Determinants of Earnings: Evidence from Pakistan Engineering Sector

Authors

Kashif Imran*
&
Khalid Naeem Akbar**

*:**Applied Economics Research Centre University of Karachi.

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Abstract

Engineering sector plays a considerable role in Pakistan's economy. The contribution of engineering industry to GDP is $2 billion and it provides employment to significant personnel. The engineering sector in a number of economies of the world, works as a major and speedy engine of economic growth. This study is an attempt to identify the factors affecting the earnings of engineering sector of Pakistan, by using the panel data of twenty-seven engineering firms listed on Karachi Stock Exchange (KSE) covering the period of 1990 to 2008. It is found that, in the long run Net Working Capital, and GDP growth has a positive impact on Earnings per Share and Operating Ratio, Net Fixed Assets and GDP deflator has a negative impact while Interest rate has not significant effect on earnings per share.

1) Introduction

Engineering sector is a prominent sector of Pakistan and works as engine of economic growth in the economy. It produces a lot of valuable goods (especially capital goods) that plays a significant role in the development of country. So, it is important to find the factors that determine and affecting the earnings of this sector.

A number of micro level; firm specific factors and macro level; economy wide factors affect the firm's earnings varying from firm to firm and depend on the nature and volume of business. A manufacturing firm requires a large amount of investment in its fixed assets whereas a service providing firm depends on qualified or skilled personnel and sophisticated information systems. The present study investigates the factors affecting the earnings of engineering sector of Pakistan by using the panel data of twenty-seven engineering firms listed on Karachi Stock Exchange (KSE). Due to the complexity of the financial reporting framework and a restricted format of the financial reporting and disclosures, to comely with the related corporate governance and applicable International Financial Reporting Standards for the purpose of financial disciplines in market, only quantitative data is available for econometric analysis.

The structure of the paper is as follows. Section 2 contains an overview of the engineering sector of Pakistan; theoretical model is presented in section 3. A brief description of data, its sources and econometric methodology are explained in section 4. Empirical results can be found in section 5. Concluding remarks are made in the last section.

2). Overview

The contribution of engineering sector of Pakistan to the GDP is currently $2000 million and it provides employment to mere than 0.6 million people (directly & indirectly). However the progress of engineering sector has been described as lower than satisfactory level. The present share of engineering industry covers only 25 per cent of total demand while the remaining need is being met by imports which almost has been doubled over last eight years. Its share in total imports has varied from 33 to 42 per cent; on the other hand the share of engineering goods in country's exports is only three per cent. Pakistan exports $270 million worth of engineering goods annually which is negligible share of world trade. Total worth of capital employed by this sector is more than $1050 million in 2008. Besides, for most of the engineering industries, effective protection was negative. A mix trend of firms listing on KSE can be seen in Table (1).

Table: 1 Listing Trend of Engineering Firms on KSE

Year	Nos. of Firms
1981-85	31
1986-90	35
1991-95	52
1996-00	50
2001-06	41
2007-08	40

Source: Balance Sheet Analysis by SBP

The main groups within the engineering industry include machinery & instruments, steel bars & pipes, cables & electronic goods, vehicles, tyres, and batteries etc.

3). The Model

The econometric model used in the current study is as follows

$$EPS_{it} = \gamma_1 + \gamma_2 NWC_{it} + \gamma_3 OpR_{it} + \gamma_4 NFA_{it} + \gamma_5 Def_t + \gamma_6 Int_t + \gamma_7 GDPg_t + \mu_{it} .....(1)$$

i = 1,…,N and t = 1,…,T

Where, EPS is Earning per Share, NWC is Net Working Capital, OpR represents Operating Ratio, NFA represents Net Fixed Assets, Def is GDP deflator, Int represents Interest rate, GDPg is GDP growth and μ is white noise.

