Energy Crisis and Profitability of Listed Food Producers[1] in Pakistan

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Abstract

This paper applies Panel GMM EGLS Method to a panel of 15 out of 18 listed food producers in Pakistan for the period 2001-10 and attempts to explore the impact of energy crisis combined with energy price escalation on profitability of listed food producers in Pakistan.

Composite energy price index and all firm-specific explanatory variables including lagged profitability, firms' growth, working capital management, efficiency, change in firm size, have positive and statistically significant impact on firms' profitability; the impact of corporate gearing is negative while GDP and rate of inflation are insignificant at the conventional level.

Positive coefficients with change in inflation rate and energy price index signify and confirm that adverse supply shocks combined with restricted firms' output raise food prices and producers' surplus (profit). Our results indicate that producers pass on more than energy price escalation to

consumers; one percent increase in energy price index escalates profitability of listed food producers by 2.25 percent. Producers gain at the cost of consumers' sufferings.

Key Words: Corporate profitability, food producers, adverse supply shocks, producers' surplus, determinants of profitability, partial equilibrium, energy crisis.

1. Introduction

There has been growing concern over the global food crisis that has affected numerous countries including Pakistan. In addition to this, the maladministration and crisis in the energy sector have added to the challenges of poverty, income disparities and the national food security in the country. Recent food and energy price escalation in Pakistan (Appendix 1; Fig.1) has raised concerns among policy advisers about the decline in economic welfare of low income households who spend fairly large fraction of their incomes on food and utility bills. The percentage distribution of monthly consumption expenditures among households in the Household Integrated Economic Survey (2010-11), show that the 3rd, 4th, and 5th, quintiles spend 63.16 percent, 59.89 percent and 46.46 percent of their total income on food, fuel and lighting activities. This study attempts to explore the impact of energy crisis and increase in energy prices on food prices and profitability of the listed food producers in Pakistan and infers some interesting policy implications based on results of this study.

Statistics and Data Warehouse Department of State Bank of Pakistan regularly publishes Financial Statement Analysis of Joint Stock Companies Listed at the Karachi Stock Exchange in Pakistan. There exist an interesting paradox of booming corporate profits (especially of food sector) while Pakistan's economy is facing a recession. There is a strong evidence of booming profits of some listed companies and sectors particularly those with inelastic demand. This is also reflected in the booming Karachi Stock Market (KSE) of Pakistan especially when KSE-100 index is approached the limit of

19000 during the month of April, 2013. Food producers in Pakistan are classified into two categories i.e. sugar producers and other food producers (excluding Sugar producers) in this analysis. We note extremely high (outstanding) profits of the food sector (excluding sugar) like, during 2010, gross profit is 27 percent; return on assets is 26 percent; return on equity is 76 percent; and earnings per share are as high as Rs. 36 per share (Appendix 1; Fig.1,2,3 &4). We also note a rising trend in these profitability measures especially during the recent years. In addition, the food sector (excluding sugar) stands out from the sugar industry, food industry as a whole, all other sectors and the overall corporate sector in terms of its profitability in 2010 (Appendix 1; Fig. 5, 6 & 7).

Such empirical evidence on high profitability of listed food producers give rise to some key questions including:

a. What are the key drivers for such amazing profitability of listed food producers?

b. Why sugar sector, despite being part of the food sector, is not so profitable?

c. Whether firm-specific and macroeconomic/industry-specific factors contribute to high profitability of listed food producers?

d. What are the likely consequences of high profitability of the listed food producers?

This paper attempts to explore the key determinants and consequences of high profitability of listed food producers in Pakistan and answer these questions.

2. Supply and Demand in a Partial Equilibrium Setting

In the context of current circumstances, Pakistan can be described as an

economy of shortages with adverse supply shocks (continuous upward revision of power and gas tariffs, rising prices of oil and petroleum products) combined with restricted output due to load shedding of electricity & gas, disharmony in the society due to poor law & order and security situation in the country and reduced supply of inputs or raw material due to natural calamities like floods & heavy rains. This picture assists us in explaining the outstanding profitability of listed food producers.

