

Modigliani-Miller Proposition II on best performing Nifty midcap 50 stocks

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Abstract

The research tries to study the MM theory second proposition in the context of midcap stocks. The well performing stocks (10 stocks) were chosen from the universe of nifty midcap 50 stocks. The selection was based last 10 years profit growth, RoE and asset growth in the last 10 years. Here r_0 , unlevered cost of equity, is calculated using CAPM model for a company which is close to the company in question in terms of operation and size. For each company cost of equity r_e is calculated using DE of the same and r_0 (cost of equity of unlevered firm). The DE variable alone was regressed against the calculated r_e . The result was that DE was not significant in impacting r_e and the model was not fit with R^2 value is 0.17. When the model is modified with two variables, DE and r_0 and regressed against r_e , the model proved to a fit model (R^2 is 0.96) and the two variables were found significantly impacting the r_e s of the ten midcap companies.

Keywords: MM Proposition, Nifty midcap 50, return on equity, levered firm, debt-equity ratio

Background

The midcap stocks are becoming prominent by the day. The return they offer is risk worthy. When applying the MM proposition II for the select stocks, we can get to understand how far expected return (cost of equity) given by the proposition is in line with the return generated by the stock. The stock selection was done based on Roe, asset growth, 10 year CAGR in profit growth. Then using the regression model the analysis was done with R_e as dependent variable and R_0 and DE as independent variables.

Literature review

The study, done by Bui, Thi Ngoc concludes that the debt ratio exerts a positive influence on ROE and ROA. But on specific note, both short-term and long-term debts have negative effects on ROE, ROA. However, long term debt ratio has no significant impact on the firm value. Venkatraman et al did a study. The study found that the firm value can be measured through profitability, earnings per share, revenue growth and market value/book value ratio.

Pettergill et al, in their research presents theoretical and empirical arguments in support of the claim that “the cost of equity increases slowly with moderate increases in debt but increases dramatically as leverage increases sufficiently to cause equity investors to fear bankruptcy”.

Aggarwal and Padhan (2017) studied the listed Indian hospitality firms over the period from 2001 to 2015. They found that there exists a significant relationship between firm value and firm quality, leverage, liquidity, size, and economic growth.

The authors (Galuh Adika Alifani Anggoro Budi Nugroho) found some difference in calculation result between the research calculations and the MM theories, which is that the return on equity decreases as the leverage increase, as opposed to MM theory statement that the return on equity should increase as the leverage increase, but that difference does not violate the theories because those factors have already been addressed as an exceptional condition in the MM theory itself.

Valery V. Shemetov, in the study points out that for a firm with payments, MMPs (Miller Modigliani Propositions) hold for short times and are false for time intervals exceeding a year. In contradiction with MMPs, the asset structure affects the firm value at the perfect market, and at the market with taxes, debt decreases the firm value even when there are no bankruptcy costs.

In a study by Hirdinis (2019), it was found that capital structure had a significant positive effect on firm value, while firm size had a significant negative effect on firm value. Surprisingly, profitability had no significant effect on firm value, but size of the firm had a significant positive impact on profitability.

The study by Dhan suggested that the equity risk premium associated with leverage is decreasing in the corporate tax benefit from debt. We find some evidence that the equity risk premium from leverage is increasing in the personal tax penalty associated with debt.

Maria Chesnokova found that for a banking industry, the level of increase in WACC varies among countries from 0.09pp to 18pp for 50pp decrease in leverage. The research concludes that there is a MM effect greater than 60% in UK and US, but only of 25% in Euro area. The beta increases when the leverage increases. The influence of liquidity and profitability on risk is less obvious, but we can suppose that increase in profitability has significant negative influence on risk, while liquidity determined as loans-to-deposits ratio is significant only if it reflects excessive lending activities of the bank

Methodology

From the universe of 50 companies in nifty 50, ten companies were selected based on three fundamental factors namely **Profit growth** (last 10 year CAGR more than 15%), **Roe** (more than 15% for last 10 years), consistent **Asset growth** of 10-15% CAGR over last 10 years. The selected ten companies are listed below

- 1. Astral Ltd**
- 2. Coforge Ltd**
- 3. Dixon technologies (India) Ltd**
- 4. PI Industries Ltd**
- 5. Polycab India Ltd**
- 6. Balkrishna Industries Ltd**
- 7. Bharat Electronics Ltd**
- 8. Mphasis Ltd**
- 9. Page Industries Ltd**
- 10. Tube investments of India Ltd**

The Model

Proposition II without Taxes: Higher Financial Leverage Raises the Cost of Equity

Modigliani and Miller find that the cost of equity is a linear function of a company’s debt/equity ratio.

According to this proposition, the cost of equity increases as a company uses debt financing to maintain a constant WACC. The risk of equity is contingent on business risk and financial risk. Business risk determines the cost of capital, while capital structure determines financial risk.

