

Systematic and Unsystematic Risk Analysis of (SunPharma, Dr Reddy & Pfizer)

Assignment 3

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By

Group 12

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Group Details

Group Number: 12

Industry: Pharmaceutical

Company Name: Pfizer's Laboratories, Sun Pharmaceuticals Industries Ltd., Dr. Reddy's Laboratories

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Abstract

The objective of our project is to calculate the cost of equity and the weighted average cost of capital and perform an analysis of the systematic and unsystematic risk by calculating all the necessary betas and ratios (Degree of Operating Leverage and Degree of Financial Leverage) of three firms in the pharmaceutical industry: Sun Pharma., Dr Reddy's Lab., and Pfizer. We designed our index for the calculations by choosing 20 firms from the industry and constructing a value-weighted index by consolidating all their closing prices over 10 years with quarterly frequency, and using a base quarter and beginning index value of 1000. Regression of quarterly returns of the three firms was done against the excess index returns to calculate the beta values and thereby perform systematic risk analysis. The financial statements of the firms were used to calculate the leverage of the firms.

The cost of equity and cost of debt was also calculated by using the credit rating to spread relation as used in Damodaran valuation for the interest coverage ratio. This was combined with the current tax rate and the debt/equity ratio to calculate the WACC.

The data was acquired from the Bloomberg Terminal and Excel was used for performing the operations. The methodology, findings and conclusions have been reported in detail.

Table of Contents

Group Details	1
Abstract	2
Table of Contents	3
1. Designing of the Index	4
2. Regression Analysis for Unsystematic Risk	6
Risk-Free Rate	10
Dr. Reddy's Lab.	11
Sun Pharma	12
Pfizer	13
3. Unsystematic Risk Analysis	14
Degree of Operating Leverage	14
Degree of Financial Leverage	14
Total Leverage	15
Pfizer	15
Dr. Reddy's	16
Sun Pharma	17
4. Implied ERP	18
5. Calculation of ROE and WACC	20
Cost of Equity	20
Cost of Debt	21
Tax rate	22
Return on Equity	23
Pfizer	23
DR. Reddy's	24
Sun Pharma	25
6. Summary	26
7. References	27

1. Designing of the Index

An index is a statistical figure that is created to be used as a benchmark for the evaluation of funds. The following are the companies from the Pharmaceutical industry that we have chosen to include in our index.

EQY_FUT_REL_INDEX	FA_ADJUSTED							
LCL								
Ticker	Short Name	Market Cap	Current Market Cap	Price:D-1	P/E	12 Month Return YTD		
None (25 securities)								
SUNP IN E	SUN PHARMA INDU	2404554375168.00	1.00	24045543	1002.20	73.21	19.84	
DIVI IN E	DIVI LABS LTD	893421223936.00	2.00	89342122	3365.45	30.03	-27.51	
CIPLA IN E	CIPLA LTD	889233539072.00	3.00	88923353	1101.80	35.13	17.27	
DRRD IN E	DR REDDY'S LABS	744080670720.00	4.00	74408067	4468.95	31.27	-8.32	
TRP IN E	TORRENT PHARMA	544534265856.00	5.00	54453426	1609.00	69.90	-0.13	
BOOT IN E	ABBOTT INDIA LTD	437134262272.00	6.00	43713426	20571.70	54.37	6.99	
ZYDUSLI	ZYDUS LIFESCIENC	413586620416.00	7.00	41358662	408.60	18.59	-14.83	
ALKEM IN E	ALKEM LABORATORI	366269431808.00	8.00	36626943	3063.35	22.35	-14.63	(Data Not available)
LPC IN E	LUPIN LTD	341457010688.00	9.00	34145701	750.85		-20.53	
BIOS IN E	BIOCON LTD	324522180608.00	10.00	32452218	270.30	51.89	-25.75	
ARBP IN E	AUROBINDO PHARMA	261855969280.00	11.00	26185596	446.90	9.80	-38.48	
GLXO IN E	GLAXOSMITHKLINE	227588538368.00	12.00	22758853	1343.45	60.27	-18.95	(Data Not available)
IPCA IN E	IPCA LABS LTD	218259357696.00	13.00	21825935	860.45	24.51	-20.21	(Data Not available)
LAURUS	LAURUS LABS LTD	211961397248.00	14.00	21196139	394.45	25.10	-26.51	(Data Not available)
PFIZ IN E	PFIZER LTD	201205383168.00	15.00	20120538	4398.15	33.01	-11.64	
JBCP IN E	JB CHEMS & PHARM	160738131968.00	16.00	16073813	2077.95	41.62	17.88	(Data Not available)
PIRPHAR	PIRAMAL PHARMA L	155012071424.00	17.00	15501207	129.90	40.60		(Data Not available)
AJP IN E	AJANTA PHARMA	152379244544.00	18.00	15237924	1189.30	21.83	-19.76	
SANL IN E	SANOFI INDIA LTD	133005295616.00	19.00	13300529	5775.15	14.03	-19.57	
GNP IN E	GLENMARK PHARMA	123152293888.00	20.00	12315229	436.45	12.92	-16.90	
ALPM IN E	ALEMBIC PHARMACE	115303931904.00	21.00	11530393	586.60	21.02	-25.73	
NTCPH IN E	NATCO PHARMA LTD	104468340736.00	22.00	10446834	572.25	61.71	-36.15	
ASTR IN E	ASTRAZENECA PHAR	84403748864.00	23.00	84403748	3376.15	136.77	9.27	
GRAN IN E	GRANULES INDIA	80793870336.00	24.00	80793870	333.80	19.83	-0.39	
NTCP IN E	NATURAL CAPSULES	76669845504.00	25.00	76669845	506.20	25.82	52.94	
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We had picked a total of 24 companies, but unfortunately, data was not available for a few of them (indicated in the table above).

There are multiple types of indices. While designing ours, we have chosen to go with a value-weighted index. The formula for calculating a weighted index is:

$$\text{Index}_t = \frac{\sum P_t Q_t}{\sum P_h Q_h} \times \text{Beginning Index Value}$$

where:

Index_t = index value on day t

P_t = ending prices for stocks on day t

Q_t = number of outstanding shares on day t

P_h = ending price for stocks on base day

Q_h = number of outstanding shares on base day

The free float percentage, the closing price and the number of shares outstanding was pulled from the Bloomberg terminal for all the companies at a quarterly frequency for the duration of 10 years. Monthly

data was not available for the number of outstanding shares and free float percentage on the Bloomberg terminal, therefore, we had to resort to using quarterly data.

