FTS Real Time Project: Operating Risk and Beta

Question: What is the relationship between (fundamental) operating risk and beta?

The operating, or "fundamental," risk of a company is the risk a company faces because of the business it is in. For example, the profits a firm makes depend on the demand for its goods and the costs of producing the goods, so it inherently faces the risk that costs could increase and/or demand could fall, which would affect the profits of the firm.

Operating risks result from the *investment decision* of the firm, and are separate from financial risk, which results from the *financing decision*.   We will explore financial risk in a separate project.

One way to measure operating risk is through *activity analysis*, which measures how the operating activities of the company generate profits, see below.

 A different measure of risk, beta, which we explored in another project, is based on stock returns. It measures the sensitivity of a stock's return to the market as a whole. In its pure form, it does not pay attention to fundamentals. However, people have developed the concept of a "fundamental beta" which takes into account information such as operating and financial risk. One argument in favor of this approach is that beta typically is calculated using historical data, while fundamentals provide information about the future performance of a firm. Perhaps the most famous example of a fundamental beta is BARRA's Predicted Beta
http://admin.epiq11.com/onlinedocuments/trb/exhibits/dcl%20exhibits/D1148.pdf

Operating Risk

 Operating risk in "Activity Analysis" is measured by the "Degree of Operating Leverage." The ideas underlying this measure can be developed as follows. From the firm's financial statements we can first estimate a firm's Earnings Before Interest and Taxes (EBIT) which provides a measure of the operating income for a firm. One measure of operating risk is the Degree of Operating Leverage (DOL) defined by

Degree of Operating Leverage (DOL) = % Change EBIT/% Change in sales revenue

This definition is related to the concept of *elasticity* in economics: it measures the percentage change of one variable due to a percentage change in another. So here, operating risk is defined as the elasticity of a firm's EBIT to Sales Revenue.

Why is this measure of operating risk? Because it tells you how sensitive profits are to changes in sales. If they are very sensitive, then it could mean, for example, that the firm has high fixed costs, so it is more exposed to a downturn in sales than a firm with low fixed costs. Numerically, consider a firm that has a fixed cost of $50m and then a variable cost of $1 per unit. If it sells 100m units at $2 each, it has a profit of $50m (200m in revenue minus 100m in variable costs minus 50m in fixed costs). If sales drop by 10% to 90m units, profit drops to 180m – 90m – 50m = 40m, which is a 20% drop in profit. If the same firm had zero fixed costs, its profit would drop by 10% if sales dropped by 10%.
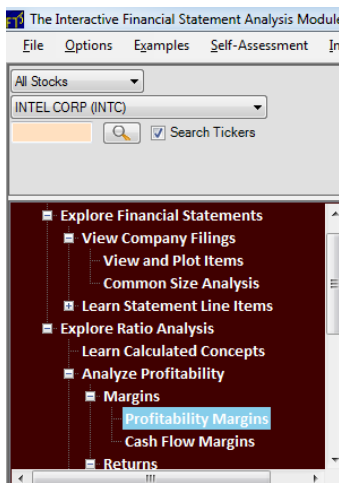
Example: Estimating the DOL for INTC versus WMT.

Step 1: Launch the Interactive Financial Statement Analysis Module from within the FTS Real Time Client:
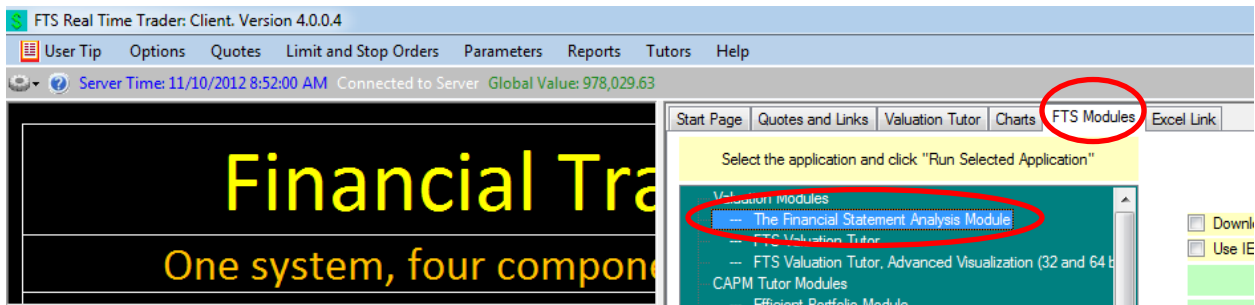
Step 2:

Select Intel and click on Profitability Margin as displayed below:

Step 3: Select Intel's latest 10-K and drag and drop the required accounting numbers into the calculator. You will first select the latest 10-K and Consolidated Statement of Income as Indicated below:

In the above screen first drag and drop the three Date Headers (Dec 31, 2011; Dec 25, 2010; and Dec 26, 2009 to create the three date headers in the calculator.

