The changing face of the S&P 500: Are analysts seeing the "smiles" and "frowns"?

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Abstract

Aggregated financial data as a percent of sales for the S&P 500 and the Real GDP over a twenty plus year span is examined to determine the impact of economic cycles on profitability. The results show that firms have their highest costs during the lowest and highest GDP growth quartiles. These smiles/frowns in cost/profitability could help explain why analysts tend to overestimate or herd around these specific periods. The largest overhead costs occur in the lowest growth part of the economic cycle and improve monotonically from weakest to strongest, suggesting that the popular press is mistaken to believe firms only layoff to improve their numbers.

Keywords: S&P 500, Herding, Cost/Profit, Layoffs

With more than $1.3 trillion[1] invested in S&P 500 index Exchange Traded Funds (ETFs) and mutual funds by money managers, few could argue the importance of the S&P 500 to the U.S. financial markets. While many factors might impact the outcome of the earnings and subsequent market valuation of this index, the legions of analysts have in general been optimistic about where these earnings might fall in the future. Research conducted on the index during economic cycles has tended to focus on two topics: the capital structure of companies within the S&P 500 relative to macroeconomic factors and the tendency of analysts to herd around news events.

As explained below, the popular press is quick to note that during limited economy-wide growth, companies are overzealous in their efforts to control their cost structure (i.e. cutting employees). Many researchers have agreed, suggesting these layoffs are over used and unnecessary as described in the following literature review.

The purpose of this study is to break down the components of the cost structure of the S&P 500 to see where and when these companies tend to realign their costs when faced with numerous different growth and slowdown cycles. Observing the timing and size of these efforts may offer an explanation as to why analysts tend to overshoot on earnings and whether firms do indeed excessively reduce head count numbers to cope with business economic cycles.

INTRODUCTION

Previous research has shown that forecasts of earnings by analysts have on average been too optimistic. Karamanou (2001) discovers in her study that analysts have an intentional positive bias to their forecasts. Louis, Lys and Sun (2009) confirm her results finding that analysts do not include in their initial forecasts information about conservatism even though that information is available at the time of the forecasts, which contributes to the optimistic analyst forecast bias.

By considering all the available information and the signals coming from the companies they follow, analysts should be able to formulate optimal forecasts (Obrien, 1988; Schipper 1991). Forecasters are generally optimistic; according to Dreman & Barry (1995) and Ciccone (2005), with the latter noting at least 40% of all forecasts were too optimistic by an average of more than 11% one year out.

One possibility for this over-forecasting is a phenomenon called herding that has been studied extensively in finance. Herding is an imitation behavior that often leads to inefficient outcomes for the market as a whole (Shiller, 1987; Banerjee, 1992; Bikchandani, Hirshleifer and Welch, 1992). These trends can be pervasive at times—up to 72% of their forecasts according to Olsen (1996)—and is most prevalent among less experienced analysts (Trueman 1994). Welch (2000) noted the buy/sell recommendations of analysts have a significant positive influence on the recommendations of the next two analysts. An excellent review of current herding literature can be found in Campenhout and Verhestraeten (2010).

Other rich areas of research include the interaction among macroeconomic and financial variables and how the S&P 500 reacts to economic cycles. Conover, Jensen, Johnson and Mercer (2008) found that the movement of the various sectors of the economy is impacted by monetary conditions. Keynesian economists believe there is at least an indirect link between the

[1] From Standard and Poors, http://www.standardandpoors.com/indices/sp-500/en/us/?indexId=spusa-500-usduf--p-us-l--

economy and various sectors of the economy (Bernanke and Mihov, 1995) and that through the impact of monetary policy on inflation, the economy also directly impacts the components of the income statement like the cost of goods sold (Frankel, 2008). Other researchers such as Peters (1991) find that certain cycles, while they are repeatable, are not linear.

Joseph Piotroski (2001) developed a modern take on financial variables impacting firm valuation when he found a strong link between firms performing above average on nine firm-specific ratios, and their stock returns in the following twelve months.

Tong and Ning (2004) established that institutional investors prefer a debt ratio that is positively and significantly related to the average shares held by each institutional investor but negatively related to the number of institutional investors, implying that the debt structure of firms at all points in the economic cycle matters.

