

Summary

My project was to build a tool to assist students participating in the CapSim online capstone program in making decisions. CapSim (short for Capstone Simulation) is a simulated market place in which different companies compete in a marketplace for one product. Decisions include how to position your products, how much to market them, how much to produce, to how to finance operations.

After uploading your decisions, all variables are run through algorithms to appropriate market share across the industry. A summary page is then made available in the form of a “Capstone Courier” containing the market results and standing of each company. An example of one table of data available in these reports is shown below. The reports are usually 15 pages.

My project involves consolidating all these couriers into a workbook then summarizes a few key indicators for the market. The workbook has a ribbon with two buttons, one to import PDFs, and another to perform a market share allocation calculation.

To use this workbook, users would create a folder in the same location as the workbook named “Couriers” to store downloaded Capstone Courier summaries. They would then update the segment information as listed in the “Industry Conditions” Sheet. The workbook is then ready to import and analyze data. The user should work on the dashboard, inputting estimates for how their competitors will behave, then press the calculate button to receive estimates for how their behavior will shape market distribution.

Name	Primary Segment	Units Sold	Unit Inventory	Revision Date	Age Dec.31	MTBF	Pfmn Coord	Size Coord	Price	Material Cost	Labor Cost	Contr. Marg.	2nd Shift & Over-time	Auto mation Next Round	Capacity Next Round	Plant Utiliz.
Able	Trad	999	189	11/21/2010	3.1	17500	5.5	14.5	\$28.00	\$11.59	\$7.49	29%	0%	4.0	1,800	66%
Acre	Low	1,763	39	5/25/2009	4.6	14000	3.0	17.0	\$21.00	\$7.81	\$7.12	27%	30%	5.0	1,400	129%
Adam	High	366	40	4/18/2012	1.7	23000	8.0	12.0	\$38.00	\$15.98	\$8.57	33%	0%	3.0	900	45%
Aft	Pfmn	358	78	6/30/2011	2.5	25000	9.4	15.5	\$33.00	\$15.87	\$8.57	23%	0%	3.0	600	73%
Agape	Size	314	62	5/25/2011	2.6	19000	4.0	11.0	\$33.00	\$13.62	\$8.57	30%	0%	3.0	600	63%
Baker	Trad	999	189	11/21/2010	3.1	17500	5.5	14.5	\$28.00	\$11.59	\$7.49	29%	0%	4.0	1,800	66%
Bead	Low	1,763	39	5/25/2009	4.6	14000	3.0	17.0	\$21.00	\$7.81	\$7.12	27%	30%	5.0	1,400	129%
Bid	High	366	40	4/18/2012	1.7	23000	8.0	12.0	\$38.00	\$15.98	\$8.57	33%	0%	3.0	900	45%
Bold	Pfmn	358	78	6/30/2011	2.5	25000	9.4	15.5	\$33.00	\$15.87	\$8.57	23%	0%	3.0	600	73%
Buddy	Size	314	62	5/25/2011	2.6	19000	4.0	11.0	\$33.00	\$13.62	\$8.57	30%	0%	3.0	600	63%
Cake	Trad	999	189	11/21/2010	3.1	17500	5.5	14.5	\$28.00	\$11.59	\$7.49	29%	0%	4.0	1,800	66%
Cedar	Low	1,763	39	5/25/2009	4.6	14000	3.0	17.0	\$21.00	\$7.81	\$7.12	27%	30%	5.0	1,400	129%
Cid	High	366	40	4/18/2012	1.7	23000	8.0	12.0	\$38.00	\$15.98	\$8.57	33%	0%	3.0	900	45%
Coat	Pfmn	358	78	6/30/2011	2.5	25000	9.4	15.5	\$33.00	\$15.87	\$8.57	23%	0%	3.0	600	73%
Cure	Size	314	62	5/25/2011	2.6	19000	4.0	11.0	\$33.00	\$13.62	\$8.57	30%	0%	3.0	600	63%
Daze	Trad	999	189	11/21/2010	3.1	17500	5.5	14.5	\$28.00	\$11.59	\$7.49	29%	0%	4.0	1,800	66%
Dell	Low	1,763	39	5/25/2009	4.6	14000	3.0	17.0	\$21.00	\$7.81	\$7.12	27%	30%	5.0	1,400	129%
Dixie	High	366	40	4/18/2012	1.7	23000	8.0	12.0	\$38.00	\$15.98	\$8.57	33%	0%	3.0	900	45%
Dot	Pfmn	358	78	6/30/2011	2.5	25000	9.4	15.5	\$33.00	\$15.87	\$8.57	23%	0%	3.0	600	73%
Dune	Size	314	62	5/25/2011	2.6	19000	4.0	11.0	\$33.00	\$13.62	\$8.57	30%	0%	3.0	600	63%
Eat	Trad	999	189	11/21/2010	3.1	17500	5.5	14.5	\$28.00	\$11.59	\$7.49	29%	0%	4.0	1,800	66%
Ebb	Low	1,763	39	5/25/2009	4.6	14000	3.0	17.0	\$21.00	\$7.81	\$7.12	27%	30%	5.0	1,400	129%
Echo	High	366	40	4/18/2012	1.7	23000	8.0	12.0	\$38.00	\$15.98	\$8.57	33%	0%	3.0	900	45%
Edge	Pfmn	358	78	6/30/2011	2.5	25000	9.4	15.5	\$33.00	\$15.87	\$8.57	23%	0%	3.0	600	73%
Egg	Size	314	62	5/25/2011	2.6	19000	4.0	11.0	\$33.00	\$13.62	\$8.57	30%	0%	3.0	600	63%
Fast	Trad	999	189	11/21/2010	3.1	17500	5.5	14.5	\$28.00	\$11.59	\$7.49	29%	0%	4.0	1,800	66%
Feat	Low	1,763	39	5/25/2009	4.6	14000	3.0	17.0	\$21.00	\$7.81	\$7.12	27%	30%	5.0	1,400	129%
Fist	High	366	40	4/18/2012	1.7	23000	8.0	12.0	\$38.00	\$15.98	\$8.57	33%	0%	3.0	900	45%
Foam	Pfmn	358	78	6/30/2011	2.5	25000	9.4	15.5	\$33.00	\$15.87	\$8.57	23%	0%	3.0	600	73%
Fume	Size	314	62	5/25/2011	2.6	19000	4.0	11.0	\$33.00	\$13.62	\$8.57	30%	0%	3.0	600	63%