In a partial equilibrium setting in Fig. 8 below, suppose a firm faces D_1 and OS_1 demand and supply curves respectively and produces output Q_1 charging price OP_1. Suppose increase in load shedding of electricity and gas, poor situation of law & order situation or a flood like situation restrict firms to produce output at Q_2 rather than at Q_1, then supply curve turns from OS_1 to ODS_2 raising price to OP_2.

$$\text{Initial producers surplus at price } OP_1 = \text{Area } (G + H) \qquad (1)$$

$$\text{Producer surplus at price } OP_2 = \text{Area } (F + G) \qquad (2)$$

$$\text{(followed by output restrict from } OQ_1 \text{ to } OQ_2)$$

Therefore,

$$\text{Net gain in Producer surplus} = \text{Area } (F + G) - \text{Area } (G + H)$$

$$\text{Net gain in producer surplus} = \text{Area } (F-H) \qquad (3)$$

It can be noted that $F > H$ only if demand is inelastic. This net gain in producer surplus would be higher if demand is relatively more inelastic.

$$\text{Initial consumer surplus at price } OP_1 = \text{Area } (F + I + J) \qquad (4)$$

$$\text{Consumer surplus at price } OP_2 = \text{Area } (J) \qquad (5)$$

(followed by output restriction from OQ_1 to OQ_2)

Therefore,

$$\text{Net loss in consumer surplus} = \text{Area} (F + I + J) - \text{Area} (J)$$

$$\text{Net loss in consumer surplus} = \text{Area} (F + I) \qquad (6)$$

Producers take away part of the consumer surplus indicated by the area *F* while *I* is a part of consumer surplus that goes into deadweight loss. *H* is the part of wasted producer surplus. In addition, increase in tariffs of electricity, gas, petroleum and oil consequent to removal of subsidies on buying of IMF program (by present government) have also adverse impact on output and raise prices, thus adding further to the sufferings of consumers. Consequences of such an output restriction combined with adverse supply shocks in the form of low employment opportunities (real incomes) and high food prices (see Fig. 1 also) are certainly catastrophic to households (consumers).

On the other hand, sugar producers could not sustain such gains from adverse supply shocks because they had to bring down sugar price due to the intervention of Supreme Court of Pakistan through its orders. To the best of our knowledge, this is the first study on listed food producers in Pakistan and therefore, is likely to motivate further research and debate on the role of food producers (both listed and non-listed) to explore whether exceptionally high profitability of food producers contributes especially to food inflation, uneven income distribution and poverty in Pakistan which is already one of the considered reasons for terrorism. Non-availability of data on non-listed food producers restricts our analysis to only listed food producers.

Rest of the paper is organized as follows: Section 1 provides literature review. Section 2 identifies data sources, variables and methodology. Section 3 present results and discussion while Section 4 gives conclusion and policy recommendations.
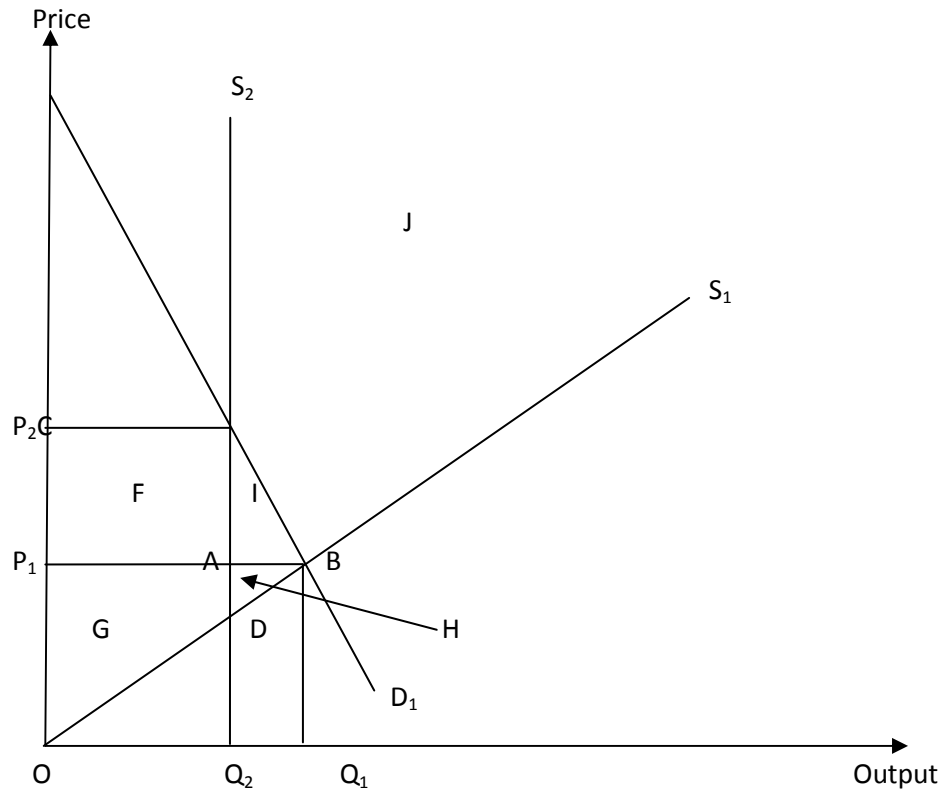
Price