One of the most common reactions propagated by the popular press is how firms deal with any economy-wide crisis by downsizing their payrolls. From annotating which firms are the layoff kings to how overreliance on layoffs is killing the economy and even a firm's bottom line, there is no lack of critics when it comes to pointing the finger of blame at top management (Grey, 2010; Motley, Fool 2008; The Daily Beast, 2010; McIntrye, 2010; McKinsey, 2009; Plant Moran,,2011; and Ydste ,2010). Further articles also suggest corporate profits soar on layoffs and wage cuts (Grey 2010). Even the Wall Street Journal has chimed in suggesting that retooling and downsizing is driving the comeback from the great recession for corporate America (Grey 2010; Motley Fool, 2008).

The information available to analysts constructing their earnings forecasts rely on two types of inputs: public and private information (Ramnath, Rock and Shane, 2008). This study will consider whether information that is publicly available might shed light on inherent trends thereby making future forecasts more accurate. An analysis of the timing of the recession and recovery will consider whether the popular press is on point or not in regards to the efficacy of layoffs.

METHODOLOGY AND DATA

With the S&P 500 serving as a proxy for the financial information of corporate America, quarterly income statement and balance sheet data for all firms that are part of the S&P 500[2] are collected from Compustat for the years 1991 through the third quarter of 2011 for a total of 83 quarters. Different firms report at different times so any information collected from January through March is quarter one, April through June quarter two and so on. Specific information relating to basic income statement and balance sheet information is then aggregated to create a single statement for the entire index by quarter.

The accounting variables of interest in this paper are the income statement common size variables typically considered controllable by management and indicative of the financial state of a firm at any given point in time. They include:

- Cost of Goods Sold as a percentage of sales (PCTCOGS)
- Sales and General Administration as a percent of sales (PCTSGA) and
- Net Income as a percent of sales (PCTNI).

[2] While the firms included in the index changed somewhat through time, aggregated data includes those firms in the index for any given year.

Previous statistically significant research findings by Barnes (1987), John (1993), Piotroski (2001) and De et al. (2011) are used to determine the independent accounting control variables, which include:

- The Cash to Total Assets ratio (CASH_TO)
- Debt to Equity ratio (DEBT_EQ)
- Sales to Total Assets (Sales_TA)
- the year over year quarterly growth rates of Sales (SALESGRO) and
- the Times Interest Earned Ratio (TIE) calculated as the quantity net income plus interest expense divided by the interest expense.

While several of the macroeconomic control variables were taken from previous research, others such as the Baltic Dry Dock Index was chosen because of its emphasis over the last few years in the popular press. The Baltic Dry Dock Index (BDI), which is measured as a cost to ship products across oceans, most directly measures the demand for shipping capacity versus the supply of dry bulk carriers. According to the London-based Baltic Exchange, dry bulk carriers make up 40% of the world-wide merchant fleets covering a range of commodities from coal and iron ore to grain. It is commonly thought of as a leading indicator.

All macroeconomic variables were downloaded using the Global Financial Data database. They include:

- The Baltic Dry Dock Index (BALTDRY)
- the Business Consumer Confidence Index (BUSCONF)
- the Manufacturing Capacity Utilization Index (CAPUTIL)
- the Quarterly Change in Real Gross Domestic Product relative to the same quarter a year ago (GDP)
- Recessions as noted by the National Bureau of Economic Research (RECESS) and
- the percentage of unemployment (UNEMPL) as determined by the Bureau of Labor Statistics.

The regression formula for each dependent variable of interest is:

PCTCOGS = BALTDRY + BUSCONF + CAPUTIL + RECESS + GDP + UNEMPL + CASH_TA + DEBT_EQ + SALES_TA + TIE + SALESGRO + C (1)

PCTSGA = BALTDRY + BUSCONF + CAPUTIL + RECESS + GDP + UNEMPL + CASH_TA + DEBT_EQ + SALES_TA + TIE + SALESGRO + C (2)

PCTNI = BALTDRY + BUSCONF + CAPUTIL + RECESS + GDP + UNEMPL + CASH_TA + DEBT_EQ + SALES_TA + TIE + SALESGRO + C (3)

Basic statistical information about the performance of these income statement ratios is compared for time periods marked by recessions as well as the growth rate of the GDP subdivided into quartiles (lowest, midlow, midhigh, and highest).