Sun Pharmaceutical Industries Ltd (SUNP IN) - SAHIL																											
In Millions of INR except Per Share	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019		
3 Months Ending	03/31/2013	6/30/2013	9/30/2013	12/31/2013	3/31/2014	6/30/2014	9/30/2014	12/31/2014	3/31/2015	6/30/2015	9/30/2015	12/31/2015	3/31/2016	6/30/2016	9/30/2016	12/31/2016	3/31/2017	6/30/2017	9/30/2017	12/31/2017	3/31/2018	6/30/2018	9/30/2018	12/31/2018	3/31/2019		
Free Float EQY_FREE_FLOAT_PCT	52.37	54.77	55.05	54.88	53.86	54.88	53.13	53.56	53.71	59.26	57.09	53.65	55.95	56.47	57.57	55.98	56.52	55.08	56.16	55.97	54.66	54.66	54.61	35.02	37.00		
Shares O BS_SH_OUT	2,071.2	2,071.2	2,071.2	2,071.2	2,071.2	2,071.2	2,071.2	2,071.2	2,071.2	2,406.2	2,406.4	2,406.5	2,406.6	2,406.7	2,406.7	2,399.2	2,399.3	2,399.3	2,399.3	2,399.3	2,399.3	2,399.3	2,399.3	2,399.3	2,399.3		
Last Price PX_LAST	409.48	505.78	593.30	567.45	574.75	687.95	857.25	826.55	1,023.90	874.60	868.40	820.15	820.00	763.10	742.70	630.00	688.15	555.70	503.25	571.15	495.10	564.00	623.25	430.50	478.00		
Source: Bloomberg Right click to show data transparency (not supported for all values)																											
Divi's Laboratories Ltd (DIVI IN) - SAHIL																											
In Millions of INR except Per Share	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019		
3 Months Ending	03/31/2013	6/30/2013	9/30/2013	12/31/2013	3/31/2014	6/30/2014	9/30/2014	12/31/2014	3/31/2015	6/30/2015	9/30/2015	12/31/2015	3/31/2016	6/30/2016	9/30/2016	12/31/2016	3/31/2017	6/30/2017	9/30/2017	12/31/2017	3/31/2018	6/30/2018	9/30/2018	12/31/2018	3/31/2019		
Free Float EQY_FREE_FLOAT_PCT	45.51	45.51	29.23	29.23	29.23	46.01	46.05	46.08	46.07	44.36	44.86	39.36	44.81	45.16	45.36	44.86	45.03	44.91	44.94	46.39	47.53	47.71	47.71	47.70	27.00		
Shares O BS_SH_OUT	258.2	258.2	258.2	258.2	258.2	258.2	258.2	258.2	259.0	259.0	259.0	259.0	264.3	264.3	265.1	265.1	265.2	265.5	265.5	265.5	265.5	265.5	265.5	265.5	265.5		
Last Price PX_LAST	152.79	153.74	292.52	305.02	317.21	334.21	333.80	333.81	236.08	278.49	283.08	338.40	339.15	386.73	344.93	323.43	337.48	383.03	493.75	682.95	892.72	1,038.60	1,310.90	1,482.65	1,703.00		
Source: Bloomberg Right click to show data transparency (not supported for all values)																											
Cipla Ltd/India (CIPLA IN) - SAHIL																											
In Millions of INR except Per Share	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019		
3 Months Ending	03/31/2013	6/30/2013	9/30/2013	12/31/2013	3/31/2014	6/30/2014	9/30/2014	12/31/2014	3/31/2015	6/30/2015	9/30/2015	12/31/2015	3/31/2016	6/30/2016	9/30/2016	12/31/2016	3/31/2017	6/30/2017	9/30/2017	12/31/2017	3/31/2018	6/30/2018	9/30/2018	12/31/2018	3/31/2019		
Free Float EQY_FREE_FLOAT_PCT	49.35	55.37	56.45	60.53	60.73	60.45	59.55	59.80	60.31	61.48	31.10	61.61	52.83	56.00	60.89	60.91	60.91	57.60	57.60	57.59	57.56	57.56	57.57	57.57	64.00		
Shares O BS_SH_OUT	802.9	802.9	802.9	802.9	802.9	802.9	802.9	802.9	803.0	803.1	803.1	803.3	803.4	803.6	804.2	804.4	804.5	804.6	804.7	805.0	805.1	805.2	805.2	805.7	805.8		
Last Price PX_LAST	322.35	391.95	432.50	400.80	382.80	438.00	626.80	626.40	712.45	615.40	636.05	649.75	511.95	501.00	680.05	568.80	592.95	555.60	586.10	608.50	545.45	616.65	654.05	519.50	526.00		
Source: Bloomberg Right click to show data transparency (not supported for all values)																											

The three values were multiplied in order to calculate the free float market capitalization for each firm. Then the free float market capitalizations of all firms were summated for each quarter and the first quarter was taken as the base quarter with a beginning index value of 1000.

Date	Numerator(Sumation of PI*Qj*FF%)	INDEX
03/31/2013	114673194	1000.00
06/30/2013	144772529	1262.48
09/30/2013	163228286	1423.42
12/31/2013	168408535	1468.60
03/31/2014	233170559	2033.35
06/30/2014	200252765	1746.29
09/30/2014	250216290	2181.99
12/31/2014	256182955	2234.03
03/31/2015	305535361	2664.40
06/30/2015	372174259	3245.52
09/30/2015	309553215	2699.44
12/31/2015	294122112	2564.87
03/31/2016	269094708	2346.62
06/30/2016	268200356	2338.82
09/30/2016	283127440	2468.99
12/31/2016	251656012	2194.55
03/31/2017	263135071	2294.65
06/30/2017	224593838	1958.56
09/30/2017	214945166	1874.42
12/31/2017	233661409	2037.63
03/31/2018	210075723	1831.95
06/30/2018	234733074	2046.97
09/30/2018	262947091	2293.01
12/31/2018	212500715	1853.10
03/31/2019	209887363	1830.31
06/30/2019	187202146	1632.48
09/30/2019	186184710	1623.61
12/31/2019	202428082	1765.26
03/31/2020	191715299	1671.84
06/30/2020	254842366	2222.34
09/30/2020	299336434	2610.34
12/31/2020	324652241	2831.11
03/31/2021	317158919	2765.76
06/30/2021	362971679	3165.27
09/30/2021	357264006	3115.50
12/31/2021	353087625	3079.08
03/31/2022	334267020	2914.95
06/30/2022	302154630	2634.92
09/30/2022	314494196	2742.53
12/16/2022	308727527	2692.24

2. Regression Analysis for Systematic Risk

The regression equation is given by the following:

$$R_i = R_f + \beta_i * (R_m - R_f)$$

Where, R_i is the Expected return, R_f is the Risk-Free Rate, β_i is Beta(sensitivity to market changes) and $R_m - R_i =$ Market risk premium.