4). Data and Methodology

Annual data is used in the present study obtained from various sources; Firms related data is obtained from Balance Sheet Analysis of Joint Stock Companies listed on the Karachi Stock Exchange available at the State Bank of Pakistan (SBP), while macro level data is obtained from International Financial Statistics (IFS) of the International Monetary Fund and Annual Reports of Economic Survey, data covers the period of 1990-2008 of twenty-seven engineering sector firms.

Methodology

The prelude step is concerned to establish the degree of integration of each variable. So, for this purpose we test for existence of unit root among variables. In the past decade or so, there has been much interest to test for the presence of unit root in panel data, a number of investigators, includes Hadri (1999), Maddala and Wu (1999)[1], Breitung (2000), Levin, Lin and Chu [LLC (2002)], and Im, Pesaran, and Shin [IPS (2003)] have elaborate panel based unit root tests that are resemblance to tests carried out on a single series. All these investigators have shown that panel unit root tests are more powerful than others. (see Baltagi 2003 for detail). This study focuses on LLC (2002) to establish the degree of integration.

Levin, Lin and Chu [LLC (2002)]

LLC suggest a stronger unit root test by meditate the following basic ADF specification

$$\Delta y_{it} = a y_{it-1} + \sum_{j=1}^{pi} \Delta y_{it-j} + x_{it}\delta + \varepsilon_{it} .....(A)$$

where

Δy_{it} = difference term of y_{it}, α = ρ-1, pi = number of lag used,

x_{it} = exogenous variable in model

We can define Δy_{it} as by taking Δy_{it} and removing the autocorrelations and deterministic components from equation (A) as well as can be rewritten as equation (B) below

$$\Delta y_{it} = \Delta y_{it-1} + \sum_{j=1}^{pi} \beta_{it} \Delta y_{it-1} + x_{it}\delta + \varepsilon_{it} .....(B)$$

LLC (2002) show that under the null hypothesis, a modified t-statistics for the resulting $\hat{\alpha}$ is asymptotical normally distributed as given below

Where t^* = the standard t-statistic for $\hat{\alpha}$ = 0 and T- ($\sum_i$ pi / N) -1

The null and alternative hypothesis tested are ρ= 1 and ρ < 1; respectively in LLC (2002) panel unit root test.

After checking the stationarity of variables, we can imply the co-integration test. The various researchers

[1] Maddala and Wu propose two types of non parametric tests including Fisher-ADF and Fisher-PP statistics.

used different co-integration tests for panel data. Gutierrez (2003) and Banerjee et al. (2004) study small sample performance of many of these tests using Monte Carlo simulations and can not find supremacy of any test on the others. In terms of applied work however, the class of residual based tests has proven to be the most popular one[2]. So we use residual based Pedroni co-integration test in present study to find the co-movement among variables.

Pedroni (1999) proposed a number of tests for the null hypothesis of no co-integration in a panel data model. The processes u_{it} in Pedroni's test can be written as

$$u_{it} = \rho_i u_{it-1} + \eta_{it}\ ,$$

where the processes η_{it} are assumed stationary, The correction for serial correlation can be handled either non-parametrically (following Phillips and Perron, 1988), Pedroni co-integration equation can be written as follows

$$PP = N^{1/2}\,\frac{N^{-1}\sum_{i=1}^{N}\hat{\omega}_{u,\varepsilon i}^{-2}\left(T^{-1}\sum_{t=2}^{T}\hat{u}_{it-1}\Delta\hat{u}_{it}-\hat{\lambda}_i\right)}{N^{-1}\sum_{i=1}^{N}\hat{\omega}_{u,\varepsilon i}^{-2}\left(T^{-2}\sum_{t=2}^{T}\hat{u}_{it-1}^{2}\right)}$$

