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Financial Analysis of Industrial Portfolios in Pakistan: A Comparative Analysis of Pre 9/11 and Post 9/11 Period

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Abstract:

This study is intended to measure and compare the Pakistani industries performance as well to measure the impact of September 11, 2001 terrorist attack on Pakistani industries. The performance measures such as Sharpe ratio (1966), Treynor ratio (1965), Idiosyncratic risk, market risk, beta and Jensen's alpha have been used as a tool for financial analysis of industries as well to measure the response of these industries to 9/11 event. Results indicate insurance industry as the best performing industry; Food Beverages and Tobacco and Sugar as second best performing industry; and Household/Personal Goods Paper and Board as third best performing industry, whereas, Textile and related; Telecommunication and Travel and Leisure; and other financials are found worst performing industries. The results also indicate that 9/11 event have significant and positive impact on Pakistani firms.

Keywords: Pakistani Industries, 9/11 terrorist attack, Treynor ratio, Sharpe ratio, idiosyncratic risk, performance measures

I. Introduction

The terrorism is a geopolitical risk which one way or other affects the financial markets of local and global economy. The investors are usually risk averse and the investors' level of risk aversion increases as a result of terrorist attacks. Since the investors are always sensitive about their investment, they need information about the right choices of investment and they need to know the market performance. Specially, the Pakistani investors, who face the worst economy of the country, need special emphasis on their investments and need to know whether the world wide terrorist attacks affect the local industries. They also need information, which of the industries in Pakistan are positively affected by the terrorist attacks and which one are negatively affected by those attacks.

Some of the recent terrorists attacks, considered in the literature for knowing their impact on financial markets, are: September 11 attack on World Trade Center in the United States on 11th September 2001, Bali bombing in Indonesia on 12th October 2002, Madrid in Spain on 11th March 2004, London-United Kingdom on 7th July 2005, and Mumbai India on 11th July 2006 (Ramiah, et al. 2010). However, the attack on World Trade Center (WTC) is considered as one of the biggest attacks and has become the hottest issue for the researchers to know its impact on

financial returns of industries. Keeping in view the fact in mind, this study has also led special emphasis on WTC Attack.

Glaeser and Shapiro (2002) in their article mentioned that it was 11th September 2001, when two airplanes collided with the both towers of World Trade center and as a result the whole Trade collapsed. In addition to this Trade Center the five buildings surrounded by this center also completely destroyed and more than 3500 people crushed in this cause. The total area of office space destroyed was 13.45 million square feet (Bagli 2001) and it was almost 30 percent loss of real estate in downtown area (Heschmeyer 2001) and the area of office space was around 3.6 percent on the Island of Manhattan (Enright 2001).

Past researches in different countries have shown mixed results about the impact of 9/11 event on industry's/ firms performance but in Pakistan no research has been done so far to measure the effect of this event on Pakistani industries. This study, therefore, helps us to find out the industry wise portfolio performance and impact of WTC attack on Pakistani industries. The specific objectives, setup for this study is as under:

- To evaluate the performance of Pakistani industries.
- To compare the Pakistani industries performance and rank the all twelve industries based on the performance.
- To differentiate the each industry's post 9/11 period performance from pre 9/11 period performance.
- To find out the impact of 9/11 event on Pakistani industries.

These objectives have been achieved with the help of performance measures such as, Beta, market risk, Treynor ratio (1965) Sharpe Ratio (1966), and Idiosyncratic risk. The Treynor ratio, Sharpe Ratio and idiosyncratic risk have been discussed in detail in Research and Methodology section.

The section II of this paper focuses on literature review, Section III discusses the Data Sources and Methodology, section IV focuses on the data interpretation and analysis of the results and section V concludes this paper.

