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Performance Measurement and Shareholder Value Creation in Indian Computer Software Industry: An Empirical Analysis

Prof. (Dr.) Siddhartha Sankar Saha
Senior Faculty, Department of Commerce (Accounting & Finance), St. Xavier's College (Autonomous), Kolkata, & Guest Faculty, Department of Commerce (MBA- Finance), University of Calcutta, West Bengal, India
Postal Address: 245/1 Dum Dum Road, Santosh Apartment, Flat No. 305, 3rd Floor, Kolkata – 700074, Dum Dum, West Bengal, India
Email id: drsiddharthasxc@gmail.com

Mitrendu Narayan Roy
Research Scholar, Department of Commerce, University of Calcutta & Assistant Professor, Goenka College of Commerce and Business Administration, Kolkata, India
Postal Address: Flat No. 4B (Block B), 3rd Floor, Tanisha Enclave, 66, Sarat Bose Road, Rabindranagar, Dum Dum, Kolkata – 700065, West Bengal, India
Email id: mitrenduroy@gmail.com

Abstract
The paper empirically analyses business performance of Indian computer software industry over the years 2003-04 to 2012-13 with the help of Return of Investment (ROI) and Economic Value Added (EVA) of select 10 companies in this industry. A comparative analysis of ROI and EVA reflected in these companies is made using some statistical tools like average, Standard Deviation, Maximum and Minimum values and Coefficient of Variation. It is observed that Tata Consultancy Services (TCS), Infosys and Wipro are the top companies in this industry in terms of their ROI and EVA. One way ANOVA conducted to analyse the significant difference among select companies in terms of their ROI and EVA shows that select companies are significantly different. Pearson's Correlation Coefficient (r) between ROI and EVA depicts a strong positive correlation between these two business performance indicators. Significance of this correlation is then tested using t test. The result suggests that the correlation between ROI and EVA is not significant in this industry. Impact of EVA and select economic variables on ROI is analysed with the help of Multiple Regression Analysis. Standardised regression coefficients for each predictor variables estimated based on Ordinary Least Square Method indicate the relationship between each predictor variable and ROI. Significance of regression coefficients are tested using t test. It is observed that variables like Net Operating Profit after Tax, Capital Employed, Net Sales, etc. significantly influence ROI in this industry. Adjusted Coefficient of Multiple Determinations (R^2) shows a strong association between ROI and its predictor variables. Finally, the model perfectly fits the data according to one way ANOVA result.
Keywords: Return on Investment, Economic Value Added, Indian Computer Software Industry, Pearson's Correlation Coefficient, t test, one way Analysis of Variance, Multiple Linear Regression Analysis
JEL Codes: M490, O160

1. Introduction

Performance of corporate enterprises was traditionally measured with the help of conventional performance measurement tools like Return on Investment (ROI); Return on Equity (ROE); Operating Profit Margin (OPM), etc. All these measures reflect company's performance subject to an underlying aspect, while a comprehensive picture is not reflected by any one of them. This lacuna basically led to evolution of value based measurement technique. Economic Value Added (EVA) is the most prominent and widely accepted value based measurement technique where company's performance is measured in terms of their ability to create value for their shareholders (Saha, 2005). Over the years, it has been realised that EVA is not a computational technique; rather it is a corporate culture. In 1991, Stern & Stewart Co. endorsed the idea of EVA in the corporate arena. Since then a number of corporate adopting this techniques has increased worldwide (Khan & Sinha, 2014). In the current study, let us have an insight into one traditional (ROI) and another value based measure (EVA) of corporate performance.

2. Conceptual Issues

2.1 Return on Investment (ROI)

Performance of a corporate enterprise is measured in terms of their ability to earn to meet the requirements of different stakeholders. Company's earning is measured by their accounting profit, while this is not a conclusive measure of business performance as accounting profit depends upon several factors like revenue, assets, or invested capital. Hence, traditionally profit represented in terms of revenues, assets, or capital was considered to

be the measures of business performance. ROI as one of the important traditional performance measurement tool used by business enterprise, measures the profitability of the business in terms of capital invested. It indicates how well a company is utilising their invested capital.

Mathematically, *ROI = Net Operating Profit after Tax (NOPAT)/ Invested Capital*

Where, NOPAT is the profit after tax derived from company's operation before charging finance cost and other non-cash expenses and Invested capital or capital employed is the total asset net of non interest bearing liabilities. Though ROI is a comprehensive tool to measure profitability of the company in terms of total invested capital, it suffers from certain limitations as under:

- The profit component of ROI is based on current values of revenues and expenses in Profit and Loss Account. But the asset component is measured in historical costs. It creates an anomaly in measuring business performance.
- Calculation of ROI does not consider cost of equity. Selection of project ignoring cost of equity may lead to destruction of shareholders' value.
- Performance of corporate enterprise is a result of wide range of managerial decision including strategic planning, capital allocation, pricing acquisition and divesture, even day to day operating decisions. These decisions can be broadly classified into three groups: investment decision, dividend decision and financing decision. Financing decision of management is not reflected in ROI.

