INDIAN INSTITUTE OF MANAGEMENT CALCUTTA

Financial Research & Trading Laboratory

Leverage to Profit

Sudhir S. Jaiswall

Sudhir S. Jaiswall is a faculty member in the Finance and Control group at IIM Calcutta and the Faculty-in-charge of FRTL. He enjoys writing, analyzing data, teaching, training, and advising. Accounting, Corporate Governance, and Shareholder Wealth Creation are his primary areas of interest. He earned his Ph.D. and M.Com. (University of Calcutta), M.S. (University of Rochester), and MBA (IIM Ahmedabad). Besides, he is professionally certified in financial analysis, management accounting, and financial risk management.

This article describes how to use the degree of total leverage (DTL) to forecast earnings. Although both DTL and forecasted earnings are accounting constructs, they get covered under different fields of accounting in the MBA curriculum. DTL is a useful concept in Cost, Volume, and Profit (CVP) analysis, which is covered in Managerial Accounting. Forecasting of earnings is an essential outcome of Financial Statement Analysis, and forecasted earnings are an integral input in valuation. Often, the learnings from managerial accounting are kept aside while doing financial statement analysis, generating earnings forecast, and valuing a firm, which happens because of a lack of exposure to how various fields of accounting are related. This short article aims to bridge this gap and remind forecasters how they can use the CVP analysis insights in forecasting profits.

An essential assumption of CVP analysis is that only the quantity of output can change in the short run. Thus, total fixed costs would remain the same within a relevant range, whereas variables costs would change as output quantity changes. This assumption allows us to plot the amount of revenue, cost, and profit (on the y-axis) for various levels of sales quantity (on the x-axis). In this graph, the slope of the profit line is constant and represents contribution per unit.

The concept of contribution is fundamental to CVP analysis and represents the amount provided by sales (after paying for variable costs) to cover the fixed costs of a firm. When contribution and fixed costs (both operating and financial) are equal, the firm breaks even. When the contribution is less than the fixed costs, the firm has incurred a loss. By contrast, when the contribution exceeds the fixed costs, a firm generates a profit (before taxes). It is mainly the operating and financial fixed costs and non-operating incomes that separates profit from contribution. The higher the total fixed cost, the lower is the profit holding everything else constant. A firm's business model and its operating, investing, and financial decisions affect fixed costs.

The degree of total leverage (DTL) measures the percent change in profit before taxes (PBT) for a one-percent change in contribution. Contribution varies directly with sales revenue given the constant selling price and unit variable cost assumptions in CVP analysis. Therefore, we can also say that DTL measures the percent

a₹tha

change in PBT for a 1 percent change in sales revenue. Consequently, DTL is a summary statistic to showcase how profits will fluctuate with sales. It highlights the risks to profitability inherent in a firm's business model.

To compute DTL, we take the ratio of two performance measures: contribution and PBT. Thus, using the contribution and PBT, we can obtain the DTL. Furthermore, using the PBT for the current year (for example, 2018) and the predicted DTL and revenue growth rate for the next year (2019), we can predict the PBT in the following year (2019).

An important question is how to estimate DTL for Indian companies using their reported Statement of Profit and Loss (Income Statement) and its notes/schedules. The issue is vital because income statements disclose PBT but not report contribution. Whether in India or elsewhere, companies do not separately disclose variable and fixed costs in their publicly available financial reports. That is why it is necessary to scrutinize items in a company's Income Statement and notes to ascertain which expenses are likely to be variable and what proportion of their total is genuinely variable. [1] Once we have measured total variable cost, we can deduct it from net sales/service revenue (revenue from operations in the examples that follow in this article) to ascertain contribution. With the estimated Contribution and the reported PBT, we can compute DTL.

I illustrate the estimation of Variable Cost, Contribution, and Degree of Total Leverage first and after that, the forecasting of PBT using the information in standalone Income Statement (included in annual reports available on the website of respective companies) for four financial years (2016 through 2019) of two companies: SAIL and Hindalco.[2] It is essential to scrutinize the items included under Expenses on the standalone Income Statement and those under the note for Other Expenses (in the 2019 annual report) to identify which ones are variable costs.

SAIL's 2019 Income statement and Note 40 have nine items that appear more likely to be variable costs. Three are on the Income Statement: Cost of material consumed, Changes in inventories of finished goods (FG) and work in progress (WIP), and Excise duty.[3] The rest are in Note 40 (the 2019 Other Expenses): Power & fuel, Freight outward, Handling expenses for raw material & scrap recovery, Handling expenses for finished goods, Conversion charges, and Commission to selling agents.