II. Literature Review

Chan and Wei (1996) in their papers investigated the effect of political risk on return and risk in financial markets. Ramiah, *et al.* (2010) investigated whether terrorism, which is one of the political risks, affects the returns in foreign markets. Cam (2006) analyzed the impact of 9/11 and other terrorist attacks such as Madrid bombing and Bali on equity markets of the United States. Cam (2006) analyzed that 9/11 event had high impact on US market industries such as telecommunication, defense and water which showed strong positive abnormal returns while leisure, airline and hotel industries which showed strong negative abnormal returns. In addition, Charles *et al.* (2006) examined very high, both temporary and permanent shocks of 9/11 terrorist attack on international stock market. Nikkinen *et al.* (2008) found that there was significant increase in market volatility due to 9/11 terrorist attack, more over their study also discussed that the impact of 9/11 attack on international markets is related to the extent to which each region is integrated with the international market. Cam (2006) and Ramiah, *et al.* (2010) assumed that it is not necessary that investors respond negatively to these terrorist attacks but mentioned that investors only respond negatively when they think that these terrorist attacks would ultimately increase the cost of expected returns. On the contrary, the investors don't respond when they assume that the terrorist activities have no impact on financial

markets. Ramiah et al. (2010) further shed light on his argument that different terrorist attacks can have different effect on the market; moreover different sectors within an economy can have different volatility in returns and risk.

III. Data Sources and Research Methodology

Data of closing monthly stock prices for 150 firms listed on Karachi Stock exchange 100 index (KSE-100) has been collected from DataStream database. The period covered for the study is from January 1993 to January 2013 that is 241 observations in total. The closing monthly stock prices of only 150 firms are selected based on the reasons that database only contained these firms for which the prices were adjusted for merger, stock split, dividends and other corporate actions. The data for these stocks has been organized into 12 manageable industrial portfolios based on characteristics of industries. In addition, the monthly data of closing indices of KSE-100 is collected from Yahoo finance which is used in this study for the purpose of calculating market return. Following the Hanif and Bhatti, 2010; Sipra 2006; and Ataullah 2001, Treasury bill issued by the government is used as risk free rate in this study.

The 12 equally weighted portfolios have been constructed in this study to serve the purpose of comparing the performance of industries by using different measures such as shape ratio (1966), treynor ratio (1965), Jensen alpha (1968), idiosyncratic risk and so on. For comparing the performance of each industry, data was used from January 1993 to January 2013. However to analyze the impact of 9/11 event on Pakistani industries, the data from January 1993 to January 2013 has also been classified into two periods that is Pre 9/11 period and post 9/11. The pre 9/11 period is inclusive of monthly observations from January 1993 to August 2001 and post 9/11 period is inclusive of observations from September 2001 to January 2013.

The performance measures and other related terms used in study are described below:

Return

Monthly log returns of closing stock prices for all the firms are calculated. The Equation-1, given below, helps to calculate the log returns;

$$R_{it} = \text{Ln}(P_t/P_{t-1}) * 100 \quad (1)$$

Where, R_{it} shows the log return of firm i at time t , p_t and p_{t-1} show the monthly closing price of stock for time t and $t-1$ respectively.

The Portfolio return, (Port_{it}) has been calculated with the help of following formula given in equation-2

$$\text{Port}_{it} = \sum R_{it}/n \quad (2)$$

Where Port_{it} shows portfolio return of industry i at time t which is the average log return of all firms of industry i at time t .

Log return of the market, which is the closing indices of KSE-100, at time t is shown in equation-3

$$R_t = \text{Ln}(I_t/I_{t-1}) \quad (3)$$

Where, I_t and I_{t-1} are value of a benchmark stock market index at period t and $t-1$, respectively.

Risk Free Rate

Risk free rate has zero variability in returns. If we buy an asset today with known value of that asset at the end of its maturity, then the asset can be called riskless asset or risk free asset. Treasury bill issued by the government is one of the best examples of risk free rate as it has no variability in returns. T-bill is used as proxy for risk free rate in this study.

Risk

The risk in this study has been calculated by using two measures such as Beta (β) and standard deviation (SD).

Beta (β): shows the co movement of individual stock prices with that of market prices. High beta of individual firm or portfolio industry indicates its high volatility of funds returns with that of market returns and low value of beta indicates low volatility of funds return with that of market return.

Standard Deviation (SD): It shows variation of stock returns from the expected returns.

Both beta and standard deviation show the riskiness of asset, however Treynor ratio (1965) and Sharpe ratio are very helpful models to show the risk return relationship and these are described below.