Implementation

This workbook contains a custom ribbon containing two buttons, one for importing courier data, and another for

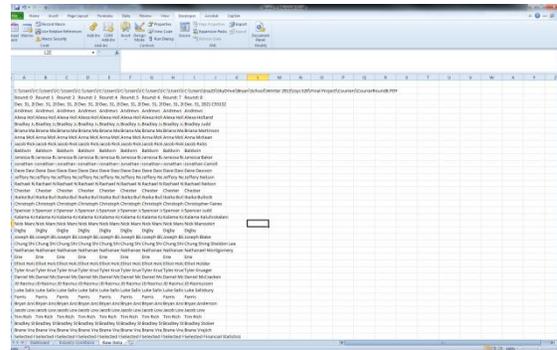
There were 4 steps to my solution:

1. Import Data
2. Parse and print formatted Data
3. Create a dashboard
 - a. Deviation from ideal Function
 - b. Filtered data display
4. Calculate Market Scores

Import Data

Data is made available through PDF files. With many rounds per simulation, importing them manually is a hassle. To import the data, all PDFs are to be kept in a single folder named “Couriers” located in the same place as the workbook, and in alphabetical order.

The workbook uses a DIR function to access each file in succession, uses a shell command to open the PDF, passes the commands to copy the text of that file, then pastes the text in a column in a newly created “Raw Data” sheet. The process repeats for each file, offsetting by one column after each. The resulting page, which can be seen to the right, is hidden after all the data is imported. I also had the origin file’s name posted at the top of each column for future reference.



Since there are many PDF reading programs, the sub procedure prompts the user to select the correct PDF reader. The path selected is then stored in the workbook for future reference. I chose this method over the “.open” method to avoid prompting the user at any point.