---

[1] To keep the article focused on the use of DTL to forecast earnings, I assume that an expense is either fully variable or fully fixed, i.e. I do not segregate the variable and fixed components of an item of expense in this article although such a separation is vital to enhance accuracy. Furthermore, I do not incorporate trends in variable cost and fixed cost to adjust DTL, which would enhance the accuracy of forecasted earnings. I would do so in a future article.

[2] I could have also used the figures in their consolidated financial statements. I avoid using 2015 or a prior year data because from the fiscal year 2016 onwards companies started reporting as per the new Companies Act format. Using 2016 onwards data keeps things simple enough to allow us to focus on the topic of assessing DTL and forecasting PBT, and thereby avoids addressing harmonization issues.

[3] Note that Excise duty has been abolished and has declined to zero value in 2019. Furthermore, although not truly variable, changes in finished goods, work in progress, and stock-in-trade inventory are included as variable costs. The reason is that the change in these inventories are used to determine cost of goods sold, which does not appear on income statements of Indian companies but varies with sales/service revenue.

SAIL Variable Cost: Rs. crore	2016	2017	2018	2019
Cost of materials consumed	17,155	21,126	26,679	32,291
Changes in inventories of FG & WIP	541	121	1,135	(2,717)
Excise Duty	4,823	5,315	1,404	0
Power and fuel	5,334	5,234	5,810	6,053
Freight outward	1,131	1,162	2,242	2,611
Handling expenses	633	626	708	813
Handling expenses - FG	181	157	186	174
Conversion charges	413	454	306	306
Commission to selling agents	7	7	7	14
Total Variable Costs (Estimated)	**30,218**	**34,202**	**38,477**	**39,546**

Similarly, from Hindalco's 2019 Income statement and Note 40, I compute variable costs using eight items. Of these, four are on the Income Statement: Cost of material consumed, Purchase of Stock-in-Trade, Changes in inventories of finished goods and work in progress, and Excise duty. The rest are in Note 35 (the 2019 Other Expenses): Power & fuel, Freight & forwarding, Cost of own manufactured products capitalized/used, and Premium for coal extraction.

Hindalco Variable Cost: Rs. crore	2016	2017	2018	2019
Cost of materials consumed	19,209	21,018	25,408	27,247
Purchases of Stock-in-Trade (SIT)	1	89	5	235
Changes in Inventories of FG, WIP, & SIT	192	(1,100)	(419)	(382)
Excise Duty	2,442	2,447	637	0
Power and Fuel	6,508	5,899	6,000	6,937
Freight & Forwarding	607	720	774	872
Cost of Own Manufactured Products Capitalized/ Used	(23)	(21)	(29)	(60)
Premium on Coal Extraction	21	661	761	747
Total Variable Costs (Estimated)	28,958	29,713	33,137	35,596

Now that we have estimated variable costs, we can proceed to determine the contribution and Degree of Total Leverage (DTL). For SAIL, DTL fluctuates between -27.0 and 8.2. Given that the PBT is negative in the first three years, DTL is also negative. For example, the DTL is -1.9 in 2016, which indicates that loss will *decrease* (or profits will increase) by 1.9% for every 1% increase in revenue from operations. Thus, if the revenue from operations were to increase by 13.4% between 2016 and 2017, loss before taxes would be expected to decline by 25.46% [= −1.9×13.4%]. By contrast, Hindalco's DTL is positive and relatively stable, ranging between 4.5 and 11.6. Thus, if Hindalco's revenue from operations were to increase by 10.3% between 2017 and 2018, its profit before taxes would be expected to rise by 46.35% [= 4.5×10.3%].

SAIL: Rs. crore (except DTL)	2016	2017	2018	2019
Revenue from Operations (Reported)	43,875	49,767	58,962	66,967
Less Total Variable Costs (Estimated)	30,218	34,202	38,477	39,546
Contribution (Estimated) [A]	13,657	15,565	20,485	27,422
Profit Before Taxes (Reported) [B]	(7,008)	(4,851)	(759)	3,338
Degree of Total Leverage [C] [=A/B]	**-1.9**	**-3.2**	**-27.0**	**8.2**
Hindalco: Rs. crore (except DTL)	**2016**	**2017**	**2018**	**2019**
Revenue from Operations (Reported)	36,713	39,383	43,446	45,749
Less Total Variable Costs (Estimated)	28,958	29,713	33,137	35,596
Contribution (Estimated) [A]	7,756	9,670	10,309	10,153
Profit Before Taxes (Reported) [B]	651	2,153	2,229	1,810
Degree of Total Leverage [C] [=A/B]	**11.9**	**4.5**	**4.6**	**5.6**

Now, I illustrate how to forecast PBT using DTL. For this purpose, the forecasted growth rate (in revenue from operations) that I have used is the same as the actual growth rate (to ensure that any difference in predicted & actual PBT is due to DTL and not due to a variation in sales growth rate). Note that the forecasted and the reported PBT, both have the same sign for SAIL and Hindalco in all three years. For 2019, SAIL's forecasted PBT is 2,022 as against its reported PBT of 3,338, whereas Hindalco's is 2,775 as against the reported 1,810. The deviation between forecasted and actual PBT is significant. Still, we can reduce the difference by estimating the variable portion of each expense (rather than assuming that the costs used to compute total variable cost are 100% variable, as noted previously).