Sharpe Ratio

William F. Sharpe (1966) proposed a model for portfolio performance measure, which is defined as reward to variability ratio. This ratio tells the tradeoff between reward and volatility, in other words, it is tradeoff between return and risk. The equation-4, given below, gives Sharpe ratio which is the ratio of industry portfolio's excess return and standard deviation.

$$\text{Sharpe Ratio} = (\text{Port}_i - R_f) / \text{sd} \quad (4)$$

Where, Port_i = average portfolio return of industry i over a sample period of time, R_f = Average risk free rate of return for the given time period, and sd = standard deviation of excess returns for the given time period. In equation-4 the difference of average portfolio return and average risk free rate of return is divided by the standard deviation and gives the return earned per unit of risk for i portfolios (where $i = 1, 2, 3 \dots 12$). The higher the sharpe ratio the more attractive is the industry for the investors and vice versa.

Treynor Ratio

In 1965 Treynor proposed a portfolio performance measure. It is similar to sharpe ratio in the sense that it also tells the return per unit of risk but unlike sharpe ratio, which is based on the unsystematic risk, treynor ratio is based on the systematic risk it means it defines reward as a ratio of beta risk. In equation-5 the difference of average portfolio return and average risk free rate of return is divided by the standard deviation which gives the return earned per unit of risk for i portfolios (where $i = 1, 2, 3 \dots 12$). The higher the treynor ratio the more attractive is the industry for the investors and vice versa.

$$\text{Treynor Ratio} = (\text{Port}_i - R_f) / \text{Beta}_p \quad (5)$$

Where, Port_i = average portfolio return of industry i over a sample period of time, R_f = Average risk free rate of return for the given period, and Beta_p = Beta risk for Industry portfolio. The higher the sharpe ratio the more attractive is the industry for the investors and vice versa.

Idiosyncratic risk:

The Investopedia online dictionary defines idiosyncratic risk as the risk that is associated with assets and a small group of assets and has very little or no correlation with the market risk. This risk can be eliminated by diversifying the investment of our assets. The Equation-6 given below describes idiosyncratic risk as the square of standard error

$$\text{Idiosyncratic risk} = (\text{Standard Error})^2 \quad (6)$$

IV. Data Interpretation and Analysis

Table 01

Table 01 given in Appendix is designed to measure and compare the performance of Pakistani industries. The monthly stock returns of 150 firms from January 1993 to January 2013 have been considered in this study that is 241 observations in total. These 150 firms have been organized into 12 equally weighted industry portfolios. The least square method has been used in this case to calculate the alpha, P-value and beta for all twelve respective industries. Regression was run separately for all twelve industries based portfolios, in which excess return on each portfolio was considered dependent variable where as excess return on market was considered independent variable

The beta values show the volatility/responsiveness of industry portfolios to the market. In this case, the beta values of all industries are less than one indicating that all industries are less volatile than the market. However, the beta value of commercial banks industry portfolio, in this case, is 0.9457 which is the highest beta value indicating that as compared to other industries the commercial banks industry is the most volatile. The results of this study indicate Oil Gas and Power Industry as the second most volatile having a beta value of 0.9216, the cement as the third most volatile with a beta value of 0.849 and so on. The column six of this table gives the ranking to the industry portfolios from one to twelve where one represents the industry as most volatile where as twelve represents the industry as the least volatile. For risk averse investors, the beta values conclude that Food Beverages and Tobacco and Sugar; Engineering and Metal Construction; and Household/Personal Goods Paper and Board industries, are most preferable choices for investment as these industries show the least volatility with a beta value of 0.3389, 0.438, and 0.445 respectively. The column seven of this table shows the results of these industries based on market risk. The market risk is also called systematic risk or undiversifiable risk. Beta also measures the systematic risk therefore the results of both beta and market risk give same conclusion i.e the column six and eight give same ranking to all industries based on the riskiness of the industries.

The Idiosyncratic risk, which is also called industry based or unsystematic risk, indicate that Telecommunication and Travel and Leisure; Commercial Bank; Cement; and Household/Personal Goods Paper and Board have the higher industry based risk with a value of 137, 85.83, 68.48 and 66.83 respectively. Likewise Chemical and Pharmacy; and Oil Gas and Power Companies have the lowest Idiosyncratic risk with a value of 14.85 and 16.27 respectively.