Where

$\hat{\lambda}_i = \frac{1}{2}\left(\hat{\omega}_{\mu i}^2 - \hat{\sigma}_{\mu i}^2\right)$, ($\hat{\sigma}_{\mu i}^2$ and $\hat{\omega}_{\mu i}^2$ are estimated variances and long run variances of $\hat{\mu}_{it}$ respectively, while $\hat{\mu}_{it}$ is the estimated residuals from the OLS regression of equation (1) $\hat{\omega}_{u,\varepsilon i}^2 = \frac{1}{N}\sum_{i=1}^{N}\frac{\hat{\omega}_{\mu i}^2}{\hat{\omega}_{NT}^2}$ ($\hat{\omega}_{u,\varepsilon i}^2$ is an endogeneity correction factor, it also can be obtained by using a kernel estimator,)

Different researchers used various estimators to estimate panel co-integration vector. These estimators include Ordinary Least Square (OLS), Fully Modified OLS (FMOLS), and Dynamic OLS (DOLS). In these estimators DOLS has some advantages over OLS and FMOLS; it is proposed by Stock and Watson (1993). The Stock and Watson method is a robust single equation approach which corrects for regressors endogeneity by inclusion of leads and lags of differenced regressors, and for serially correlated errors by a GLS procedure, which is not well handled by OLS and FMOLS[3]. The current study uses DOLS method to investigate the co-integration vector. So, we can write equation as follows in the case of DOLS.

$$\begin{aligned} EPS_{it} &= \gamma_1 + \gamma_2 NWC_{it} + \gamma_3 OpR_{it} + \gamma_4 NFA_{it} \\ &+ \gamma_5 Def_t + \gamma_6 Int_t + \gamma_7 GDPg_t + \sum_{k=-K}^{K}\Psi_{ik}\Delta NWC_{it-k} \\ &+ \sum_{k=-K}^{K}\Omega_{ik}\Delta OpR_{it-k} + \sum_{k=-K}^{K}\delta_{ik}\Delta NFA_{it-k} + \sum_{k=-K}^{K}\zeta_k \Delta Def_{t-k} \\ &+ \sum_{k=-K}^{K}\theta_k \Delta Int_{t-k} + \sum_{k=-K}^{K}\Phi_k \Delta GDPg_{t-k} + v_{it}\ .....(2) \end{aligned}$$

The factors effecting earnings may be different from firm to firm; with a panel model it is possible to control for the firm specific, time invariant characteristics through the use of firm specific intercepts or "fixed effects". So, for capture this specific effect we use fixed effect also.

In fixed effect approach model can be write as:

$$\begin{aligned} EPS_{it} &= \gamma_{1i} + \gamma_2 NWC_{it} + \gamma_3 OpR_{it} + \gamma_4 NFA_{it} \\ &+ \gamma_5 Def_t + \gamma_6 Int_t + \gamma_7 GDPg_t + \mu_{it}\ .....(3) \end{aligned}$$

Because in fixed effect model the intercept varying from cross section to cross section, so we can get this effect easily by inclusion of dummy variables as regressors, so above model can be written as:

$$\begin{aligned} EPS_{it} &= \varphi_1 + \varphi_2 D_2 + \ldots + \varphi_N D_N \\ &+ \gamma_2 NWC_{it} + \gamma_3 OpR_{it} + \gamma_4 NFA_{it} + \gamma_5 Def_t \\ &+ \gamma_6 Int_t + \gamma_7 GDPg_t + \mu_{it}\ .....(4) \end{aligned}$$

The random effects model is a regression with a random constant term (Greene 2003). One way to handle the ignorance or error is to assume that the intercept is a random outcome variable. The random outcome is a function of a mean value plus a random error. But this cross sectional specific error term μ_i which indicates the deviation from constant of the cross sectional (firm) unit, must be uncorrelated with

[2]See "Mixed Signals Among Tests for Panel Co-integration" By Westerlund and Basher (2008).

[3]See Kao and Chiang (1999) for detail.

the errors of the variables if this is to be modeled. The random effect estimation has several advantages including the number of parameters stay constant when sample size enlarges, and it also allows the estimation of the effect of time invariant variables.