The relationship between the dependent variables, the GDP, and the returns of the S&P 500 are discussed relative to the beginning and end of the three recessions over the event study. Quarterly information relative to the recessions is noted as R +/- 3 to observe these relationships through time.

Finally, charts are drawn to observe visually the relationships of key variables through time.

RESULTS

The summary data (Table 1) shows that, among the more common macroeconomic variables, the unemployment rate was just under six percent, the GDP was 2.6%,[3] and that on average the economy spends one of eight quarters in a recession. For the accounting variables, the TIE ratio shows that at its worst, the companies in the S&P 500 were barely able to cover any of their interest cost at just .08 times. The regression analysis in Table 2 indicates that the only two variables that were not statistically significant for any of the dependent variables were CAPUTIL and the SALES_TA.

The overlap in significant variables between the PCTCOGS and PCTSGA variables was minimal. Only the CASH_TA ratio was significant for both, and only weakly so for the latter. There were two overlapping independent variables between PCTCOGS and PCTNI, the recession binary variable and the ability of a firm to meet its debt obligations as measured by the TIE variable. The finding that the level of Real GDP growth was only significant to the S&P 500's PCTCOGS suggests that the majority of the impact of economy wide movements is centered in the basic cost of materials. The UNEMPL rate, which would be expected to impact the PCTSGA for firms due to its direct impact on the availability of cost of labor, also filters down in a negative way to a firm's PCTNI bottom line.

Table 3 breaks down the accounting and macroeconomic variables into quartiles based on growth in the GDP as well as a look at the averages during a recession. They are ranked by order of worst to best economy with the best economy being noted by the highest GDP. Every single category, with exception of the Baltic Dry Index, hit its worst numbers during a recession. This is likely due to the BDI being a leading economic indicator.

All of the macroeconomic variables as well as PCTSGA improve monotonically as the economy improves. However, both the PCTCOGS and PCTNI variables as well as the TIE measure, show a U-shaped pattern with their worst numbers during the worst GDP quartile where the average growth rate is negative at -0.733%. Each category's second worst numbers, however, is during the highest level of GDP. The PCTNI drop is a full 20% decline from the previous quartile net income numbers. Further analysis of the common-size income statement reveals that the amount spent on the other major category cost variables typically thought of as uncontrollable by management over the short run—the combination of depreciation/amortization, interest, and tax expenses—are highest during the LowMid quartile of the GDP, indicating that the U-shaped pattern in the PCTCOGS and PCTNI numbers is not due to those expenses. Combined, these results provide indirect support for Peters's finding (1991) that not all the firm relationships through time are linear. To the extent that these results are related to inflation, they may provide support for the assumptions of Bernanke and Mihov (1995).

Table 4 addresses the question of whether the accounting costs of the S&P 500 changes as the economy goes into or comes out of a recession. In the three quarters prior to the economy entering a recession, all of the accounting numbers and two of the three GDP numbers are above historical trends, many by a significant margin. PCTNI, for instance, covers a range from 8.95%

[3] The sixty-five year average for Real GDP is 3.18% according to http://www.data360.org

three quarters prior to 7.86% in the quarter before a recession actually begins. These are significantly higher than the twenty-year average of 6.47%.

Stock returns, on the other hand, are headed down. As measured relative to the official beginning of the recession, all the stock returns for the S&P 500 are negative, averaging a total overall drop of approximately 4.6% in the three quarter prior to a recession. This gives support for the idea that the market is looking six to nine months out when it places a value on future earnings. While it would be difficult for analysts to look too far into the future or to have knowledge of the full extent of the economic decline, it is worth noting that from the quarters leading up to a recession to the actual low point in the S&P 500 price, on average another 20% loss could have been avoided just by selling at the first sign of a recession.

A similar trend occurs coming out a recession. While the stock market begins to recover prior to the recession ending, as can be seen from the S&P bottom returns recovering a full 15 to 18% from the lowest point in the recession, the accounting and GDP numbers tend to languish even up to three quarters after the official end of the recession. With the exception of the GDP at R+1, the underperformance occurred coming out of the recession with every single measure, showing a significantly worse financial position relative to the historical averages. The market does begin to discount this financial performance by the third quarter after the recession has ended. The S&P 500 return has given back a full 6.5% of the first quarter gain relative to the last quarter in the recession. Combined these results show that the market, perhaps driven by analysts' expectations, has valued the future earnings of the companies coming out of a recession more highly than historical numbers might suggest is prudent.

