Stock Skywalk

Locating Your Stock on a Bell Curve

Ticker	Company Name	Market Cap	Price	# Shares	P/E	P/B	P/S	P/CF	Cash as % of Assets	Cap Ex per Share	Gross Margin	Op Margin	Net Margin	ROA	ROE	ROE 3-yr	ROIC	ROIC 3-yr	Rev Y/Y	Rev 3-yr	Rev 5-yr	Op Mar Y/Y	Op Mar 3-yr	Op Mar 5-yr	Net Marg Y/Y	Net Mar 3-yr	Net Mar 5-yr	EPS Y/Y	EPS 3-yr
CMI	Cummins Inc	16.24 B	$ 90.18	180	9.8	2.1	0.8	11.742	10.91	4.33	25.8	12.4	8.65	10.70	21.7	23.3	25.8	20.1	11.1	2.12	12.22	12.57	-4.09	28.24	11.33	-3.69	31	14.03	-1.89
AVG	**Industry Median**	**41.67 B**	**$ 90.18**	677	**18.30**	**2.90**	**2.10**	**20.97**	**12.15**	**1.34**	**40.60**	**16.30**	**11.66**	**9.76**	**21.71**	**23.24**	**40.60**	**15.23**	**2.47**	**2.12**	**5.45**	**4.78**	**1.88**	**11.51**	**8.03**	**6.15**	**14.51**	**11.46**	**6.84**
GE	General Electric Co	307.02 B	$ 30.19	10155	58.90	2.80	2.10	20.97	23.40	1.34	45.00	16.20	-4.97	-1.18	-5.91	11.16	45.00	4.97	1.74	0.29	-1.07	1.69	-8.30	-1.71	16.67	2.49	6.68	18.11	6.84
MMM	3M Co	97.13 B	$156.79	644	20.40	8.00	3.30	21.48	5.29	2.34	49.20	23.20	16.20	15.07	35.08	28.63	49.20	21.21	3.08	2.43	6.59	7.04	4.92	8.19	6.37	4.99	9.19	11.46	7.91
HON	Honeywell International Inc	80.29 B	$102.66	794	18.30	4.50	2.10	14.06	5.29	2.34	29.50	16.30	11.66	9.76	24.69	24.84	29.50	16.92	3.20	3.33	5.45	6.00	29.48	11.51	8.03	27.05	14.51	8.33	26.87
DHR	Danaher Corp	65.99 B	$ 95.77	714	26.80	2.90	3.30	19.79	22.23	1.38	53.10	16.70	16.12	7.81	14.22	12.57	53.10	10.69	4.16	7.36	12.23	4.78	9.45	17.34	-3.58	6.15	17.67	-4.47	5.29
ABLZF	ABB Ltd	41.67 B	$ 18.81	2265	16.80	2.90	1.10			1.00	28.60	10.80	6.77	5.72	15.91	15.69	28.60	11.51	-4.82	1.59	4.61	-4.76	-3.62	0.25	-6.93	-6.45	-2.21	-6.61	-6.45
ABB	ABB Ltd	41.67 B	(USD)																										
ITW	Illinois Tool Works Inc	33.95 B	$ 92.29	376	18.40	6.70	2.60	69.92	12.15	0.43	40.90	21.10	13.93	10.81	29.48	26.71	40.90	17.31	2.47	-6.62	0.86	14.88	1.88	15.82	75.46	12.46	25.48	94.65	20.22
EMR	Emerson Electric Co	31.75 B	$ 47.28	677	12.1	3.9	1.5	35.818	12.15	0.43	40.6	17.3	12.15	11.72	29.8	23.2	40.6	15.2	-9.1	-2.97	1.17	-13.03	1.09	4.24	26.22	11.25	4.6	31.68	14.33
ETN	Eaton Corp PLC	25.32 B	$ 53.00	470	12.7	1.6	1.2			1.00	31.1	8.2	9.49	6.10	12.7	11.2	31.1	7.6	2.3	12.01	13.69	-15.93	3.39	32.38	-3.65	9.92	36.17	-3.59	-1.46

By: Brandon Wood

IS 520

Executive Summary

The Problem:

I worked for a hedge fund that managed around $20 million, which they invested into stocks and bonds. This hedge fund insisted that Morningstar and Bloomberg had too many errors in their financial data. Therefore, the hedge fund required analysts to manually input the financial statement data. The manual input process could take 3-5 hours for any particular company, and the manual input often had errors as well.