However, it is observed that maximisation of ROI does not always ensure that the company is creating value for their shareholders. This demands the development of value based measurement technique.

2.2 Economic Value Added (EVA)

With the passage of time, it is felt that traditional measures of business performance are not able to explain true economic value of the company. It does not consider the expectations of shareholders from the business as well. Therefore, a new approach of measuring business performance came into existence. In this approach, corporate success is measured in terms of the ability of the company to create value for their shareholders. Several value based measures like EVA, Cash Flow Return on Investment (CFROI), Cash Value Added (CVA), Shareholder Value Added (SVA), Adjusted Economic Value Added (AEVA), Refined Economic Value Added (REVA), Market Value Added (MVA) etc. are currently in force. Out of them, EVA is the most accepted and widely popular measure of business performance. It is used by the companies whose main objective is to measure the shareholders' wealth. Under this mechanism, true economic value of the company is derived from accounting profit after adjusting for several accounting anomalies (Stewart, 1994).

Mathematically, EVA = [NOPAT – Capital Charge]

Where, Capital Charge = Weighted Average Cost of Capital (WACC) × Invested Capital

WACC is obtained by adding cost of each source of capital after weighing them with their respective proportion in the total capital. Capital used while calculating EVA is not book value of capital. Rather it is an approximation of economic book value of all cash invested in the business. It is the net asset of the business subject to adjustment for marketable securities, present value of non-capitalised leases and certain equity equivalent reserves. There are mainly two categories in this capital, namely Equity and Debt. Their proportion in the total capital can be easily computed. But, we need to find out their individual costs in order to calculate WACC. Cost of Equity (K_e) is calculated based on Capital Asset Pricing Model (CAPM) as follows:

$\Rightarrow K_e = R_f + (R_m - R_f) \times \beta$

- *Where, R_f = Risk free rate of return*
- *R_m = Rate of return of the market*
- *& β = Volatility of the return of the stock against market volatility*

On the other hand, Cost of Debt (K_d) is mathematically represented as (Total interest/ Total borrowings) (1-tax rate) ×100

Though EVA is a pervasive tool for measuring business performance, it suffers from certain limitation of ROI as well. Apart from that, calculation of NOPAT or WACC may also become a difficult and subjective phenomenon in case of multi-business or multi-product companies. Calculation of K_e using CAPM framework may not always give appropriate result in a volatile economic environment. However, when the EVA system is implemented effectively, it links strategic planning with operational effectiveness and facilitates communication among different department. Value based compensation system provides additional incentive to the management to work towards attaining high shareholders' wealth. Therefore, despite its inherent limitations, proponents EVA mechanism claim it to be more appropriate measure of business performance than traditional accounting based measures like ROI (Saha, 2005).

3. A Brief Idea on Indian Computer Software Industry

Indian Computer Software industry led by Information Technology (IT) or IT Enabled Services (ITES) sectors

contribute substantially to Gross Domestic Product (GDP), employment and exports of Indian economy. There was a remarkable development in this industry in the post-reform era when e-transactions, free movement of employees between countries, foreign investment in this sector were liberalized. Currently 7.5% of the Gross Domestic Product (GDP) comes from this sector. By the end of 2012, the aggregated revenue of this sector crossed $100 billion benchmark. With unprecedented growth in export of products and services, this industry is making their presence felt in other developed countries of the world. This industry also plays an important role in generating employment. By the end of 2012, direct employment in this industry reached 2.8 million. Tata Consultancy Services (TCS), Wipro, Infosys, HCL Technologies are some of the most important companies in this industry (NASSCOM, 2012). Scandal at Satyam Computer Services, global economic meltdown reduced the growth of this industry to some extent, while the industry has now recovered from that situation reflecting better financial performance in this industry. Before 1990, companies in this industry measured their financial performance using traditional tools as well. However, as soon as the concept of EVA came into existence, this industry started applying the same. Infosys Ltd. was the first company to consider EVA in their Annual Report (Chauhan & Virani, 2013). Following this move by Infosys, other companies like TCS and Wipro also started measuring their performance using the same technique.

In this backdrop, the study attempts to analyse performance of select companies in Indian computer software industry based on their ROI and EVA and establish a relationship between ROI and EVA as performance measurement tool with special reference to Indian computer software industry.

4. Review of Literature

4.1 Concept of EVA

The concept of EVA is relatively new. But, in some of the early literatures [Hamilton (1777) and Marshall (1890)] it is observed that EVA is an extension of the age old concept of residual income calculated by deducting current interest on invested capital from net gains. Stewart (1991) for the first time named this concept as EVA. Feltham et. al. (2004) and O'Hanlon and Peasnell (1998) identified the difference between EVA and accounting profit and established it as an important tool for measuring shareholder value.