Firstly the returns to the index, and all the chosen organizations, Sun Pharma, Dr. Reddy's Lab and Pfizer, were calculated with the formula $\ln(\text{Price at } t / \text{Price at } t-1)$. The Regression gives us the value of beta, which tells us how sensitive the firm's returns are to the change in the market returns premium.

INDEX	Quarterly Returns of Index
1000.00	
1262.48	23.31%
1423.42	12.00%
1468.60	3.12%
2033.35	32.54%
1746.29	-15.22%
2181.99	22.27%
2234.03	2.36%
2664.40	17.62%
3245.52	19.73%
2699.44	-18.42%
2564.87	-5.11%
2346.62	-8.89%
2338.82	-0.33%
2468.99	5.42%
2194.55	-11.78%
2294.65	4.46%
1958.56	-15.84%
1874.42	-4.39%
2037.63	8.35%
1831.95	-10.64%
2046.97	11.10%
2293.01	11.35%
1853.10	-21.30%
1830.31	-1.24%
1632.48	-11.44%
1623.61	-0.54%
1765.26	8.36%
1671.84	-5.44%
2222.34	28.46%
2610.34	16.09%
2831.11	8.12%
2765.76	-2.34%
3165.27	13.49%
3115.50	-1.58%
3079.08	-1.18%
2914.95	-5.48%
2634.92	-10.10%
2742.53	4.00%
2692.24	-1.85%
Average Quarterly Returns	2.54%
Annualized Returns	10.55%

Fig: Index returns

SUN PHARMA INDU	Quarterly Returns of SUN PHARMA INDU
409.48	
505.78	21.12%
593.30	15.96%
567.45	-4.45%
574.75	1.28%
687.95	17.98%
857.25	22.00%
826.55	-3.65%
1023.90	21.41%
874.60	-15.76%
868.40	-0.71%
820.15	-5.72%
820.00	-0.02%
763.10	-7.19%
742.70	-2.71%
630.00	-16.46%
688.15	8.83%
555.70	-21.38%
503.25	-9.91%
571.15	12.66%
495.10	-14.29%
564.00	13.03%
623.25	9.99%
430.50	-37.00%
478.85	10.64%
400.95	-17.76%
389.45	-2.91%
432.55	10.50%
352.30	-20.52%
472.95	29.45%
500.45	5.65%
592.35	16.86%
597.80	0.92%
675.45	12.21%
818.25	19.18%
845.70	3.30%
914.75	7.85%
830.60	-9.65%
948.65	13.29%
1000.85	5.36%
Average Quarterly Returns	2.29%
Annualized Returns	9.49%

Fig: Sun Pharma returns


DR REDDY'S LABS	Quaterly Returns of DR REDDY'S LABS
1766.50	
2218.85	22.80%
2381.15	7.06%
2534.60	6.25%
2563.90	1.15%
2624.05	2.32%
3229.60	20.76%
3246.20	0.51%
3488.75	7.21%
3559.45	2.01%
4162.35	15.65%
3108.60	-29.19%
3035.20	-2.39%
3381.70	10.81%
3107.40	-8.46%
3060.40	-1.52%
2632.35	-15.07%
2690.10	2.17%
2328.75	-14.42%
2414.20	3.60%
2080.55	-14.87%
2235.05	7.16%
2530.65	12.42%
2616.50	3.34%
2780.25	6.07%
2550.45	-8.63%
2702.25	5.78%
2874.55	6.18%
3120.75	8.22%
3944.95	23.44%
5187.80	27.39%
5205.10	0.33%
4516.00	-14.20%
5423.05	18.30%
4880.70	-10.54%
4907.00	0.54%
4295.45	-13.31%
4393.80	2.26%
4335.70	-1.33%
4423.10	2.00%
Average Quaterly Returns	2.35%
Annualized Returns	9.75%

Fig: Dr Reddy returns

PFIZER LTD	Quaterly Return of PFIZER LTD
1060.05	
1084.15	2.25%
1097.75	1.25%
1154.15	5.01%
1273.15	9.81%
1419.75	10.90%
1663.05	15.82%
2154.60	25.90%
2230.15	3.45%
2425.25	8.39%
2018.20	-18.37%
2358.75	15.59%
1793.35	-27.40%
1895.35	5.53%
1917.90	1.18%
1823.90	-5.03%
1915.25	4.89%
1806.90	-5.82%
1817.30	0.57%
2062.95	12.68%
2185.20	5.76%
2579.50	16.59%
2986.50	14.65%
2854.35	-4.53%
3326.00	15.29%
3355.50	0.88%
3351.05	-0.13%
4224.70	23.17%
4023.00	-4.89%
3963.80	-1.48%
4899.65	21.20%
5106.80	4.14%
4524.90	-12.10%
5670.80	22.57%
5581.10	-1.59%
5055.30	-9.89%
4348.15	-15.07%
4080.35	-6.36%
4265.35	4.43%
4409.95	3.33%
Average Quaterly Returns	3.66%
Annualized Returns	15.44%

Fig: Pfizer returns

Risk-Free Rate



भारतीय रिज़र्व बैंक

Reserve Bank of India

India's Central Bank

75

Azadi Ka

Amrit Mahotsav

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
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 (10 kb) or  (150 kb)

Date : Dec 23, 2022

Cash Reserve Ratio and Interest Rates

(per cent)