Finally the Column eleven and thirteen show the results based on Sharpe ratio (1966) and Treynor ratio (1965). As compared to other performance measures, just discussed, Sharpe ratio (1966) and Treynor ratio (1965) are very useful performance measures as these cover both risk and return at a time. These ratios are also called reward to volatility ratios. The higher these ratios are the better is the industry's performance. The Sharpe ratio indicates insurance industry as the best performing industry with a value of 0.0315. The Food Beverages and Tobacco and

Sugar; and Household/Personal Goods Paper and Board also show better performance in order with calculated values of 0.03 and .00225 respectively. The all other industries show negative Sharpe ratios however Textile and related; Telecommunication and Travel and Leisure; and other financials are worst performing industries in order according to these results. More or less, Treynor ratio also shows the same results as those of Sharpe ratio; however there is slight variation in ranking of industries performances. Sharpe ratio indicate Insurance industry as the best performing where as Treynor ratio indicate insurance industry as the second best performing industry. Sharpe ratio indicated Food Beverages and Tobacco and Sugar as second best performing industry where as Treynor ratio indicate it as the top most performing industry. In brief, insurance; Food Beverages and Tobacco and Sugar; and Household/Personal Goods Paper and Board industries are the better choices for the investors as both Treynor and sharpe ratios are higher for these industries.

Table 02:

Table 02 given in Appendix is designed to differentiate the each industry's post 9/11 period performance from pre 9/11 period performance. The monthly stock returns of 150 firms from January 1993 to January 2013 have been considered in this study but pre 9/11 period covers data from January 1993 to August 2001 that is 104 observations in total where as post 9/11 period covers data from September 2001 to January 2013 that is 137 observations in total. These 150 firms have been organized into 12 equally weighted industry portfolios in order to make the portfolios into a manageable size.

The least square method has been used in this case to calculate the alpha, P-value and beta for all twelve respective industries for both pre 9/11 and post 9/11 period. Regression was run separately for all twelve industries based portfolios, in which excess return on each portfolio was considered dependent variable where as excess return on market was considered independent variable. The monthly stock returns of 150 firms from January 1993 to January 2013 have been considered in this study.

The column number five, eight, eleven, fourteen and seventeen show the difference in the results of post 9/11 period and pre 9/11 period against each industries. The column number 5 shows the differences in abnormal returns of all industries. The differences in between the results of post 9/11 period and pre 9/11 period are almost positive in this case, except for commercial banks as well as for Oil Gas and Power companies. This positive difference indicates that there is an increase in positive abnormal returns and there is decrease in negative abnormal returns as a result of 9/11 terrorist attack.

Likewise, the column number eight of table two also shows the positive differences in betas but unlike Alpha, this is not a good sign for investors and Pakistani industries. Increase in the level of beta creates fear for the risk averse investors, therefore they want safe and secure investment. In this case the industries like Auto and Allied and Transport; Insurance; Food Beverages and Tobacco and Sugar; and Household/Personal Goods Paper and Board have shown a big change in volatility from pre 9/11 period to post 9/11 period. Whereas, Telecommunication and Travel and Leisure; Textile and Related; and Oil, Gas and Power have shown very little change in the volatility with difference values of 0.003, 0.034, and 0.1 respectively.

The Idiosyncratic risk, which is industry based risk, has shown mixed results in this case. For industries like Telecommunication and Travel and Leisure; Textile and Related; Engineering and Metal Construction; Commercial Bank; and Household/Personal Goods Paper and Board there is decrease in Idiosyncratic risk as a result of 9/11 attack, whereas there is increase of idiosyncratic risk for Insurance; and Food Beverages and Tobacco and Sugar industries.

The above measures show that on average there is increase in positive abnormal returns which is good sign but at the same time there is also increase in market volatility, which is not good sign for the investors and industries in Pakistan. These both results are conflicting, and can confuse to understand whether the 9/11 event had positive or negative impact on Pakistani financial industries. The Treynor ratio and Sharpe ratio consider both risk and return at a time so these ratios help us in this regard. For all industries the difference of Sharpe ratio of the two time periods is positive, which indicates positive impact of terrorist attack. The Sharpe ratio indicate that, among all industries, the Auto and Allied and Transport; Household/Personal Goods Paper and Board; Cement; Chemicals and Pharmacy; and Engineering and Metal Construction industries are highly and positively affected by 9/11 attack. On the other hand, Telecommunication and Travel and Leisure; and Oil, Gas and Power industries are positively but less likely affected by this terrorist attack. Treynor ratio indicate that industries like Household/Personal Goods Paper and Board; Engineering and Metal Construction; Auto and Allied and Transport; Cement; and Food Beverages and Tobacco and Sugar are highly and positively affected by this terrorist attack. On the contrary, Oil, Gas and Power industry is least likely but positively affected by this terrorist attack.