4.2 EVA and ROI

A comparison between traditional measures of performance (e.g. ROI) and modern value based measures (e.g. EVA) has received special emphasis in comparatively recent studies [Stewart (1994)]. Lehn & Makhija (1996) in their study proved this point based on an empirical analysis of EVA of 241 companies during the period of 1987-96. Banerjee (1999) in his empirical study showed that EVA is a superior measure of business performance than traditional measures like ROI. One of the important studies in this respect is made by Anand, Garg and Arora (1999). Here, the authors comparatively analyse the efficacy of EVA with that of ROI with special reference to Infosys Ltd. In all these literatures, it was observed that traditional measures sometimes depict a rosy picture of company's performance. On the other hand, EVA will indicate whether the company had been able to create wealth for their shareholders.

4.3 EVA and MVA

Relationship between EVA and other value based measures also gained importance in few studies [Saxena & Saini (2001)]. One of the most important value based measure is MVA. Rakshit (2006) also conducted similar studies with regard to specific industries. It was observed that a strong positive relationship exists between EVA and MVA. Panigrahi (2005) in his study rated EVA as a more useful performance measure than MVA. Variation in shareholders' wealth is also best explained by EVA [Malik (2004)].

4.4 Problems associated with EVA

Though EVA is considered to be an important tool for measuring corporate success, some authors [Kramer & Pushner (1997)] do not believe the same. Several problems associated with calculating EVA is discussed by Pattaanayak & Mukherjee (1998). Biddle, Bowen & Wallace (1998), Kyriazis & Christos (2007) and Palliam (2006) analysed the relationship between EVA and stock returns. Based on their select samples, all the authors have concluded that EVA does not significantly influence stock return.

4.5 Industry Study

A study conducted by KPMG (1998) with Business Standard (BS) 1000 companies during the period 1996-97 showed majority of the companies were creating value for their shareholders during the study period. Similar studies were conducted by Singh & Garg (2004). In their studies, it was observed that companies in select industries are successful in creating positive values for their shareholders. However, according to Ghanbari & Sarlak (2006) the situation is different for automobile industry. Some empirical researches [Singh (2005)] measured the performance of banks based on EVA technique.

4.6 Research Gap

The gaps identified in existing literatures are pointed out as follows:

- Performance measurement and shareholder value creation in Indian computer software industry has not been taken up for research so far;
- Studies establishing the relationship between EVA and MVA is abundant, while none of the studies, reviewed so far had established a relationship between ROI and EVA;
- None of studies have taken an attempt to identify the significant determinants of ROI in a company.

5. Objectives of the Study

The following are the objectives of the present study:

(i) To comparatively analyse the performance of select companies in Indian computer software industry based on their calculated ROI *(Refer to Table 1, Section VII (i)];*
(ii) To comparatively analyse the shareholder value creation by select companies in Indian computer software industry based on their calculated EVA *(Refer to Table 2, Section VII (ii)]*
(iii) To empirically analyse whether significant difference exist among select companies in terms of their ROI and EVA *[Refer to Table 3, Section VII (iii)]*
(iv) To study analytically the relationship between ROI and EVA in Indian computer software industry on the basis of our select sample *[Section VII (iv)];*
(v) To statistically analyse impact of select measures on ROI in this industry *[Table 4, Section VII (v)];*
(vi) To identify significant determinants of ROI in this industry *[Table 5, Section VII (v)];*
(vii) To measure strength of association between ROI and its explaining variables;
(viii) To measure the significance of such strength of association; and
(ix) To draw a suitable conclusion of the study.

6. Research Methodology

The study is exploratory in nature. For the purpose of measuring performance and shareholder value creation by Indian computer software industry, top 10 companies in this industry has been selected based on based on their market capitalisation dated 14th November, 2013 (moneycontrol.com). They are listed as follows:

(i) Tata Consultancy Services Limited (TCS);
(ii) Infosys Limited;
(iii) Wipro Limited;
(iv) HCL Technologies;
(v) Tech Mahindra Limited;
(vi) Oracle Financial Services Software Limited;
(vii) MphasiS;
(viii) MindTree;
(ix) Hexaware Technologies; and
(x) Persistent Systems Limited.

ROI and EVA of these companies have been considered to be the measure of performance and shareholder value creation. Hence, data on ROI and EVA for these companies during the period 2003-04 to 2012-13 are collected from 'Capitaline Plus' Database. Apart from ROI and EVA, data on Market Value Added (MVA), Dividend Paid (DP), Earnings per Share (EPS), Return on Net Worth (RONW), Net Operating Profit after Tax (NOPAT), Debt Equity Ratio (DER), Current Ratio (CR), Price Earnings Ratio (PER), Interest Coverage Ratio (ICR), Profit before Interest Depreciation and Tax Margin (PBIDTM) , Fixed Asset Turnover Ratio (FATOR), Inventory Turnover Ratio (ITOR) , Debtors Turnover Ratio (DTOR), Debtors Velocity (DV), Capital Employed (CE), Net Worth (NW), Market Capitalisation (MC), Net Sales (NS), Other Income (OI), Extraordinary Item (EOI) . Degree of Operating Leverage (DOL), Degree of Financial Leverage (DFL), Net Working Capital (NWC), and Book Value per Unit (BV) for all the select companies during the same period are collected from the same source.