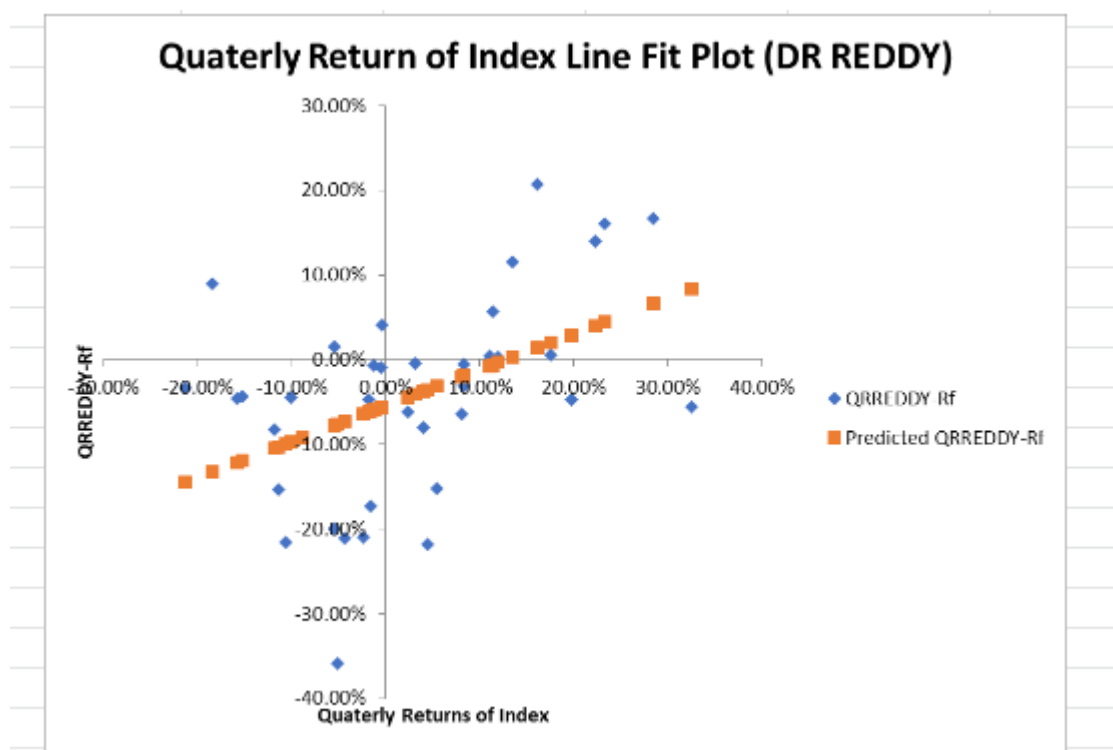
Item/Week Ended	2021	2022				
	Dec. 17	Nov. 18	Nov. 25	Dec. 2	Dec. 9	Dec. 16
	1	2	3	4	5	6
Ratios						
Cash Reserve Ratio	4.00	4.50	4.50	4.50	4.50	4.50
Statutory Liquidity Ratio	18.00	18.00	18.00	18.00	18.00	18.00
Cash-Deposit Ratio	4.95	5.36	..	5.29	..	..
Credit-Deposit Ratio	71.30	74.85	..	74.79	..	..
Incremental Credit-Deposit Ratio	48.34	126.98	..	114.78	..	..
Investment-Deposit Ratio	28.99	29.41	..	29.22	..	..
Incremental Investment-Deposit Ratio	18.33	42.99	..	37.05	..	..
Rates						
Policy Repo Rate	4.00	5.90	5.90	5.90	6.25	6.25
Fixed Reverse Repo Rate	3.35	3.35	3.35	3.35	3.35	3.35
Standing Deposit Facility (SDF) Rate*	..	5.65	5.65	5.65	6.00	6.00
Marginal Standing Facility (MSF) Rate	4.25	6.15	6.15	6.15	6.50	6.50
Bank Rate	4.25	6.15	6.15	6.15	6.50	6.50
Base Rate	7.25/8.80	8.10/8.80	8.10/8.80	8.10/8.80	8.10/8.80	8.10/9.40
MCLR (Overnight)	6.50/7.00	7.05/8.05	7.05/8.05	7.25/8.15	7.30/8.15	7.30/8.15
Term Deposit Rate >1 Year	4.90/5.60	6.10/7.25	6.10/7.25	6.10/7.25	6.10/7.25	6.00/7.25
Savings Deposit Rate	2.70/3.00	2.70/3.00	2.70/3.00	2.70/3.00	2.70/3.00	2.70/3.00
Call Money Rate (Weighted Average)	3.41	5.84	6.13	5.88	5.96	6.18
91-Day Treasury Bill (Primary) Yield	3.53	6.44	6.45	6.40	6.45	6.40
182-Day Treasury Bill (Primary) Yield	3.87	6.74	6.75	6.73	6.79	6.75
364-Day Treasury Bill (Primary) Yield	4.18	6.88	6.88	6.87	6.92	6.87

We used the 364-day Treasury Bill Yield as of December 2, 2022, which was 6.87% as the risk free rate.

Then we proceeded to regress the returns of each company against the market returns. The following sections shows the regression summaries for all three companies:

Dr. Reddy's Lab

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.46016				R Square (Systematic Risk)	0.211748		
R Square	0.211748				1-R Square (Unsystematic Risk)	0.788252		
Adjusted R Squa	0.190443				Beta	0.423626		
Standard Error	0.10782							
Observations	39							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	0.115545	0.115545	9.939277	0.003203			
Residual	37	0.43013	0.011625					
Total	38	0.545675						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.05452	0.017599	-3.09787	0.00371	-0.09018	-0.01886	-0.09018	-0.01886
Quarterly Return:	0.423626	0.134371	3.152662	0.003203	0.151365	0.695887	0.151365	0.695887