For promising investment opportunities, the hedge fund would analyze comparable investments to ensure the subject company was superior to peers. This process required the input of additional data for the comparison companies. The hedge fund often looked for the same desirable performance indicators from the financial data. The repetitive nature of this work makes it a prime candidate for automation.

The Solution:

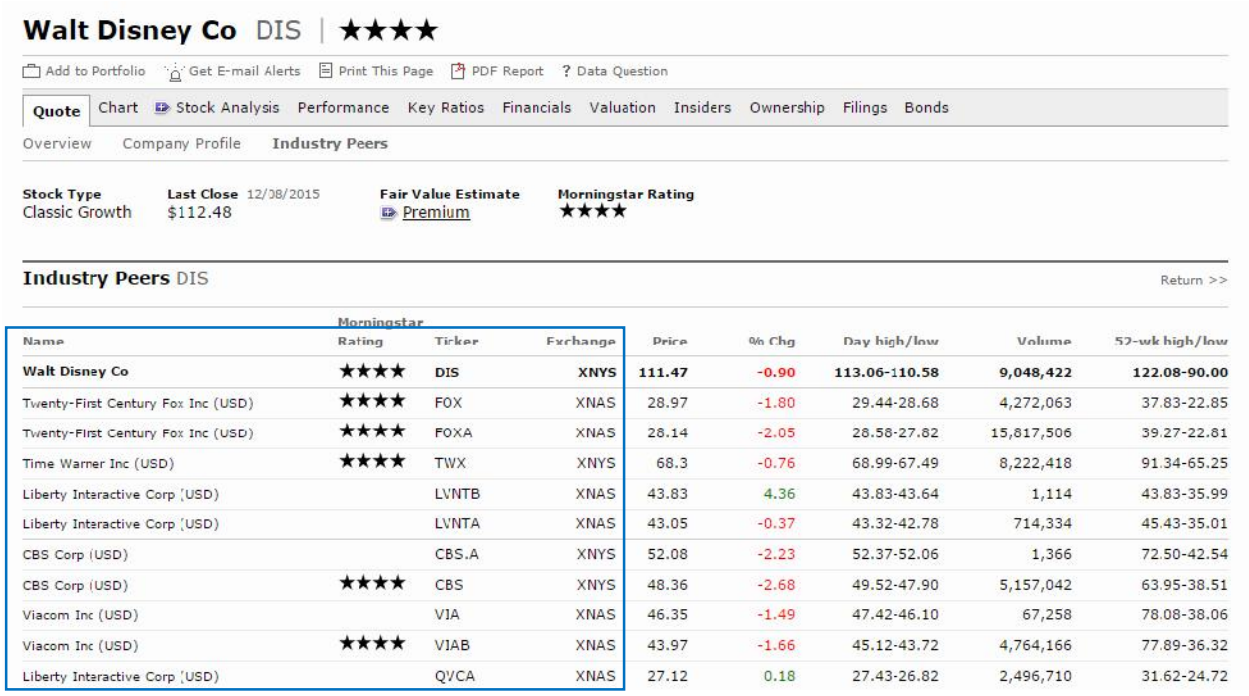
The goal was to create a tool that takes the ticker entered, finds relevant comparable companies, and downloads all the financial data for those companies. The tool then ranks those companies in comparison to each other—this allows the user to 'walk above' hundreds of ratios for each company and quickly make decisions.

The program I created is called Stock Skywalk. The program downloads financial data from Morningstar and the SEC website. The program creates a normal distribution of similar companies, and ranks them compared to each other. The data is then displayed using graphs and a familiar grading system that allows users to visually see the end results after barely one minute.

Stock Skywalk uses Morningstar to select 5-20 comparable companies for the ticker entered. Twenty-seven ratios are compared across these companies. The program creates a normal distribution based on the sample of companies, and ranks each company on each metric. The individual metric scores are then combined for a total score for each company. All of the data is still accessible for the user to see.

Implementation

1. Get comps data – The program uses the ticker typed in the box to search Morningstar for comparable companies. The webpage is parsed to bring in the name, ticker, stock exchange, and price for comparable companies. Arrays are generated for each of these items.