V. Conclusions

This study helps us to serve two purposes: to compare each industries performance with one another and to differentiate each industries post 9/11 period performance from pre 9/11 period performance. The Sharpe ratio (1966) indicates insurance industry as the best performing industry, Food Beverages and Tobacco and Sugar as second best performing industry; and Household/Personal Goods Paper and Board as third best performing industry. On the other hand, Textile and related; Telecommunication and Travel and Leisure; and other financials are worst performing industries in order according to the Sharpe ratio results. More or less, Treynor ratio also shows the same results as those of Sharpe ratio; however there is slight variation in ranking of industries performances. Sharpe ratio indicate Insurance industry as the best performing where as Treynor ratio indicate insurance industry as the second best performing industry. Sharpe ratio indicated Food Beverages and Tobacco and Sugar as second best performing industry where as Treynor ratio indicate it as the top most performing industry. In brief, insurance; Food Beverages and Tobacco and Sugar; and Household/Personal Goods Paper and Board industries are the better choices for the investors as both Treynor and sharpe ratios are higher for these industries.

Finally, a comparative analysis of pre 9/11 period and post 9/11 period was made. Results indicate that as a result of September 11, 2001 terrorist attack on World Trade Center, on average, there is increase in positive abnormal returns for most of the industries which is good sign but at the same time there is also increase in market volatility, which is not good sign for the investors and industries in Pakistan. The Treynor ratio and Sharpe ratio which consider both risk and return at a time give better analysis in this regard. For all industries the difference of Sharpe ratio of post 9/11 and pre 9/11 periods is positive indicating that this terrorist attack has positive impact on Pakistani industries performance. The Sharpe give further analysis that, among all industries, the Auto and Allied and Transport; Household/Personal Goods Paper and Board; Cement; Chemicals and Pharmacy; and Engineering and Metal Construction industries are highly and positively affected by 9/11 attack. On the other hand, Telecommunication and Travel and Leisure; and Oil, Gas and Power industries are positively but less likely affected by this terrorist attack. Treynor ratio indicate that industries like Household/Personal Goods Paper and Board; Engineering and Metal Construction; Auto and Allied and Transport; Cement; and Food Beverages and Tobacco and Sugar are highly and positively affected by this terrorist attack. On the contrary, Oil, Gas and Power industry is least likely but positively affected by this terrorist attack.

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Appendix A

Table 01

This table shows the performance of Pakistani industries and ranking of these industries based on the performance

Industry Name	No of Firms	Alpha	P-value	Beta		Market Risk = $\text{Beta}^2 \cdot \text{Var}(r_m)$		Idiosyncratic risk		Sharpe Ratio		Treyner Ratio	
				Results	Ranking	Results	Ranking	Results	Ranking	Results	Ranking	Results	Ranking
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Household/Personal Goods Paper and Board	5	-0.0824	0.875	0.4453	10	16.810	10	66.83	4	0.0022	3	0.045	4
Telecommunication and Travel and Leisure	6	-1.1053	0.144	0.820	4	57.02	4	137	1	-0.065	11	-1.11	12
Insurance	9	0.1627	0.742	0.5335	8	24.124	8	58.8	5	0.0315	1	0.535	2
Engineering and Metal Construction	10	-0.4815	0.249	0.4382	11	16.272	11	41.89	7	-0.050	8	-0.867	9
Auto and Allied and Transport	11	-0.1679	0.686	0.5712	7	27.652	7	41.6	8	-0.004	4	-0.063	5
Food Beverages and Tobacco and Sugar	12	0.1316	0.746	0.3389	12	9.7373	12	39.87	10	0.03	2	0.619	1
Other Financial	13	-0.8068	0.092	0.7308	5	45.259	5	54.82	6	-0.064	10	-0.873	10
Commercial Bank	14	-0.1497	0.648	0.9457	1	75.789	1	85.83	2	-0.039	7	0.073	3
Cement	15	-0.8381	0.109	0.849	3	61.19	3	68.48	3	-0.0573	9	-0.755	8
Oil, Gas and Power	18	-0.5208	0.046	0.921	2	71.9	2	16.2	11	-0.033	5	-0.33	6
Textile and Related	18	-0.6997	0.09	0.531	9	23.93	9	41.26	9	-0.0719	12	-1.086	11
Chemicals and Pharmacy	19	-0.4217	0.09	0.63	6	34.06	6	14.8	12	-0.0395	6	-0.434	7