Chart 1 demonstrates this visually by showing the recovery of the price of the S&P 500 prior to the official end of the recession in two of the three previous recessions. On average the S&P 500 price has hit the low point between one and two quarters prior to the end of the recession.

The PCTCOGS data in Chart 2 shows a definitive smile when plotted against a second degree polynomial. A higher COGS as a percentage of sales represents a smaller gross profit and therefore a lower level of profitability. The bottom of the cost curve appears to bottom out somewhere in the third quartile of growth in GDP. Combining these results with the previous finding that the return of the S&P 500 rises rapidly coming out of economic hard times, analysts would be wise to expect COGS to begin rising during the hottest part of the economic cycle.

PCTSGA falls monotonically throughout the rise in GDP. This appears to contradict the popular press hypothesis that corporations cut more employees than they need to during tougher economic times. While they may indeed layoff more employees during recessions, the PCTSGA numbers suggests that firms would need to cut even deeper to achieve their twenty-year average for their SGA costs.

PCTNI inversely mirrors the story of the PCTCOGS polynomial curve, resembling a frown. As COGS rise when the economy gets overheated, the small decline in the SGA is not enough to offset the increased costs which filter their way down to a lower net income as a percent of sales.

CONCLUSION

The S&P as a whole is impacted by economic slowdowns when it comes to profitability. While it was a statistically significant variable in the regression analysis, unlike previous research findings (McKinsey 2009), the debt to equity ratio did not change relative to the rate of

change of real GDP, suggesting that firms did not significantly change their capital structure in response to the state of the economy. Short term adjusts meant to improve their financial flexibility, as represented by the cash to sales ratio were important, increasing as the economic conditions deteriorated.

Firms appear to be less profitable in both the worst AND best GDP periods, forming a "smile" for the PCTCOGS function and a "frown" for PCTNI. One possible reason for the PCTCOGS smile is that during difficult economic environments businesses discount, putting pressure on their margins, while the increase in raw material and manufacturing costs put the squeeze on profits during economic booms.

The outcome of these trends if not widely known would tend to lead analysts to be overly optimistic coming out of recessions and into economic booms. Since these two quartiles represent half of the economic numbers in this study, it is logical to assume these results would have some bearing on the overly optimistic analyst forecasts.

The accounting numbers going into a recession give little forewarning of the near term poor performance that is forthcoming. While firms cut costs in a recession, their overall numbers are exceptionally poor relative to the twenty-year average. Irrespective of the desire to maintain labor to grow market share during or just after a downturn, this results suggests that firms would benefit from larger, quicker reductions during downturns.

The financial numbers for the firms in the S&P 500, while improving over the recession data, are substantially below average for the first three quarters coming out of a recession. This reality is contrary to the information in the popular press articles like that in the Wall Street Journal which presumes there are immediate cost savings that will be carried forward, leading to a rapid growth in future earnings.

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Table 1: Summary Data

This is summary data taken over an 83 quarter time period from 1991 through Q3 of 2011 based on U.S. data. The abbreviations are as follows: BALTDRY - Baltic Dry Dock Index, BUSCONF – Business Confidence Index, CAPTUIL - Capacity Utilization Index, UNEMPL – percentage unemployment rate, GDP – Gross Domestic Product, PCTCOGS – Percentage of Cost of Goods Sold for the entire S&P 500, PCTSGA – Percentage Sales, General and Admin Expenses, PCTNI – Percentage Net Income, RECESS – binary variable equal to 1 when in a Recession, SALES_TA – Sales to Total Assets, SALESGRO – year over year quarterly growth rate in Sales, TIE – Times Interest Earned, CASH_TA – Cash to Total Assets, DEBT_EQ – Debt to Equity ratio.