Walt Disney Co DIS | ★★★★

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Stock Type	Last Close 12/08/2015	Fair Value Estimate	Morningstar Rating
Classic Growth	$112.48	Premium	★★★★

Industry Peers DIS — Return >>

Name	Morningstar Rating	Ticker	Exchange	Price	% Chg	Day high/low	Volume	52-wk high/low
Walt Disney Co	★★★★	**DIS**	**XNYS**	**111.47**	**-0.90**	**113.06-110.58**	**9,048,422**	**122.08-90.00**
Twenty-First Century Fox Inc (USD)	★★★★	FOX	XNAS	28.97	-1.80	29.44-28.68	4,272,063	37.83-22.85
Twenty-First Century Fox Inc (USD)	★★★★	FOXA	XNAS	28.14	-2.05	28.58-27.82	15,817,506	39.27-22.81
Time Warner Inc (USD)	★★★★	TWX	XNYS	68.3	-0.76	68.99-67.49	8,222,418	91.34-65.25
Liberty Interactive Corp (USD)		LVNTB	XNAS	43.83	4.36	43.83-43.64	1,114	43.83-35.99
Liberty Interactive Corp (USD)		LVNTA	XNAS	43.05	-0.37	43.32-42.78	714,334	45.43-35.01
CBS Corp (USD)		CBS.A	XNYS	52.08	-2.23	52.37-52.06	1,366	72.50-42.54
CBS Corp (USD)	★★★★	CBS	XNYS	48.36	-2.68	49.52-47.90	5,157,042	63.95-38.51
Viacom Inc (USD)		VIA	XNAS	46.35	-1.49	47.42-46.10	67,258	78.08-38.06
Viacom Inc (USD)	★★★★	VIAB	XNAS	43.97	-1.66	45.12-43.72	4,764,166	77.89-36.32
Liberty Interactive Corp (USD)		QVCA	XNAS	27.12	0.18	27.43-26.82	2,496,710	31.62-24.72

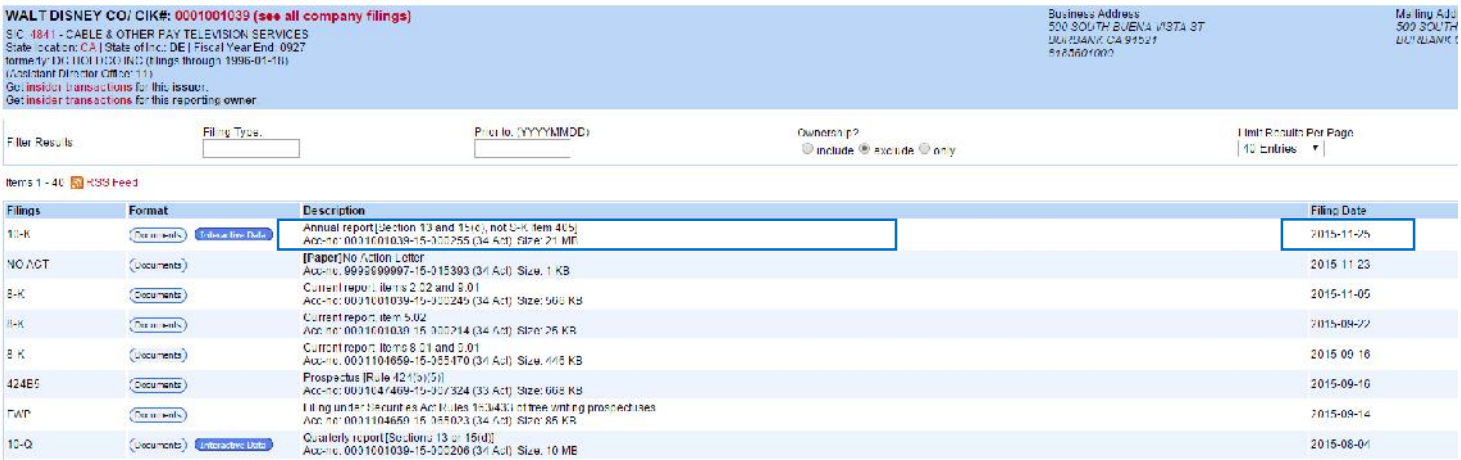
2. Download Financial Data (Morningstar) – The program uses the arrays of tickers and stock exchanges to download the income statement, balance sheet, and cash flow statement for each company. The data are then organized on the "Comps" tab on the workbook. [1] Each statement has a different number of rows, so data is dynamic.

[1] *This sub procedure is only run for the first three companies in the analysis program because it's a lot of data to download, and the program was modified to not require these sheets for ratio calculation. This data can still be gathered with the written code, but this data would just be for viewing, no computations are performed.