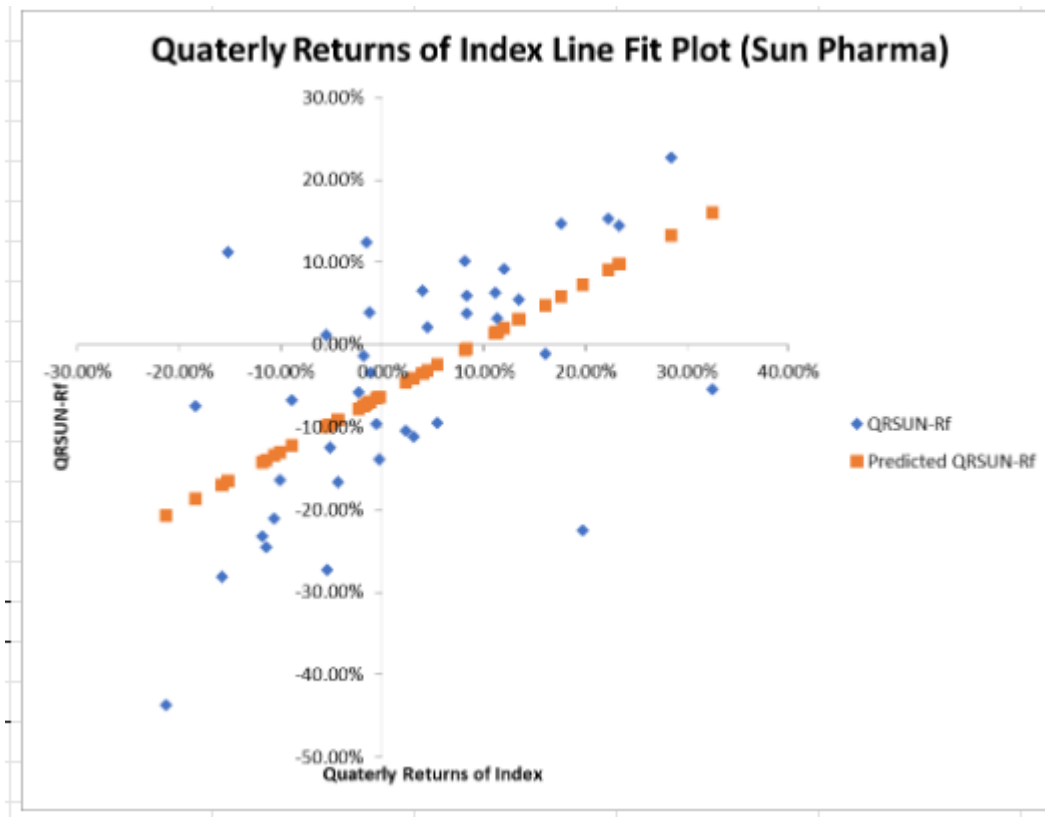


The value of beta is 0.423 with a p-value less than 0.05. The R square value, i.e. the risk explainable by the regression coefficient (systematic risk), is 0.211748. The idiosyncratic risk or the risk explained by firm-specific factors that can be diversified (unsystematic risk) is $1 - 0.211748 = 0.788252$. As the beta value is less than 1, the firm is less sensitive to systematic stimuli than the industry is.

Sun Pharma

SUMMARY OUTPUT

Regression Statistics				R Square (Systematic Risk)		0.370399135			
Multiple R	0.608604252			1-R Square (Unsystematic Risk)		0.629600865			
R Square	0.370399135			Beta		0.681993774			
Adjusted R Squa	0.353382895								
Standard Error	0.117292731								
Observations	39								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	1	0.299467	0.299467	21.76739	3.94E-05				
Residual	37	0.509031	0.013758						
Total	38	0.808497							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-0.061701196	0.019145	-3.2228	0.00265	-0.10049	-0.02291	-0.10049	-0.02291	
Quarterly Return	0.681993774	0.146176	4.665554	3.94E-05	0.385812	0.978175	0.385812	0.978175	

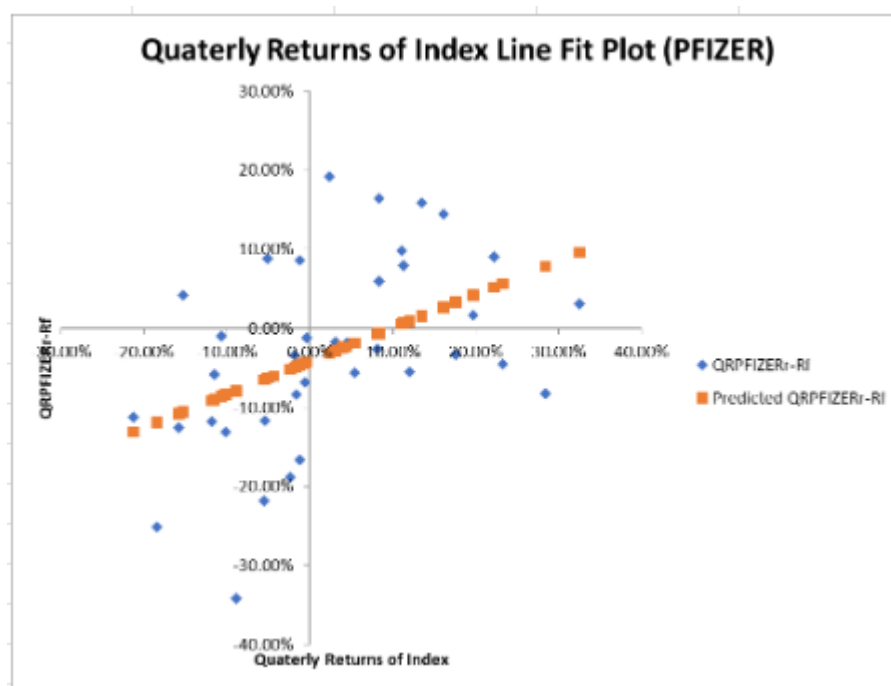


The beta value is 0.681 with a p-value less than 0.05. The R square value, i.e. the risk explainable by the regression coefficient (systematic risk), is 0.370399.

As the beta value is less than 1, the firm is less sensitive to systematic stimuli than the industry is.

Pfizer

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.468858				R Square (Systematic Risk)	0.219828		
R Square	0.219828				1-R Square (Unsystematic Risk)	0.780172		
Adjusted R Squa	0.198742				Beta	0.421294		
Standard Error	0.104697							
Observations	39							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	0.114277	0.114277	10.42543	0.002607			
Residual	37	0.40557	0.010961					
Total	38	0.519847						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.04144	0.017089	-2.42506	0.020305	-0.07607	-0.00682	-0.07607	-0.00682
Quarterly Return	0.421294	0.130478	3.228843	0.002607	0.15692	0.685668	0.15692	0.685668



The value of beta is 0.421, with a p-value less than 0.05. The R square value, i.e. the risk explainable by the regression coefficient (systematic risk), is 0.219828.

As the beta value is less than 1, the firm is less sensitive to systematic stimuli than the industry is.