The collected data has been analysed using SPSS 19.0 to fulfil stated objectives. In order to comparatively analyse the performance and shareholder value creation of select companies based on ROI and EVA respectively, their average or mean, standard deviation (SD) [sum of squares of the difference of each observation from mean value], coefficient of variation [CV] [(SD/average) ×100], and minimum and maximum values of the ROIs and EVAs over the period of 10 years is calculated for each companies. Significant difference among the companies in terms of their ROI and EVA are calculated with the help of one way Analysis of Variance (ANOVA). Pearson's Correlation Coefficient (r) and t test is used to analyse interrelationship between ROI and EVA as performance measurement tools. Finally, impact of select variables ROI in Indian computer software industry is analysed using Multiple Linear Regression Analysis based on data on all the financial variables collected for all the select companies during the stated period. Significance of predictor variables is

analysed using t test. Adjusted Coefficient of Multiple Determination (R^2) is used to measure strength of association between dependent and independent variables. Finally, fitness of the Multiple Linear Regression Model is tested using one way ANOVA.

7. Empirical Analysis and Discussion

7.1 Analysis of Inter-Company Business Performance based on ROI (%)

ROI of select companies and descriptive measures for analysing performance of the companies during the period 2003-04 to 2012-13 are presented here:

Table 1. ROI (%) of Select Companies in Indian Computer Software Industry during 2003-04 to 2012-13

ROI (%)										
Year	HCL	Hexaware	Infosys	MindTree	MphasiS	Oracle Financial	Persistent	TCS	Tech Mahindra	Wipro
03-04	12.09	7.39	48.13	3.37	14.72	25.27	39.62	1.46	26.83	30.98
04-05	11.93	18.62	52.5	13.36	10.71	23.63	35.4	109.87	29.96	41.15
05-06	12.89	27.27	45.09	34.01	15.37	22.95	24.98	67.77	44.53	41.01
06-07	21.28	23.7	45.99	27.95	20.93	20.26	25.85	60.69	86.22	39.72
07-08	39.33	14.02	41.52	21.89	24.83	16.56	28.69	52.34	74.91	28.7
08-09	23.52	6.87	42.92	7.8	42.69	23.17	16.3	42	68.22	22.72
09-10	33.69	19.36	37.76	37.81	52.76	19.45	23.82	44.55	30.05	28.41
10-11	24.27	5.74	37.89	21.09	43.23	22.07	20.39	49.86	18.1	23.45
11-12	20.74	29.05	43	29.01	27.76	23.09	23.7	59.29	14.52	23.08
12-13	32.25	35.88	37.48	36.13	20.16	22.06	26.51	53.73	16.61	24.98
Average	23.2	18.79	43.23	23.24	27.32	21.85	26.53	54.16	41	30.42
S.D.	9.544	10.322	4.894	11.959	14.191	2.488	6.793	26.661	26.27	7.546
CV	41.14	54.93	11.32	51.46	51.94	11.39	25.60	49.23	64.07	24.81
Min	11.93	5.74	37.48	3.37	10.71	16.56	16.3	1.46	14.52	22.72
Max	39.33	35.88	52.5	37.81	52.76	25.27	39.62	109.87	86.22	41.15

(Source: Compilation of Secondary Data using SPSS)

Inferences

- During the period of our study, TCS has highest average ROI, followed by Infosys, Tech Mahindra and Wipro. Hexaware Tech exhibits lowest average ROI during this period.
- Risk of earning ROI represented by their S.D is also highest for TCS followed by Tech Mahindra. Risk is considerably low in two other major market players Infosys and Wipro. Hence, it can be inferred that Infosys and Wipro have utilised their capital more efficiently than TCS or Tech Mahindra.
- CV indicates the ability of a company to earn maximum ROI with minimum possible risk. Lower the value of CV, higher a company is able to earn good ROI with less risk. In this respect, Infosys, Oracle Financial and Wipro are performing really well. On the contrary, TCS and Tech Mahindra earning a good ROI are exposed to a great deal of risk.
- The range of maximum and minimum ROI (%) is highest for TCS. It indicates that TCS has most volatile performance during the period under study. A similar trend is observed for Tech Mahindra as well. Acquisition of Satyam does not fit too well with the company's performance resulting in their volatile performance.

7.2 Analysis of Inter-Company Business Performance based on EVA

EVA of select companies along with descriptive measures for analysing performance of the companies during the period 2003-04 to 2012-13 are presented here.