We take γ_{1i} in fixed effect (LSDV)[4] model but in random effect (ECM)[5] model the $\gamma_{1i} = \gamma_1 + \mu_i$
$i = 1, 2, \ldots, N$

where μ_i is a random error term with a mean value of zero and equal to $\varepsilon_i + \mu_{it}$
So, we can write the model as

$$EPS_{it} = \gamma_1 + \gamma_2 NWC_{it} + \gamma_3 OpR_{it} + \gamma_4 NFA_{it} + \gamma_5 Def_t + \gamma_6 Int_t + \gamma_7 GDPg_t + \mu_i .....(5)$$

5). The Empirical Results

This study used LLC (2003) unit root test to check the level of integration; results can be seen in Table (2). Results show that at level all the variables are non stationary except OpR, while at 1st difference all the variables are significant at even 1% level of significance. So,the variables are I (1).

Table: 2 Panel Unit Root Results based on LLC (2003)

Variables	Level	1st Difference
EPS	-0.67	-18.43
NWC	5.53	-11.37
OpR	-20.87**	5.59
NFA	14.41	-3.87
Def	18.83	-5.48
Int	-8.09	-2.82
GDPg	-10.40	-26.29

** indicates statistical significant at 5%. Null Hypothesis is unit root. At first difference all the variables are significant at 1% level of significance.

This empirical work used residual based Pedroni (1999) co-integration test, results shown in Table (3). The null hypothesis is no co-integration in the panel, results show that co-integration relationship exists in the panel variables.

Table: 3 Pedroni (1999) Residual Based Panel Co-integration Results

Test	Test statistic	Probability
PP statistic	-3.243	0.002

H_0: No co-integration in panel

Table (4) shows the result of long run relationship by using the Dynamic OLS estimation.

Table: 4 Results based on Dynamic OLS Estimation

Variables	DOLS estimator
NWC	0.020* (-11.33)
OpR	-2.221* (-3.51)
NFA	-0.005* (-3.41)
Def	-0.114** (-2.13)
Int	0.423 (-0.75)
GDPg	1.278** (-1.97)

Values in parenthesis are t-statistics and * and ** indicate that the estimated parameters are statistically significant at 1 and 5% level, respectively.

Table (5) shows the result by using fixed effect [LSDV] and the Random Effect [GLS method] estimation.

Table:5 Results based on Fixed and Random Effects Estimation

Variables	Fixed Effect	Random Effect
NWC	0.010* (10.17)	0.011* (11.72)
OpR	-0.208 (-0.93)	-0.29 (-1.31)
NFA	-0.006* (-4.55)	-0.006* (-4.86)
Def	-0.112* (5.98)	-0.104* (5.64)
Int	0.109 (0.60)	0.098 (0.54)
GDPg	1.024* (2.93)	0.984* (2.82)

Values in parenthesis are t-statistics and * indicates that the estimated parameters are statistically significant at 1% level.

Net working capital is significant in all three cases and has positive relationship with earning per share. Increase in net working capital means the firm has more cash to invest or handle her operations so;

[4]Least Square Dummy Variable, (Fixed Effect Approach and LSDV can be used interchangeably)

[5]Error Component Model (Random Effect Approach also called ECM) for detail see Gujarati (2004) "Basic Econometrics" ed. 4,

overall it has positive impact on net profit and earnings per share. A detailed relationship between net working capital, turnover and earning can be seen in Table 6.