Panel A: Economic Variables

	BALTDRY	BUSCONF	CAPUTIL	UNEMPL	GDP
Mean	2384.23	99.66	79.32	5.97	2.59
Median	1615.50	99.95	80.50	5.60	2.75
Maximum	9589.00	104.25	85.10	9.90	8.00
Minimum	774.00	91.65	66.80	3.90	-8.90
Std. Dev.	1926.74	2.24	4.13	1.64	2.66
Skewness	2.28	-0.75	-0.95	1.02	-1.42
Kurtosis	8.09	4.55	3.46	3.08	7.65

Panel 2: Accounting Variables

	PCT-COGS	PCT-SGA	PCTNI	RE-CESS	SALES_TA	SALES-GRO	TIE	CASH_TA	DEBT_EQ
Mean	66.55%	14.19%	6.47%	0.12	11.42%	2.14%	3.52	9.07%	1.39
Median	66.66%	14.05%	7.10%	0.00	10.54%	2.05%	3.49	8.90%	1.37
Max	70.64%	16.66%	9.70%	1.00	15.58%	8.65%	7.49	13.97%	1.73
Min	55.45%	12.57%	-2.57%	0.00	8.20%	-9.48%	0.08	5.38%	1.11
Std. Dev.	2.39%	0.76%	2.47%	0.32	2.20%	2.96%	1.18	2.18%	0.10
Skewness	-1.18	1.16	-1.52	2.31	0.30	-0.98	-0.03	0.34	0.51
Kurtosis	7.18	4.63	5.52	6.44	1.57	6.47	4.69	2.07	4.04

Table 2: Regressions

This is a regression analysis of data taken over an 83 quarter time period from 1991 through Q3 of 2011 based on U.S. data. PCTCOGS, PCTSGA and PCTNI are the dependent variables in separate regressions. The abbreviations are as follows: BALTDRY - Baltic Dry Dock Index, BUSCONF – Business Confidence Index, CAPTUIL - Capacity Utilization Index, UNEMPL – percentage unemployment rate, GDP – Gross Domestic Product, PCTCOGS – Percentage of Cost of Goods Sold for the entire S&P 500, PCTSGA – Percentage Sales, General and Admin Expenses, PCTNI – Percentage Net Income, RECESS – binary variable equal to 1 when in a Recession, SALES_TA – Sales to Total Assets, SALESGRO – year over year quarterly growth rate in Sales, TIE – Times Interest Earned, CASH_TA – Cash to Total Assets, DEBT_EQ – Debt to Equity ratio.

	PCTCOGS		**PCTSGA**		**PCTNI**	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
BALTDRY	-8.87E-08	0.937	7.75E-07	0.018**	2.44E-06	0.001***
BUSCONF	0.003697	0.001***	-1.3E-06	0.997	-0.00069	0.311
CAPUTIL	-0.00063	0.640	-0.00011	0.770	-0.00076	0.358
CASH_TA	-0.60396	0.005***	0.117642	0.053*	0.124391	0.338
DEBT_EQ	0.001697	0.933	0.013821	0.018**	0.041547	0.001***
GDP	-0.0025	0.007***	-0.00028	0.278	0.000284	0.606
RECESS	0.013902	0.091*	-0.00362	0.120	-0.01244	0.015**
SALES_TA	-0.01991	0.950	0.007604	0.933	0.261051	0.184
SALESGRO	0.180098	0.027**	-0.01223	0.592	-0.02681	0.586
TIE	-0.01312	0.000***	-0.00018	0.795	0.020701	0.000***
UNEMPL	0.00345	0.138	0.002682	0.000***	-0.00663	0.000***
C	0.428314	0.002***	0.104355	0.007***	0.056656	0.484
R-squared	0.678		0.752		0.901	
Adj R-sqrd	0.633		0.718		0.887	

N = 82

* Statistically Significant at 10% level
** Statistically Significant at 5% level
*** Statistically Significant at 1% level

Table 3: Variable Averages by GDP Quartiles

Averages of the variable were taken based on the low to high GDP divided in quartiles. Bottom is the lowest quartile, Lowmid was next followed by Highmid and High. Recession represents the averages for each of the variables while the economy was in a recession as designated by the National Bureau of Economic Research.