3. Unsystematic Risk Analysis

Degree of Operating Leverage

The DOL measures how much the EBIT of a firm (ΔEBIT) changes in response to changes in sales (Δsales). Using the DOL ratio, analysts can evaluate the impact of any change in sales on firm earnings. It is calculated with the help of the following formula:

$$\text{Degree of Operating Leverage} = \frac{\% \text{ of change in operating income}}{\% \text{ of change in sales}}$$

Degree of Financial Leverage

$$\begin{aligned} \text{Degree of Financial Leverage} &= \frac{\% \text{ change in Net Income}}{\% \text{ change in Operating Income (EBIT)}} \\ &= \frac{\left(\text{Net Income}_{\text{Time 1}} - \text{Net Income}_{\text{Time 0}} \right) \div \text{Net Income}_{\text{Time 0}}}{\left(\text{EBIT}_{\text{Time 1}} - \text{EBIT}_{\text{Time 0}} \right) \div \text{EBIT}_{\text{Time 0}}} \end{aligned}$$

The DFL measures the sensitivity of a company's profits per share to changes in operating income. The more the DFL, the more the volatility of the earnings.

EBIT is Earnings Before Interest and Tax and it is given by the sum of Operating Profit and other income, less the depreciation

Total Leverage

The total leverage is given by the product of DFL and DOL.

We could access the Earnings Per Share, Sales, Expenses, and the other data mentioned in the tables below through the Bloomberg Terminal. These data were reported in March 2021 and March 2022. Both DFL and DOL were calculated for the three companies.

Pfizer

Mar-21	Mar-22		
2,238.55	2,610.99		
1,526.15	1,775.05		
712.40	835.94		
81.12	62.65		
109.41	115.00		
15.39	10.70		
668.72	772.89		
171.11	160.33		
497.61	612.56		
793.52	898.59		
684.11	783.59	Degree of Operating Leverage	0.27
2,368.84	3,030.23	Degree of Financial Leverage	0.2526135907
809.63	996.85	TOTAL LEVERAGE	6.75%
108.77	133.90		
1,559.21	2,033.38		
-865.16	474.17		
1,316.00	1,383.00		
1.00	67.00		
	20.74%		
1,657.68	194.90		
45750372	45750372		
192.12	746.28		
0.0036233%	0.0004260%		
0.00000420	0.00001631		
3,265.90	3,900.51		
2,456.27	2,903.66		
0.28	0.27		
684.11	783.59		
0.00	0.00		
4.68%	14.54%		
-0.69	2.88		

Dr. Reddy's

Dr.Reddy				
Narration	Mar-21	Mar-22		
Sales	19,047.50	21,545.20		
Expenses	15,173.40	17,777.50		
Operating Profit	3,874.10	3,767.70		
Other Income	335.20	554.70		
Depreciation	1,228.80	1,165.20		
Interest	97.00	95.80		
Profit before tax	2,883.50	3,061.40		
Tax	931.90	878.90		
Net profit	1,951.60	2,182.50		
EBIT	2,980.50	3,157.20	Degree of Operating Leverage	0.07
Other Assets	14,605.30	17,714.70	Degree of Financial Leverage	0.07804187889
Other Liabilities	5,718.70	6,988.50	TOTAL LEVERAGE	0.55%
EPS	117.35	131.14		
WC = Current as	8,886.60	10,726.20		
Change in WC	2,040.20	1,839.60		
Gross Block	18,556.00	19,786.00		
Capex= Gross bl	2,448.00	1,230.00		
Tax rate (current)				
FCFF	-278.90	1,252.80		
No. of Equity St	166425849	166425849		
FCFE	3,696.81	3,202.19		
Debt Equity Ratio (not in Cr)				
FCFF / Share (no	-0.0001676%	0.0007528%		
FCFE/ Share (no	0.00002221	0.00001924		
Total	26,587.90	29,745.50		
Capital employe	20,869.20	22,757.00		
ROCE	0.14	0.14		
FCFF= ROCE*CE	2,980.50	3,157.20		
FCFF/Share	0.00	0.00		

Sun Pharma

SUN PHARMACEUTICALS INDUSTRIES LTD			
Narration	Mar-21	Mar-22	
Sales	33,498.14	38,654.49	
Expenses	25,028.18	28,396.92	
Operating Profit	8,469.96	10,257.57	
Other Income	-3,449.21	-3,505.16	
Depreciation	2,079.95	2,143.74	
Interest	141.43	127.35	
Profit before tax	2,799.37	4,481.32	
Tax	514.69	1,075.50	
Net profit	2,903.82	3,272.73	
EBIT	2,940.80	4,608.67	Degree of Operating Leverage
Current assets	34,889.96	33,172.88	Degree of Financial Leverage
Current Liabilities	17,290.86	20,466.49	TOTAL LEVERAGE
EPS	12.10	13.64	
WC = Current as	17,599.10	12,706.39	
Change in WC	-1,769.87	-4,892.71	
Gross Block	35,579.00	38,502.00	
Capex= Gross bl	463.00	2,923.00	
Tax rate (current)			
FCFF	6,327.62	8,722.12	
No of shares (Cr)			
FCFE	6,012.26	7,048.08	
Debt Equity Ratio (not in Cr)			
FCFF / Share (no	26.37	36.35	
FCFE/ Share (no	25.06	29.38	
Total assets	67,622.22	69,768.01	
Capital employed	50,331.36	49,301.52	
ROCE	0.06	0.09	
FCFF= ROCE*CE	2,940.80	4,608.67	
FCFF/Share	12.26	19.21	
growth rate of F	-44.64%	56.71%	
Average last 5 yr- FCFF			
growth rate of F	0.59	0.17	
Average last 5 yr - FCFE			
EPS in Rs	11.11	15.69	
Dividend Payout	25%	25%	
Current Liabilities	78278.83	90638.6	

4. Implied ERP (Equity Risk Premium) calculation:

Equity risk premium is the rate investors demand to invest in equity over a risk-free asset. It is the subtraction of the risk-free rate from the expected return from equity divided by beta. Expected return on equity is generally calculated by considering historical data and regressing it with a suitable market index to obtain the corresponding beta,

Generally, equity risk premiums are estimated by three approaches:

- Surveying investors on their desired risk premium and averaging out the results.
- Take actual premium delivered by the equity over a long time period (Historical Data).
- Estimate implied premium using today's asset price.

The first approach isn't viable as procuring data from diverse investors is a tedious job and could result in a large number of outliers.

Using the second approach according to Aswath Damodaran, results in a significant standard error with a low significance value (p-value > 0.05), as "the user's preferred time window, kind of average chosen, and selected risk-free rate are all factors that influence historical risk premiums".

Therefore, the third approach is chosen wherein we calculate the ERP using discounted dividend and buyback price till perpetuity assuming a two stage dividend discount model, and equate the resulting value to the current value of the index.

