FIRM SIZE, EXCHANGE RATE AND EXPORTS PERFORMANCE:
A FIRM LEVEL STUDY OF PAKISTAN'S MANUFACTURING SECTOR

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IN THE NAME OF ALLAH
THE MOST MERCIFUL AND GRACIOUS
ALL PRAISED BE TO ALLAH

DEDICATED

TO

TO MY REVERED PARENTS

DECLARATION

I solemnly declare that this research work is written by me in partial fulfillment for the degree of MASTER OF PHILOSOPHY IN ECONOMICS**.** I also affirm that this thesis has not been submitted, either in the same or different form, to this or any other university for a degree.

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Roll No 16
Session 2010-12

CERTIFICATE

It is hereby confirmed that this thesis is based on the research undertaken by Mr. Asad Abbas and it is also verified that the research work has not been previously presented for a higher degree. Mr. Asad Abbas has done this research work under my supervision. He has fulfilled all the requirements and is qualified to submit the accompanying thesis for the degree of Master of Philosophy in Economics.

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Asad Abbas

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

Background of the Study and Statement of the Problem

1.1 Introduction

It is the age of globalization and each country is striving to grasp the export-led phenomenal growth. Exports being an engine of economic growth accelerate the process of development. In the realm of exports, domestic firms can reap economies of scale and profitability by more internationalization and globalization. Escalation in exports produces more foreign exchange earnings and permits the country to import the necessary raw material and capital goods to achieve development needs. Export concentrated countries acquire more economic efficiency on account of advanced technology, competition and learning by doing [Krugman, 1984].

In fact, exports are the sources of many other positive externalities such as generating employment opportunities, improving production chains and creating innovation and competitiveness [Braga and Willmore, 1991; Tybout, 1995; Czinkota, 1999; Tookey, 1964; Leonidou *et al*. (2002); Din et al., 2009]. Thus, exports enhance the economic efficiency and productivity gains of the countries by getting technological transfer and diffusion.

Mostly East Asian countries along with China and India have adopted the export-led growth strategy with more economic integration to achieve growth targets. This gives the insight to the developing countries' policy makers to give more attention to exports in their development agendas.

The export performance[1] of domestic firms is very critical for developing countries like Pakistan to address their economic challenges. Pakistan is focusing to expand its exports but fail to get a

[1] See Leonidou *et al*. (2002) for definition of export performance.

loin's share in the World market due to many reasons e.g. less diversification of exports, semi-manufactured goods, narrow export base, outdated technology and machinery, devaluation, increase in the sick indusial units, technical barriers, political instability etc. So due to aforesaid factors, Pakistan's exports have become uncompetitive. In the face of the bouncy efforts put by government, exports to GDP ratio in Pakistan remained the same over the years and share in world exports is 0.13 percent [Din et al., 2009].

In this backdrop, it is imperative to investigate the export performance of Pakistani firms. Various studies[2] have identified numerous factors that are vital to analyze the export performance of firms. The variables that have used in the literature as determinants of export performance include: firm size, technology level, export experience, foreign market knowledge, export marketing strategies, distribution capabilities, customer relation and warranty, management commitment, perception and orientation, research and development expenditures.

Pakistan is a developing country and facing many economic problems. An export led growth strategy can be a better choice to overcome the economic challenges. For this, exports performance must be better. Thus, keeping in view of the above discussion, this study is concentrating to explore the relationship among firm size, exchange rate and export performance by using the secondary data.

1.2 Significance of the Study

The empirical literature suggests that many studies have been conducted to explore the determinants of exports at macro level but rare studies have been found (specifically for Pakistan) that have used the firm-level data to investigate the export performance. We have used

[2] See Perkett, 1963; Tookey, 1964; Cavusgil & Navin, 1981; Axinn, 1988; Samiee & Walters, 1990; Leonidou 2002; Barua & Chakraborty, 2010; Toften, 2005; Ortega & Vera 2005; Nazar, M. S., & Saleem, H. M. N. (2011);

the firm-level data to determine the exports performance of Pakistan and to the best of our knowledge; it is the first study on the relationship between firm size and export performance of manufacturing firms.

We have also analyzed the effects of exchange rate on the firms' exports by constructing exchange rate indices for exports and imports which has not been formed earlier in Pakistan. It is also a contribution of this study that none of the previous studies has formulated exchange rate indices for Pakistan to examine the export performance. In this regard, the findings of the theoretical model developed by Akbar (unpublished) have been empirically analyzed.

Furthermore, a concentration index has been constructed and its impacts on export performance have been observed to explore that whether the domestic monopoly can outperform the competitive firms in the international export market. Such type of study has never been conducted for Pakistan. Finally, many other important factors such as global economic conditions, domestic and foreign prices have been included in the estimation to encapsulate the effects of such factors at firms with diverse characteristics.

1.3 Objectives of the Study

The main objective of the study is to examine the relationship among the firm-size, exchange rate and exports performance of Pakistan. The specific objectives are as to:

1. Examine the trends and magnitude of exporting firms in manufacturing sector
2. Analyze the effects of firm size and exchange rate for exports on firm-level export performance.
3. Explore the effects of firm size and exchange rate for imports on domestic sales.
4. Investigate the effects of economic conditions of our trading partners on Pakistani firms' exports performance.

5. Access the role of domestic monopoly in export performance.
6. Determine the effects of firm-specific characteristics on export performance.

1.4 Structure of the Study

The organization of the study is as follows. Chapter 1 provides background of the study and statement of the problem that includes significance of the study, objectives of the study and structure of the study. Chapter 2 traces out the review of literature on firm-size and export performance and exchange rate and export performance. Chapter 3 deals with trends and performance of Pakistan's exports-based industries in manufacturing sector. Chapter 4 gives theoretical model, data and empirical specifications. Chapter 5 presents model test, results and discussions. Finally in chapter 6, conclusion and policy recommendations have been offered.

Chapter 2

Review of Literature

2.1 Introduction

Exports are considered an important ingredient of economic growth. Most of the countries are now focusing their exports by changing its structure, concentration and direction. This has authenticated the hypothesis of export-led growth. Among many other factors, firm-size and exchange rate are the vital factors that can influence the export performance of a country. So, this chapter has been planned to review the various studies on firm-size, exchange rate and export performance. Section 3.2 is devoted for the studies that highlight the relationship between firm-size and export performance. The studies on exchange rate and exports have been reviewed in section 3.3. Finally in section 3.4, we have presented the concluding remarks.

2.2 Studies on Firm-size and Export Performance

In this section, we have concentrated on the assorted studies that have examined the relationship between firm-size and export performance. Mostly studies show the positive association between firm-size and export performance but some studies reveal the negative relationship as well.

Archarungroj and Hoshino (1988) investigated the impact of firm size (small, medium, and large) on export performance and attitudes for Thailnd. They took a random sample of 500 manufacturing exporters. The variables used for export performance included export intensity, export earnings ratio, export growth, expected export growth, export experience, and export market coverage and data on these variables were collected through mailed questionnaire. For purpose of analysis, Both one-way analysis of variance (ANOVA) and Kruskall-Wallis H tests were conducted to assess that whether the export performance and attitudes differed significantly

among exporting firms of different sizes. The study concluded that smaller exporting firms in terms of sales volume exported more and earned more from export business than did larger exporting firms.