Panel A: Economic Variables

	UNEMPL	GDP	PPI	BALTDRY	BUSCONF	CAPUTIL
Recession	6.60	-3.26	0.0833	2680	95.26	74.09
Bottom	6.20	-0.73	0.3238	2691	97.83	77.49
Lowmid	6.30	2.20	0.3952	2508	99.92	78.30
Highmid	5.78	3.39	0.5952	2676	100.17	79.64
High	5.63	5.43	0.9600	1588	100.52	81.94

Panel B. Accounting Variables

	PCTCOGS	PCTSGA	PCTNI	SALESGRO	CASH/TA	SALES/TA	TIE	DEBT/EQ
Recession	0.6848	0.1460	0.0382	-0.0215	0.0990	0.1012	2.30	1.52
Bottom	0.6746	0.1432	0.0570	0.0087	0.0947	0.1092	3.13	1.42
Lowmid	0.6599	0.1429	0.0631	0.0181	0.0951	0.1078	3.67	1.37
Highmid	0.6569	0.1428	0.0749	0.0261	0.0932	0.1123	3.88	1.38
High	0.6720	0.1384	0.0623	0.0325	0.0781	0.1301	3.32	1.39

Table 4: Variable Averages Leading into and Out of Recessions

R represents the time period when the U.S. economy was in a recession. R-1 is the last quarter before each recession, R-2 the second prior and so forth. R+1 represents the first quarter after the end of the recession and so forth. The variable numbers are the averages for those quarters represented.

	r-3	r-2	r-1	r	r + 1	r + 2	r + 3	20 yr Avg
GDP	5.80	1.95	2.70	-3.26	2.63	2.53	2.50	2.59
PCTCOGS	65.48%	65.27%	65.68%	68.48%	67.59%	67.29%	67.39%	66.55%
PCTSGA	13.94%	13.70%	13.63%	14.60%	14.65%	14.66%	14.66%	14.19%
PCTNI	8.95%	8.61%	7.86%	3.82%	5.20%	4.11%	5.40%	6.47%
S&P Return	-4.27%	-5.37%	-4.20%	0.00%	10.26%	7.06%	3.84%	3.38%
S&P Bottom	-25.12%	-25.35%	-24.39%	0.00%	16.62%	17.91%	14.92%	3.38%

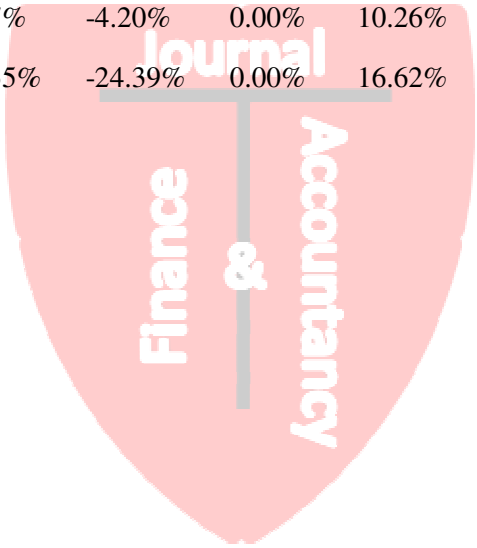

Chart 1

This is the quarterly average price of the S&P 500 over the last eighty-three quarters. The time periods representing recessions are outlined in grey.