Table 2. EVA of Select Companies in Indian Computer Software Industry during 2003-04 to 2012-13

EVA (Rs. In Crores)										
Year	HCL	Hexaware	Infosys	MindTree	MphasiS	Oracle Financial	Persistent	TCS	Tech Mahindra	Wipro
03-04	117.96	30.72	939.30	10.44	48.62	15.12	26.29	16.34	113.19	725.03
04-05	278.78	20.88	127.94	27.03	24.51	32.33	46.42	-580.53	97.43	275.61
05-06	479.08	22.67	1303.26	74.61	49.77	41.09	60.38	341.15	257.79	750.58
06-07	591.88	-22.66	243.39	-21.00	80.19	-36.69	87.39	865.78	-281.68	725.49
07-08	533.04	-183.13	1755.39	20.51	111.96	33.22	112.52	1086.15	-270.81	862.75
08-09	682.50	10.51	921.90	31.07	-108.72	-35.74	86.24	1024.21	-99.38	733.33
09-10	488.86	11.06	1360.94	43.77	-49.11	-54.26	148.77	3667.14	-15.16	526.45
10-11	311.68	60.90	3159.68	50.90	-5.45	-153.64	31.46	2298.10	56.50	1381.66
11-12	579.36	85.25	2186.60	30.31	83.44	99.56	37.64	3998.89	64.20	1454.39
12-13	852.41	114.64	1717.77	28.14	262.54	-59.15	42.97	3257.03	94.90	1844.78
Average	491.56	15.09	1371.62	29.58	49.77	-11.82	68.01	1597.43	1.70	928.01
S.D.	211.75	80.29	903.21	25.17	99.88	70.91	39.95	1607.03	172.51	479.13
CV	43.08	532.07	65.85	85.09	200.68	-599.92	58.74	100.60	10147.65	51.63
Min	117.96	-183.13	127.94	-21.00	-108.72	-153.64	26.29	-580.53	-281.68	275.61
Max	852.41	114.64	3159.68	74.61	262.54	99.56	148.77	3998.89	257.79	1844.78

(Source: Compilation of Secondary Data using SPSS)

Inferences

- Average EVAs of the companies show that all the companies except Oracle Financial are creating positive values for their shareholders. Value created by Tech Mahindra is also very less. Acquisition of Satyam could be a possible reason behind it. On the other hand, TCS is generating maximum wealth for their shareholders followed by Infosys and Wipro.
- Volatility in EVAs during the study period represented by S.D. is also highest for TCS followed by Infosys and Wipro. MindTree, on the other hand, has registered lowest volatility in their EVA generation.
- CV measures the volatility in EVA per unit of mean EVA. Lower the value of CV, better the company's position in risk return trade-off. According to this rule, HCL, Infosys and Wipro are showing a good result. It indicates that risk taken by these companies for earning reported EVA is justified. However, a high value of CV for Tech Mahindra and Hexaware Technologies indicates that these companies are taking too much risk for earning reported EVA.
- Minimum value of EVA suggests that during the study period, most of the companies except HCL, Infosys or Wipro have destroyed shareholders' value at least once. Even TCS is also no exception. In fact, their minimum EVA during the study period is least among all other companies. If we consider maximum EVAs earned by companies during the study period, TCS tops the group also. This result once again justifies huge volatility in TCS's EVA result. Apart from TCS, Infosys and Wipro also registered a high amount of maximum EVA during the study period.

7.3 Analysing significant difference among select companies towards ROI and EVA using one way ANOVA

In the above segment, we have performed a comparative analysis of ROI and EVA for our select companies and showed how one company is performing better than other in terms of their ROI or EVA measure. However, previous analysis does not explain as to whether any significant difference exists among ROIs or EVAs of select companies of the study. Hence, in order to statistically testing the same, following null hypotheses are taken into consideration:

Hypothesis-1

$H_0$1: No significant differences exist among ROIs of the select companies
Against, $H_1$1: Significant difference exists among ROIs of the select companies

Hypothesis-2

$H_0$2: No significant differences exist among EVAs of the select companies
Against $H_1$2: Significant difference exists among EVAs of the select companies

In order to test aforesaid hypotheses for the entire population, one way ANOVA is conducted here. The test statistics for this test is F calculated using following formula:

F = [(Between group sum of squares/C-1)]/ [Within group Sum of Squares/N-C]

Where C-1 and N-C are degrees of freedom where, N = total number of observations = 100 (10 companies for 10 year period) and C = number of categories = 10

Therefore, at (9, 90) degrees of freedom and 5% level of significance, if the probability of obtaining calculated value (P-Value) of F is less than .05, H_0 is rejected and vice versa. The result of F test for aforesaid hypotheses is under:

Table 3. Result of F test

Hypothesis	Calculated Value of F	P-Value	Decision Rule	Acceptance of H_0
1	6.279	.000	P-Value<.05	Rejected
2	10.384	.000	P-Value<.05	Rejected

(Source: Compilation of Secondary Data using SPSS)

Inference

Based on current sample, it can be concluded that H_0 cannot be accepted for both the hypotheses. It indicates that ROIs of select companies are significantly different. Likewise, EVAs of select companies are significantly different as well.

