

PREDICTING EARNINGS USING COST ACCOUNTS RATIOS: EVIDENCE FROM MANUFACTURING LISTED FIRMS

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ABSTRACT: In the research fields of earnings forecast and the behavior of cost accounts there are many studies that indicate factors that affect earnings and factors that are affected by the cost accounts.

Earnings affected by many factors as investments, cash flows, ROI, cost of capital, size, and others. Also in the area of earnings management crucial factors that affect earnings are inventories, accounts receivable, accounts payable, depreciation expense, accrued liabilities and others.

Recent research in cost accounting field addresses the stickiness of CGA cost as an important factor that may be affect earnings or stock return in all industries except financial service industry. The stickiness of cost has investigated mostly in SGA cost because the manufacturing cost, inventory and cost of goods sold, change proportionately with activity levels that it means that are mostly variable factors.

This empirical study investigates the impact of manufactory cost and SGA to operating income in manufacturing industry, using data from 2.128 listed firms, separated in three sectors according to sales level.

The findings show that manufacturing cost and SGA cost affects the operating income differently in the three levels. This result disclosures the need for further investigation in separated industries, in different countries and finally to find a stable forecasting model using the cost accounts.

Keywords: Earnings Predictability, Cost Structure, SG&A, Manufacturing Cost, Cost of Goods Sold

JEL Codes: M40, G30

Introduction

The main purpose of research, generally, is undoubtedly the best use of available data in order to produce useful and meaningful information. In case that the research is done for a specific purpose, the main objective is the production of forecasts and possibly creating predictive module.

In the area of Management Accounting and Financial Management specifically, the available data are mainly provided by the published financial statements and the main goal of researchers is to process the data to predict stock returns and earnings.

The predictive of stock returns is the mayor part of researches because the interest of investors is higher than the interest for the company's earnings. In theory the earnings and returns are in proportion. But everyone knows that this is not always true. And definitely it is not happen in periods of economic and financial crisis.

The most researches in financial accounting literature, examine the relation between firms' values, stock prices or earnings and accounting variables. The accounting variables provided from Accounting Statements are a lot, very important and the most of them affect stock returns and earnings. Most of the studies assume stock returns can be represented as a linear combination of the unexpected component of earnings and other accounting variables, without consideration of precisely what those variables might signal about the behavior of the firm or its markets, or how the interpretation of those variables might be influenced by the mosaic of other information already

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available. As a result, it is sometimes difficult to interpret the result of the studies. In particular, it is difficult to draw implication for what can be learned from financial statement.

In past decade in literature there are many researches in which the researchers investigate the relations of cost behavior and predictability of earnings. Earnings are the result, of the most important management decision, and simply is the result of difference between sells revenue and cost.

The relevance of cost information for management decision making has been a central issue in cost accounting for more than a century. The relation between sells, cost and earnings examined by fundamental analysis and the result of these relations indentified from the traditional cost accounting systems (TCS), but is very clear that the TCS have often failed to provide relevant information for management decision making. And for that reason a number of alternative systems have been proposed to meet this need. That is the drying to solve the problem

In the international literature and especially in the analysis of accounting information, the behavior of costs is a matter for intense investigation.

Fundamental analysis as discussed in textbooks identifies business costs into fixed and variable. These costs differ in the characteristics in proportion with many factors as the type of business, the size of the firm and the size of the market where it operates, the timing, and more. Many professionals and the most researchers know that a managerial decision is more proportional to cost behavior and cost structure than all other factors.

From the beginning of last decade Cooper and Kaplan postulated and Anderson, Banker and Janakiraman confirmed the “Sticky” cost hypothesis, beginning a rapidly growing literature attributes the short-run asymmetric cost response to activity change (i.e., sticky cost) as resulting from short-run managerial choices.

All that investigates try to find predicting model for helping managers to take the right decisions. That is not an easy work and that due to difficulties from fixity and stickiness of a part of costs.

With this research I investigate the relations between the various parts of costs with earnings and this investigate is a part of a complex investigation for finding a stable, predictive earnings, model with cost accounts. In particular investigate the different effect of manufacturing cost and of SGA cost to the earnings with Panel data Analysis.