Bonaccorsi (1992) reported different studies and Italian data that are relevant to prove or negate the proposition that export intensity is positively correlated with firm size. He focuses on three different measure of firm size, namely the number of employs, company export to sale ratio and total asset of the firm. The studies that he documented give mix result on the size-export relation in case of Italy. According to him there are two problems with the existing view on the relation between firm size and export intensity. The first one is the assumption that only size cause export performance with no reverse effects and the second is the wrong specification of the models. He argues that the existing theory which state that larger firm is in a better position to export is not well developed and is incomplete. The statistical data that he documented over the period of 1972-87 suggest that the small firm (Italian SMEs) has performed quite well at the international market negating the hypothesis that firm size is positively related with it export performance

Calof (1994) analyze the relationship between firm size and export behavior. He used 14072 Canadian manufacturers' firm data taken from part of the Canadian Federal Government's Business Opportunity Sourcing System (B.O.S.S). Writer focused on different measures of export behavior, export intensity, number and nature of countries exporting, propensity to export and stage in the internationalization process. This study found positive link between size and firm's propensity to export. Calof (1994) also found positive and significant relationship between firm size (Sale and number of employees) and export behavior variables (no of market exported to, specific market served, export stage and export intent and year of exporting).

Papadogonas et al. (1999) studied the determinants of export behavior in Greek manufacturing sector using cross sectional data from 1652 firms in 1999 and Tobit regression model. The firm level data of sale turn over, employment, labor cost, export was taken from Greece manufacturing survey. Using the data, they found that firms that have large size, lower unit cost and low capital to labor ratio have higher propensity to export. The study also concluded that export propensity of the firms are positively affected by firm size and R&D intensity and negatively affected by capital intensity and labor cost. Moreover the study also indicated that firms with low labor cost were the main exporter in the Greek manufacturing industry.

Moen (1999) reported the relationship between Firm Size, competitive advantage and export performance. Author utilize the data taken from KOMPASS Norway list and divide data into three groups (namely micro firms, small firms and medium-size firms) on the basis of Annual turnover and number of employees in each firm. The Writer addressed three questions regarding firm size and exports in Norway. First, what is the relationship between firm size and export performance? Second, competitive advantages are different for firms of different sizes. Third, was there different export motivation for different sized firms? Result indicated that there was no relation between export performance and firms' size. 5 out of 6 possible relations were not significant. Smaller firms have technological advantages over the micro-size firms' but were weaker on all other grounds (prices, economies of scale and resource constrained etc). As for as the export motivation was concerned, his study indicated that larger firms have reactive motive but for smaller firms' proactive and external motives are more important.

Dean et al. (2000) investigated the firm characteristics, Strategy and Export performance relationship. They were interested in analyzing that why some New Zealand small manufacturing firms experience better export performance than others. Export performance was measured by

external influences (environment) and internal influences (firm competencies, firm characteristics and strategy). Primary data was obtained from Canterbury Manufacturers Association (CMA).This study showed positive and significant relationship between export performance (measured by annual export sale, exporting as percentage of total sales and export growth) and firm characteristics (annual sale as measure of size and number of years in business). Perceived level of export barriers (foreign restriction and standard, Lack of focus and commitment on foreign market) also influence the firm characteristics and exports. Results indicated that foreign restriction and standard, Lack of focus and commitment on foreign market were more imperative than first for high export performance.

Wolff and Pett (2000) examined the internationalization of small firms. The data used in this study was obtained from questionnaire of 157 small firms of U.S. They checked the relationship between firm size and export intensity (ratio of export sale to total sale). By using analysis of variance (ANOVA) technique, results of this study indicated that different size firm, in fact, approach export in different ways. The relationship between sale and size is positive but there was a negative relation between size and export intensity. According to them, empirical findings that describe a direct relationship between firm size and export intensity are loyal of the stage theory of internationalization. On the other hand the finding of negative, mixed or no relationship between size and exports are supportive of resource-based theory of firm.

Joachim Wagner (2000) studied the relationship between firm size and direct exports of Canadian firms using data from a large comprehensive survey of German manufacturing establishments. For this purpose a sample of four industries with a sufficient number of firms including stone, clay, pottery and glass industry (80 firms), mechanical engineering industry (101 firms), lumber and wood products industry (85 firms), and food, drinking and tobacco

industry (82 firms) were selected randomly. To investigate the relationship, the Authors have estimated an empirical models for different industries separately using OLS, TOBIT, BETA and the quasi likelihood method introduced by Papke and Wooldridge (1996).They found inversely u-shaped relationship between firm size and exports for the mechanical engineering industry, lumber and wood products industry.

Sterlacchini (2001) in a firm level study examined the determinants of export performance of Italian manufacturing firms. The study revealed that the factors of exports performance varied in line with the firm size and the firm size was measured by total sales. Small size firms were found more significant in their export performance. So, the relationship between firm size and export performance was inverse-U shaped in the case of small firms. For medium size firms, the relationship between firm size and export performance was not significant while for large size firms, U-shaped curve was appeared. The author concluded that the export performance of the small size firms than the medium and large size firms. The reason of low export performance of medium and large size firms was subcontracting record. It was also pointed out mostly Italian SMEs produce and sell for domestic contractors.

Gabbitas and Gretton (2003) give some empirical evidence on firm size and export performance for Australian firms. They used the data of Business Longitudinal Survey over the period of 1994 to 1998. They addressed explicitly the relationship between the firms' domestic base (measured by domestic-market sale), overall firm size (total sale, employment and total asset) and export performance. They applied two types of framework for the regression analysis namely binary choice analysis (logit model) and panel analysis (fixed effect model). The result of panel data model indicated that if export performance is calculated by value of export then the coefficient of domestic base is not statistically significant but this coefficient is significant and negative after

controlling for other factors, particularly export intensity. The coefficient of overall sale supported the proposition that export performance (value of export) is positively correlated with firm size. But the overall sale has no significant effects on export intensity after controlling for other factors. Whereas the binary choice model showed that domestic sale size and overall firm size were positively associated with export performance.

Mittelstaedt and Ward (2003) studied the effect of Internal and External Scale Economies on U.S. manufacturers' decisions to export. For this purpose, a sample of 2,777 firms, across 87 industries, was selected randomly. Three sets of regressions were conducted. Initially, regressions were conducted to assess the effects of internal and external scale economies on export decisions. The effects of urbanization and localization were examined for micro, small, medium and large firms. Finally, industry specific effects for 87 different 3-digit industries were examined. The study found a significant positive relationship between firm size and the propensity to export. Moreover the results of the study indicate that firm size affects the choice to make exporting a part of a firm's business strategy.

Barua et al (2010) developed a static partial equilibrium model where the profit maximizing firm acts as price taker in the international market and as a oligopolistic in the domestic market. From the first order condition of profit maximization they derived different propositions with different implications. Among this one proposition was that if marginal costs of firms are same than they will produce and export same level of output. But if marginal costs differ, the lower cost firm will produce and exports larger amount of output as compared to inefficient firms that is they have predicted positive relation between size of firm and its exports volume. They have empirically checked their propositions by using firm level data of Indian manufacturing firms

from 1990 to 2008. Total assets were used as measure of size and its coefficient was found positive and significant.

2.3 Studies on Exchange rate and Export Performance

In this section, we have reviewed the studies that have explored the relationship between exchange rate and export performance. Almost all the studies have inferred the negative relationship between exchange rate and export performance.

Roy (1991) investigated the determinants of export performance of Bangladesh. For the purpose of empirical analysis, data was taken from 1976 to1987. World demand and relative export price were include as demand side determinants of export while variables like effective rate of assistance (ERA), exchange rate, non-price factor (process of learning), government policies, export diversification were considered as supply side factors of export growth. Econometric estimations, incorporating supply and demand side factors to explain export performance, demonstrate that the world demand, overall exchange rate, trade weighted exchange rate, efficiency index, effective rate of assistance and non price factors are significant determinants of export performance. The positive and significant coefficient of the exchange rate indicates that devaluation has some positive effect on the exports performance of Bangladesh.