Firstly, the total annual cash flow was calculated by adding the trailing 12 months' dividends paid out and the buyback. This value multiplied by the corresponding ratio of the market capitalisation of each firm, gives us the individual cash flow of each firm compared to the index. Adding up these values gives us the total cash flow of the index, which are the cashflows of the base year (current year).

Name	Mar Cap Rs.Cr.	Ratio	Buyback(Trailing 12 months)	Dividend(Trailing 12 months)	Total CF(Trailing 12	Total CF X Ratio
SUN PHARMA INDU	2404554375168.00	0.30	0.00	10.00	10.00	3.01
DIVI LABS LTD	893421223936.00	0.11	0.00	30.00	30.00	3.36
CIPLA LTD	889233539072.00	0.11	0.00	5.00	5.00	0.56
DR REDDY'S LABS	744080670720.00	0.09	0.00	30.00	30.00	2.80
TORRENT PHARMA	544534265856.00	0.07	0.00	48.00	48.00	3.28
ABBOTT INDIA LTD	437134262272.00	0.05	0.00	275.00	275.00	15.07
ZYDUS LIFESCIENC	413586620416.00	0.05	7.39	2.50	9.89	0.51
LUPIN LTD	341457010688.00	0.04	0.00	4.00	4.00	0.17
BIOCON LTD	324522180608.00	0.04	0.00	0.50	0.50	0.02
AUROBINDO PHARMA	261855969280.00	0.03	0.00	6.00	6.00	0.20
PFIZER LTD	201205383168.00	0.03	0.00	65.00	65.00	1.64
AJANTA PHARMA	152379244544.00	0.02	22.29	7.00	29.29	0.56
SANOFI INDIA LTD	133005295616.00	0.02	0.00	683.00	683.00	11.38
GLENMARK PHARMA	123152293888.00	0.02	0.00	2.50	2.50	0.04
ALEMBIC PHARMACE	115303931904.00	0.01	0.00	10.00	10.00	0.14
	7979426267136.00					42.74

Only two companies did buyback in the trailing year, as shown in the figure above.

The growth rate of the first stage (assumed to be 5 years) of the two stage dividend discount model was found from the growth rate of the index considered, which was equal to 10.55%. It is assumed that the companies would grow at a risk-free rate after five years; hence, the growth rate was taken as 6.87%, calculated from 364 days T-Bill.

As on Dec 12th							
Inputs							
Current Price of Equity	2692.24						
Dividends and Buybacks for Trailing 12 months (Year 1)	42.73516318						
Growth Rate Types							
Growth Rate Estimates based on NIFTYPHARMA	10.55%						
Risk Free Rate	6.87%						
Calculations							
Year	Base Year	1	2	3	4	5	Perpetuit
Expected Cash Flow	42.73516318	47.24423081	52.22905867	57.73984511	63.83208501	70.56712863	3775.21720
DCF		43.39602901	44.0671146	44.74857802	45.44057972	46.1432827	2468.58442
Sum of discounted cash flows	2692.380009						
Discount rate	0.088676358						
IERP	1.99764%						

Discount rate	0.088676358
IERP	1.99764%

The sum of the discounted cash flows was equated to the current value of the index, and the corresponding discount rate was calculated using excel goal seek by equating the value of the discounted cash flows to the current value of the index. The value obtained was 8.89% and subtracting the risk-free rate from this results in the implied equity risk premium equal to 1.997%.

Solver Parameters

Set Objective:

\$B\$43

↑

To:

☐ Max
☐ Min
☒ Value Of:

2692.24

By Changing Variable Cells:

\$B\$44

↑

Subject to the Constraints:

\$B\$44 >= 0.059

▲

▼

Add

Change

Delete

Reset All

Load/Save

☒ Make Unconstrained Variables Non-Negative

Select a Solving Method:

GRG Nonlinear

▼

Options

Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Help

Solve

Close

5. Calculation of Cost of Equity, Cost of Debt, and WACC

Cost of Equity

Cost of Equity is the return an equity investor expects to receive from his investment. It is given by the sum of risk-free rate with beta multiplied with the market risk premium.

$$\text{Cost of Equity} = \text{Risk Free Rate} + (\beta \times \text{Equity Risk Premium})$$

We have calculated COE above by finding Beta by regressing with our three companies and using the index as a market return and using a 364-day T-bill as R_f .

Here, the Equity risk premium is the IERP which we calculated above.

The Weighted Average Cost of Capital is the discount rate used to calculate the Net Present Value of a firm. It is calculated with the following formula

$$WACC = \frac{E}{E + D} * R_E + \frac{D}{E + D} * R_D * (1 - T)$$

where R_E is the cost of equity, R_D is the cost of debt, E and D are the values of equity and debt, and T is the corporate tax rate.

Cost of Debt

Cost of Debt is calculated as the sum of the Return on Risk-free asset and the spread.

The firm's rating is determined by first calculating its interest coverage ratio and using the value to identify its credit rating.

If interest coverage ratio is			
greater than	≤ to	Rating is	Spread is
-100000	0.499999	D2/D	14.34%
0.5	0.799999	C2/C	10.76%
0.8	1.249999	Ca2/CC	8.80%
1.25	1.499999	Caa/CCC	7.78%
1.5	1.999999	B3/B-	4.62%
2	2.499999	B2/B	3.78%
2.5	2.999999	B1/B+	3.15%
3	3.499999	Ba2/BB	2.15%
3.5	3.999999	Ba1/BB+	1.93%
4	4.499999	Baa2/BBB	1.59%
4.5	5.999999	A3/A-	1.29%
6	7.499999	A2/A	1.14%
7.5	9.499999	A1/A+	1.03%
9.5	12.499999	Aa2/AA	0.82%
12.5	100000	Aaa/AAA	0.67%

$$\text{EBITDA to Interest Coverage Ratio} = \frac{\text{EBITDA}}{\text{Total Interest Payment}}$$

Interest coverage Ratio of SunPharma	
For 2022	
EBITDA	6,752.41
Interest	127.35
Interest Coverage Ratio	53.02
Interest coverage Ratio of Pfizer	
For 2022	
EBITDA	898.59
Interest	10.70
Interest Coverage Ratio	83.98
Interest coverage Ratio of Dr Reddy	
For 2022	
EBITDA	4,322.40
Interest	95.80
Interest Coverage Ratio	45.12

Here we calculated the Interest coverage ratio by dividing the EBITDA by Interest (of the year 2022). They had ICR above 12.5, thus a rating of Aaa/AAA. This means the Cost of Debt for them is almost the same as $R_f + 0.67\% = 7.54\%$.