Table: 6 Relationship between Working Capital, Turnover and Earning

S. No.	Trend of WC & TO	Trend of TO/WC & E	Growth trend	Relationship b/w WC & E
1	Δ WC = 0 Δ TO = 0	Δ TO/WC = 0 Δ E = 0	Δ INDg = 0 Δ GDPg = 0	+ve
2	Δ WC = 0 Δ TO ↑	Δ TO/WC ↑ (Over-Trading) Δ E ↑	Δ INDg ↑ Δ GDPg ↑	+ve
3	Δ WC = 0 Δ TO ↓	Δ TO/WC ↓ (Over-Capitalization) Δ E ↓	Δ INDg ↓ Δ GDPg ↓	+ve
4	Δ WC ↑ Δ TO = 0	Δ TO/WC ↓ Δ E = 0	INDg is expected GDPg is expected	+ve
5	Δ WC ↑ Δ TO ↑	Δ TO/WC = 0 Δ E ↑	Δ INDg ↑ Δ GDPg ↑	+ve
6	Δ WC ↑ Δ TO ↓	Δ TO/WC ↓ (Over-Capitalization) Δ E ↓	Δ INDg ↓ (Advers Shock) Δ GDPg ↓ (Aderse Shock)	**-ve**
7	Δ WC ↓ Δ TO = 0	Δ TO/WC ↑ (De-investment in WC) Δ E = 0	INDg is expected to decline GDPg is expected to decline	+ve
8	Δ WC ↓ Δ TO ↑	Δ TO/WC ↑ (De-investment in WC) Δ E ↑	Δ INDg ↑ Δ GDPg ↑	**-ve**
9	Δ WC ↓ Δ TO ↓	Δ TO/WC = 0 (De-investment in WC) Δ E ↓	Δ INDg ↓ Δ GDPg ↓	+ve

Note: TO is turn over, INDg is industry growth

Operating ratio affect significantly in the case of DOLS while insignificant in fixed and random effect approach, but in all three cases it has negative relationship. Detailed relationship between operating ratio, capital labor ratio and earnings is given in Table 7.

Fixed assets are the main apparatus and infrastructure for the product of a firm. Investment in fixed assets has a positive impact on earning and shows a progressive growth. In present study the net fixed assets have significant effect but has negative relation with very small coefficient value to earning per share in all three cases. It may due to two reasons firstly, we used in the study assets after depreciation and these surely decrease with the passage of time, so their relationship to earnings is negative secondly, investment in fixed assets decrease cash, so working capital decrease and it has inverse effect on sales and earnings. Relationship between net fixed assets, marginal product of net fixed assets and EPS can be seen in Table 8.

Table: 7 Relationship between Operating ratio, K/L and Earning

S. No	Trend of OPR & TO	Trend of K/L & E	Growth trend	Correlation b/w OPR & E
1	Δ OPR = 0 Δ TO = 0	Δ K/L = 0 Δ E = 0	Δ INDg = 0 Δ GDPg = 0	-ve
2	Δ OPR = 0 Δ TO ↑	Δ K/L = 0 Δ E ↑	Δ INDg ↑ Δ GDPg ↑	-ve
3	Δ OPR = 0 Δ TO ↓	Δ K/L = 0 Δ E ↓	Δ INDg ↓ Δ GDPg ↓	-ve
4	Δ OPR ↑ Δ TO = 0	Δ K/L ↓ (Technical inefficiency) Δ E ↓	Δ INDg = 0 Δ GDPg ↓ or 0	-ve
5	Δ OPR ↑ Δ TO ↑	Δ K/L ↓ (Technical inefficiency) Δ E = 0 or ↑ or ↓	Δ INDg ↑ Δ GDPg ↑	Depends on magnitude of OPC and TO and may be positive or negative
6	Δ OPR ↑ Δ TO ↓	Δ K/L ↓ (Technical inefficiency) Δ E ↓	Δ INDg ↓ Δ GDPg ↓	-ve
7	Δ OPR ↓ Δ TO = 0	Δ K/L ↑ (Technical efficiency) Δ E ↑	Δ INDg = 0 Δ GDPg ↑ or 0	-ve
8	Δ OPR ↓ Δ TO ↑	Δ K/L ↑ (Technical efficiency) Δ E ↑	Δ INDg ↑ Δ GDPg ↑	-ve
9	Δ OPR ↓ Δ TO ↓	Δ K/L ↑ (Technical efficiency) Δ E = 0 or ↓ or ↑	Δ INDg ↓ Δ GDPg ↓	Depends on magnitude of OPC and TO and may be positive or negative