Mathematically, that cost of equity is a linear function of a company’s D/E ratio is given as below:

$$re = ro + (ro - rd)DE$$

re- cost of equity

ro- cost of equity of unlevered firm

rd- Cost of debt

DE- Debt equity of the company

Proposition II with Taxes

$$re = ro + (ro - rd) (1 - t) DE$$

WACC for a company with debt is lower than the WACC for companies without debt. Therefore, debt financing is highly beneficial when considering taxes and ignoring financial distress and bankruptcy costs. The firm’s optimal capital structure is still 100% debt. When corporate tax is present, the cost of equity (re) increases as the company employs more debt but at a slower rate compared with the no-tax proposition $re = ro + (ro - rd)DE$. As a firm employs more debt, its WACC decreases, which leads to increasing its value.

Ignoring financial distress and bankruptcy costs, in the presence of corporate tax, the use of tax enhances the value of a company with the optimal benefit at 100% debt.

Companies	Mcap(Rs Crore)	Price 10 yr cagr	Profit growth 10 cagr	ROE (10 yrs)	Asset growth (11 yr cagr)
ASTRAL	60894	31.00%	21.00%	19.00%	21.17%
COFORGE	39329	31.00%	13.00%	21.00%	21.17%
DIXON	75104	56.91%*	39.00%	24.00%	34.11%
PIIND	58876	27.00%	24.00%	20.00%	22.69%
POLYCAB	99678	61.00%*	34.00%	19.00%	15.88%
BALKRISHIND	60203	22.00%	12.00%	18.00%	11.46%
BEL	234408	33.00%	15.00%	20.00%	9.30%
PERSISTENT	74259	31.00%	16.00%	20.00%	17.13%
PAGEIND	45663	18.00%	14.00%	46.00%	17.05%
TIINDIA	79208	45.85%*	38.75%*	25.00%	15.88%

*Dixon –price CAGR is for 7 years

*POLYCAB - price CAGR is for 5 years

*TI india- price CAGR is for 7 years, profit CAGR is for 7 years

S.No	Companies	Beta	NW (Rs Cr)	Debt (Rs Cr)	Interest (Rs Cr)	rd(Rs Cr)	ro (Ke of unleverred)	D/E	re (no tax)	re (Tax)
1	ASTRAL	1.16	3130	49	6	0.122	0.1680	0.016	16.87%	16.85%
	supreme	0.75	4500	55			0.1680	0.012		
2	COFORGE	1.12	3250	415	55	0.133	0.1283	0.128	12.78%	12.79%
	tata tech	0.44					0.1283	0.080		
3	DIXON	1.2	1390	44	41	0.932	0.2256	0.032	20.32%	21.00%
	Dixon	1.2					0.2256			
	tata elxsi	1.14					0.2179	0.090		
4	PIIND	0.65	8700	200	20	0.100	0.1437	0.023	14.47%	14.44%
	sumitomo chemical india	0.56					0.1437	0.010		
5	POLYCARB	0.9	8187	870	108	0.124	0.1642	0.106	16.84%	16.71%
	Finolex cable	0.72	4200	18			0.1642	0.004		
6	Balkrishna	0.86	8862	3037	110	0.036	0.2128	0.343	27.33%	25.52%
	MRF	1.1	16700	2822			0.2128	0.169		
7	BEL	1.1	16300	63	7.00	0.111	0.2128	0.004	21.32%	21.31%
	BEL	1.1					0.2128			
8	Persistent	0.9	5000	451	47	0.104	0.0720	0.090	6.91%	7.00%
	Persistent	0.9					0.0720			
	Mphasis	0.85	8800	1544	160.00	0.104	0.1808	0.175	19.43%	19.03%
9	Pageind	0.42	1586	185	45.00	0.243	0.1360	0.117	12.35%	12.72%
	page ind	0.5					0.1360			
	kpr							0.256		
10	TIIndia	0.74	5100	896	73.00	0.081	0.1667	0.176	18.17%	17.72%
	Ti India						0.1667			
	jindal stain	0.9	14000	6000			0.1872	0.429		

The companies shown emboldened are the levered firms and the companies which are in consideration. The companies shown below it are the companies (herein after it is referred as **UL(unlevered firm)**) which are comparable by market cap and have no debt/less debt in their balance sheet from the same industry and are used as a unlevered firm whose cost of equity (Ko) is calculated using CAPM formulae

$$K_o = R_f + \text{Beta} * (R_m - R_f)$$

For all the companies, R_f is taken as 7.2% which is approximately yield of 10year govt bond. R_m is assumed to be 20%, so R_m-R_f is 12.8% (20%-7.2%). The onply variable here is beta. Based on beta of the unlevered firm, the Ko is found first for unlevered firm.