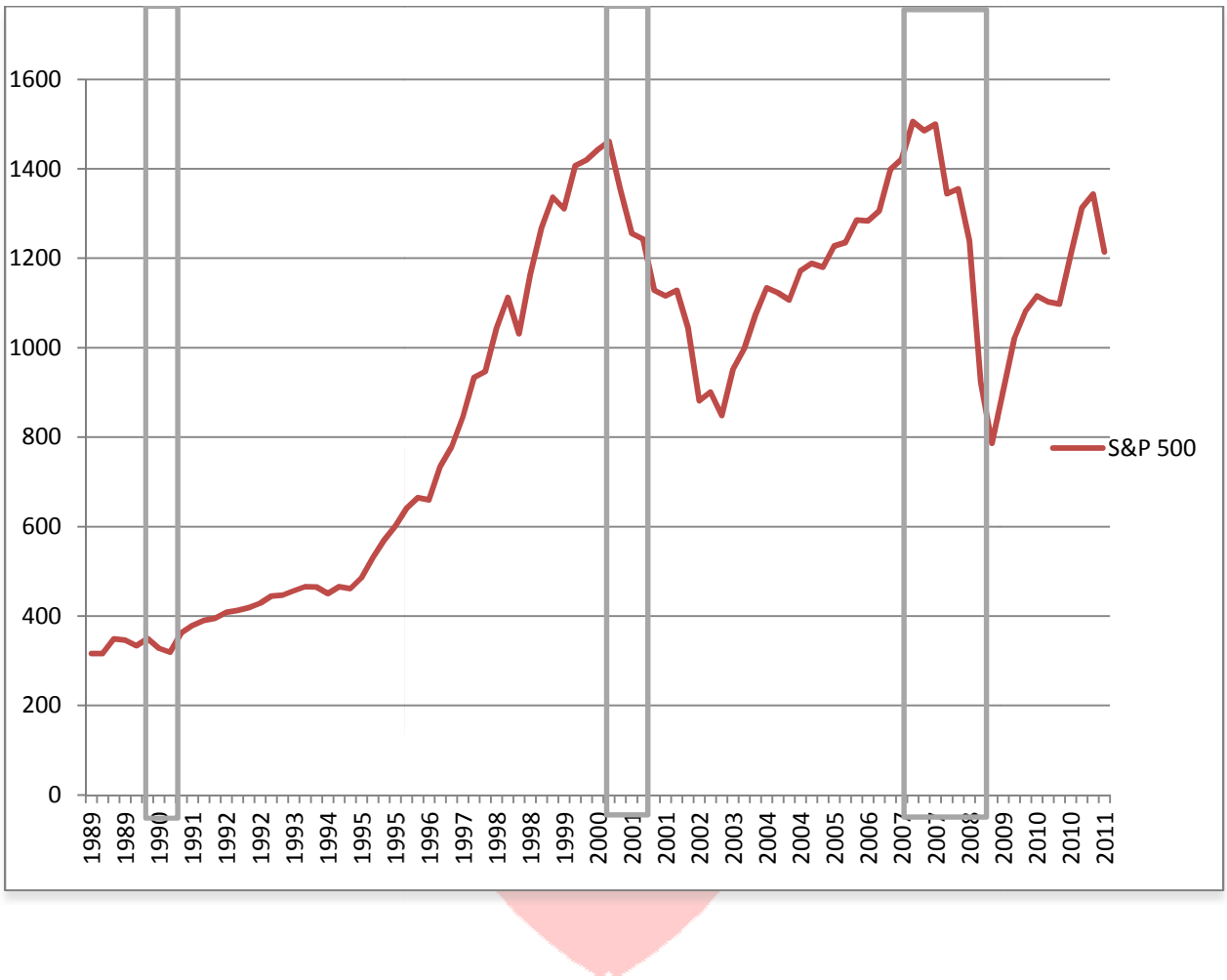

Chart 2.A

These are graphs of the cost of goods sold, sales general and administration cost and net income as a percentage of sales over the eighty-three quarters from 1991 thru the third quarter of 2011. The Poly line is the second degree polynomial graph of those various data points.