Parsing and Formatting Data

Data parsing is initiated by the executive sub procedure running the data imports. It is necessary to parse and format the data after importing because it is not accessible. As previously shown, the data for each sheet is shown in long columns in which each cell contains one line of text. The format, however, is consistent for each report, but the row numbers differ as the market’s product count and bond count fluctuates. Also, the arrangement of data, though consistent report to report, varies data section by data section. For example, in financial summaries for income and cash flows, company names are row headers, but in the stock market section they are column headers. Lastly, all of the data listed on the same line in the PDF was considered one string.

For these reasons, the workbook has a number of dynamic arrays; string arrays are used for section headers, company names, and product names; single-type arrays are used for corresponding data. I then used InStr() functions to locate anchor points and mark its row location, then search for an anchor point at the end of that section. After the anchor points then used 2-level nested loops to load each piece array.

After loading all arrays, a new sheet is made named "Courier Data," into which all data is saved. The resulting page can be seen below. It is also hidden after creation, and serves as the reference sheet for data summary in the Dashboard sheet.

Round 1							Round 2											
Financial Summary							Financial Summary											
	Andrews	Baldwin	Chester	Digby	Erie	Ferris	Andrews	Baldwin	Chester	Digby	Erie	Ferris						
5 ROS	-4.1	-1	1.2	-2.4	-10.9	2.6	2.6	-1.8	1.3									
6 Asset Turnover	0.79	0.89	1.05	0.91	0.95	1.2	1.12	0.77	1.02									
7 ROA	-3.3	-0.8	1.3	-2.2	-10.4	3.2	3	-1.4	1.4									
8 Assets/Equity	2.2	1.9	1.9	2.4	2.9	1.8	1.8	-1.8	1.9									
9 ROE	-7.3	-1.6	2.4	-5.1	-29.9	5.8	5.3	-2.5	2.6									
10 Emergency Loan	753885	0	0	18525676	0	0	0	1024920	0	5								
11 Sales	1E+08	1.02E+08	1.2E+08	1.05E+08	1.01E+08	1.35E+08	1.33E+08	1.04E+08	1.42E+08	1								
12 EBIT	1452747	4677878	8228090	4287926	9314967	11151624	11452663	3914099	10160324	5								
13 Profits	-4167939	-974430	1442862	-2570120	-1.1E+07	3581612	3507498	-1867665	1896109	-2								
14 Cumulative Profit	20569	3214078	5631370	1618387	-6845450	7770119	3528067	1346413	7527479	-1								
15 SG&A / Sales	13.3	12.7	13.8	10	23.7	13.3	13.7	13.7	15									
16 Contrib. Margin	24.3	27.9	28.4	22.4	23.8	28.1	29.2	29.6	29.4									
17																		
18 Close	21.79	30.25	33.99	17.44	8.09	37.74	25.62	20.43	31.12									
19 Change	-12.47	-4	-0.27	-16.82	-26.16	3.49	3.84	-9.82	-2.87									
20 Shares	2399957	2399957	2291939	2145970	2000000	2309456	2629471	2879948	2645012	2								
21 MarketCap	52	73	78	37	16	87	67	59	82									
22 Book-Value	23.95	25.28	25.86	23.47	18.45	26.9	25.09	25.46	27.66									
23 EPS	-1.74	-0.41	0.63	-1.2	-5.52	1.55	1.33	-0.65	0.72									
24 Dividend	0	0	0.05	0	0	0	0	0	0									
25 Yield	0	0	0.1	0	0	0	0	0	0									
26 P/E	-12.6	-74.7	53.9	-14.6	-1.5	24.3	19.2	-31.6	43.4									
27																		
28 Production Summary																		
29 Prod Name	Pr	Segme	Units Sold	Unit Inv.	Rev.	Date	Age	MTBF	Pfmn	Size	Price	M Cost	L Cost	Cont Marg	2nd shift	Automati	Capacity	Plant Util
30 Able	Trad	1,134	838	#####	2.4	17500	6	14	26.99	11.16	7.85	23	0	4	1,800	99		
31 Acre	Low	1,401	440	#####	5.6	14000	3	17	19.99	7.05	7.46	23	30	5	1,400	129		
32 Adam	High	468	166	#####	1.4	23000	9.2	10.8	37.99	16.07	8.97	33	0	3	1,100	66		
33 Aft	Pfmn	366	305	#####	2	26000	10.4	15.3	32.49	15.83	8.97	16	0	3	800	99		
34 Agape	Size	368	288	#####	1.9	19000	4.7	9.6	32.99	13.73	8.97	27	0	3	800	99		
35 Baker	Trad	1,325	28	#####	2.4	17500	5.7	14.3	27.5	10.85	7.85	30	0	4	1,800	65		
36 Bead	Low	1,666	32	#####	2.8	14000	4.1	16	19	8.12	7.25	23	20	8	1,800	118		
37 Bid	High	332	31	#####	2.7	23000	8	12	38	14.84	8.97	35	0	3	900	36		
38 Bold	Pfmn	385	0	#####	1.9	27000	10.4	15.3	33	16.13	8.97	25	0	3	600	51		
39 Buddy	Size	254	96	#####	1.8	19000	4.7	9.6	33	13.73	8.97	30	0	3	600	48		