	A	B	C	D	E	F	G	H
1	**CUMMINS INC (CMI) CashFlowFlag INCOME STATEMENT**							
2	Fiscal year ends in December. USD in millions except per share data.	2010-12	2011-12	2012-12	2013-12	2014-12	TTM	
3	Revenue	13226	18048	17334	17301	19221	19434	
4	Cost of revenue	10058	13459	12826	12918	14360	14426	
5	Gross profit	3168	4589	4508	4383	4861	5008	
6	Operating expenses							
7	Research and development	414	629	728	713	754	745	
8	Sales, General and administrative	1487	1837	1900	1920	2095	2152	
9	Other operating expenses	-335	-558	-374	-351	-353	-298	
10	Total operating expenses	1566	1908	2254	2282	2496	2599	
11	Operating income	1602	2681	2254	2101	2365	2409	
12	Interest Expense	40	44	32	41	64	64	
13	Other income (expense)	55	34	49	59	133	80	
14	Income before taxes	1617	2671	2271	2119	2434	2425	
15	Provision for income taxes	477	725	533	531	698	666	
16	Net income from continuing operations	1140	1946	1738	1588	1736	1759	
17	Other	-100	-98	-93	-105	-85	-77	
18	Net income	1040	1848	1645	1483	1651	1682	
19	Net income available to common shareholders	1040	1848	1645	1483	1651	1682	
20	Earnings per share							
21	Basic	5.29	9.58	8.69	7.93	9.04	9.37	
22	Diluted	5.28	9.55	8.67	7.91	9.02	9.35	
23	Weighted average shares outstanding							
24	Basic	197	193	189	187	183	179	
25	Diluted	197	194	190	187	183	180	
26	EBITDA	1977	3040	2664	2567	2953	2997	
27								
28	**CUMMINS INC (CMI) CashFlowFlag BALANCE SHEET**							
29	Fiscal year ends in December. USD in millions except per share data.	2010-12	2011-12	2012-12	2013-12	2014-12		
30	Assets							
31	Current assets							
32	Cash							
33	Cash and cash equivalents	1023	1484	1369	2699	2301		
34	Short-term investments	339	277	247	437	93		
35	Total cash	1362	1761	1616	3136	2394		
36	Receivables	2243	2526	2475	2362	2946		
37	Inventories	1977	2141	2221	2381	2866		
38	Deferred income taxes	314	268					

	I	J	K	L	M	N	O
	GENERAL ELECTRIC CO (GE) CashFlowFlag INCOME STATEMENT						
	Fiscal year ends in December. USD in millions except per share data.	2010-12	2011-12	2012-12	2013-12	2014-12	TTM
	Revenue	150211	147300	147359	146045	148589	146425
	Cost of revenue	71713	68278	74310	77141	81311	80481
	Gross profit	78498	79022	73049	68904	67278	65944
	Operating expenses						
	Sales, General and administrative	41116	40296	39244	37819	30572	30584
	Other operating expenses	7191	4083	3891	4818	9995	11638
	Total operating expenses	48307	44379	43135	42637	40567	42222
	Operating income	30191	34643	29914	26267	26711	23722
	Interest Expense	15983	14545	12508	10116	9482	9483
	Other income (expense)						-381
	Income before taxes	14208	20098	17406	16151	17229	13858
	Provision for income taxes	1050	5732	2504	676	1772	8204
	Net income from continuing operations	13158	14366	14902	15475	15457	5654
	Net income from discontinuing ops	-979	77	-1038	-2120	-112	-12513
	Other	-535	-292	-223	-298	-112	-416
	Net income	11644	14151	13641	13057	15233	-7275
	Preferred dividend	300	1031				
	Net income available to common shareholders	11344	13120	13641	13057	15233	-7275
	Earnings per share						
	Basic	1.06	1.24	1.29	1.28	1.51	-0.72
	Diluted	1.06	1.23	1.29	1.27	1.5	-0.72
	Weighted average shares outstanding						
	Basic	10661	10591	10523	10222	10045	10077
	Diluted	10678	10620	10564	10289	10123	10155
	EBITDA	40204	43828	39260	36029	35994	32407
	GENERAL ELECTRIC CO (GE) CashFlowFlag BALANCE SHEET						
	Fiscal year ends in December. USD in millions except per share data.	2010-12	2011-12	2012-12	2013-12	2014-12	
	Assets						
	Current assets						
	Cash						
	Cash and cash equivalents	78958	84501	77356	88555	90208	
	Short-term investments	43938	47374	48510	43981	47907	
	Total cash	122896	131875	125866	132536	138115	
	Receivables	18621	19531	21500	21388	23237	
	Inventories	11526	13792	15374	17325	17689	