Note: K/L is capital labor ratio

Table: 8 Relationship b/w NFA, MPNFA and EPS

S. No	ΔNFA, ΔTO	MPNFA		Δ EPS	Relationship b/w EPS and NFA
1	ΔNFA = 0	MPNFA = 0	Industry at 100% Capacity	ΔEPS = 0	+ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS = 0	+ve
	ΔTO = 0	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS = 0	+ve
2	ΔNFA = 0	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↑	+ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↑	+ve
	ΔTO ↑	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↑	+ve
3	ΔNFA = 0	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↓	+ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↓	+ve
	ΔTO ↓	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↓	+ve
4	ΔNFA ↑	MPNFA = 0	Industry at 100% Capacity	ΔEPS = 0	-ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS = 0	-ve
	ΔTO = 0	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS = 0	-ve
5	ΔNFA ↑	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↑	+ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↑	+ve
	ΔTO ↑	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↑	+ve
6	ΔNFA↑	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↓	-ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↓	-ve
	ΔTO ↓	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↓	Negative
7	ΔNFA ↓	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↓	+ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↓	+ve
	ΔTO = 0	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↓	+ve
8	ΔNFA ↓	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↑	-ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↑	-ve
	ΔTO ↑	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↑	-ve
9	ΔNFA ↓	MPNFA = 0	Industry at 100% Capacity	ΔEPS ↓	+ve
		MPNFA > 0	Industry < 100% Capacity	ΔEPS ↓	+ve
	ΔTO ↓	MPNFA < 0	Indusrty is at risk and need investment in K	ΔEPS ↓	+ve

MPNFA is marginal product of net fixed assets and shows the degree of utilization, and TO is turn over.

Table (4 and 5) show that interest rate has insignificant effect on earnings in all three cases. An increase in interest rate influences the interest expenses to higher but these expenses are paid before tax so the earning before tax (EBT) decrease and as a result tax expenses also decrease so, it may or may not that a change occur in net profit or earning hence it is possible that it has insignificant effect on EPS. Table 9 shows the relationship between interest and EPS. while Table 10 shows between interest, debt to equity ratio, number of shares and earning per share.

Table: 9 Relationship b/w Interest (I) and Earning per Share (E/P)

S. No	ΔI	ΔFinC and ΔEPS	Statistical relationship b/w I and EPS
1	ΔI = 0	ΔFinC = 0 → ΔEPS = 0	-ve
2	ΔI ↑	ΔFimC ↑ → ΔEPS ↓	-ve
3	ΔI ↓	ΔFimC ↓ → ΔEPS ↑	-ve

Note: Assume Turnover (TO), Operating Cost (OPC), Debt Equity Ratio (D/Eq), Tax (T) and Working Capital(WC) are constant. And Fin C is financial cost.

GDP growth has positive relationship to EPS and significant in all three cases. When GDP increase of any country almost each element of economy must be effected and production increases also, it is two way process. GDP deflator represents inflation and it has negative effect in all three cases.

6). Conclusion

Engineering sector is prominent sector of Pakistan's economy, but its share in GDP is not remarkable yet. The trend of new firms entering in industry is not so consistent. But it is important to find the factors affecting the earnings of this sector, so for this purpose we used the data of twenty-seven firms listed on Karachi Stock Exchange (KSE) and has a huge share of market, for the period of 1990 to 2008. On the basis of our findings we can conclude that net working capital (NWC) is highly significant and has positive impact on earning per share (EPS) in all three cases like DOLS, fixed and random effect approach. In DOLS its coefficient value is 0.020 it mean EPS increase by 2.0% due to 1% increase in NWC, 0.010 and 0.011 are coefficient values in fixed and random effect approach respectively. Operating ratio (OpR) is significant in the case of DOLS method and show a negative relationship. Net fixed assets (NFA) have highly significant effect on EPS in all three cases and have negative sign with a very low coefficient value. GDP Deflator (Def) is significant in all three cases and has negative sign. Interest rate (Int) has not any affect on EPS in all three cases while GDP growth (GDPg) has significant effect in all three cases and has positive sign as expected.

