

## Project Title: Shorting Stocks with the Beneish Model

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### Executive Summary

The Beneish Model is a tool developed by Professor Messod Beneish back in 1999 that identifies public companies who have (abnormally) manipulated their earnings. For my project, I decided to develop a tool that would calculate the Beneish “M-score” on all of the stocks in the S&P 500, and then summarize the stocks with Beneish scores below the given threshold that show manipulated earnings. With this knowledge, I then plan to short those stocks.

This is of interest to me because I’ve traded stock options before, and have been trying to get back into it this year. Shorting stocks is where I have the most experience and have had the most success, so this tool fits right into my trading philosophy.

### Implementation Documentation

My project consisted of 3 major steps:

1. Establish and refresh the stock data
2. Calculate the Beneish M-Score for each stock
3. Summarize the companies with manipulated earnings

For my analysis, I decided to use the S&P 500 initially, although the tool is easily adaptable to the manual addition of more tickers. The list of stocks is pulled from Wikipedia, which regularly updates its list of stocks in the S&P 500 with any changes.

#### 1. Refresh the Stock Data

[insert screenshot of customized ribbon]

\*\*\*Note: I tried for 2 hours, but couldn’t quite get the customized ribbon to work.

The user clicks on the ‘Update Stocks’ button under the ‘Stocks to Short’ tab, and this initializes the process to refresh the stock data. The data here (aside from the list of tickers pulled from Wikipedia) is pulled from Yahoo! Finance, which includes the detailed financial statistics from all 3 financial statements (balance sheet, income statement, and statement of cash flows) needed to perform the Beneish model.

Technically, I broke this step down into five different sub procedures, one to update the tickers, one for the stock price, and one for each of the three financial statements. (See screenshot below).

```
Sub getAllData()  
  Sheets("S&P Tickers").Select  
  Range("A2").Select  
  Do Until ActiveCell.Value = ""  
    getTickers  
    getStock|  
    getIS  
    getBS  
    getCF  
  Loop  
End Sub
```

Here are the two data tables pulled for basic stock info:

	A	B	C
1	AEP		
2	Prev Close:		52.32
3	Open:		52.27
4	Bid:	50.80 x 1000	
5	Ask:	52.50 x 2100	
6	1y Target Est:		51.1
7	Beta:		0.25
8	Next Earnings Date:	25-Apr-14AEP Earnings announcement	
9			
10	Day's Range:	52.02 - 52.50	
11	52wk Range:	41.83 - 52.50	
12	Volume:		2,526,020
13	Avg Vol (3m):		2,981,380
14	Market Cap:	25.61B	
15	P/E (ttm):		17.27
16	EPS (ttm):		3.04
17	Div & Yield:	2.00 (3.90%)	
18			

Here's the income statement:

	A	B	C	D	E
1	Period Ending		31-Dec-13	31-Dec-12	31-Dec-11
2	Total Revenue		15,357,000	14,945,000	15,116,000
3	Cost of Revenue		6,738,000	6,395,000	6,848,000
4					
5	Gross Profit		8,619,000	8,550,000	8,268,000
6					
7		Operating Expenses			
8		Research Development	-	-	-
9		Selling General and Administrative	3,795,000	3,812,000	3,692,000
10		Non Recurring	226,000	300,000	139,000
11		Others	1,743,000	1,782,000	1,655,000
12					
13		Total Operating Expenses	-	-	-
14					
15					
16	Operating Income or Loss		2,855,000	2,656,000	2,782,000
17					
18		Income from Continuing Operations			
19		Total Other Income/Expenses Net	161,000	154,000	891,000
20		Earnings Before Interest And Taxes	3,016,000	2,810,000	3,300,000
21		Interest Expense	906,000	988,000	933,000
22		Income Before Tax	2,110,000	1,822,000	2,367,000
23		Income Tax Expense	684,000	604,000	818,000
24		Minority Interest	-4,000	-3,000	-3,000
25					
26		Net Income From Continuing Ops	1,484,000	1,262,000	1,949,000
27					
28		Non-recurring Events			
29		Discontinued Operations	-	-	-
30		Extraordinary Items	-	-	-
31		Effect Of Accounting Changes	-	-	-
32		Other Items	-	-	-
33					
34					
35	Net Income		1,480,000	1,259,000	1,946,000