3. Financial ratios are downloaded (Morningstar) – Using a similar procedure as above, over 100 financial ratios are downloaded for each company. These sheets are used directly in the computations that appear on the front page. This data appears on the "Ratios" tab.
4. Target Company data (Morningstar) – The annual financial statements and quarterly financial statements are downloaded for the target company. These are for viewing and no computations are performed with this data. This data appears on the "Annual" and "Quarterly" tabs.
5. SEC parsing – The program uses the ticker input to search for the SEC's special CIK number. This is an identifier unique to each company.
6. SEC compilation – the program uses the CIK numbers to navigate to the index page for the subject company. The program parses this webpage to search for 10-k (annual) or 10-q (quarterly) financial statements. Each financial statement has a special ACC number that is unique to that filing. Therefore, the program parses this page to pull in all of the ACC numbers, and dates.



7. SEC data download – Code was written to use the sec database, both CIK numbers, and the ACC number to download the actual 10-k statement from the SEC website. This process didn't make a lot of sense for a small operation, as each excel file was about 1 mb in size, and it would require downloading 12-16 excel files just to compile the quarterly data for a company.
8. SEC links – Links were compiled with the data that was parsed from the SEC page. The CIK and ACC numbers were used to create an active hyperlink that can take the user to any of the recent annual or quarterly statements. The hyperlink opens the PDF filing.

   The program inserts these links for any ticker that is entered. The program also formats the hyperlinks and the vba code inserts the blue "SEC Links" shape that is shown below.

	SEC Links To 10-k Filings
7/30/09	CUMMINS INC (CMI) 10-Q Quarterly Report for 2009 - 7
10/30/09	CUMMINS INC (CMI) 10-Q Quarterly Report for 2009 - 10
4/29/10	CUMMINS INC (CMI) 10-Q Quarterly Report for 2010 - 4
7/30/10	CUMMINS INC (CMI) 10-Q Quarterly Report for 2010 - 7
10/29/10	CUMMINS INC (CMI) 10-Q Quarterly Report for 2010 - 10
4/28/11	CUMMINS INC (CMI) 10-Q Quarterly Report for 2011 - 4
7/28/11	CUMMINS INC (CMI) 10-Q Quarterly Report for 2011 - 7
10/27/11	CUMMINS INC (CMI) 10-Q Quarterly Report for 2011 - 10
5/2/12	CUMMINS INC (CMI) 10-Q Quarterly Report for 2012 - 5
8/1/12	CUMMINS INC (CMI) 10-Q Quarterly Report for 2012 - 8
10/31/12	CUMMINS INC (CMI) 10-Q Quarterly Report for 2012 - 10
5/1/13	CUMMINS INC (CMI) 10-Q Quarterly Report for 2013 - 5
7/31/13	CUMMINS INC (CMI) 10-Q Quarterly Report for 2013 - 7

9. Set up company data – The program takes the Ratio data and inputs it on the front page of the program. On row 24 an "Average" column is inserted that takes the median value for the company and competitors. This is a dynamic average, as the number of companies (rows) can change. The code enters the Median formula into the cells, rather than just the value.

10. Remove duplicates – Sometimes, Morningstar lists Class A and Class B shares of a company's stock, and will include both competitors. If the same company is included two or three times in the median calculation, it won't be a true median. For this reason, if any two companies share the same name, the program makes the cells in the duplicate company blank. This ensures that the median formula takes a true median, and each company is distinct.

HON	Honeywell International Inc	80.29 B	$ 102.66	794	18.30	4.50	2.10	14.06	5.29	2.34	29.50	16.30	11.66
DHR	Danaher Corp	65.99 B	$ 95.77	714	26.80	2.90	3.30	19.79	22.23	1.38	53.10	16.70	16.12
ABLZF	ABB Ltd	41.67 B	$ 18.81	2265	16.80	2.90	1.10			1.00	28.60	10.80	6.77
ABB	ABB Ltd	41.67 B	(USD)										
ITW	Illinois Tool Works Inc	33.95 B	$ 92.29	376	18.40	6.70	2.60	69.92	12.15	0.43	40.90	21.10	13.93
EMR	Emerson Electric Co	31.75 B	$ 47.28	677	12.1	3.9	1.5	35.818	12.15	0.43	40.6	17.3	12.15
ETN	Eaton Corp PLC	25.32 B	$ 53.00	470	12.7	1.6	1.2			1.00	31.1	8.2	9.49