7.4 Analysing relationship between ROI and EVA

This section makes an attempt to explore the nature and direction of relationship between these two measures, ROI and EVA. Hence, we calculate Pearson's correlation coefficient (r) between average ROI and average EVAs (as obtained from Table 1 & 2) using following formula:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2}\sqrt{n(\sum y^2) - (\sum y)^2}}$$

Where, x = average ROI (%) and y = average EVA; n for this current study is 10.

The value of r ranges between -1 to +1. In our study, the calculated value of r is .762. If the calculated value of r

is more than .5, it indicates very strong positive correlations between two variables (Leared Statistics). As the value of r in our study is more than .5, it can be concluded that a strong positive correlation exist between ROI and EVA for our current sample. However, this may not hold true for the entire population (i.e. Indian computer software industry as a whole). In order to test the same, we take following hypothesis:

Hypothesis-1

H_0: Correlation between ROI and EVA is insignificant i.e. r = 0;

Against H_1: Correlation between ROI and EVA is significant i.e. r≠ 0

The above hypothesis can be tested using t test.

⇒ The test statistics (t) = $r/\sqrt{[(1-r^2)\times(N-2)]}$ *where N = sample size = 10*

At N-1 (9) degrees of freedom and 5% level of significance, if the probability of obtaining calculated value of t (p-value) is less than .05, H_0 is rejected and vice versa. In our study, the calculated value of t comes out to be 2.181 and p-value is .057. This p-value is more than .05. Hence, it can be inferred that H_0 is accepted based on the current sample. It shows that even if a strong positive correlation exist between ROI and EVA for this current sample, their relationship is not significant for the entire computer software industry.

7.5 Impact of Select Measures on ROI in Computer Software Industry : Multiple Linear Regression Analysis

7.5.1 Identifying Determinants of ROI in Indian Computer Software Industry

This segment analyses the impact of select measures of financial statements on ROI based on select sample. Past researches identify certain factors that theoretically influence ROI of a business. They are presented as follows:

(i) *Economic Value Added (EVA)*
(ii) *Market Value Added (MVA)*
(iii) *Dividend Paid (DP)*
(iv) *Earnings per Share (EPS)*
(v) *Return on Net Worth (RONW)*
(vi) *Net Operating Profit after Tax (NOPAT)*
(vii) *Debt Equity Ratio (DER)*
(viii) *Current Ratio (CR)*
(ix) *Price Earnings Ratio (PER)*
(x) *Interest Coverage Ratio (ICR)*
(xi) *Profit before Interest Depreciation and Tax Margin (PBIDTM)*
(xii) *Fixed Asset Turnover Ratio (FATOR)*
(xiii) *Inventory Turnover Ratio (ITOR)*
(xiv) *Debtors Turnover Ratio (DTOR)*
(xv) *Debtors Velocity (DV)*
(xvi) *Capital Employed (CE)*
(xvii) *Net Worth (NW)*
(xviii) *Market Capitalisation (MC)*
(xix) *Net Sales (NS)*
(xx) *Other Income (OI)*
(xxi) *Extraordinary Item (EOI)*
(xxii) *Degree of Operating Leverage (DOL)*
(xxiii) *Degree of Financial Leverage (DFL)*
(xxiv) *Net Working Capital (NWC)*
(xxv) *Book Value per Unit (BV)*

Now, with a view to analysing the impact of aforesaid variables on ROI, we assume that a linear relationship exist between ROI and all these 25 variables. A multiple linear regression equation is formulated taking ROI as Dependent Variable (DV) and all these 25 variables as Independent Variables (IVs).

7.5.2 Formulation of Regression Equation

The multiple linear regression equation of ROI and its explanatory variable can be represented as follows:

$$ROI = \alpha_i + \beta_1 EVA_{i,t} + \beta_2 MVA_{i,t} + \beta_3 DP_{i,t} + \beta_4 EPS_{i,t} + \beta_5 RONW_{i,t} + \beta_6 NOPAT_{i,t} + \beta_7 DER_{i,t} + \beta_8 CR_{i,t} + \beta_9 PER_{i,t} + \beta_{10} ICR_{i,t} + \beta_{11} PBIDTM_{i,t} + \beta_{12} FATOR_{i,t} + \beta_{13} ITOR_{i,t} + \beta_{14} DTOR_{i,t} + \beta_{15} DV_{i,t} + \beta_{16} CE_{i,t} + \beta_{17} NW_{i,t} + \beta_{18} MC_{i,t} + \beta_{19} NS_{i,t} + \beta_{20} OI_{i,t} + \beta_{21} EOI_{i,t} + \beta_{22} DOL_{i,t} + \beta_{23} DFL_{i,t} + \beta_{24} NWC_{i,t} + \beta_{25} BV_{i,t} + E_{i,t}$$