Literature Review

To understand about the difficulties to make decisions using cost information we present various researches about the information may a manager use. First of all we may note that in the most researches the researchers use data from a number of firms from various industries and for that reason they use only the Selling and General Administrative expenses (SGA).

Boyd[†] and Cox[†] (2002) in the conclusion of their research refer that for a cost accounting system to provide information for optimal decisions, it must (1) be aware of production constraints and (2) not use allocated cost. The cost allocation

Bernard and Noel, (1991) in their research examined the relationship between current inventory disclosures and future sales, profit margin and earnings. Their analysis indicated that inventory disclosure can improve predictions of future sales and earnings, beyond the degree of accuracy achievable based on past sales and earnings alone. They used data from 8 industries with 15 to 32 firms per industry. The seven industries were manufacturers and the eight was general merchandise retailer.

Anderson, Banker and Janakiraman (2003), investigated the “stickiness of cost with data from 7.629 firms for 20 years and they find that the SGA cost increase 0,55% per 1% increase in sales but decrease only 0,35% per 1% decrease in sales. This different define, in cost accounting literature, the stickiness of the cost. This finding contrast the basic theory of cost behavior in which

the budgeted cost should be flexed symmetrically for both positive and negative differences between the actual and initial budget quantity.

Using a sample of US, UK, French, and German firms, we find that operating costs are sticky in response to changes in revenues; operating costs increase, on average, by around 0.97% per 1% increase in revenues, but decrease by only 0.91% per 1% decrease in revenues. Costs of French and German firms are more sticky than costs of UK and US firms; we conjecture that this result is attributable to differences in systems of corporate governance and managerial oversight. Costs tend to be less sticky over longer time-horizons and when firms sustain larger drops in revenue. Firm-specific and industry characteristics also impact on levels of cost stickiness.

Anderson, Banker, Huang and Janakiraman (2007) estimated an earnings prediction model using Sales and Selling and General Administrative expenses (SGA) and find that future earnings are positively related to changes in the SGA cost ratio in periods when revenue declines, inconsistent with traditional interpretation of SGA cost changes. Also they find that abnormal positive returns may be earned on portfolios formed by going long on firms with high increases in the SGA cost ratio (and short on firms with low increases in the SGA cost ratio) on revenue declining periods. They used data for 23 years for 1,000 firms from all industries except financial services industry.

Anderson and Lanen (2007) with their research they illustrate the fragility of empirical results related to the characterization of SGA costs as sticky. Although they find weak evidence consistent with sticky SGA costs, the results are quite sensitive to assumptions about what managerial behavior is implied by the sticky cost hypothesis. Specifically, if they constrain their inquiry to cases in which SGA changes move in the same direction as sales activity, as implied by the theory of sticky cost behavior, they find only limited evidence of sticky cost.

Balakrishnan, Petersen and Soderstrom (2004) explore the "sticky" cost hypothesis investigating data from health industry. They utilized data for 1,898 clinic months from 49 therapy clinics and they used both the number of therapist hours staffed and they paid to therapist as dependent variables in testing the hypothesized relations. They find that the response to a decline in activity levels is smaller (larger) than that for an increase only when capacity is currently strained (in excess) and they suppose that capacity is an important omitted variable in cross-sectional studies of cost behavior.

Weiss (2010) in his study examines how firms' asymmetric cost behavior influences analysts' earnings forecasts, primarily the accuracy of analysts' consensus earnings forecasts. Results indicate that firms with stickier cost behavior have less accurate analysts' earnings forecasts than firms with less sticky cost behavior. Furthermore, findings show that cost stickiness influences analysts' coverage priorities and investors appear to consider sticky cost behavior in forming their beliefs about the value of firms.

Balakrishnan, Labro and Soderstrom (2011), show that past decisions on cost structure affecting the interpretation of estimates from the standard specification used in literature. With their analysis indicate that both long and short term choices affect the asymmetry in cost response to increase and decrease and they propose to researchers to account for the effects of both choices (and their interactions) when designing studies that link response coefficients to managerial choices.

Banker and Chen (2006), propose an earnings forecast model decomposing earnings into components that reflect variability of cost with sales revenue and (2) stickiness in costs with sales declines. They compare their results with the results of other two similar models and they find that their model is more reliable. Finally their study documents that the simple cost variability and cost stickiness model has predictive content for the analysis of future profitability. They used data for 11 years from 8,771 firms.