S₂

J

S₁

P₂C

F   I

P₁   A   B

G   D   H

D₁

O   Q₂   Q₁   Output

Fig 9 Implications of Output Restriction

3. Literature Review

Hussain (2012) confirms the negative impact of corporate gearing and positive impact of working capital management, asset turnover for a panel of 75 textile firms listed in Karachi Stock Exchange of Pakistan. Ali (2011) finds that average days in inventory, average days receivable and average days payable have a significant economic impact upon return on assets. Chhapra and Naqvi (2010) show a positive and significant relationship between working capital management and firm profitability in addition to a significant relationship between the cost of production, size (capital), and profitability of Pakistan's textile sector.

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Amjed (2007) confirms the negative relationship between long-term debt and profitability, and the positive relationship between short-term debt and profitability. While the estimations in Stierwald (2010) reveal that almost two thirds of the heterogeneity can be explained by differences across firms (firm characteristics) and that industry effects are of much less importance for a sample of large Australian firms for the period 1995-2005.

Lazaridis and Tryfonidis (2006) establish a statistically significant relationship between profitability and measures of working capital management for a sample of 131 companies listed in the Athens Stock Exchange (ASE) for the period of 2001-2004. Using a sample of 2123 Japanese non-financial firms listed in the Tokyo Stock Exchange for the period 1990-2004, Nobanee and Al Hajjar (2009) prove positive relationship between measures of working capital management and firm profitability.
Raza*et al.* (2011) provide evidence of a significant relationship between firm effects, industry effects, market share and two measures of profitability, i.e., returns on equity and returns on assets. Ammar*et al.* (2003) note that; small, medium, and large firms differ significantly from one another in terms of their profit rate—profitability drops as firms grow beyond USD 50 million in sales. Treacy (1980) identifies a strong negative correlation between firm size and the variance in returns on equity, and a moderate correlation between firm size and average returns on equity while, Whittington (1980) notes the positive relationship between size and profitability is interesting because the larger firm size contributes to the high degree of concentration and monopoly power, and also to efficient cost structure due to scale economies.

Yildirim (2011) concludes that controlling for leverage; low growth-high profitability firms (profit-focused firms) outperform high growth-low profitability firms (growth-focused firms) regarding both directions of their transition to an upper (i.e., high growth-high profitability) state and a lower (i.e., low growth-low profitability) state in subsequent periods. Moreover, controlling for firm type (growth-focused or profit-focused); leverage matters with respect to firm's future performance is weakly supported by 3-year

transition data for top 1000 Turkish firms. Fitzsimmons et. al (2005) point out no evidence of a consistent relationship between growth and profitability and on the longitudinal behavior of the growth profitability relationship a much lower proportion of firms pursuing the growth pathway were likely to achieve above average performance in profitability in future years among Australian firms. Serrasqueiro (2009) concludes that growth in Portuguese companies mean increased profitability.

However, impact of energy prices on corporate profitability has not yet been explored in literature especially in the context of Pakistan. There has also been no previous literature available on profitability of listed food producers in Pakistan. This paper fills up these voids in the literature.

