	11,651	9,777	6,193	2,418	3,941	4,459
Less: Net (loss) income attributable to no	(24)	(24)	(23)	(66)	(27)	24	21	17
Net Income attributable to Merck & Co., In	14,592	13,266	11,628	9,843	6,220	2,394	3,920	4,442
EPS								
Basic	5.69	5.17	4.53	3.84	2.34	0.88	1.42	1.58
Diluted	5.89	5.27	4.57	3.81	2.32	0.87	1.41	1.56
Consensus - GAAP	6.08	5.26	4.38					
Shares Outstanding								
Basic	2,565	2,565	2,565	2,565	2,664	2,730	2,766	2,816
Diluted	2,478	2,516	2,542	2,580	2,679	2,748	2,787	2,841
Tax Rate	17.8%	17.8%	17.8%	14.7%	28.8%	62.9%	15.4%	17.4%
D&A	1,085	1,041	956	3,652	4,519	4,676	5,441	6,375
% of Sales	2.0%	2.0%	2.0%	7.8%	10.7%	11.7%	13.7%	16.1%
CapEx	2,713	2,602	2,389	3,473	2,615	1,888	1,614	1,283
% of Sales	5.0%	5.0%	5.0%	7.4%	6.2%	4.7%	4.1%	3.2%
Receivables	8,682	8,327	7,644	6,778	7,071	6,873	7,018	6,484
% of Sales	16.0%	16.0%	16.0%	14.5%	16.7%	17.1%	17.6%	16.4%
Inventory	6,512	6,245	5,733	6,778	7,071	5,096	4,866	4,700
% of Sales	12.0%	12.0%	12.0%	14.5%	16.7%	12.7%	12.2%	11.9%
Payables	4,070	3,903	3,583	3,738	3,318	3,102	2,807	2,533
% of Sales	7.5%	7.5%	7.5%	8.0%	7.8%	7.7%	7.1%	6.4%
Change in WC	(456)	(875)	24	1,006	(1,957)	210	(426)	921
Sales	4.27%	8.93%	2.00%	10.75%	5.41%	0.79%	0.78%	-6.48%
Expenses as % of Sales								
Gross Margin	73.7%	73.7%	73.7%	69.9%	68.1%	67.8%	64.8%	61.9%
Selling, general and administrative	18.0%	19.0%	20.0%	22.7%	23.9%	25.1%	25.2%	26.6%
Research and development	18.5%	18.5%	18.5%	21.1%	23.1%	25.8%	25.8%	17.2%
Restructuring costs	1.5%	2.0%	2.5%	1.4%	1.5%	1.9%	1.6%	1.6%
Other (income) expense	-0.7%	-0.7%	-0.8%	-1.02%	-1.96%	-2.17%	-0.44%	1.89%
Interest Expense	1.80%	1.8%	1.8%	1.91%	1.83%	1.88%	1.74%	1.70%
Interest Income	0.60%	0.4%	0.4%	0.58%	0.81%	0.96%	0.82%	0.73%
Operating Margin	35.7%	34.2%	32.7%	24.8%	19.6%	15.0%	12.2%	16.5%

Discount Cash Flow Model Valuation

Merck & Co., Inc. (MRK)

Analyst: Vicky Zheng
7/12/2020
(in Millions)

Terminal Discount Rate = *8.75%*
Terminal FCF Growth = *3.50%*

Year	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Revenue	47,777	52,043	54,266	56,436	58,694	61,041	63,178	65,389	67,351	69,371	71,452
% Growth		8.9%	4.3%	4.0%	4.0%	4.0%	3.5%	3.5%	3.0%	3.0%	3.0%
Operating Income	15,623	17,799	19,373	19,753	20,543	21,364	22,112	22,886	23,573	24,280	25,008
Operating Margin	32.7%	34.2%	35.7%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Other (income) expense, net	287	364	271	282	293	305	316	327	337	347	357
% of Sales	0.6%	0.7%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Taxes	2,730	3,103	3,400	3,466	3,604	3,749	3,880	4,016	4,136	4,260	4,388
Tax Rate	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%
Less Depreciation/Amort	956	1,041	1,085	1,129	1,174	1,221	1,264	1,308	1,347	1,387	1,429
% of Sales	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Net (loss) income attributable t	23	24	24	25	26	27	28	29	30	31	32
% of Sales	0.05%	0.05%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%
Net Income	11,628	13,266	14,592	14,851	15,445	16,063	16,625	17,207	17,723	18,255	18,803
% Growth		14.1%	10.0%	1.8%	4.0%	4.0%	3.5%	3.5%	3.0%	3.0%	3.0%
Add Depreciation/Amort	956	1,041	1,085	1,129	1,174	1,221	1,264	1,308	1,347	1,387	1,429
% of Sales	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Plus/(minus) Changes WC	24	(875)	(456)	(474)	(493)	(512)	(530)	(549)	(565)	(582)	(600)
% of Sales	0.0%	-1.7%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%	-0.8%
Subtract Cap Ex	2,389	2,602	2,713	2,822	2,935	3,052	2,527	2,616	2,694	2,255	2,322
Capex % of sales	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	3.3%	3.3%
Free Cash Flow	10,218	10,830	12,509	12,684	13,192	13,719	14,831	15,350	15,811	16,805	17,310
% Growth		6.0%	15.5%	1.4%	4.0%	4.0%	8.1%	3.5%	3.0%	6.3%	3.0%

NPV of Cash Flows	89,811	38%			
NPV of terminal value	147,494	62%		**Terminal Value**	341,246
Projected Equity Value	237,305	100%			
Free Cash Flow Yield	5.28%			**Free Cash Yield**	5.07%
Current P/E	16.6	14.6	13.3	**Terminal P/E**	18.1
Projected P/E	*20.4*	*17.9*	*16.3*		
Current EV/EBITDA	14.6	12.8	11.8	**Terminal EV/EBITDA**	14.7
Projected EV/EBITDA	*17.2*	*15.1*	*13.9*		
Shares Outstanding	2,521				
Current Price	$ 76.73				
Implied equity value/share	$ 94.13				
Upside/(Downside) to DCF	22.7%				
Debt	58,396				
Cash	10,450				
Cash/share	4.15				

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