The column three, four, five, seven, nine, eleven and thirteen in above table show the results of all respective performance measures; however the column six, eight, ten, twelve and fourteen show the ranking of each industry according to the respective measures. The industry with highest value against each measure is ranked one and continues upto twelve where twelve shows the lowest value. The sharpe and treynor ratio which measure reward to volatility ratio, show the best performance of industry with highest value and are given rank one where as these ratios show the worst performance with lowest value of these results and are given rank twelve. On the Contrary; idiosyncratic risk, market risk, and beta show the riskiness of industries so lower these values show the better performance. Ranking one in this case shows that the industry is the riskiest and has therefore worst performance and vice versa.

Table 02

Industry Name	No of Firms	Alpha			Beta			Idiosyncratic risk= Square of SE			Sharpe Ratio			Treyner Ratio			
		pre 9/11	post 9/11	Diff:	pre 9/11	post 9/11	Diff:	pre 9/11	post 9/11	Diff:	pre 9/11	post 9/11	Diff:	pre 9/11	post 9/11	Diff:	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Household/Personal Goods Paper and Board	5	-1.1	0.47	1.54	0.34	0.54	0.21	71.2	61.8	-	-0.2	0.12	0.28	-4.2	2.04	6.24	
Engineering and Metal Construction	10	-1.0	-	0.77	0.33	0.54	0.21	48.3	35.7	-	-0.2	0.05	0.23	-4.1	0.70	4.82	
Auto and Allied and Transport	11	-0.9	0.02	0.92	0.38	0.75	0.37	38.9	38.7	-	-0.2	0.10	0.28	-3.3	1.21	4.55	
Cement	15	-1.5	-	1.15	0.78	0.90	0.12	63.3	66.9	-	-0.2	0.06	0.27	-3.0	0.73	3.73	
Food Beverages and Tobacco and Sugar	12	-0.2	0.2	0.45	0.23	0.45	0.22	7.81	22.4	14.6	-0.1	0.12	0.18	-2.1	1.62	3.73	
Other Financial	13	-1.1	-	0.79	0.63	0.83	0.20	53.5	55.0	1.49	-0.2	0.02	0.19	-2.7	0.23	2.97	
Chemicals and Pharmacy	19	0.61	-	0.42	0.189	0.562	0.711	0.149	14.51	14.48	0.03	0.17	0.059	0.232	2.11	0.587	2.697
Telecommunication and Travel and Leisure	6	-1.3	-	0.96	0.34	0.82	0.82	0.01	202	90.4	-112	-0.1	.001	0.13	-2.6	0.02	2.63
Textile and Related	18	-0.8	-	0.65	0.15	0.51	0.54	0.03	54.6	31.7	22.9	-0.1	-0	0.14	-2.5	-0.01	2.58
Insurance	9	-0.01	0.05	0.06	0.41	0.65	0.24	25.8	84.4	58.5	-0.1	0.08	0.16	-1.1	1.26	2.30	
Commercial Bank	14	-0.1	-0.3	-0.16	0.89	1.01	0.12	32.3	20.8	-11.	-0.1	0.1	0.19	-1.2	0.91	2.07	
Oil, Gas and Power	18	-0.2	-0.8	-0.69	0.88	0.97	0.1	17.8	14.7	-3.1	-0.1	0.03	0.14	-1.2	0.28	1.52	
Average		-0.5	-0.5	-0.02	0.68	0.79	0.11	57.8	42.8	-15.	-0.1	0.04	0.16	-1.8	0.51	2.30	

This table shows the comparative analysis of Pakistani industries. Both results of Pre 9/11, which is before the 11th September 2001 terrorist attack, and post 9/11, that is after this terrorist attack, are shown under each performance measure. The differences of post 9/11 and pre 9/11 period results are calculated for better analysis.