Calleja K., Steliaros M., and Thomas D. C., (2006) in their study using a sample of US, UK, French, and German firms, they find that operating costs are sticky in response to changes in

revenues; operating costs increase, on average, by around 0.97% per 1% increase in revenues, but decrease by only 0.91% per 1% decrease in revenues. Costs of French and German firms are more sticky than costs of UK and US firms; they conjecture that this result is attributable to differences in systems of corporate governance and managerial oversight. Costs tend to be less sticky over longer time-horizons and when firms sustain larger drops in revenue. Firm-specific and industry characteristics also impact on levels of cost stickiness.

Cannon (2011) with his research used data from United States Air Transportation industry and the empirical evidence show that sticky cost are also associated with capacity and output selling price changes as management matches capacity and sales volume. Specifically, he concluded that sticky costs can arise when the marginal cost of adding capacity as demand grows is greater than the marginal benefit from reducing capacity as demand falls.

Apergis, Johnson and Sorros (2011) investigated the role of manufacturing cost as opposed to the other cost components in determining the firms' profitability and for the case of US manufacturing firms using data from 1.287 firms. Through the methodology of panel co integration and causality testing, the empirical findings show that the manufacturing cost has a significant informational content value for firms' profitability.

Finally Banker, Byzalov[†] and Dujowich[†] (2011) with their research about theory and evidence of sticky cost behavior they note that the empirical evidence lends strong support to the notion that costs arise as a result of deliberate resource commitment decisions made by forward-looking managers, and is inconsistent with the traditional textbook model of cost behavior.

Data and Methodological Issues

The annual data used in this research obtained from Wordscope data base, and they are the Operating Income (OI), a proxy for firms' profitability, the Inventories (INV), the Manufacturing Cost (MC) and Selling and General Administrative Expenses (SGA). The MC became from the following computation:

$$\text{Cost of Goods Sold}_t + \text{Inventory}_t - \text{Inventory}_{t-1}$$

To accept this computation, we suppose, that the inventory amount from merchandise activities of those manufacturing firms are not significant.

The data obtained from 2.128 firms listed on 14 European (Belgium, Danmark, England, Finland, France, Germany, Greek, Ireland, Italy, Netherland, Poland, Portugal, Spain and Sweden) exchanges, spanning the period 2000-2010 on a fiscal year basis. The selection procedure resulted in a sample of 23.408 observations. All firms are from manufacturing industry.

Table 1 presents the sectors from our sample comes from.

Table no. 1.

The sector from the sample	
Basic Materials	262
Consumer Goods	261
Industrial	951
oil&gas	100
Technology	458
Telecom	53
Utilities	43
Total Companies	2.128

The main hypothesis for this research is that the changes (increases or decreases) in sells are not symmetric with the changes in costs (increases or decreases) and are not also symmetric between the classified costs, the cost of goods sold or the manufacturing cost and the SGA. The

impact of each one from the classified costs to earnings must be different and also must be different depending on the amount of sales.

In this hypothesis we estimate that the amount of sells is a main impact factor and for that reason we split firms of our sample in three segments depends on Sales Revenues. In the first (small) segment included 902 firms with total average sell revenue from \$1 to \$49.9 million. The second segment (medium) include 650 firms with total average sell revenue amount from \$50 to \$300 million and the third segment include 576 firms with total average sell revenue from \$300 to \$222.000 which is the revenue of the biggest one.

The logical argument for this hypothesis is that the SGA are more fixed than variable in contrast with the manufacturing cost and the cost of goods sold which is more variable than fixed. Also the SGA expenses are higher in bigger firms because includes expenses like advertising which are proportional with the growth.

For the above reasons the focus of this empirical analysis is the impact of the annual changes of Manufacturing Cost (dMC) and Selling and General Administrative Expenses (dSGA), which are the independent variables, on manufacturing firm’s annual changes on Operating Income (dOI) that is the dependent variable.

First I examined the accounting variables for correlation and dependence
In the Tables 2 and 3 present basic data for the accounting variables that I examined

Table no.2

Correlation Matrix

	dMC	dSGA
dMC	1.000000	0.119906
dSGA	0.119906	1.000000

From the above table we see that the variables dSGA και dMC are not correlated so I can use them as independent variables in a model, having no problem of collinearity.