Here's the balance sheet:

	A	B	C	D	E
1	Period Ending		31-Dec-13	31-Dec-12	31-Dec-11
2					
3	<b>Assets</b>				
4	<b>Current Assets</b>				
5		Cash And Cash Equivalents	188,000	355,000	288,000
6		Short Term Investments	353,000	324,000	294,000
7		Net Receivables	1,860,000	1,871,000	1,834,000
8		Inventory	1,423,000	1,519,000	1,292,000
9		Other Current Assets	486,000	520,000	474,000
10					
11	<b>Total Current Assets</b>		4,310,000	4,589,000	4,182,000
12	Long Term Investments		2,229,000	2,074,000	1,995,000
13	Property Plant and Equipment		40,997,000	38,763,000	36,971,000
14	Goodwill		91,000	91,000	76,000
15	Intangible Assets		-	-	-
16	Accumulated Amortization		-	-	-
17	Other Assets		6,749,000	7,223,000	7,653,000
18	Deferred Long Term Asset Charges		2,038,000	1,627,000	1,346,000
19					
20	<b>Total Assets</b>		56,414,000	54,367,000	52,223,000
21					
22	<b>Liabilities</b>				
23	<b>Current Liabilities</b>				
24		Accounts Payable	2,333,000	2,185,000	2,091,000
25		Short/Current Long Term Debt	2,396,000	3,307,000	3,233,000
26		Other Current Liabilities	1,383,000	1,331,000	1,287,000
27					
28	<b>Total Current Liabilities</b>		6,112,000	6,823,000	6,611,000
29	Long Term Debt		16,828,000	15,586,000	15,083,000
30	Other Liabilities		5,944,000	6,315,000	6,468,000
31	Deferred Long Term Liability Charges		11,444,000	10,406,000	9,396,000
32	Minority Interest		1,000	-	1,000
33	Negative Goodwill		-	-	-
34					
35	<b>Total Liabilities</b>		40,329,000	39,130,000	37,559,000
36					
37	<b>Stockholders' Equity</b>				
38	Misc Stocks Options Warrants		-	-	-
39	Redeemable Preferred Stock		-	-	-
40	Preferred Stock		-	-	-
41	Common Stock		3,303,000	3,289,000	3,274,000
42	Retained Earnings		6,766,000	6,236,000	5,890,000
43	Treasury Stock		-	-	-
44	Capital Surplus		6,131,000	6,049,000	5,970,000
45	Other Stockholder Equity		-115,000	-337,000	-470,000
46					
47	<b>Total Stockholder Equity</b>		16,085,000	15,237,000	14,664,000
48					
49	<b>Net Tangible Assets</b>		15,994,000	15,146,000	14,588,000

And here's the statement of cash flows:

	A	B	C	D	E
1	Period Ending		31-Dec-13	31-Dec-12	31-Dec-11
2	Net Income		1,480,000	1,259,000	1,946,000
3					
4	Operating Activities, Cash Flows Provided By or Used In				
5	Depreciation		1,874,000	1,918,000	1,792,000
6	Adjustments To Net Income		502,000	676,000	-451,000
7	Changes In Accounts Receivables		5,000	-16,000	107,000
8	Changes In Liabilities		114,000	191,000	178,000
9	Changes In Inventories		122,000	-224,000	176,000
10	Changes In Other Operating Activities		5,000	-3,000	37,000
11					
12	Total Cash Flow From Operating Activities		4,106,000	3,804,000	3,788,000
13					
14	Investing Activities, Cash Flows Provided By or Used In				
15	Capital Expenditures		-3,624,000	-3,025,000	-2,669,000
16	Investments		-112,000	-180,000	-167,000
17	Other Cash flows from Investing Activities		-154,000	-186,000	-54,000
18					
19	Total Cash Flows From Investing Activities		-3,818,000	-3,391,000	-2,890,000
20					
21	Financing Activities, Cash Flows Provided By or Used In				
22	Dividends Paid		-954,000	-916,000	-900,000
23	Sale Purchase of Stock		84,000	83,000	28,000
24	Net Borrowings		303,000	473,000	-104,000
25	Other Cash Flows from Financing Activities		118,000	5,000	5,000
26					
27	Total Cash Flows From Financing Activities		-449,000	-355,000	-971,000
28	Effect Of Exchange Rate Changes		-	-	-
29					
30	Change In Cash and Cash Equivalents		-161,000	58,000	-73,000

Again, several fields are pulled from each of these tables pulled from Yahoo! Finance, such as Net Sales, Cost of Goods Sold, Net Receivables, PP&E, Depreciation Expense, and Cash Flows from Operations. The balance of each of item is pulled for both current and prior year, as the Beneish model relies on the comparison between two years of data.