Hassan and Tufte (1998) investigated relationship between Exchange rate volatility and aggregate export growth in Bangladesh. A sample of monthly observations on the real value of Bangladeshi exports, the real volume of world trade taken as the sum of imports and exports, price index for Bangladeshi exports, price index for world trade and measure of Bangladeshi exchange rate volatility for the period July 1977 -January 1992 was considered. Error correction and Cointigration techniques were used to estimate and test hypothesis about short and long run relationship among variables .They found that in the long run, Bangladeshi export growth was

driven by the volume of world trade, and was inelastic and negatively related to the volatility of Bangladeshi exchange rates.

Majeed and Ahmad (2006) analyzed the determinants of exports in developing countries using panel data of 75 countries for the period 1970-2004. The data on Exports, Foreign Direct Investment, gross domestic production, Annual percentage growth rate of GDP, National savings, Official development assistance, indirect taxes, real exchange rate, Number of televisions, Number of telephones, Industry value added and total labor force have been taken from world development indicators. The study showed that GDP and GDP growth rates had positive effects on exports. The effect of FDI on exports was found positive but insignificant. It was also found that depreciation of real exchange had positive effect on exports. The study further identified that industrialization significantly promoted exports.

Robert et al. (2007) investigated relationship between Exchange Rates and Exports using panel data of exporting firms of Japan for the period 1982-1997. The sample of firms was selected from Japanese four digit export industries. They estimated a monopolistic competition model of exporting firms, and showed that the exchange rate elasticity of exports is significantly negative at both firm and aggregate levels. They also identified the preferences and technology parameters and found the importance of decreasing returns to scale and the high elasticity of substitution among consumption goods in determining the magnitude of this elasticity.

Hsu et al. (2007) graphically analyzed the effect of exchange rate changes on industry profitability and firm exports volume for Taiwan. According to them depreciation of domestic currency would force the firm to produce less quantity due to higher prices of imported inputs but the effect of depreciation on exports of individual firm is not clear in their model.

Sanderson (2009) analyzed the impact of exchange rate changes on firm production and its trade in New Zealand. He found that exchange rate changes affects both the cost of important intermediate inputs and the prices of export goods received by firms (real appreciation inhibiting export opportunities while real depreciation increase the cost of production). Results indicate that New Zealand firms are Price-takers and are not able to they avoid the exchange rate volatility. Results also suggest that bilateral exchange rate with the destination country fails to reflect the realities of exchange rate risk.

Veeramani (2008) studied the Impact of exchange rate appreciation on India's Exports for the period 1960-2007. He found that appreciation of the REER lead to a fall in the dollar value of India's merchandise exports. He also found that the gain from keeping the REER constant was relatively small. Moreover the study also concluded that a fall in the rate of growth of India's real GDP or that of world exports exert a much greater downward pressure on the rate of growth of India's exports as compared to the downward pressure from the REER appreciation.

Mustafa and Nishat (2004) empirically investigated the effect of exchange rate volatility on exports growth between Pakistan and leading trade partners using quarterly data from 1991:3 to 2004:2. The countries included in the study were SAARC (India and Bangladesh), ASEAN (Singapore and Malaysia), European (UK), Asia-Pacific (Australia and New Zealand) and North America (US). Using Cointegration and Error Correction techniques, the study concluded that the volatility of exchange rate had negative and significant effects, both in the long run and short run, on export with major trade partners namely UK and US. Similar pattern was observed in case of Australia, Bangladesh, and Singapore, where the volume of trade with Pakistan was comparatively consistent and less volatile. The relationship between exports growth and exchange rate volatility for India and Pakistan was observed only in long run perspective.

However, for countries like New Zealand and Malaysia no empirical relationship was observed between export growth and exchange rate volatility.

Shuangshuang (2012) investigated the impact of real effective exchange rate and inflation on export performance for Switzerland. The data used in his study was obtained from World Bank and Global financial data for 1978 to 2011. The result of his paper indicated that real effective exchange rate appreciation negatively affected the export performance of the same year with statistical significance while its effect in subsequent years is negligible.

Cheung and Sengupta (2012) investigated the impact of exchange rate movements on exports. For the purpose of analysis they focused on exporting firms between 2000 and 2010. Firm level data were taken from Center for Monitoring Indian Economy (CMIE). Empirical analysis indicated that currency appreciation and currency volatility have strong and significant negative impact on firms' export shares. While the firm-level accounting information and other macro variable has limited implication. Indian firms respond asymmetrically to exchange rates changes. Those Indian firms which have smaller export shares tend to have a stronger response to both REER changes and volatility. Firms that export services were more affected by exchange rate changes as compare to those exporting goods.

Srinivasan and Kalaivani (2013) investigated the impact of exchange rate volatility on the real exports in India using time series data for the period of 1970-2011.The data set comprised of observation on India ,s export of goods and services, real Gross Domestic Product, real exchange rate, real exchange rate volatility and the world GDP. They used Autoregressive Distributive Lag (ARDL) technique proposed by Pesaran et al. (2001) to analysis the relationship between exchange rate volatility and real export. They found that real exports are cointegrated with exchange rate volatility, real exchange rate, gross domestic product and foreign economic

activity. Moreover, they identified that the exchange rate volatility had significant negative impact on real exports both in the short-run and long-run, implying that higher exchange rate fluctuation tends to reduce real exports in India. In addition, real exchange rate changes were found to have negative short-run and positive long-run effects on real exports.

2.4 Conclusion

In this chapter, we have reviewed the studies focusing on firm-size, exchange rate and export performance. The studies on firm-size and export performance indicate the positive relationship. Some studies have also reported negative relationship between firm-size and export performance and they have given diverse reasons for this type of conflicting result that is against to common belief of positive relation between firm-size and export performance. The important factor is the exchange rate that affects the exports. There is consensus among the researchers that exchange rate appreciation negatively influences the exports of a country.

Chapter 3

Trends and Performance of Pakistan's Manufacturing Exports

3.1 Introduction

Exports are considered a foremost source of economic growth. These influence many macroeconomic variables e.g. employment, balance of payments, distribution of income, foreign exchange etc. This chapter would explain the trends and performance of Pakistan's exports-based industries in manufacturing sector. In section 3.2, we would exhibit the some descriptive statistics along with graphs to analyze magnitude and the direction of changes of various variables related with exports for the time period of 1998-2011. Finally, in section concluding remarks have been offered.

3.2 Magnitude and Direction of Pakistan's Manufacturing Exports

To investigate the trends and performance of exports-based industries in the manufacturing sector, we have focused on six variables: export sales ratio, domestic sales ratio, concentration ratio, profit sales ratio, capital output ratio and total assets. All the variables are in percentage except total assets. In Table 3.1, the behavior of these variables is displayed. The bottom two rows indicate the average and standard deviation of the variables. The first column of the table shows the years whereas the second column exhibits the exports sales ratio. If we analyze the column of export sales ratio, it shows that in 1998, exports sales ratio is the highest i.e. 31.27% whereas it is zero in 1999 and 2000. It remains 15% in 2001 to 2003. After that, it is gradually increasing from 12% to 23% till 2010 then it falls to 19.70% in 2011. The overall average of export sales ratio is 14.82% and standard deviation that suggests the spread around the mean is 8%.