Where,

- *α = Percentage of ROI in the absence of IVs;*
- *$\beta_1,\beta_2....\beta_{25}$ are regression coefficients of IVs. Estimated values of β represent nature and direction of relationship between ROI and corresponding IV.*
- *E is error term i.e. percentage of ROI not explained by any of the IVs*
- *'t' is the time period.*

7.5.3 Estimation of Relationship

Relationship between ROI and each IV is obtained from the estimated values of β. It is calculated as Covariance of ROI and individual IV/ Variance of that IV. The β calculated based on this formula is however un-standardised as IVs are designated in different units. Therefore, β must be standardised (Draper & Smith, 1998) by multiplying it with (S.D. of individual IV/S.D. of ROI). The calculated values of standardised β are represented here:

Table 4. Estimation of Relationship using Standardised β

Variable Code	Variable Name	Standardised β
EVA	Economic Value Added	-.368
MVA	Market Value Added	.153
DP	Dividend Paid	.396
EPS	Earnings per Share	.245
RONW	Return on Net Worth	.678
NOPAT	Net Operating Profit after Tax	-.693
DER	Debt Equity Ratio	-.111
CR	Current Ratio	-.135
PER	Price Earnings Ratio	.080
ICR	Interest Coverage Ratio	.040
PBIDTM	Profit before Interest Depreciation and Tax Margin	.147
FATOR	Fixed Asset Turnover Ratio	.019
ITOR	Inventory Turnover Ratio	-.027
DTOR	Debtors Turnover Ratio	-.148
DV	Debtors Velocity	-.111
CE	Capital Employed	-.944
NW	Net Worth	.150
NS	Net Sales	1.152
OI	Other Income	.026
EOI	Extraordinary Item	-.050
DOL	Degree of Operating Leverage	.041
DFL	Degree of Financial Leverage	-.038
NWC	Net Working Capital	.220
BV	Book Value per Unit	-.116

(Source: Compilation of Secondary Data using SPSS)

Inferences

- It is observed that value based performance measure EVA negatively affect ROI in Indian computer industry. It indicates that if a company in computer software industry is earning positive ROI, it is likely that its EVA will not be positive. Same thing is true for NOPAT. If the company is earning a positive NOPAT, it will ultimately result in a negative ROI. DER, CR, DTOR, DV, CE, DFL, EOI, and BV negatively influence ROI as well. It suggests that high debtor turnover, extra-ordinary income, and excessive leverage inversely affect ROI in this industry.
- Other variables have positive influence on ROI. NS has highest positive influence. Apart from that, market value of the firm, overall earnings of the company, high inventory turnover ratio and net working capital also help ROI of the companies in this industry to grow.
- The model excludes MC. It indicates that market capitalisation do not have any impact on ROI in this industry.

7.5.4 Analysing Significance of Estimated Relationship

In the previous segment, we have estimated the relationship between ROI and individual IVs based on a select sample of 10 years. We need to take following hypothesis in analysing the significance of such relationship:

Hypothesis-1

H_0: Relationship is not significant (i.e. $\beta_i = 0$)

H_1: Relationship is significant (i.e. $\beta_i \neq 0$)

In order to test aforesaid hypothesis, we use t test with test statistics (t) = Un-Standardised β_i/ S.D. of β_i

At n-2 degrees of freedom and 5% level of significance, if the probability of obtaining the calculated value of t is less than .05, H_0 is rejected and vice versa. Result of t test is under:

Table 5. Result of t test

Variable Code	Variables	Calculated value of t	P-Value	Decision Rule	Acceptance of H_0
EVA	Economic Value Added	-1.653	.102	P-Value>.05	Accepted
MVA	Market Value Added	1.524	.132	P-Value>.05	Accepted
DP	Dividend Paid	1.394	.167	P-Value>.05	Accepted
EPS	Earnings per Share	2.531	.013	P-Value<.05	*Rejected*
RONW	Return on Net Worth	11.310	.000	P-Value<.05	*Rejected*
NOPAT	Net Operating Profit after Tax	-2.237	.028	P-Value<.05	*Rejected*
DER	Debt Equity Ratio	-2.522	.014	P-Value<.05	*Rejected*
CR	Current Ratio	-2.665	.009	P-Value<.05	*Rejected*
PER	Price Earnings Ratio	2.531	.013	P-Value<.05	*Rejected*
ICR	Interest Coverage Ratio	.752	.455	P-Value>.05	Accepted
PBIDTM	Profit before Interest Depreciation and Tax Margin	3.068	.003	P-Value<.05	*Rejected*
FATOR	Fixed Asset Turnover Ratio	.384	.702	P-Value>.05	Accepted
ITOR	Inventory Turnover Ratio	-.878	.383	P-Value>.05	Accepted
DTOR	Debtors Turnover Ratio	-2.107	.039	P-Value<.05	*Rejected*
DV	Debtors Velocity	-1.624	.108	P-Value>.05	Accepted
CE	Capital Employed	-2.604	.011	P-Value<.05	*Rejected*
NW	Net Worth	.337	.737	P-Value>.05	Accepted
NS	Net Sales	3.507	.001	P-Value<.05	*Rejected*
OI	Other Income	.332	.741	P-Value>.05	Accepted
EOI	Extraordinary Item	-1.263	.211	P-Value>.05	Accepted
DOL	Degree of Operating Leverage	1.285	.203	P-Value>.05	Accepted
DFL	Degree of Financial Leverage	-1.134	.260	P-Value>.05	Accepted
NWC	Net Working Capital	1.444	.153	P-Value>.05	Accepted
BV	Book Value per Unit	-1.106	.272	P-Value>.05	Accepted