Create a Dashboard

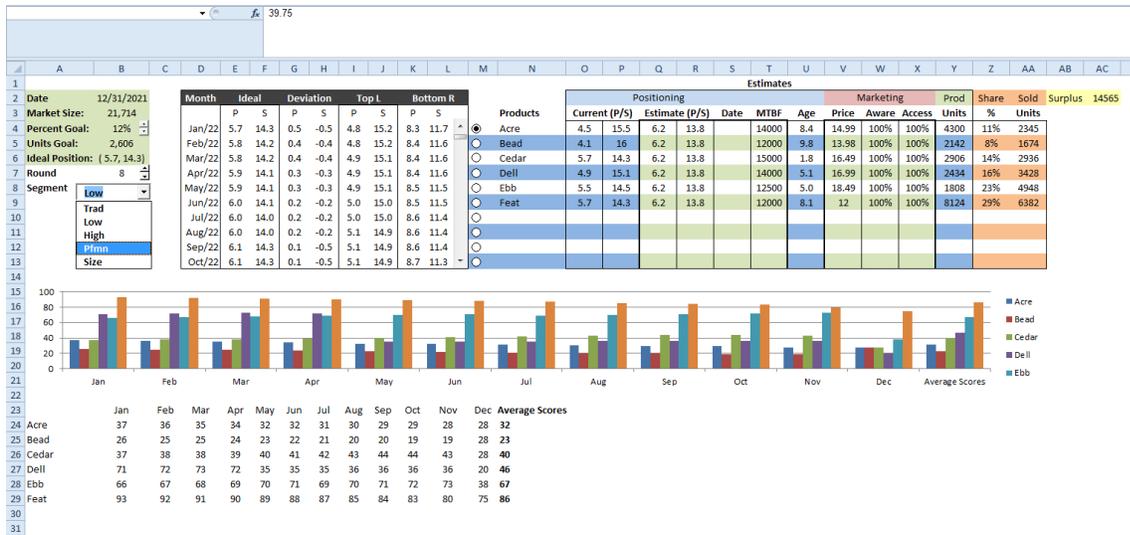
The point of the dashboard is to provide access to any relevant information one would use this workbook for, in one screen. This workbook was designed to help determine how anticipated opponent behavior will impact available market share. The simulation determines market share on a month to month basis, with preferences in product position and price expectations drifting each month. However, decisions are made for the entire year before calculating the round, and summary info is only available for the year-end summary, with positioning insights for only the last month available. This dashboard gives a one-screen solution to see how different actions will play out month to month.

Deviation from Ideal Function: In analyzing position changes and timing, it is helpful to see preference drift month over month to compare against your release date. This workbook contains a UDF that checks the current month against the revision date to determine release specifications or current specifications. Then, the specifications are compared month by month with the drifting preferential

ideal. The function includes an application.caller method to determine rows and columns. The function is only designed to work in specific cells in line with imported data on the same rows. Option buttons on each row determine which product to compare with the ideal.