The green cells are input fields and the blue cells are derived for you by the calculator. There are a few tricks you will learn to perform but one in particular is to drag and drop the accounting numbers into the first column 31 Dec 2011 and then clicking inside the second column (i.e., the Sales cell to give it focus) and then clicking on the arrow icon (circled above). This automatically gets the second year's data for you from the statement and you can then repeat this for year 3.

Step 4: Now you have three years of Sales and EBIT information and so you can calculate the DOL as follows:

INTC	31 Dec 2011	25 Dec 2010	26 Dec 2009
Sales	53,999.00	43,623.00	35,127.00
Cost of Sales	20,242.00	15,132.00	15,566.00
Gross Margin	33,757.00	28,491.00	19,561.00
SG&A	7,670.00	6,309.00	7,931.00
R&D	8,350.00	6,576.00	5,653.00
Lease Expense	0.00000	0.00000	0.00000
Other Operating Expenses	260.000	18.00000	266.000
EBIT	17,477.00	15,588.00	5,711.00

	Mean	Volatility	Intercept	Slope	Growth
Sales	44,249.67	59,555,086.22	34,813.67	9,436.00	0.21500
Cost of Sales	16,980.00	5,351,714.67	14,642.00	2,338.00	0.13134
Gross Margin	27,269.67	34,333,563.56	20,171.67	7,098.00	0.27283
SG&A	7,303.33	505,702.89	7,433.83	-130.50	-0.01673
R&D	6,859.67	1,252,534.89	5,511.17	1,348.50	0.19504
Lease Expense	0.00	0.00	0.00	0.00	NaN
Other Operating Expenses	181.33	13,344.89	184.33	-3.00	-0.01141
EBIT	12,925.33	26,618,022.89	7,042.33	5,883.00	0.55925
Interest Expense	0.00	0.00	0.00	0.00	NaN
Interest Revenue	154.67	1,182.89	140.17	14.50	0.08187
Net Interest Expense	-154.67	1,182.89	-140.17	-14.50	NaN

The above screen is the calculator screen completed in step 4 and by further clicking on the Statistics tab above you get the Growth estimate for each line item. In particular from the Sales and EBIT Growth numbers above for Intel the DOL is:

DOL = 0.55925/0.2150 = 2.6

You can equivalently calculate WMT as follows:

WMT	31 Jan 2012	31 Jan 2011	31 Jan 2010
Sales	446,950.00	421,849.00	408,085.00
Cost of Sales	335,127.00	314,946.00	304,106.00
Gross Margin	111,823.00	106,903.00	103,979.00
SG&A	85,265.00	81,361.00	79,977.00
R&D	0.00000	0.00000	0.00000
Lease Expense	0.00000	0.00000	0.00000
Other Operating Expenses	0.00000	0.00000	0.00000
EBIT	26,558.00	25,542.00	24,002.00

	Mean	Volatility	Intercept	Slope	Growth
Sales	425,628.00	258,888,458.00	406,195.50	19,432.50	0.04549
Cost of Sales	318,059.67	165,231,200.22	302,549.17	15,510.50	0.04857
Gross Margin	107,568.33	10,476,056.89	103,646.33	3,922.00	0.03636
SG&A	82,201.00	5,013,290.67	79,557.00	2,644.00	0.03201
R&D	0.00	0.00	0.00	0.00	NaN
Lease Expense	0.00	0.00	0.00	0.00	NaN
Other Operating Expenses	0.00	0.00	0.00	0.00	NaN
EBIT	25,367.33	1,104,110.22	24,089.33	1,278.00	0.05060
Interest Expense	2,197.33	11,037.56	2,068.83	128.50	0.05865
Interest Revenue	181.33	253.56	190.83	-9.50	-0.05554
Net Interest Expense	2,016.00	12,768.00	1,878.00	138.00	0.05836

Wal-Mart's DOL is:

DOL = 0.0506/0.04549 = 1.112

You can see that the initial intuition holds up the DOL for Wal-Mart is lower than Intel. That is, Wal-Mart has less operating risk than does Intel.

Step 5: The stock betas for Intel and Wal-Mart as reported by MSN Investor (11/11/2012) are 1.08 for Intel and 0.33 for Wal-Mart. That is, Intel has higher operating leverage and beta than Wal-Mart. That is, beta captures some part of this earnings risk that is driven by the volatility in sales. A major objective of this project is to explore this relationship further.

The Project

The project can be conducted using any of the FTS Stock Cases. From the stocks in the case, you are to work with between 12 and 20 stocks in a 2X2 Factor position. Factor 1 is high DOL versus low DOL and Factor 2 is high beta versus low beta.