4. Methodology

4.1 Research Design

The following regression model is estimated to assess the impact of explanatory variables on profitability of listed food producers.

$$ROA_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_t + \varepsilon_{it} \tag{7}$$

Where, ROA_{it} denotes return on assets of firm i while t specifies time dimension. $\beta_0, \beta_1, \beta_2$ are unknown constants. X_{it} include a lagged dependent variable and other firm-specific explanatory variables that vary across firms and over time while Z_t is the set of macroeconomic or industry-specific explanatory variables that are constant across firms and vary over time only. ε_{it} is the error term.

Since the regressions include a tagged dependent variable, there is a possibility of endogeneity in the estimated model, therefore, for estimation purpose panel Generalized Method of Moments (GMM) used to account for endogeneity in the estimation of above model. It is an instrumental variable

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approach with the instruments optimally weighted by the variance-covariance matrix (Arellano & Bond, 1991).

4.2 Choice and Description of Variables

Table 1 explains dependent and independent variables used in the study with corresponding symbols and proxies. Explanatory variables include firm specific and macroeconomic variables.

Table 1

List, Symbols and Proxies of Variables

S. No.	Variable	Symbol	Proxy
Dependent Variable			
1.	Return on Assets	ROA	Net profit after tax i.e. Net profit expressed as a percentage of book value of total assets
Explanatory Variables			
A. Firm Specific Variables			
2.	Return on Assets (Lagged)	ROA (-1)	Net profit after tax i.e. Net profit expressed as a percentage of book value of total assets
3.	Size	RMS	Gross sales of a firm expressed as percentage of the gross sales of respective industry.
4.	Firm's Growth	Log (TA)	Logarithm of the book value of total assets
5.	Efficiency	ATO	Asset turnover i.e. Gross sales expressed as a percentage of book value of total assets.
6.	Financial Leverage	CGR	Corporate Gearing Ratio i.e. Book value of long term liabilities expressed as percentage of the book value of total assets.
7.	Working Capital Management	CR	Current ratio i.e Current assets divided by current liabilities
B. Macroeconomic Variables			
8.	Economic Growth	GDPG	Growth rate of GDP
9.	Inflation	INF	Rate of inflation
10.	Energy Price Index	EPI	A composite energy price index calculated based on the commercial tariffs of electricity and gas for industry.

4.3 Data Set

This paper uses secondary data for the period 2001-10 from "Balance

Sheet Analysis (various issues) of Joint Stock Companies Listed on the Karachi Stock Exchange and Hand Book on Statistics of Pakistan Economy (2010) published by Statistics Department of State Bank of Pakistan." The sample of this study covers all 15 out of 18 listed food producers[3] with complete and consistent 10 years data series. The study excludes the firms with incomplete and/or inconsistent data series. Electricity and gas tariffs for industry are available in the Pakistan Economic Survey of Pakistan (Various issues).We develop composite energy price index based on commercial gas and power tariffs compiled in Subhan (2012).

5. Results and Discussion

Summary statistics of these variables are presented in Table 2below. Correlation coefficients are presented in Table 3 to rule out perfect multi-collinearity. Correlation coefficient of current profitability with lagged profitability though not perfect, is fairly high and highlights the positive feedback effect. Based on the matrix of correlation coefficients, perfect multi-co-linearity is ruled out for all other variables.

R^2 is almost 0.74 and DW Statistics is almost 2.0879 in our regression results (Table 4). These results imply that choice of explanatory variables in our profitability model explains 74 percent variation in profitability of the listed food producers and there exists no significant multi-co-linearity or serial correlation among the regressors. Statistically significant influence of lagged (past) profitability on current profitability (at 1 percent) confirms persistence in the profitability of the listed food producers. Regression results of our profitability model shows that high growth (i.e. growth in total assets) of firms has statistically positive and significant (at 10 percent) impact on firms' profitability. Effective working capital management is another statistically significant (at 5 percent) determinant of firms' profitability consistent with the findings of Hussain (2012), Ali (2011), Chhapra and Naqvi (2010), Nobanee and Al Hjjar (2009) and Lazaridia and Tyrfonidis

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[3] Please see list of food producers (Excluding sugar producers) in Annexure A.1.