Tax Rate

The corporate tax rate was individually calculated for each firm by calculating the ratio of the total tax paid and the net profits (Before tax) of the companies (the above table is the calculation of the tax rate for Dr. Reddy's Lab).

Tax	878.90
Net profit	2,182.50
Tax rate (current)	28.71%

Fig. Tax calculation for Dr Reddy

Tax	160.33
Net profit	612.56
Tax rate (current)	20.74%

Fig. Tax calculation for Pfizer

Tax	1,075.50
Net profit	3,272.73
Tax rate (current)	24.00%

Fig. Tax calculation for Sun Pharma.

Return On Equity

Pfizer

ROE:

DATE	2018	2019	2020	2021	2022
EQUITY CAPITAL	46.00	46.00	46.00	46.00	46.00
RESERVES & SURPLUS	2,637.00	2,966	3,350	2,347	2,819
ROE	0.13	0.14	0.15	0.21	0.21
Dividend Payout %	0.25	0.24	0.30	0.32	0.26

DATE	2018	2019	2020	2021	2022
Dividend Payout	0.25	0.24	0.30	0.32	0.26
Return on Equity	13.42%	14.24%	14.99%	20.79%	21.38%
Average ROE	16.97%				
AVERAGE DIV PAYOUT	27.34%				

Interest coverage ratio = 83.98 thus credit rating is Aaa/AAA.

WACC:

Data of Pfizer		Interest Coverage Ratio	
IERP	1.998%	83.98	
Return Risk free	6.87%		
Beta	0.421	Cost of Debt= Rf + Spread	7.54%
Cost of equity	7.71%		
Cost of Debt	7.40%		
Debt to equity ratio	0.00	Tax rate (current)	20.74%
Weight of Debt	0.00%		
Weight of Equity	100.00%		
WACC	0.07712		

WACC of Pfizer =7.712%.

DR. Reddy's

ROE:

	DATE	2018	2019	2020	2021	2022
EQUITY CAPITAL		83.00	83.00	83.00	83.00	83.00
RESERVES & SURPLUS		12,489.00	13,994	15,616	17,755	19,289
ROE		0.08	0.14	0.13	0.11	0.11

DATE	2018	2019	2020	2021	2022
Div payout ratio last 5 ys	35%	17%	21%	21%	23%
Return on Equity	0.0753	0.1385	0.1291	0.1094	0.1127
Average ROE	11.30%				
AVERAGE DIV PAYOUT	23.40%				

Interest coverage ratio = 45.12 thus credit rating is Aaa/AAA.

WACC:

Data of Dr Reddy		Interest Coverage Ratio	
IERP	1.998%	45.12	
Return Risk free	6.87%		
Beta	0.424	Cost of Debt= Rf + Spread	7.54%
Cost of equity	7.72%		
Cost of Debt	7.40%		
Debt to equity ratio	0.12	Tax rate (current)	28.71%
Weight of Debt	10.71%		
Weight of Equity	89.29%		
WACC	0.07455		

WACC of DR. Reddy's = 7.455% .

Sun Pharma

ROE

	DATE	2018	2019	2020	2021	2022
EQUITY CAPITAL		240.00	240.00	240.00	240.00	240.00
RESERVES & SURPLUS		38,074.00	41,169	45,025	46,223	47,771
ROE		0.05	0.06	0.08	0.06	0.07
INTEREST COVERAGE RATIO		53.02245779				

DATE	2018	2019	2020	2021	2022
Div payout ratio last 5 ys	14%	12%	23%	25%	25%
Return on Equity	20%	17%	18%	14%	19%
Average ROE	17.478%				
AVERAGE DIV PAYOUT	19.80%				

Interest coverage ratio = 53.02 thus credit rating is Aaa/AAA.

WACC:

Data of SunPharma		Interest Coverage Ratio	
IERP	1.998%	53.02	
Return Risk free	6.87%		
Beta	0.68	Cost of Debt= Rf + Spread	7.54%
Cost of equity	8.23%		
Cost of Debt	7.40%		
Debt to equity ratio	0.20	Tax rate (current)	24.00%
Weight of Debt	16.67%		
Weight of Equity	83.33%		
WACC	0.0780		

WACC of Sun Pharma =7.8% .

6. Summary

We initiated our project with the designing of our Pharmaceutical industry-specific index with the help of 15 firms. We used the quarterly closing prices and free-float market capitalization data over 10 years to calculate the index using a value-weighted index format.

We then calculated the quarterly returns to the index and the firms by using the formula $\ln(\text{Price at } t / \text{Price at } t-1)$.

We regressed the returns to the firms against the excess returns of the index over the risk-free rate of India.

The following are the values obtained of Betas:

Sun Pharma: 0.681

Pfizer: 0.421

Dr Reddy's: 0.423

This indicates that all three firms are less sensitive as compared to the entire industry. Thus, we can conclude that Sun pharma was the most sensitive with the Index as it had the highest beta and Pfizer and Dr Reddy's were less sensitive but more or less similar.

For the Unsystematic Risk Analysis (idiosyncratic risk), we calculated DOI and DOFL to calculate the total leverage. The following are values of the total leverage for all the companies:

Sun Pharma: **0.03%** (This can be attributed to a lower Debt Financing as compared to its peers and has been quite successful in diversifying its idiosyncratic risk)

Pfizer: **6.75%** (Had the highest Debt Financing among its peers)

Dr. Reddy's: **0.55%**.

The next step was calculating the cost of equity and cost of debt for all three companies. The Cost of Equity was calculated with the help of Implied ERP which was = **1.99764%** & Cost of Debt with the help of the Interest coverage ratio credit spread of Aswath Damodaran.

The following are the values obtained of betas COE=

Sun Pharma: **8.23%** (Had the highest Cost of Equity which can be attributed to its higher Beta.)

Pfizer: **7.71%**

Dr Reddy's: **7.72%**.

The WACC for all three companies was calculated by taking the weighted average of both the Cost of Equity after tax and the Cost of Debt.

The WACC for the companies are as follows:

Sun Pharma: **7.798%**

Pfizer: **7.712%**

Dr. Reddy's: **7.455%** (Has successfully managed to reduce its cost of capital the most)

They have roughly the same Cost of Capital keeping in line with their peers.

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