Firms already in industry need to manage the efficiency of working capital and fixed assets and the effectiveness of organizational systems, controls and procedures. Working capital management is the management of all aspects of both current assets and liabilities to minimize the risk of insolvency while maximizing the return on assets. The decision regarding the level of overall investment in working capital is cost / benefit trade off – liquidity Vs profitability, or cash flow Vs profits. Operating expenses should be minimized through adopt the economy of scale technique, and it can be done through export of engineering products. The raw material for engineering production should be exempted from import duty or it should be minimize. Export of engineering products should be encouraged by government, because a strong and efficient engineering system will facilitate to achieve a self-contained and vigorous economy.

Table: 10 Relationship b/w Interest (I), Debt Equity Ratio (D/Eq), Number of Shares and EPS

		Economic and accounting implications of ΔI, ΔT on earning			Statistical Relationship b/w I and EPS
S #	**ΔI**	**ΔD/Eq**			**Correlation b/w I and EPS, Coefficient**
1	ΔI = 0	ΔD/Eq = 0	ΔLR = 0→0	→ Δ # EqS = 0	-ve
			ΔLR ↑→WC Management	→ Δ # EqS = 0	-ve
			ΔLR ↓→WC Management	→ Δ # EqS = 0	-ve
		ΔD/Eq ↑	ΔLR = 0→Buy back using Debt	→ Δ # EqS ↓	-ve
			ΔLR ↑→Induction of Debt	→ Δ # EqS = 0	-ve
			ΔLR ↓→Buy back	→ Δ # EqS ↓	-ve
		ΔD/Eq ↓	ΔLR = 0→Debt is replaced wit Equity	→ Δ # EqS ↑	-ve
			ΔLR ↑→New Shares Issue	→ Δ # EqS ↑	-ve
			ΔLR ↓→Repayment of debt	→ Δ # EqS = 0	-ve
2	ΔI ↑	ΔD/Eq = 0	ΔLR = 0→0	→ Δ # EqS = 0	-ve
			ΔLR ↑→WC Management	→ Δ # EqS = 0	-ve
			ΔLR ↓→WC Management	→ Δ # EqS = 0	-ve
		ΔD/Eq ↑	ΔLR = 0→Buy back using Debt	→ Δ # EqS ↓	+ve
			ΔLR ↑→Induction of Debt	→ Δ # EqS = 0	-ve
			ΔLR ↓→Buy back/Debt decrease	→ Δ # EqS ↓	+ve
		ΔD/Eq ↓	ΔLR = 0→Debt is replaced wit Equity	→ Δ # EqS ↑	-ve
			ΔLR ↑→New Shares Issue	→ Δ # EqS ↑	-ve
			ΔLR ↓→Repayment of debt	→ Δ # EqS = 0	-ve
3	ΔI ↓	ΔD/Eq = 0	ΔLR = 0→0	→ Δ # EqS = 0	-ve
			ΔLR ↑→WC Management	→ Δ # EqS = 0	-ve
			ΔLR ↓→WC Management	→ Δ # EqS = 0	-ve
		ΔD/Eq ↑	ΔLR = 0→Buy back using Debt	→ Δ # EqS ↓	-ve
			ΔLR ↑→Induction of Debt	→ Δ # EqS = 0	-ve
			ΔLR ↓→Buy back/Debt decrease	→ Δ # EqS ↓	-ve
		ΔD/Eq ↓	ΔLR = 0→Debt is replaced wit Equity	→ Δ # EqS ↑	+ve
			ΔLR ↑→New Shares Issue	→ Δ # EqS ↑	+ve
			ΔLR ↓→Repayment of debt	→ Δ # EqS = 0	-ve

Note: Assume Tax rate (T), Weighted Average Cost of Capital (WACC), Turnover and Operating Cost (OPC) are Constant, LR is liquidity ratio.