Table 2
Summary Statistics

	ROA	ROA(-1)	DLOG(TA)	CR	ATO	RMS	CGR	GDPG	D(INF)	LOG(EPI)
Mean	11.98	11.48	0.08	1.23	3.14	5.52	9.93	4.75	-0.04	5.46
Median	7.50	7.50	0.11	1.10	2.30	2.25	3.70	3.90	1.00	5.18
Maximum	62.60	54.10	6.52	2.80	48.10	61.26	58.10	9.00	2.80	6.46
Minimum	-26.60	-26.60	-7.18	0.00	0.00	0.00	0.00	1.70	-3.20	4.69
Std. Dev.	16.71	15.93	1.05	0.58	5.44	11.17	13.59	2.21	2.07	0.57
Skewness	0.48	0.38	-1.81	0.21	6.71	3.62	1.64	0.46	-0.33	0.52
Kurtosis	3.04	2.89	30.87	2.98	53.23	15.68	5.16	2.16	1.59	1.82
Jarque-Bera	6.18	3.91	5362.31	1.25	18358.45	1446.67	104.94	10.42	16.34	16.75
Probability	0.05	0.14	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00
Observations	163	163	163	163	163	163	163	163	163	163

Source: Authors' Calculations

Table 3
Correlation Coefficients

	ROA	ROA(-1)	DLOG(TA)	CR	ATO	RMS	CGR	GDPG	D(INF)	LOG(EPI)
ROA	1	0.7782	0.1283	0.4288	0.2082	0.4672	-0.3669	-0.0349	0.0221	0.0951
ROA(-1)	0.7782	1	0.0358	0.4727	0.1973	0.4164	-0.3754	-0.0308	-0.0058	0.0725
TA	0.1283	0.0358	1	0.0842	-0.0942	0.0541	0.0275	-0.0034	0.0692	-0.0665
CR	0.4288	0.4727	0.0842	1	0.0429	-0.0266	-0.2207	0.0238	0.0676	-0.0170
ATO	0.2082	0.1973	-0.0942	0.0429	1	0.1299	-0.0684	-0.1278	-0.0894	-0.0304
RMS	0.4672	0.4164	0.0541	-0.0266	0.1299	1	-0.1244	-0.0216	0.0296	-0.0730
CGR	-0.3669	-0.3754	0.0275	-0.2207	-0.0684	-0.1244	1	-0.1371	0.0372	-0.0554
GDPG	-0.0349	-0.0308	-0.0034	0.0238	-0.1278	-0.0216	-0.1371	1	0.4754	-0.1754
INF	0.0221	-0.0058	0.0692	0.0676	-0.0894	0.0296	0.0372	0.4754	1	-0.1304
EPI	0.0951	0.0725	-0.0665	-0.0170	-0.0304	-0.0730	-0.0554	-0.1754	-0.1304	1

Source: Authors' Calculations

Table 4
Regression Results

Dependent Variable: ROA
Method: Panel GMM EGLS (Cross-section weights)
Sample 2000 2010
Periods included: 11
Cross-sections included: 15
Total panel (unbalanced) observations: 163
White cross-section instrument weighting matrix
Linear estimation after one-step weighting matrix
White diagonal standard errors & covariance (no d.f. correction)
Instrument list: ROA C ROA(-1) TA CR (ATO(-1)) (RMS(-1)) (CGR(-1)) (GDPG(1)) (INF) (EPI(-1))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C: Constant	-11.9024	4.2957	-2.7708	0.0063
ROA(-1)	0.6136	0.0685	8.9602	0.0000
TA	1.7218	0.9358	1.8398	0.0677
CR	3.4062	1.2712	2.6796	0.0082
ATO	0.2227	0.1106	2.0145	0.0457
RMS	0.3294	0.0763	4.3170	0.0000
CGR	-0.1495	0.0620	-2.4103	0.0171
GDPG	-0.1960	0.1987	-0.9864	0.3255
INF	0.2120	0.1917	1.1057	0.2706
EPI	2.2530	0.8035	2.8040	0.0057

Weighted Statistics			
R-squared	0.7395	Mean dependent variance	16.1454
Adjusted R-squared	0.7241	S.D. dependent variance	17.4741
S.E. of regression	9.7714	Sum squared residual	14608.3600
Durbin-Watson stat	1.8605	J-statistic	9.1645
Instrument rank	11		

Un-weighted Statistics			
R-squared	0.6671	Mean dependent var	11.9767
Sum squared residual	15057.28	Durbin-Watson stat	2.0879

(2006). One percent improvement in working capital management (current ratio) contributes almost 3.41 percent to firms' profitability. Efficiency (Asset Turnover) though has again statistically significant (at 10 percent) impact on profitability, (consistent with the finding in Hussain (2012)).