1	+															
2																
	A	B	E	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ		
1	Ticker symbol	Security	GICS Sub Industry	blank	DSRI	GMI	AQJ	SGI	DEPI	SGAI	TATA	LVGI	M-Score	Probabilit		
137	PCLN	Priceline.com Inc	Hotels, Resorts & Cruise Lines		1.158	0.923	2.229	1.291	0.963	1.127	(0.039)	0.822	(1.770)	3.84%		
138	VRSN	Verisign Inc.	Internet Software & Services		0.247	1.002	4.715	1.105	0.931	0.866	(0.013)	1.547	(1.802)	3.58%		
139	ADT	ADT Corp	Diversified Commercial Services		2.406	0.984	0.988	1.025	1.001	1.031	(0.126)	1.246	(1.851)	3.21%		
140	KMX	Carmax Inc	Specialty Stores		0.920	1.032	0.997	1.096	0.973	0.984	0.123	1.024	(1.887)	2.96%		
141	ALTR	Altera Corp	Semiconductors		1.469	1.017	1.962	0.972	0.706	1.136	(0.025)	1.634	(2.058)	1.98%		
142	MU	Micron Technology	Semiconductors		1.640	0.577	1.319	1.102	1.182	0.771	(0.032)	1.217	(2.058)	1.98%		
143	ABC	AmerisourceBergen Corp	Health Care Distribution & Services		1.419	1.184	0.834	1.127	0.907	1.074	(0.016)	1.049	(2.063)	1.95%		
144	CAM	Cameron International Corp.	Oil & Gas Equipment & Services		1.195	1.016	1.275	1.157	0.943	1.014	(0.010)	1.024	(2.103)	1.77%		
145	THC	Tenet Healthcare Corp.	Health Care Facilities		1.261	0.989	1.281	1.217	1.394	1.029	(0.042)	1.103	(2.130)	1.66%		
146	WEC	Wisconsin Energy Corporation	Multi-Utilities & Unregulated Power		1.457	1.029	0.916	1.064	0.960	0.532	(0.044)	0.961	(2.139)	1.62%		
147	MHK	Mohawk Industries	Home Furnishings		1.205	0.985	0.975	1.270	1.385	0.974	(0.019)	1.189	(2.169)	1.50%		
148	NRG	NRG Energy	Multi-Utilities & Unregulated Power		1.276	0.964	0.971	1.341	0.890	0.835	(0.050)	1.010	(2.174)	1.48%		
149	FMC	FMC Corporation	Diversified Chemicals		1.248	1.075	0.704	1.136	1.169	0.927	0.017	1.284	(2.191)	1.42%		
150	TSCO	Tractor Supply Company	Specialty Retail		1.167	0.989	0.979	1.107	1.065	0.989	(0.003)	0.851	(2.201)	1.39%		
151	KMI	Kinder Morgan	Oil & Gas Refining & Marketing & Transportation		0.866	1.097	0.959	1.411	0.912	0.536	(0.018)	0.974	(2.209)	1.36%		
152	CF	CF Industries Holdings Inc	Fertilizers & Agricultural Chemicals		1.429	1.108	0.899	0.897	1.229	0.834	0.004	1.466	(2.241)	1.25%		
153	TSO	Tesoro Petroleum Co.	Oil & Gas Refining & Marketing & Transportation		0.924	1.350	1.139	1.261	1.176	1.047	(0.032)	1.115	(2.249)	1.22%		
154	PCL	Plum Creek Timber Co.	REITs		1.406	0.944	1.015	1.001	0.942	1.086	(0.023)	1.010	(2.262)	1.19%		
155	MAT	Mattel Inc.	Leisure Products		1.017	0.990	1.024	1.010	0.989	0.958	0.032	0.953	(2.280)	1.13%		
156	AMGN	Amgen Inc	Biotechnology		0.990	0.993	1.544	1.082	0.875	0.973	(0.018)	0.957	(2.282)	1.13%		
157	SE	Spectra Energy Corp.	Oil & Gas Refining & Marketing & Transportation		1.267	1.027	0.973	1.087	1.057	1.018	(0.026)	1.044	(2.285)	1.11%		
158	CNP	CenterPoint Energy	Multi-Utilities & Unregulated Power		1.031	1.252	1.572	1.088	0.792	0.975	(0.060)	0.950	(2.291)	1.10%		
159	GILD	Gilead Sciences	Biotechnology		1.045	1.001	0.949	1.155	0.885	1.007	(0.001)	0.858	(2.295)	1.09%		
160	AMAT	Applied Materials Inc	Semiconductor Equipment		1.554	0.954	0.916	0.861	0.974	0.973	(0.030)	1.047	(2.309)	1.05%		
161	JBL	Jabil Circuit	IT Consulting & Services		1.078	1.029	2.079	1.069	1.115	1.000	(0.092)	1.013	(2.317)	1.02%		
162	GM	General Motors	Automobile Manufacturers		1.361	0.611	0.932	1.021	2.757	0.864	(0.034)	1.079	(2.322)	1.01%		