Filtered Data Display: The dashboard also contains a combo box which is updated upon opening the workbook to include market segment names, along with a spinner control to select a round. The Dashboard sheet contains an event sub procedure to filter products on the right based on the round number and selected segment. An image of the dashboard can be seen below.

The filtering process looks at data in the formatted worksheet, offset by round number, and loads arrays with products matching the segment specifications. First, a loop counts instances of the segment to make a product count to redim the product information array. Then, arrays are loaded using 2-level loops.



Calculate Market Scores

The second button on the ribbon runs a sub procedure to calculate a score. The score is based off of many factors: position, price, quality, age, and marketing. The weights of these factors vary from segment to segment. This workbook contains an "Industry Conditions" sheet that contains segment information. The sub procedure loads each of these weights into an array. It then starts a loop to load data for each product. Within this loop, there is another loop which compares the product's position to that month's after-drift expectations for each month of the year. These two loops print data for each product's score for each month in the bottom left of the dashboard, then calculates the average scores for each product.

The printed data is used as source data for a chart. The sub procedure resets the source data for this chart. Lastly, the market share is printed. This steps calculates the weight of the average score for each product against the sum for all the products. This value is printed in the far right columns in the upper table in the dashboard.

Difficulties Encountered

The vast majority of my frustrations and mental labor was simply working through logical errors and conceptualizing what I wanted to accomplish. As it pertains to code, though, I encountered the following difficulties:

1. Learning how to open PDFs
 - a. It took a while for me to find a solution that could go through every file and import the data with no prompts to the user. I could directly open the files with the `.open "filename"` command, but Excel's security settings prompt the user.
 - b. I tried but have not yet found a solution that will automatically detect the user's default PDF Reader. After first use, the executable's path is saved for future reference.
 - c. I tried reading the file in text, but it was a mess.
 - d. In using the `keyPass` approach, the first few sheets get pasted several times before the next page is opened, then the loop ends and an overflow error results. I learned that `"Do Events"` did not necessarily work for this, but using the `"Wait"` command did.
2. Data Parsing
 - a. In order to calculate date, it needed to be cleaned of symbols (dollar signs, percent symbols, and parenthesis), so I made a function to clean the text.
 - b. Most data was stored in a string with a multi-word header in the front. I needed to find the first number and cut the string in two.
 - c. If the first number was negative, the `'-'` sign was taken with the text string, so I needed to account for that as well by cutting the string at the first `" "`, starting two positions before the first numeric symbol.
 - d. Some parenthesis surrounded words, so the text needed to check for the character before and after parenthesis to check if it was numeric.
3. Code in Sheets
 - a. Though this is a little embarrassing, I was unaware for quite a while that code can be written in the sheet objects for the objects on that sheet.
 - b. I learned to populate objects upon opening the workbook (sadly, after struggling for a while, I found this the day before we learned about it in the `CueCat` class).
4. Functions
 - a. I was unaware of how intrusive a function on the sheet can be. It kept calculating and slowed processes down dramatically. I finally discovered `application.calculation`, and have put it at both ends of major blocks of code.
 - b. It took me a long time to wrap my mind around using references relative to the function's location. `Application.caller` helped a lot.
5. Abandon Projects
 - a. I had completed this in a previous workbook, using a user form, but wanted to give this workbook the functionality to chart raw data, and round-by-round changes regarding production and capacity. The current dashboard looks at marketing data. The solution would not be overly complicated, involving a combo box, a select case statement, and a chart formatting code. It would be time consuming though.

- b. I also would have liked to save a PDF copy of a summary of generic observations (Most expanded capacity for each segment, most inventory, etc), then send an email to teammates. I am not familiar enough with these codes though. I was frustrated and abandoned them.

Assistance

I did not receive any assistance outside of through Google search and class files. I also had no team. This project, along with other projects I've created throughout the semester, has been a real joy to work through. Thank You!