Positive and highly significant (at 1 percent) coefficient of size (relative market share) confirms the advantage of being big due to cost efficiency (economies of large scale) and market influence (monopoly power) due to inelastic demand for food products. This is contradictory to the results in Ammar et al. (2003), however, confirms those in Raza et al. (2011). Financial leverage however has statistically negative and significant impact on firms' profitability at 5 percent confidence level. The findings in this study contradict the findings in Amjed (2007); however, confirm the findings in Hussain (2012). All firm specific explanatory variables (excluding financial leverage) have positive and statistically significant (at 10 percent) impact on firms' profitability while corporate financial leverage has a negative impact. GDP growth and inflation are insignificant at the conventional level. Positive coefficients of inflation and energy price index confirm the hypothesis that adverse supply shocks along with restriction of firms' output raise price and producers' surplus (profit). It is important to point out that producers pass on more than energy price escalation to consumers; one percent increase in energy price index escalates profitability of listed food producers by 2.25 percent. This also confirms that producers gain due to adverse shocks in supply at the cost of consumers' sufferings.

6.   Conclusion and Policy Implications

This paper uses data for a panel of 15 out of 18 listed food producers in Pakistan for the period 2001-10 and attempts to explore the impact of energy crisis combined with energy price escalation on food prices. Composite energy price index, all firm-specific explanatory variables including lagged profitability, firms' growth, working capital management, efficiency, change in firm size, have positive and statistically significant impact on firms' profitability while the impact of change in corporate gearing (though negative) is significant. However, the impact of GDP growth and inflation is insignificant.

Positive coefficients with changes in inflation rate and energy price index signify and confirm that adverse supply shocks combined with restricted

firms' output due to factors like energy crisis and security situation raise food prices and producers' surplus (profit). The results indicate that producers pass on more than energy price escalation to consumers; one percent increase in energy price index escalates profitability of listed food producers by 2.25 percent. Producers gain at the cost of consumers' sufferings. This in turn is adding to prevalent massive poverty and uneven income distribution which is already one of the considered reasons for terrorism in Pakistan. Therefore, it is a big challenge for the authorities responsible for price regulation and a matter of concern for policy advisers of the world and Pakistan economy.

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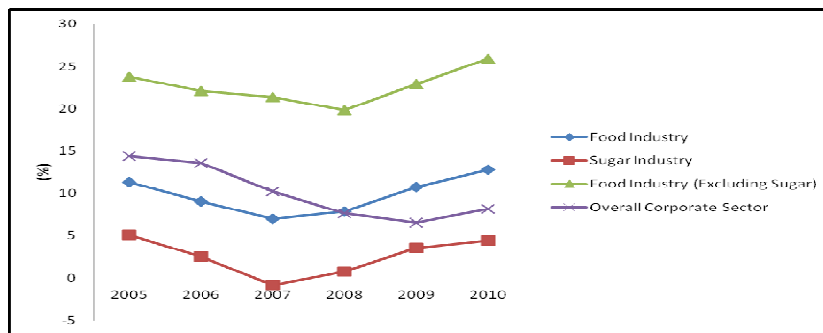**Appendix 1**
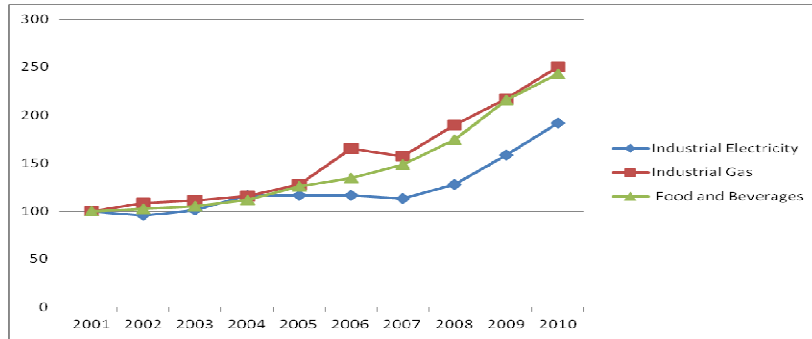
Fig. 1 Energy and Food Price Escalation (Indices)
Source: Economic Survey of Pakistan
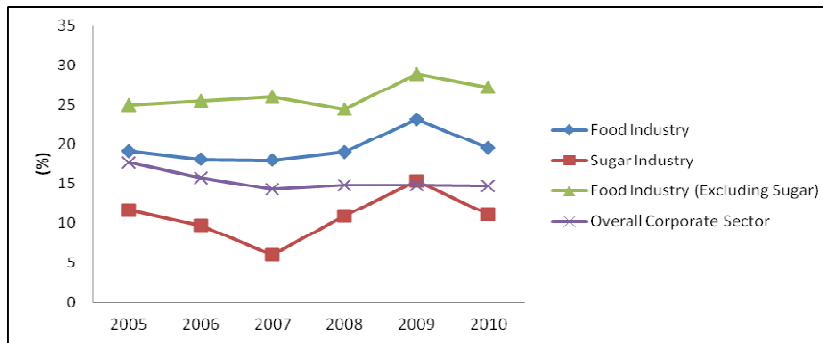
Fig. 2 Gross Profit (%)
Source: State Bank of Pakistan