## 2. Calculate the Beneish Score for Each Stock

The Beneish model uses eight major ratios in its calculation. This second step of the process was easily done without VBA. First, formulas were used to calculate the eight summary ratios based

on the line items collected from the three financial statements for each stock. Next, the Beneish M-score was calculated using these summary ratios, and finally a probability was assigned to the M-score, signifying the probability of abnormally manipulated earnings on the part of the company. Any probability over 2.94% signifies excessive manipulation and a chance to profit by shorting the stock over the next few months.

	A	B	C	D	E	F	G	H	I	J
4	Ticker	Name	Sector	Subsector	Price	M-Score	Probability			
5	DAL	Delta Air Lines	Industrials	Airlines	\$33.62	(1.382)	8.35%			
6	PCLN	Priceline.com Inc	Consumer Discretionary	Hotels, Resorts & Cruise Lines	\$1,212.25	(1.770)	3.84%		Get Data	
7	VRSN	Verisign Inc.	Information Technology	Internet Software & Services	\$50.58	(1.802)	3.58%			
8	ADT	ADT Corp	Industrials	Diversified Commercial Services	\$29.94	(1.851)	3.21%			
9	KMX	Carmax Inc	Consumer Discretionary	Specialty Stores	\$43.81	(1.887)	2.96%			
10										

### 3. Summarize the Companies with Manipulated Earnings

At first, I brainstormed several possible methods to do this step, such as creating a pivot table from the data and trying to filter it to only the tickers with scores showing manipulated earnings. However, after some research, I decided sorting the table of data to a spot where I could copy and paste the desired tickers shouldn't be too difficult.

So first, I sorted the table of stock tickers and Beneish scores by manipulation probability percentage, and then copied the tickers with high probabilities to a summary table on the 'Shorts' tab. This summary list then represents the stocks that could/should be shorted in order to turn a profit.

### Lessons Learned and Difficulties Encountered

I think VBA is a lot like my golf game—1 out of every 4 (key) strokes might be a good one, but it sure is frustrating the remaining seventy-five percent of the time. I took a programming class in high school where we made a version of Pac-Man as a final project, so I thought that the general *concepts* of VBA would at least be *somewhat* easy to grasp, however I was terribly mistaken. So while this project has helped me feel confident in a few small areas of VBA, it has mostly solidified the feeling that if I need any sort of VBA programming done, I should just hire it out—it will be much quicker and much less headache for me.

I am quite annoyed I couldn't get the ribbon customized. I thought I understood how to do it when we did it in class, but I couldn't duplicate it for some reason, even after comparing the SQL code.

I think I am fairly proficient now at web queries, since this made up a good portion of my project. I also learned the immense value of using the 'F8' key to go through the code step-by-step. Sometimes in my coding I would not get an error, although I still didn't get the desired result. Going through the code line-by-line helped me identify which steps were working and which ones were not.

### Assistance

I did not receive any help concerning this project from anyone.

Thank you for a very entertaining, albeit difficult class.