(Source: Compilation of Secondary Data using SPSS)

Inferences

On the basis of the current sample, H_0 is not accepted for EPS, RONW, NOPAT, DER, CR, PER, PBIDTM, DTOR, CE and NS. Therefore, all these variables significantly influence ROI of the companies in this industry. However, for the other variables H_0 is accepted which indicates that these variables are not significant in explaining ROI. EVA also comes under this group.

7.5.5 Strength of Association between DV and all IVs

In this model, we have initially taken 25 variables for explaining ROI in this industry. Out of them, 1 variable MC was excluded after formation of the model. Therefore, finally we have explained ROI with the help of 24 variables. However, there could be other factors as well which might influence ROI. These factors are not taken into consideration by this current model and are represented by error term. In this section, our main purpose is to measure the percentage of variance in ROI explained by all the IVs taken together. If this percentage is too high, we can conclude that all the IVs together explain a good proportion of ROI. In order to obtain the strength of association between DV and IVs, we need to calculate the estimated values of ROI, based on estimated values of β and observed values of IVs. The variance of estimated values of ROI is called explained variance and variance of observed values of ROI is called total variance. The ratio of explained to total variance is known as Coefficient of Multiple Determination (R^2). If the variables are un-correlated, value of R^2 is the mathematical summation of individual coefficient of determination (r^2) for each individual IV which explains the percentage of percentage of variance of ROI explained by that variable. However, in reality IVs are correlated among themselves. Therefore, after a certain point R^2 does not increase (Smith & Cooper-Martin, 1997). Hence, R^2 is adjusted by the number of variables. Adjusted R^2 is the most scientific measure of strength of association between ROI and other IVs. Here, the calculated value of Adjusted R^2 is .945. It suggests that 94.5% of the total variance of ROI is explained by all the IVs.

7.5.6 Model Fitness

The regression model is considered to be fit, if the calculated value of R^2 is significant for the population. In order to test the same, we take following hypothesis:

Hypothesis-1

H_0: Strength of association is not significant (i.e. $R^2 = 0$)
H_1: Strength of association is significant (i.e. $R^2 \neq 0$)

In order to test the above hypothesis, we conduct one way ANOVA with c-1 and n-c degrees of freedom. Here n = 100 and c = 25. The formula for test statistics is mentioned earlier. At (24,75) degrees of freedom and 5% level of significance, if the probability of obtaining calculated value of F is less than .05, H_0 can be rejected and vice versa.

In our study, the calculated value of F is 71.862. Corresponding p-value is .000 which is less than .05. Therefore, on the basis of the current sample, H_0 can not be accepted. Hence, the strength of association between ROI and other explanatory variables is significant and the model well fits the data.

8. Conclusions

In order to make a comparative analysis of select companies in Indian computer software industry based on their ROI and EVA, it is observed that most of the companies are generating positive ROI and positive values for their shareholders. Performance of TCS, Infosys and Wipro are really good in this respect. However, TCS's financial result is more volatile than that of other two companies. Tech Mahindra, though being a good company was not able to project a good financial result in terms of ROI and EVA because of their acquisition of fraud stricken company Satyam Computer Services Ltd. Performance of Oracle Financial and MindTree are not satisfactory. Oracle Financial is the only company with average negative EVA.

To analyse the difference of ROI and EVA among these companies, the result suggests that these companies are significantly different from one another with regard to their ROI and EVA. A strong positive correlation was identified to identify the relationship between ROI and EVA in Indian computer software industry. However, significance of such relations was found to be insignificant. While analysing impact of select variables on ROI in this industry, the result shows that EPS, RONW, DER, DTOR, NOPAT, NS, PBIDTM, CE etc. are the significant determinants of ROI in this industry. Among them, CE, DTOR, DER and NOPAT negatively influence ROI and the rest positively influence this measure. The calculated value of Adjusted R^2 suggests that all the IVs explain a significant proportion of ROI. Finally, as per the result of one way ANOVA, the model is fit and an excellent of strength of association exist between ROI and its explanatory variables.

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