Fig. 3 Return on Assets (%)
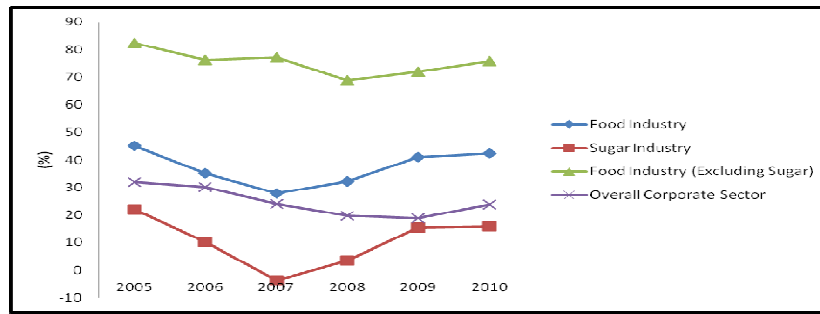Source: State Bank of Pakistan

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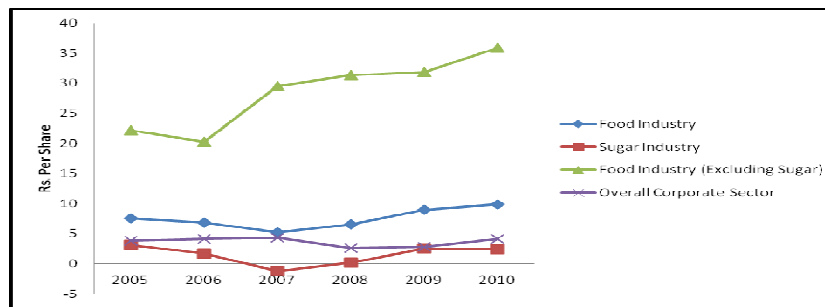Fig. 4 Return on Equity (%)
Source: State Bank of Pakistan