Table 3.1: Behavior of Different Variables of Exports-based Manufacturing Sector (Sampled Industries)

Years	Export Sales Ratio (%)	Domestic Sales Ratio (%)	Concentration Ratio (%)	Profit Sales Ratio (%)	Capital Output Ratio (%)	Total Assets
1998	31.27498	153.6183	67.07137	31.27498	2120.717	404402
1999	0	153.2116	67.93858	12.16055	2735.144	415046
2000	0	146.784	68.33968	12.9454	265.6207	439343.6
2001	15.88511	134.6577	69.35713	12.33282	132.2113	445474
2002	15.40676	125.433	69.80267	10.32782	239.1127	461640
2003	15.61954	136.4366	70.89481	8.58473	103.1743	490774.4
2004	12.05187	179.4429	71.89062	-11.7067	142.944	578178.4
2005	13.74251	153.4157	71.80035	9.98143	181.5099	660853.3
2006	13.25415	190.2831	73.01992	1.095322	407.9842	817079.8
2007	14.31094	136.4522	74.45847	7.352766	179.4656	920684.1
2008	14.78057	101.071	74.6117	-5.87442	334.4173	1132020
2009	17.75221	102.398	74.50057	-0.56884	579.0632	1214997
2010	23.80788	94.60581	78.05841	39.12417	18010.3	1271078
2011	19.70853	90.76802	78.21431	-23.9643	27209.84	1396902
Average	**14.82822**	**135.6127**	**72.1399**	**7.361835**	**3760.107**	**760605.2**
S.D	**8.02382**	**30.4839**	**3.535284**	**15.93027**	**8225.86**	**360866.4**

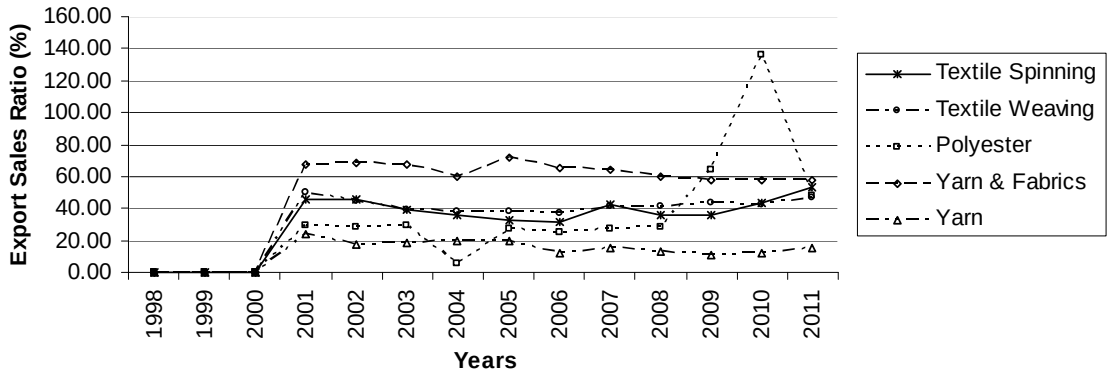
Source: Author's calculations

We have split the sample industries of manufacturing sector in two groups i.e. textile-based industries (Textile Spinning, Textile Weaving, Polyester, Yarn & Fabrics and Yarn) and non-textile based industries (Cement, Paper and Board, Sugar, Chemical, Engineering, F&D Products, Fuel & Energy, Air Lines, Foam and Power) for convenience graphical analyses.

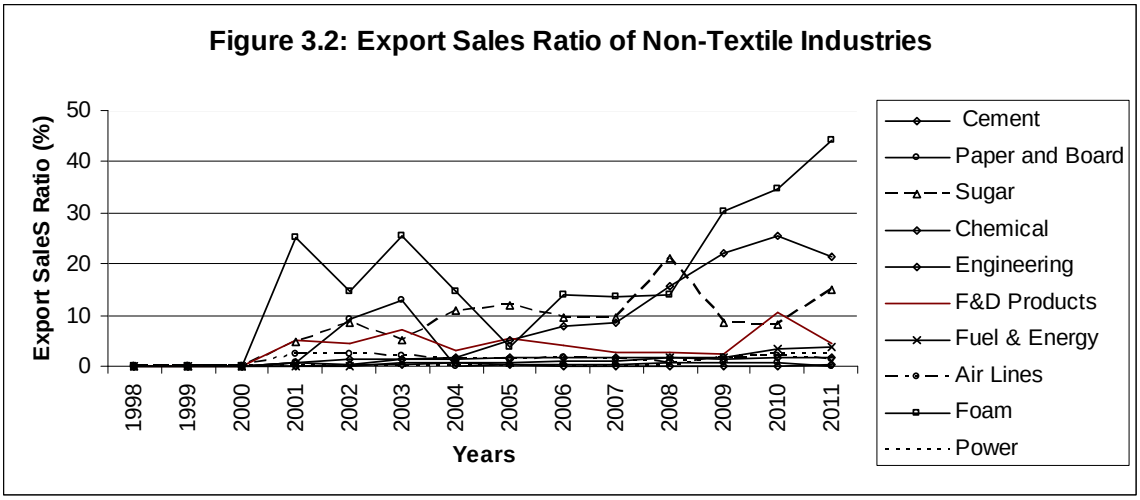
Exports sales ratio of individual industries has been shown in Figure 3.1 and 3.2. If we take a look of Figure 3.1, it gives an idea that about the export sales ratio of textile based industries. It is evident from the figure that exports sales ratio remained stable over the period except the polyester industry that has stability up to 2008 and after that it has sharp rise in 2009 to 2010. Looking at Figure 3.2, the export sales ratio of the non-textile industries we can infer that

approximately all the industries have upward export sales ratio except some industries i.e. Engineering, F&D Products, Fuel & Energy, Air Lines, and Power. The industries wise distribution of export sales ratio demonstrates that (see Table A1 in appendix A) Yarn & Fabrics industry has the highest export sales ratio with average of 49.80 percent, followed by Textile weaving with average of 33 percent and Polyester industry with average of 32.01 percent respectively.

Figure 3.1: Export Sales Ratio of Textile based Industries

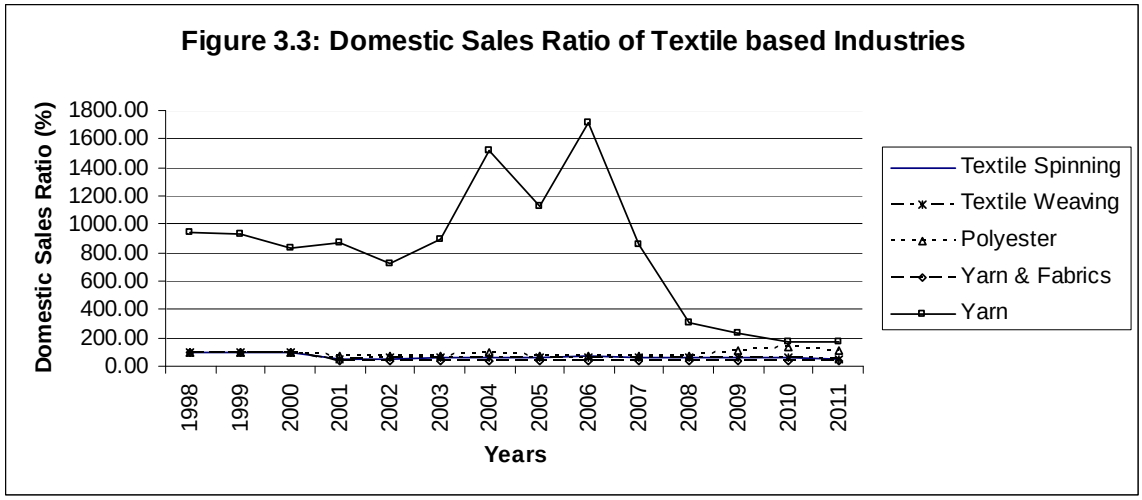


Engineering has the lowest average export sales ratio i.e. 0.199 percent and then Power industries with average of 0.47 percent and Fuel & Energy with average of 1.09 percent. The Polyester industry has highest export sales ratio in manufacturing sector in 2010. While talking about the standard deviation, we can examine that Polyester industry has more fluctuation around 33.89 percent and lowest standard deviation has been observed in engineering industry.