Portfolio Components

| Low DOL Low Beta	High DOL Low Beta
Low DOL High Beta	High DOL High Beta

For a set of 20-stocks belonging to the trading case, compute the DOL and look up the beta for each stock. Rank your stocks in terms of DOL and Beta and based upon these rankings identify between 3 and 5 stocks that you judge relative to each other satisfy the above criteria. That is, identify between 3-5 stocks that fall into the above cells. Keep the number of stocks equal, so that you have either 3 in each cell, 4 in each cell or 5 in each cell.

1. You have $1 million in cash to invest an equal dollar amount in each stock. That is, if you select 5 stocks in each cell then allocate $50,000 to purchase each stock. Also record the beta for each stock at this time.
2. Over time, as prices change, each cell will perform differently in terms of realized returns.   At the end of the allocated time period record how the S&P500 index has changed plus how each stock has performed along various portfolio performance criteria.

For this part you should use the reports menu item in FTS Real Time Client as follows:
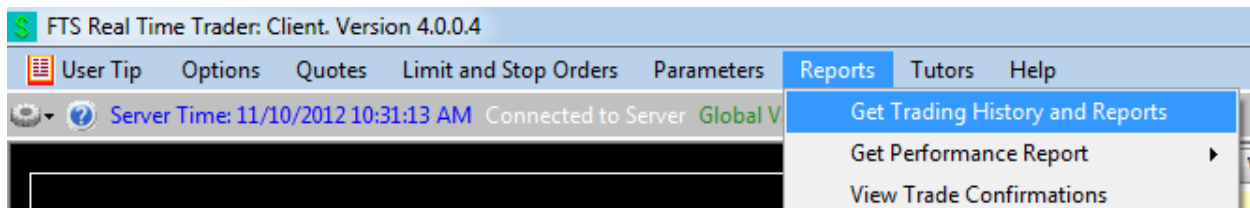
At any time you can check your performance against the performance of others or other teams by selecting Get Performance Report. However for analysis purposes you need to select Get Trading History and Reports as highlighted. This brings up the following screen:
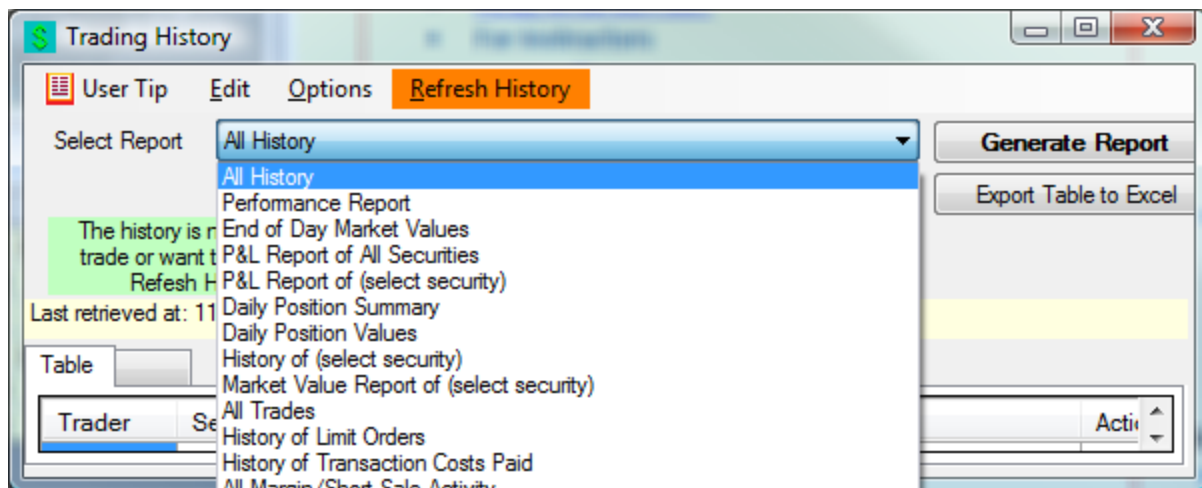
You can bring in any report and export it to Excel. In particular you will want to examine the P&L Report of your securities. Particularly useful is the report "Daily Position Values" which tells you the market value of each of your holdings at the end of each day. This helps you calculate the performance of the stocks in each cell.

3. Answer the following questions:
    - Calculate the average beta for the set of stocks in each cell.
    - Calculate the average DOL for your final set of stocks in each cell.
    - Rank betas for all of your stocks from low to high and graph the ranked betas against DOL. Discuss the relationships you observe relative to the two measures of risk (DOL and Beta) – for example is there a relationship between these two measures and if so describe it including how strong it is.
    - Risk and Return: Compute the market returns for each cell and also the return on the S&P500 index over this same period of time. Which cells changed more than the S&P500 and which cells changed less than the S&P 500?   Is this consistent with what you would hypothesis for this 2-factorial set of stocks.
    - Bottom Line: What predicted returns better, beta or DOL? Provide concise reasons in support for your answer.