Table no. 3

Descriptive Statistics

	dOI	dSGA	dMC
Mean	0.270800	-0.152761	-0.119937
Median	0.001357	-0.000911	0.003344
Maximum	1,049.153	509.4728	84,688.06
Minimum	-509.3424	-515.9286	-84,687.54
Std. Dev.	15.16120	10.37374	1,246.038
Skewness	38.81637	-9.185861	0.000904
Kurtosis	2838.398	1647.717	4,611.187
Jarque-Bera	3.10E+09	1.04E+09	8.19E+09
Probability	0.000000	0.000000	0.000000
Sum	2,506.797	-1,414.105	-1,110.253
Sum Sq. Dev.	2127602.	996078.8	1.44E+10
Observations	9,257	9,257	9,257

From the above table we see that (dOI) is skewed right, (dSGA) is skewed left and (dMC) is symmetric. Additionally the kurtosis for all data is very large showing that the distribution for each variable is not standard normal. From the p-value of the Jarque – Bera test we reject the null hypothesis of normal distribution for each variable.

My benchmark models planned to be tested in this study are expressed as:

$$dOI_{it} = b_0 + b_1 dMC_{it} + b_2 dSGA_{it}$$

where for each firm i:

dOI_{it}: Change of Operating Income during 31/12/t – 31/12/t-1

dMC_{it}: Change of Manufacturing Cost during 31/12/t – 31/12/t-1

dSGA_{it}: Change of of Sales and General Administrative Costs during 31/12/t – 31/12/t-1

According to this model the Change of Operating Income (dOI) of a firm during a period can be expressed as a function of Change of Manufacturing Cost (dMC) and Change of Sales and General Administrative Costs (dSGA) in this way:

I split the firms of the above mentioned segments and I run the model for each category.

First I test the variables for unit root. If two variables are not stationary there is a big chance that a regression analysis with these variables will lead to invalid results. The results will indicate material correlation between these variables even if the variables are absolutely independent each other. This is referred as spurious regression and was presented by Granger and Newbold in 1974. In order to examine if the variables of our analysis are stationary or not unit root test must be executed.

There is a variety of Panel Unit Root tests which include Levin - Lin - Chu (2002) and Fisher - Augmented Dickey-Fuller Unit Root Test and Fisher - Phillips - Perron Unit Root Tests (proposed by Maddala and Wu 1999 and Choi 2001) among others.

The Levin - Lin - Chu test allows heterogeneity of individual deterministic effects and heterogeneous first order autoregressive parameters. A procedure is developed that uses t – statistics of the estimator to evaluate the hypothesis that each time series is stationary.

The Fisher - ADF and Fisher - PP unit root tests offer a strategy that seems to overcome the limitations of both LLC and Im et al. tests. Maddala, Wu and Choi suggest a non – parametric test, which is based on a combination of the p- values of the t – statistics for a unit root in each cross sectional unit (ADF test). More specifically, the testing approach has the advantage of allowing for as much heterogeneity across units as possible. Under the hypothesis that the test statistics are continuous, the significance of p-values are independent in a uniform manner. The advantage of this test is that it does not require an infinitive number of groups to be valid, i.e., we do not have to assume that all groups must have the same type of non – stochastic components, its critical values are not sensitive to the choice of lag lengths in the ADF regressions and finally it does not have to assume that none of the groups have a unit root under the alternative hypothesis.

Next table present the unit root tests for the variables.

Table no. 4

Unit Root Test			
Unit root test	Variables	Statistic	Probability
Levin, Lin & Chu	dMC	-2,814.01	0
	dSGA	-3,391.09	0
	dOI	-576.20	0
Fisher ADF	dMC	3,678.95	0
	dSGA	1,983.31	0
	dOI	2,299.99	0
Fisher PP	dMC	4,605,77	0
	dSGA	2,351.29	0
	dOI	2,864.53	0

According the results presented in the above tables no variable have unit root. (In all tests for each variable the p – value is below 5% so we reject the null hypothesis of existence of unit root).