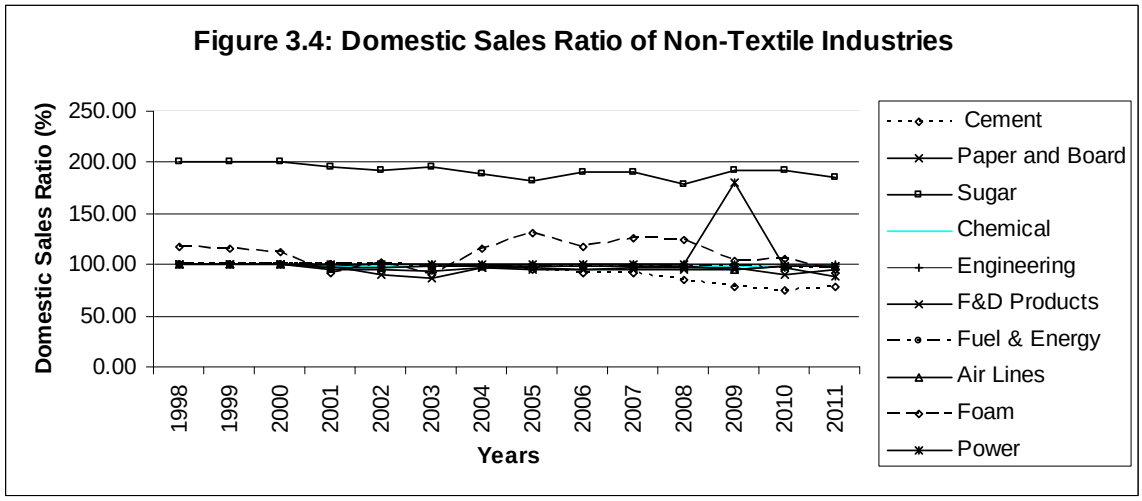


Now we discuss the trends and magnitude of domestic sales ratio reported in third column of Table 3.1. It is also a very important variable of our study. If we evaluate the column of domestic sales ratio, it shows that in 2006, domestic sales ratio is the highest i.e. 190.28%. It remains stable between 1998 to 2002. After that, it is gradually increasing till 2006 then it falls up to 2011. The overall average of domestic sales ratio is 135.61% and standard deviation is 30.48%.

Domestic sales ratio of individual industries has been shown in Figure 3.3 and 3.4. Figure 3.3 gives the idea about the domestic sales ratio of textile based industries. It is evident from the figure that domestic sales ratio remained stable over the period except the Yarn industry. The Yarn industry has stability up to 2003 and followed by a rise from 2003 to 2006 after that it is decreasing. Looking at Figure 3.4, the domestic sales ratio of the non-textile industries we can infer that approximately all the industries have stable domestic sales ratio. The industries wise distribution of domestic sales ratio demonstrates that (see Table A2 in appendix A) Yarn industry has the highest domestic sales ratio with average of 806.10 percent, followed by Sugar with average of 191.50 percent and Foam industry with average of 110.54 percent respectively.



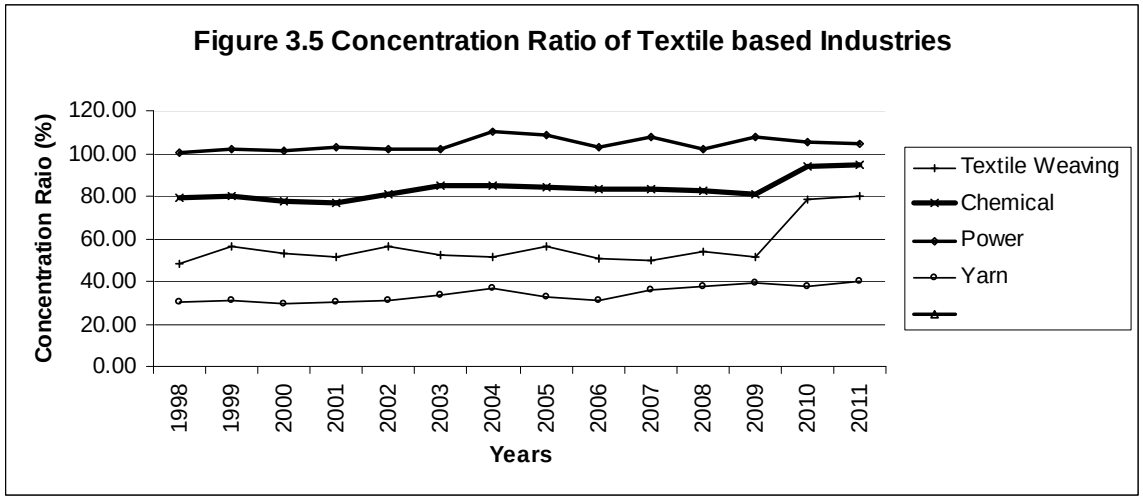
Yarn & Fabrics has the lowest average domestic sales ratio i.e. 51.16 percent and then Textile Weaving industries with average of 67 percent and Textile Spinning industries with average of 68.47 percent. In overall manufacturing sector, the Yarn industry has highest domestic sales ratio in 2010 while Yarn and Fabrics has the lowest domestic sales ratio in 2002. While talking about the standard deviation, we can examine that Yarn industry has more fluctuation around 453.73 percent and lowest standard deviation has been observed in engineering industry.



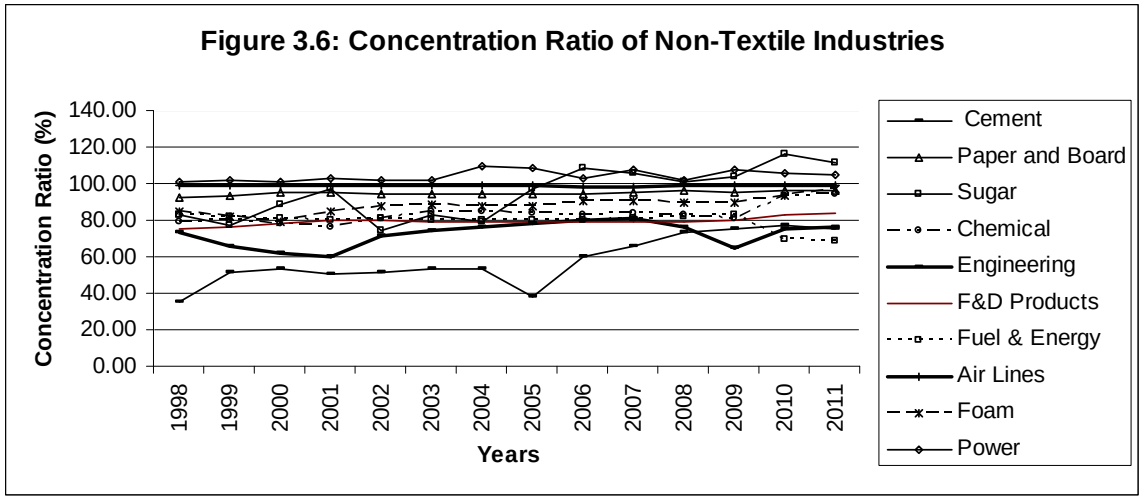
Turning our attention to another variable i.e. concentration ratio. If we analyze the column of concentration ratio in Table 3.1, it shows consistent upward trend. The table shows that four

firms were concentrating the market 67.07 percent in 1998 while the same has been observed 78.21 percent in 2011. The overall average between1998 to 2011 remained 72.13 percent with the standard deviation of 3.53 percent.