Fig. 5 Earnings per Share
Source: State Bank of Pakistan

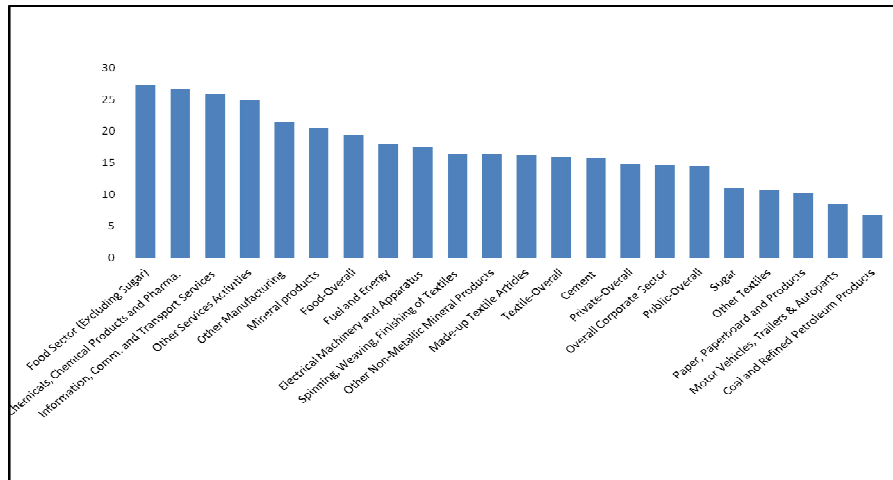Fig. 6 Gross Profit (%) by Sector (2010)
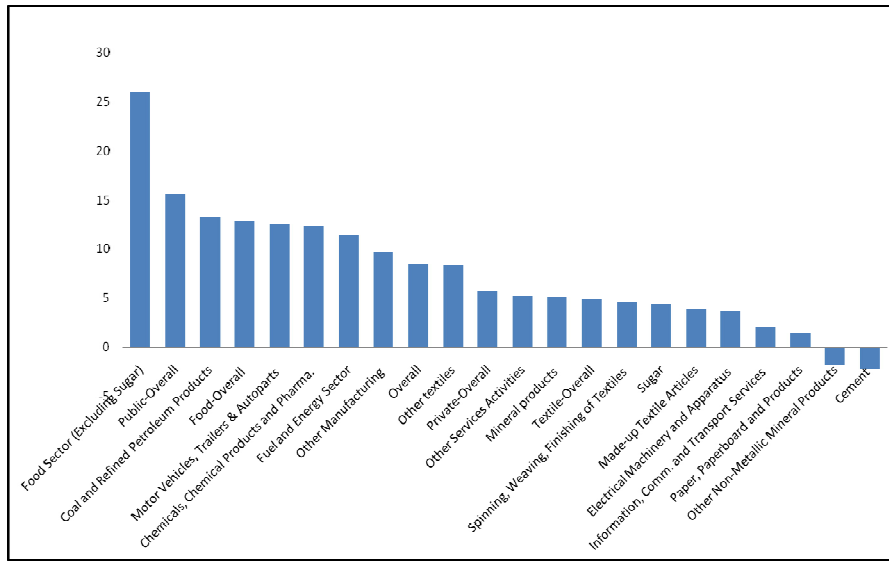Source: State Bank of Pakistan

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Fig. 7 Return (%) on Assets by Sector (2010)
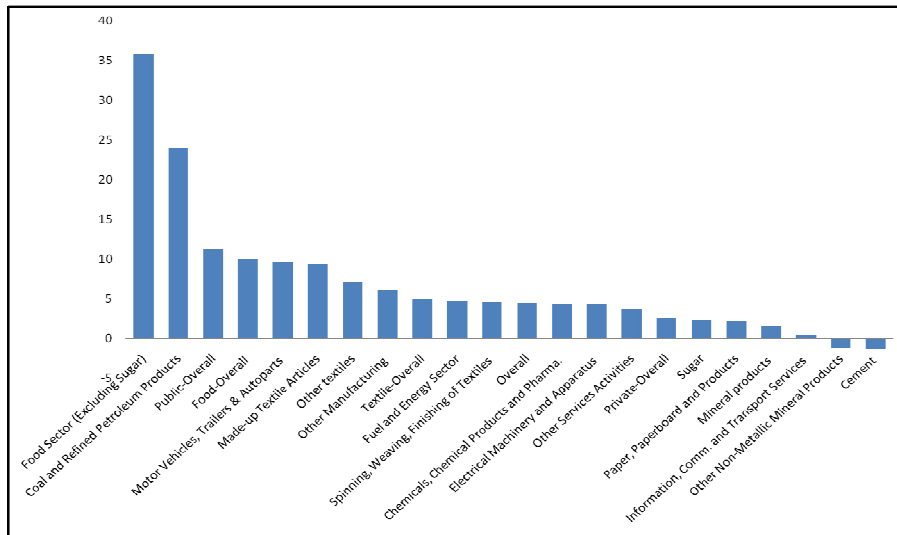Source: State Bank of Pakistan

Fig. 8 Earnings per Share (2010)
Source: State Bank of Pakistan