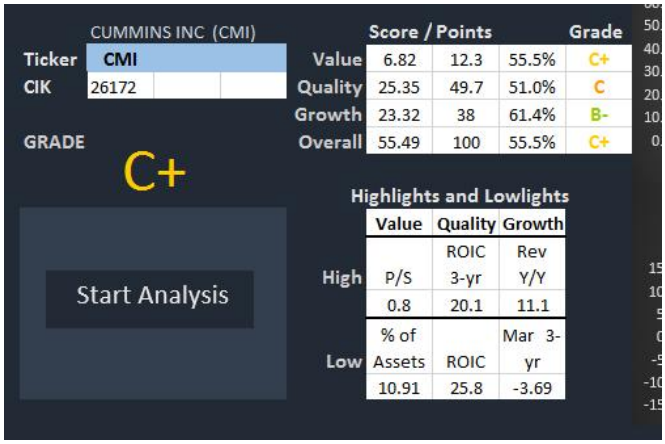
11. Create a normal distribution – The program creates a normal distribution based on the sample companies. It calculates an average and standard deviation for the value in each column. If the metric in a specific column is desirable, the stock's position on the normal curve is the score for that metric. (ie. Cummins ranks below average on a desirable metric, so it's score will be below 50% for that item). If the metric is undesirable, one minus the position in the normal distribution will give a similar ranking.
12. Calculate scores using weights – Each company is ranked on each metric based on the normal distribution. That score is recorded starting in row 80. Weights are set up by the user on each metric, based on how important they are in the analysis. Weights are divided into three categories, Value, Quality, and Growth. Weights are somewhat arbitrary and add up to 100%.

    The metric score for each category is multiplied by the weight for that category, and all of these are added together for a total score for that company. In other words, the sum product of the weights and metric scores are combined for each company.

Categories	Valuation	Quality	Growth									
Weighted Ticker Scores	6.82	25.35	23.32	1	2	3	4	5	6	7	8	9
Average Ticker Scores	62.00	44.53	59.81	79.93	81.79	91.47	80.36	37.49	0.98	9.06	22.40	41.25
Weights	12.3%	49.7%	38.0%	1.50%	2.10%	1.50%	2.60%	1.10%	3.50%	2.25%	3.50%	5.00%

13. Graphs are set up – The program uses VBA code to graph the total scores for each company. The code was set up so that when there are duplicate companies, the second is ignored. This graph is dynamic, as the number of companies can change.

    Another graph is created that finds the highest score for the particular company, and graphs that metric for all companies.



14. Grading is performed – The program finds the lowest and highest scores and displays them in the "Highlights and Lowlights" category. The program grades the target company based on the total possible points for each category, and the target companies score. Based on the percentage score a different letter grade is presented, in a different color. (above)

Learning and Difficulties

This project took over 60 hours to complete. I learned quite a bit about using VBA to launch internet explorer, and how to read and parse the html data. I had to implement code that would execute the javascript, and wait for it to load.

Setting up the graphs in VBA was really challenging. It was difficult to get the graphs to adjust the number of companies to display, and to change the metric that was displayed when the data was dynamic.

Creating hyperlinks and formatted shapes was also something new that I hadn't done. A lot of the syntax was foreign.

Making the data dynamic took a lot of careful attention. The income statements would have a different number of rows, so I had to use the Find method to locate specific values in a dynamic range.

A lot of difficulty was in debugging. Sometimes a website didn't have data for a company, so the Internet explorer object would crash.

Data was really difficult to download directly from the SEC website. It appears that most users have FTP software that can parse the data, but there are thousands of tags, and not every company uses the same tags so it would be difficult to do in VBA. I finally found a method where I could open up an excel workbook with the data, but the workbook was 50 tabs and > 1 mb in size, so it was not efficient to open 20-30 of these to assemble a financial statement. This method worked ok, but the SEC only has excel "interactive" workbooks for the past 4 years or so. My solution was to use Morningstar data instead, but the SEC data would have been preferred.

Assistance

I read a lot of forums and the Microsoft website for help with specific objects and methods. I didn't copy any code into the project, I tried to learn how to use the different objects and write my own code.