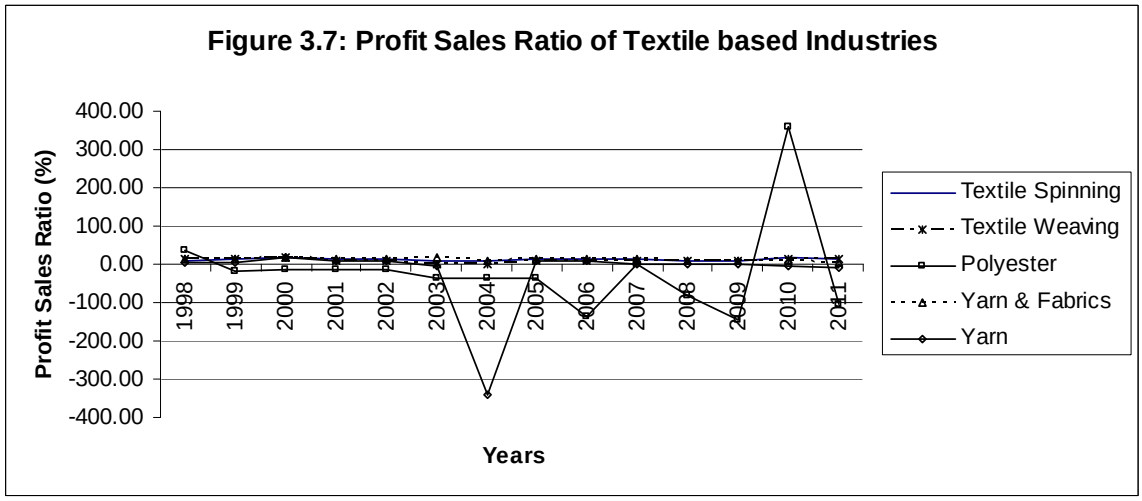
The industries wise distribution of concentration ratio exhibits that (see Figures 3.5 & 3.6 and Table A3 in appendix A) Power industry has the highest concentration ratio with average of 104.31 percent, followed by Polyester with average of 99.99 percent and Air lines industry with average of 98.71 percent respectively.



Yarn has the lowest average concentration ratio i.e. 33.99 percent and then Textile Spinning industries with average of 52.83 percent and Textile weaving industries with average of 56.37 percent. In overall manufacturing sector, the Sugar industry has highest concentration ratio in 2010 while Yarn has the lowest concentration ratio in 2000. Moreover, the sugar industry has the standard deviation around 13.81 percent and lowest standard deviation of 0.003 has been observed in polyester industry.

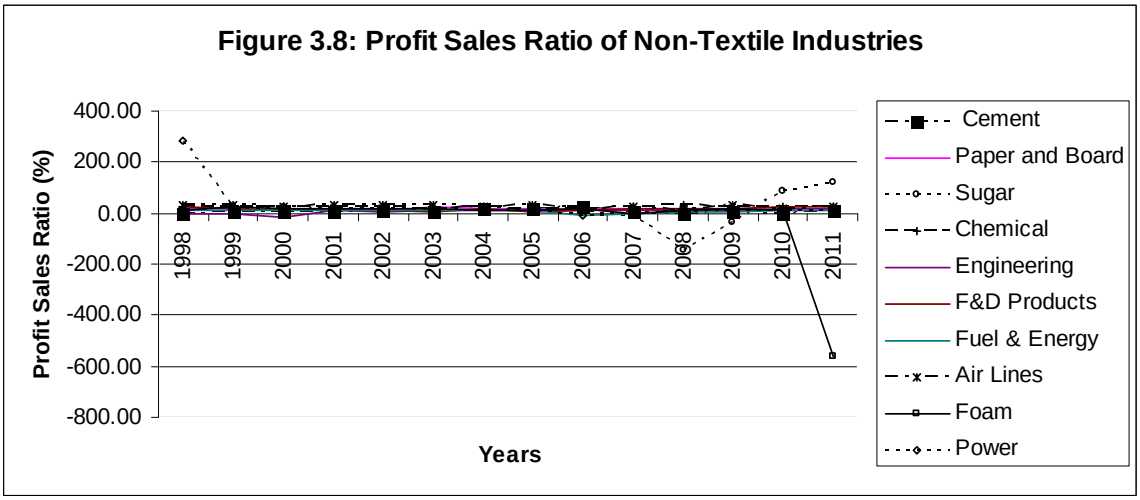


Now we discuss the trends and magnitude of profit sales ratio. The Table 3.1 shows that profit sales ratio is the highest i.e. 39.12% in 2010 whereas it is lowest i.e. -23.96 in 2011. Profit sales ratio decreases from 1998 to 2004 and fluctuating during 2005 to 2009. The overall average of profit sales ratio is 7.36% and standard deviation is 15.93%. Profit sales ratio of individual industries has been shown in Figure 3.7 and 3.8. If we take a look of Figure 3.7, it gives an idea that about the profit sales ratio of textile based industries.



It is evident from the figure that profit sales ratio remained stable over the period except the polyester and yarn industry. Looking at Figure 3.8, the profit sales ratio of the non-textile

industries we can infer that approximately all the industries have stable profit sales ratio except some industries i.e. Sugar and foam. The industries wise distribution of profit sales ratio demonstrates that (see Table A4 in appendix A) Power industry has the highest profit sales ratio with average of 31.22 percent, followed by Air lines with average of 27.56 percent and Chemical industry with average of 24.55 percent respectively.

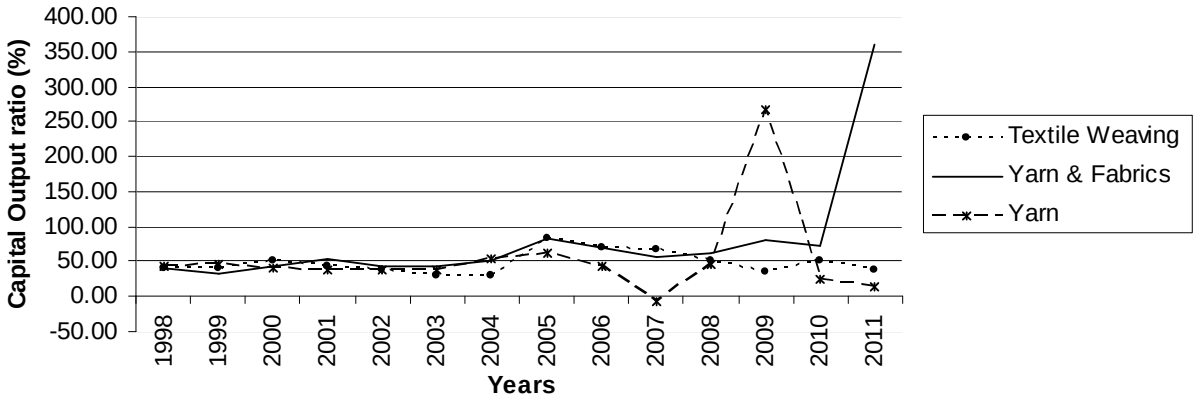


Foam has the lowest average profit sales ratio i.e. -26.25 percent and then yarn industries with average of -21.29 percent and polyester with average of -16.37 percent. In manufacturing sector, the Polyester industry has highest profit sales ratio in 2010 and foam has the lowest profit sales ratio in 2011. The standard deviation shows that foam industry has more fluctuation around 148.57 percent and lowest standard deviation has been observed in textile spinning industry.