References

Baltagi, H.B. (2003). "Econometric Analysis of Panel Data", 2nd Edition, John Wiley & Sons Ltd, New York.

Banerjee, Anindya., Marcellino, Massimiliano and Osbat, Chiara (2004). "Some Cautions on the Use of Panel Methods for Integrated Series of Macroeconomic Data", Econometrics Journal, Vol. 7(2), pp. 322-40.

Breitung, Jörg (2000). "The Local Power of Some Unit Root Tests for Panel Data", B. Baltagi (ed.): Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics, Vol. 15, Amsterdam: JAI Press, pp. 161-78.

Chen, Jong, Rong and Lu, Wen, Cheng (2003). "Panel Unit Root Tests of Firm Size and Its Growth", Applied Economics Letters, Vol. 10(6), pp. 343-45.

Choi, I. (2001). "Unit Root Tests for Panel Data", Journal of International Money and Finance, Vol. 20, pp. 249–72.

Greene, W. H. (2003). "Econometric Analysis", Prentice Hall New Jersey.

Gujarati, D. N. (2004). "Basic Econometrics", 4th Ed. The McGraw−Hill Companies, pp. 642.

Gutierrez, Luciano (2003). "On the Power of Panel Cointegration Tests: A Monte Carlo Comparison", Economics Letters, Vol. 80(1), pp. 105-11.

Haberfeld, Yitchak (1994). "Status Variables in Fixed Effect Models", Economics Letters, Vol. 45(3), pp. 299-303.

Hadri, Kaddour (1999). "Testing The Null Hypothesis Of Stationarity Against The Alternative of A Unit Root In Panel Data With Serially Correlated Errors", Working Paper No. 5, University of Liverpool Management School.

Im, K. S., Pesaran, M. H, and Y. Shin (2003). "Testing for Unit Roots in Heterogeneous Panels" Journal of Econometrics, Vol.115, pp. 53-74.

Kao, Chihwa and Chiang, Min-Hsien (1999). "On the Estimation and Inference of A Cointegrated Regression in Panel Data", Working Paper No. 2, Maxwell School of Citizenship and Public Affairs Syracuse University.

Kwiatkowski, D., P. C. B. Phillips., P. Schmidt and Y. Shin (1992). "Testing the Null Hypothesis of Stationary Against the Alternative of a Unit Root", Journal of Econometrics, Vol. 54, pp. 159–78.

Levin, A., Lin, C. F. and C, Chu (2002). "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties", Journal of Econometrics, Vol.108, pp. 1-24.

McCoskey, S. and Chihwa, Kao. (1998). "A residual–based tests of the null of cointegrationin panel data", Econometric Review, Vol. 17, pp. 57–84.

Maddala, G. S. and S, Wu (1999). "A Comparative Study of Unit Root Tests with Panel Data and A New Simple Test", Oxford Bulletin of Economics and Statistics, Vol.61, pp. 631-52.

Pedroni, P. (1999). "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors", Oxford Bulletin of Economics and Statistics, Vol.61, pp. 653-70.

Phillips, P.C.B and Perron, P. (1988). "Testing for a unit root in time series regression", Biometrika. Vol. 75, pp. 335-46.

Samuel, Bowles., Herbert, Gintis and Melissa, Osborne (2001). "The determinants of earnings: A behavioral approach", Journal-of-Economic-Literature, Vol. 39(4), pp. 1137-76.

Stephen, Dobson and Bill, Gerrard. (1991). "The Financial Performance of the Leeds Engineering Sector", Urban Studies, Vol. 28, pp. 53-64.

Stock, James, H. and Watson, Mark, W. (1993). "A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems", Econometrica, Vol. 61(4), pp. 783-820.

Westerlund, Joakim and Basher, Syed A. (2008). "Mixed Signals Among Tests for Panel Cointegration", Economic Modelling, Vol. 25(1), pp. 128-36.