SAIL: PBT in Rs. crore	2016	2017	2018	2019
Estimated DTL [D]	-1.9	-3.2	-27.0	8.2
Year-on-year % Change in reported Revenue from Operations [E]	-	13.4%	18.5%	13.6%
Reported PBT [F]	(7,008)	(4,851)	(759)	3,338
Forecasted PBT [G]	**-**	**(5,224)**	**(1,979)**	**2,028**
Hindalco: PBT in Rs. crore	**2016**	**2017**	**2018**	**2019**
Estimated DTL [D]	11.9	4.5	4.6	5.6
Year-on-year % Change in reported Revenue from Operations [E]	-	7.3%	10.3%	5.3%
Reported PBT [F]	651	2,153	2,229	1,810
Forecasted PBT [G]	**-**	**1,216**	**3,151**	**2,772**

Note: Forecasted PBT = last year F * (1 + current year D * current year E); in 2019, Hindalco's Forecasted PBT 2772 ≈ 2772.4302 = 2229 PBT * (1 + 4.6 DTL * 5.3% Δ Sales)

There is an alternate approach to obtaining DTL by dividing the percent change in profits by the percent change in revenue (PBT and revenue from operations here; alternatively, one can use PAT and sales/service revenue). The following tables illustrate the computation of DTL using this alternate approach and its use in predicting PBT.

SAIL: PBT in Rs. crore	2016	2017	2018	2019
% Change in reported PBT	-397.1%	30.8%	84.4%	539.8%
% Change in reported Revenue from Operations	-4.1%	13.4%	18.5%	13.6%
Estimated DTL using alternate approach [H]	**97.9**	**2.3**	**4.6**	**39.8**
Forecasted PBT using H, above	-	(98,921)	(6,908)	(1,230)
Estimated DTL [D], as obtained previously	-1.9	-3.2	-27.0	8.2
Forecasted PBT using D, as obtained previously	-	(5,224)	(1,979)	2,028
Reported PBT	(7,008)	(4,851)	(759)	3,338
Forecast Error for PBT forecasted using H	-	1939%	810%	-137%
Forecast Error for PBT forecasted using D	-	8%	161%	-39%

Hindalco: PBT in Rs. crore	2016	2017	2018	2019
% Change in reported PBT	-47.8%	230.9%	3.5%	-18.8%
% Change in reported Revenue from Operations	-0.4%	7.3%	10.3%	5.3%
Estimated DTL using alternate approach [H]	**112.9**	**31.7**	**0.3**	**(3.5)**
Forecasted PBT using H, above	-	6,013	9,193	2,269
Estimated DTL [D], as obtained previously	11.9	4.5	4.6	5.6
Forecasted PBT using D, as obtained previously	-	1,216	3,151	2,772
Reported PBT	651	2,153	2,229	1,810
Forecast Error for PBT forecasted using H	-	179%	312%	25%
Forecast Error for PBT forecasted using D	-	-44%	41%	53%

% Change in reported PBT = (Current year's reported PBT – Previous year's reported PBT) ÷ Absolute value of previous year's PBT; Forecast Error for PBT = (Forecasted PBT – Actual PBT) ÷ Actual PBT

We also note that the DTL computed using the alternate approach varies considerably and takes extreme values, which causes SAIL's actual PBT to be farther from forecasted PBT in all three years (two out of three years in the case of Hindalco). The magnitude of forecast error is overall higher with DTL obtained using the alternate approach than DTL computed using contribution and PBT. Therefore, relative to the alternative method, the latter does a better job.

To summarize, DTL is a summary statistic to assess how profits will fluctuate with sales. This article lays out the case for forecasting profits (before taxes) using the degree of total leverage (DTL). It shows how to compute the required inputs for DTL and forecast PBT utilizing the information contained in an Indian company's reported Income Statements and its notes. Analysts should apply their understanding of the relationship between Cost, Volume, and Profits in generating earnings forecast. By carefully segregating the fixed and variable components of each item of expense, they can achieve much higher forecast accuracy.

****