For example,

for the first company **Astral**, the comparable company in terms of mcap from the same industry is **supreme ltd** (UL) whose cost of equity (**ro**) is found as below

$$ro = R_f + \beta \cdot (R_m - R_f) = .075 + .75 \cdot (.128) = .168 = 16.8\%$$

Now this ro is used as cost of equity of unlevered firm in Astral Ltd to calculate re of Astral Ltd (**re of Levered firm**) by the formulae

$$re = ro + (ro - rd)DE$$

$$re = 16.8\% + (16.8\% - 12.2\%) \cdot 0.16$$

$$= 16.87$$

re- (Cost of equity of levered firm)-**Astral ltd**

ro- (cost of equity of unlevered firm-**Supreme industries ltd**)

rd- Cost of debt-**Astral Ltd**

DE- Debt/equity ratio of **Astral Ltd**

Two groups

1. Another company is an unlevered firm

Astral, Coforge, PI Industries, Polycab, Balakrishna industries are the five companies for whom the unlevered companies are different which are closer to its market cap and have zero or less debt than these companies from the same industry. The comparable (unlevered) companies are respectively **Supreme industries Ltd, Tata technology ltd, Sumitomo chemical India ltd, Finolex cable ltd and MRF ltd.**

2. The firm itself is considered as unlevered firm

Dixon, Bharat electronics, Persistent systems, Page industries, TI India: No comparable company by in the industry and debt is very low, same company data has been taken for the unlevered data

Regression model I:

$$Re = A + B DE$$

Considering Re and DE only

	RE	D/E
ASTRAL	16.87%	1.57%
COFORGE	12.78%	12.77%
DIXON	20.32%	3.17%
PIIND	14.47%	2.30%
POLYCAB	16.84%	10.63%
Balkrishind	27.33%	34.27%
BEL	21.32%	0.39%
Persistent	6.91%	9.02%
Mphasis	19.43%	17.55%

Pageind	12.35%	11.66%
TIIndia	18.17%	16.67%

<i>Regression Statistics</i>	
Multiple R	0.42205
R Square	0.17813
Adjusted R Square	
Square	0.08681
Standard Error	0.05159
Observations	11

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.005192	0.0052	1.9506059	0.196004
Residual	9	0.023954	0.0027		
Total	10	0.029146			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0.14444	0.023917	6.0394	0.000193	0.090339	0.19855	0.0903388	0.19854543
X Variable 1	0.23089	0.165319	1.3966	0.1960041	-0.14309	0.60487	-0.1430863	0.60486903

Model 2

Re= A+B1 ro+ B2 DE

	RE	RO	D/E
ASTRAL	16.87%	16.80%	1.57%
COFORGE	12.78%	12.83%	12.77%
DIXON	20.32%	22.56%	3.17%
PIIND	14.47%	14.37%	2.30%
POLYCAB	16.84%	16.42%	10.63%
Balkrishind	27.33%	21.28%	34.27%
BEL	21.32%	21.28%	0.39%
Persistent	6.91%	7.20%	9.02%
Mphasis	19.43%	18.08%	17.55%
Pageind	12.35%	13.60%	11.66%
TIIndia	18.17%	16.67%	17.57%

Results and discussion

<i>Regression Statistics</i>	
Multiple R	0.97912
R Square	0.95867
Adjusted R Square	0.94834
Standard Error	0.01227
Observations	11

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance</i>
					<i>F</i>
Regression	2	0.027941	0.014	92.78696	2.92E-06
Residual	8	0.001205	0.0002		
Total	10	0.029146			

	<i>Coefficients</i>	<i>Standard</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower</i>	<i>Upper</i>	<i>Lower</i>	<i>Upper</i>
		<i>Error</i>			<i>95%</i>	<i>95%</i>	<i>95.0%</i>	<i>95.0%</i>
Intercept	-0.0271	0.015071	-1.798	0.1098331	-0.06185	0.00765	-0.0618546	0.0076509
X Variable 1	1.07919	0.087796	12.292	1.78E-06	0.876729	1.28164	0.87672912	1.2816447
X Variable 2	0.17522	0.03958	4.427	0.0022059	0.083949	0.26649	0.0839485	0.2664937

In Model I, DE as an explanatory variable, and RE as a dependent variable the analysis was done. The model R square is 0.17, p value 0.19 not significant at 5% level. That is not taken for analysis.

In model 2, same test was done with Ro and DE as explanatory variables and RE as dependent variable. Here R square (fitness of model) is 0.95 which is good. Both independent variables have significant impact at 5% on dependent variable Re. DE and Ro have significant impact on Re which was calculated based on MM proposition I formulae $Re=Ro+(Ro-Rd)DE$

Conclusion

From the selection of stocks to calculating Re using the Ro and DE is done first. Ro is the cost of equity of unlevered firm of similar size from the same industry. Then Individually De and re analysis is done. This was not at enough significance. Then De, Ro as independent variable were regressed to Re. There both the variables at 5% significance they had positive effect on Re.

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