Another variable determining the export sales is capital output ratio. If we evaluate the column of capital output ratio in Table 3.1, it exhibits that capital output ratio remains stable up to 2009 and after that it increases sharply. The overall average of capital output ratio is 3760.107 % and standard deviation is 8225.86%. Capital output ratio of individual industries has been shown in Figure 3.9 and 3.10. If we take a look of Figure 3.9, it gives an idea that about the capital output

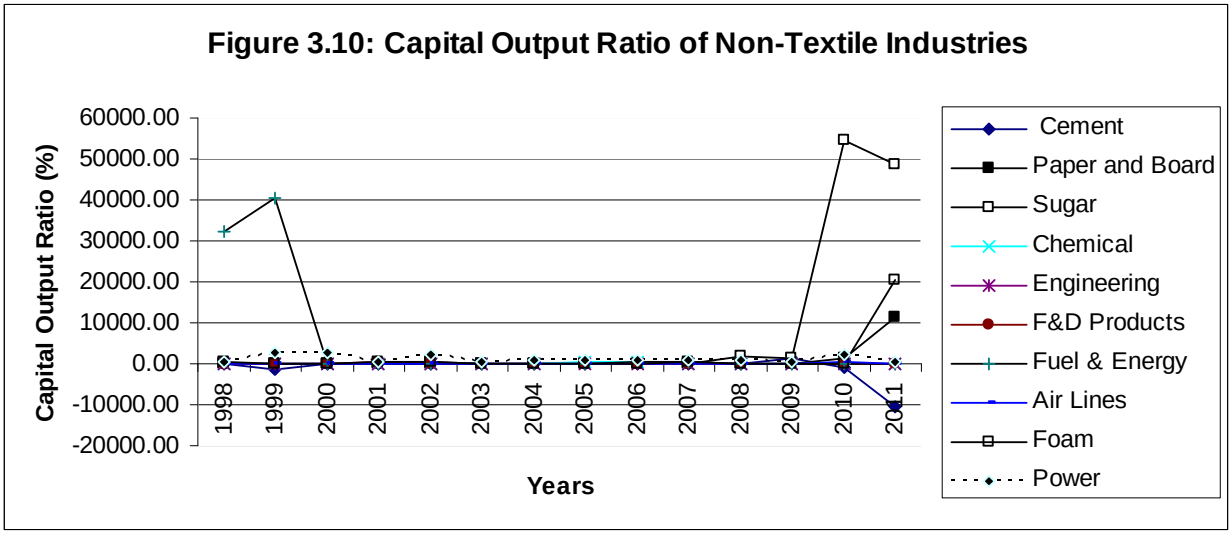
ratio of textile based industries. It is evident from the figure that capital output ratio remained stable over the period except the polyester industry and Textile spinning. Looking at Figure 3.10, the capital output ratio of the non-textile industries we can infer that approximately all the industries have stable capital output ratio except sugar and foam. The industries wise distribution of capital output ratio shows that (see Table A5 in appendix A) Textile spinning industry has the highest capital output ratio with average of 41819.02 percent, followed by Sugar with average of 7688.88 percent and Fuel and Energy industry with average of 5327.39 percent respectively.

Figure 3.9: Capital output Ratio of Textile based Industries

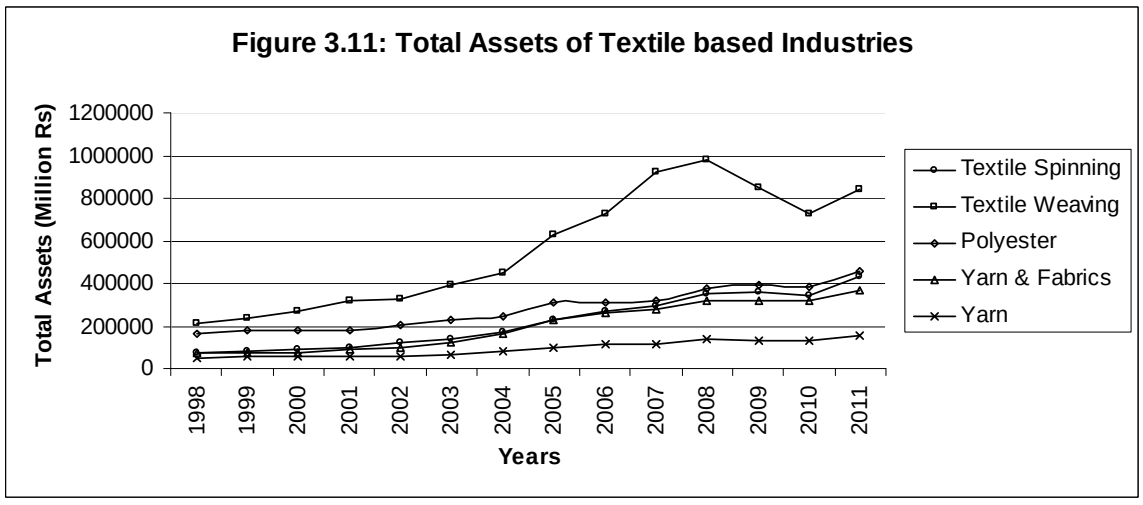


Cement has the lowest average capital output ratio i.e. -737.71 percent and then Textile weaving industries with average of 47.50 percent and yarn with average of 53.68 percent. The Textile spinning industry has highest capital output ratio in manufacturing sector in 2011 and cement has the lowest capital output ratio i.e. -10403.44 in 2011.

Moreover, Textile spinning industry has standard deviation 105415.6 percent and lowest standard deviation has been observed in Textile weaving.

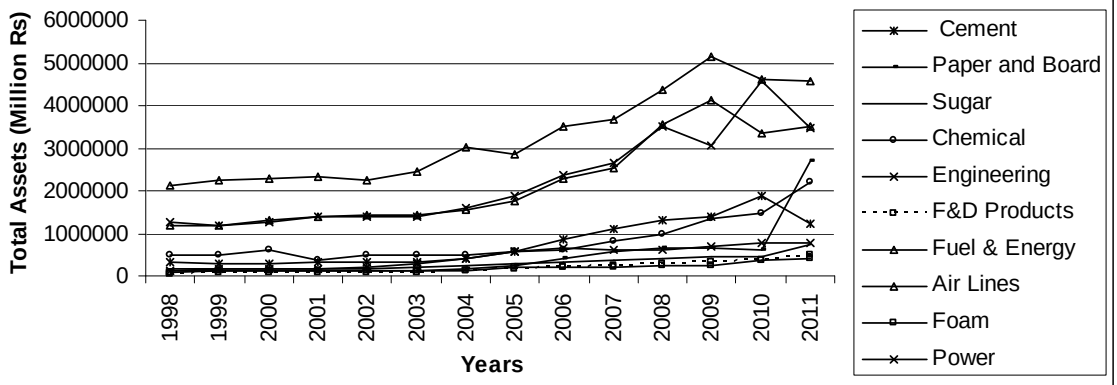


Finally in the last column of Table 3.1 we have demonstrated total assets. The variable of total assets depicts the upward trend over the time period under study. The overall average of total assets is Rs 760605.2 million and standard deviation is Rs 360866.4 million. Total assets of individual industries have been shown in Figure 3.11 and 3.12. Looking at Figure 3.11, we have an idea that about the Total assets of textile based industries. It is evident from the figure that Total assets have upward trend over the period.



Looking at Figure 3.12, the Total assets of the non-textile industries we can infer that approximately all the industries have upward total assets. The industries wise distribution of total assets demonstrates that (see Table A6 in appendix A) Airlines industry has the highest total assets with average of Rs. 3248035.7 million, followed by power with average of Rs. 2206000.2 million and Textile spinning industry with average of Rs. 217231.73 million respectively.

Figure 3.12: Total Assets of Non-Textile Industries



Yarn has the lowest total assets i.e. Rs 91532.36 million and then Food and Dairy production industries with average of Rs 187806.09 million and Foam with average of Rs 191719.74 million. The Airlines has highest total assets in manufacturing sector in 2009 and Food and Dairy production industries has the lowest total assets i.e. Rs 47997 million in 1998. Further, Power industry has the highest standard deviation i.e. Rs 1079144.5 million and lowest standard deviation has been observed in yarn industry.