Next we go on with our analysis. From Table 3 (Descriptive Statistics) we see that our variables are not normally distributed. Also we use data for a time period of 11 years that is not very long. For these reasons we choose to use for our analysis the GMM (Generalized Method of Moments) whicheave been proposed by (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). This method has become increasingly popular in applied economic research using panel data. The results from the analysis of our data are being presented at following tables:

Table no. 5

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Small Companies	dSGA	-1.010343	0.002590	-390.1265	0.0000
	dMC	-0.932934	0.052419	-17.79775	0.0000
	C	-0.009101	0.023208	-0.392142	0.6950
	Adjusted R-squared	0.989172	Durbin-Watson stat	2.43429	
Medium Companies	dSGA	0.013389	0.001470	9.107249	0.0000
	dMC	-0.934638	0.007449	-125.4796	0.0000
	C	0.020630	0.020241	1.019201	0.3082
	Adjusted R-squared	0.976031	Durbin-Watson stat	2.167495	
Large Companies	dSGA	-3.67E-05	4.99E-06	-7.349071	0.0000
	dMC	-0.989204	0.002080	-475.6540	0.0000
	C	-0.005660	0.005582	-1.014042	0.3107
	Adjusted R-squared	0.998442	Durbin-Watson stat	1.927996	
All Companies	dSGA	1.03E-05	7.06E-06	1.452630	0.1464
	dMC	-1.011226	0.001087	-930.2131	0.0000
	C	-0.006928	0.009902	-0.699675	0.4842
	Adjusted R-squared	0.995516	Durbin-Watson stat	2.265781	

Table no. 6

Summarizes the results

dOI_{it} = b0 + b1 dMC_{it} + b2 dSGA_{it} +e					
GROUP	b₀	dMC_{it}	dSGA_{it}	DW	R²Adj.
Small Companies	-0.009 (-0.39)	-0.93 (-17.80) ***	-1.01 (-390.12)***	2.43	0.99
Medium Companies	0.02 (-0.28)	0.013 (-0.05) ***	-0.93 (-1.8) ***	2.16	0.98
Large Companies	-0.005 (-1.01)	0.00 (-7.34) ***	-0.98 (475.65) ***	1.92	0.99
All Companies	-0.0069 (0.7)	0.00 (1.45)	-1.01 (-930.21) ***	2.26	0.99

$dOI_i = (\text{Operating Income} / \text{Sales})_{it} - (\text{Operating Income} / \text{Sales})_{it-1}$
$dMC_{it} = (\text{ManufacturingCost} / \text{Sales})_{it} - (\text{ManufacturingCost} / \text{Sales})_{it-1}$
$dSGA_{it} = (\text{SGA} / \text{Sales})_{it} - (\text{SGA} / \text{Sales})_{it-1}$
***=Statistically significant at 1% level Values in parenthesis coefficients are t-statistics

According the above table we can infer the followings

For small companies the coefficients of both dSGA and dMC are statistically significant and have almost the same value. So we can say that the two variables affect dOI in the same degree.

For medium companies the coefficients of both dSGA and dMC are statistically significant but the value of the coefficient of dMC is immaterial compared with this of dOI. So we can say that only dSGA affects dOI.

For large companies the coefficients of both dSGA and dMC are statistically significant but the value of the coefficient of dMC is immaterial compared with this of dOI. So we can say that only dSGA affects dOI.

Finally entire sample of all companies only the coefficient of dSGA is statistically significant. So we can say that only dSGA affects dOI.

Conclusion and remarks

In this paper I investigate the role of Manufacturing Cost and the role of Selling, General and Administrative expenses to predict earnings using the yearly changes of the factors. The goal of this paper is that examine separately the two kinds of costs in base of estimation that each one affect differently the earnings, depending of many other factors as size, industry e.t. The findings only for manufacturing firms show that there are different effects on earnings from Manufacturing Cost than Selling and General Administrative expenses depending of sells revenue amount.

Especially in firms with low shells revenue amount, both, dSGA and dMC affect earnings in the same degree.

In firms with medium shells revenue amount, the dSGA affects dOI more than dMC.

In firms with high sells revenue amount the dSGA affects mostly the earnings.

Examining all the firms' only dSGA affects earnings.

Given that the number of firms in small and medium segment are 80% of the total firms my research support the professions' contention that reported total expenses do not provide a complete summary of accounting information

Moreover, this particular item is equally useful to those who make investment or any other decisions.

For further research in this area important would be the investigation of the role of SGA and MC relation separate in various industries and in different countries.

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