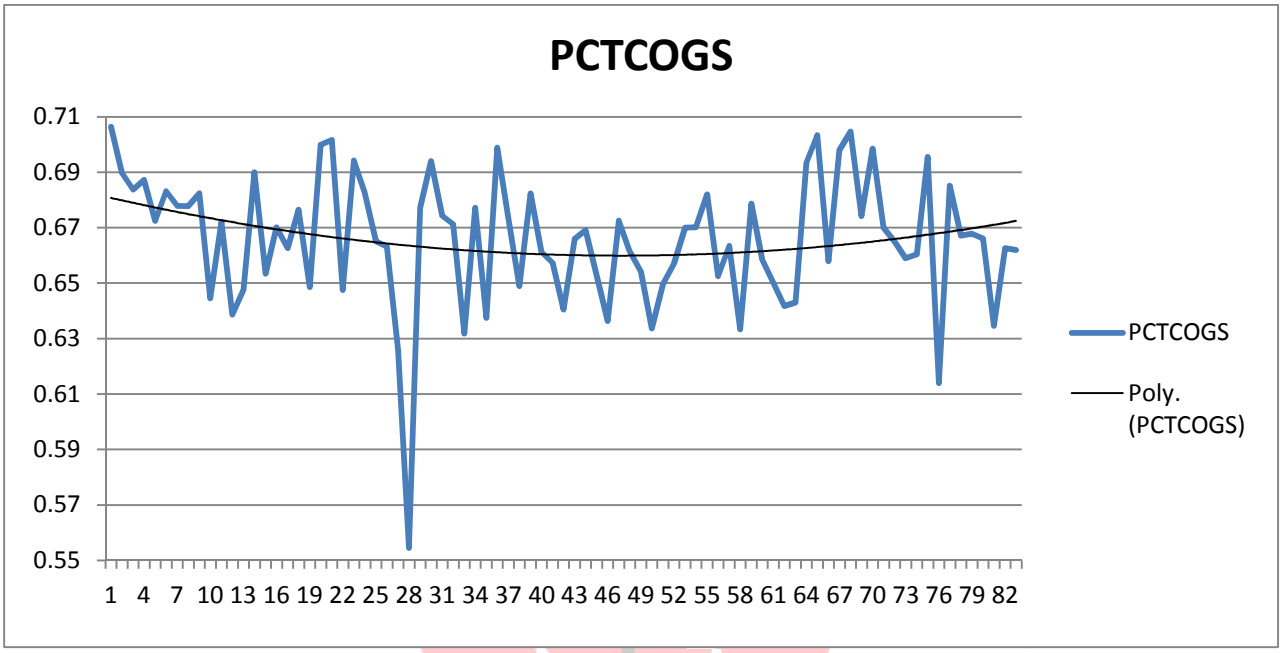

Chart 2.B

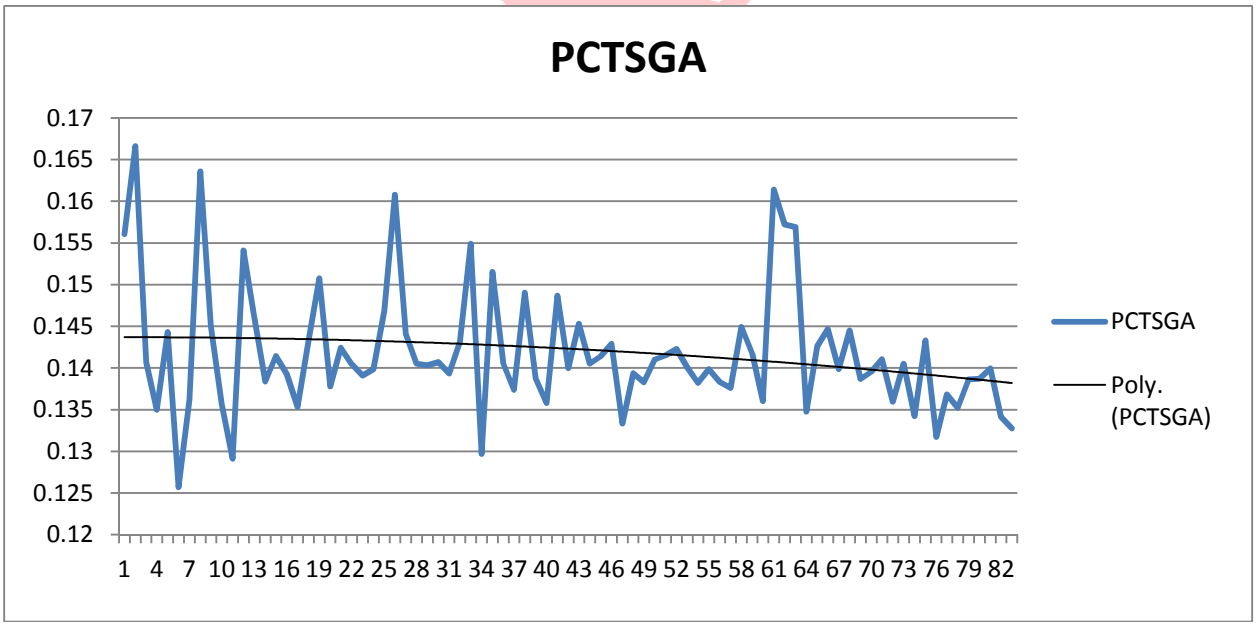

Chart 2.C