3.3 Conclusion

This chapter has been designed to uncover the trends and performance of Pakistan's exports-based industries in manufacturing sector based on the time period from 1998 to 2011. The manufacturing sector has been divided into two groups i.e. textile-based industries and non-textile based industries. The trends of different variables i.e. export sales ratio, domestic sales

ratio, concentration ratio, profit sales ratio, capital output ratio and total assets have been shown in terms of graphs and descriptive statistics to assess the magnitude and direction of manufacturing exports.

The most focused variable was exports sales ratio that touches the highest value in 1998 whereas it was observed zero in 1999 and 2000. The overall average of export sales ratio remained 14.82%. In textile based industries, it kept on stable over the period except the polyester industry while for non-textile industries an upward trend continued except some industries i.e. Engineering, F&D Products, Fuel & Energy, Air Lines, and Power. Domestic sales ratio shows the highest value i.e. 190.28% in 2006. It remained stable from1998 to 2002 after that it continues to fall up to 2011. The overall average of domestic sales ratio remains 135.61%. Domestic sales ratio remained stable both for textile and non-textile based industries. The variable of concentration ratio has been used to incorporate the potential for uncompetitive price fixing in the manufacturing sector firms. In overall manufacturing sector, the sugar industry has highest concentration ratio in 2010 while Yarn has the lowest concentration ratio in 2000. Profit sales ratio is observed the highest value of 39.12% in 2010 whereas it remained lowest i.e. -23.96 in 2011. The overall average of profit sales ratio is 7.36%. All the industries have stable profit sales ratio except some industries i.e. sugar and foam. In the same fashion, capital output ratio has also been found stable for the whole manufacturing sector. The variable of total assets depicts the upward trend over the time period.

Chapter 4

Theoretical Model, Data and Empirical Specifications

4.1 Theoretical Framework

Exports are considered an important ingredient of economic growth. Most of the countries are now focusing on changing its exports structure, concentration and direction. Among many other factors, firm-size and exchange rate are the vital factors that can influence the export performance of a country. As we have seen in literature review, wide varieties of theoretical and empirical studies on firm-size and export performance exist, with some indicating positive; other negative and still other indicate no relationship.

Another important factor is the exchange rate that affects the exports. There is consensus among the economists that exchange rate appreciation negatively influences the exports of a country. But the empirical findings are somewhat mix. Also there is little theoretical and empirical literature that is focusing on firm level effects of exchange rates changes. Keeping this in view, in the next section we present the theoretical models of firm-size, exchange rate and export performance.

4.1.1 Firm Size and Export Performance

To theoretically derive the relation between firm size and its export performance we follow the work of Barua et al (2010). Following Barua et al (2010) we consider a domestic firm that try to maximize its own profit in the short run. Furthermore we considered a small open economy so

that the domestic firms behave like a perfect competitor in the international market. To derive the size and export performance relationship we proceed as follows:

The domestic price is assumed to be an inverse function of domestic output and imports, that is

$$P^d = f(Q+M)$$

Where P^d is domestic price, Q is domestic industrial output produced for domestic market and M is import. The individual firm profit function is specified as under:

$$Max\pi_i = P^d q_i^d + eP^f q_i^f - A(eW^f)^{\alpha}(W^d)^{(1-\alpha)} q^{\beta} \qquad (4.1)$$

This firm has two revenue sources, the proceeds from domestic sales $P^d q_i^d$ and foreign sales converted to domestic currency $eP^f q_i^f$. Note that e is the exchange rate defined in terms of domestic currency per unit of foreign currency, P^f is foreign price and the individual firm take it as given. q_i^d and q_i^f are the outputs supplied to the domestic and foreign markets respectively. While $q = q_i^d + q_i^f$. The last term in equation (4.1) is the cost function which gives the minimum possible cost for the production of an optimal level of output. We have assumed a Cobb-Douglas type cost function with constant return to scale. Note that the firm use both domestic and foreign factor of production with rewards, W^d to the domestic factors and W^f to foreign factors. α and $(1-\alpha)$ are the shares of foreign and domestic factors in the production, respectively. While β in q^{β} represent shares of output in total cost which is less then one. The individual firm in our model acts exactly like price discriminating monopolist, producing output with common costs but for two different markets. The firm maximizes its profit by setting the respective marginal revenues equal to common marginal cost. Thus profit maximizing gives the first order conditions:

$$\frac{\partial \pi}{\partial q_i^d} = P^d + \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right] q_i^d - \left\{ A\left[\frac{\partial e^\alpha}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^\alpha \left(W^d\right)^{(1-\alpha)} q^\beta + \beta q^{(\beta-1)} A\left(eW^f\right)^\alpha \left(W^d\right)^{(1-\alpha)} \right\} = 0$$

(4.2)

$$\frac{\partial \pi}{\partial q_i^f} = eP^f + \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f q_i^f - \left\{ A\left[\frac{\partial e^\alpha}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^\alpha \left(W^d\right)^{(1-\alpha)} q^\beta + \beta q^{(\beta-1)} A\left(eW^f\right)^\alpha \left(W^d\right)^{(1-\alpha)} \right\} = 0$$

(4.3)

These are the first order condition of profit maximization. Here X and X^m are industrial exports and imports of input into to the industry, respectively. The idea that changes in exports and imported inputs will cause the exchange rate to change and the corresponding changes in the first order condition is taken from Akbar (unpublished work).

The first concern of this study is to see the effect of firm size on its export performance. For this purpose we take benefit of the approach followed by Barua et al. (2010) with the first order condition mentioned above.

From the above two first order conditions we can derive the relations between the firm size and it exports to turn over ratio as follows:

First note that if the marginal costs of firms are identical then all the firms will produce the same level of output as implied by equation (4.2) and (4.3). This further implies that export shares of all the firms also will be same, this can be seen as

Let define export share as $\frac{q_i^f}{q_i}$ for the ith firm.

But If $q_i = q_j$ then it implies that $\frac{q_i^f}{q_i} = \frac{q_j^f}{q_j}$

That is the export share of firm i is equal to the export share of firm j.

But if the marginal cost of production is different than according to Barua et al (2010) the more efficient firm will produce larger volume of output, although the domestic sales of the firm will be same independent of the cost conditions. This can be proved as follows:

We know that a firm which sales its product in more than one market is in equilibrium when it equate the revenues realized from the sale of last unit in each market, that is;

$$MR_i^d = MR_i^f = MC_i$$

Or in our case, the firm is in equilibrium when the following conditions hold:

$$P^d + \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right] q_i^d = eP^f + \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f q_i^f = \left\{ A\left[\frac{\partial e^\alpha}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^\partial \left(W^d\right)^{(1-\alpha)} q^\beta + \beta q^{(\beta-1)} A\left(eW^f\right)^\alpha \left(W^d\right)^{(1-\alpha)} \right\} \tag{4.4}$$

For ease of reference let MC is:

$$\varphi = \left\{ A\left[\frac{\partial e^\alpha}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^\partial \left(W^d\right)^{(1-\alpha)} q^\beta + \beta q^{(\beta-1)} A\left(eW^f\right)^\alpha \left(W^d\right)^{(1-\alpha)} \right\}$$

But equation (4.4) implies that for two firms i and j to be in equilibrium, the following identity must hold irrespective of the cost conditions.

$$P^d + \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right] q_i^d = \varphi = eP^f + \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f q = \varphi = P^d + \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_j^d}\right] q_j^d \tag{4.5}$$

What this mean is that at equilibrium the marginal revenue will be the same for each exporter firm and this will be equal to the marginal cost of its production. This identity further implies

that for two exporter firm the total supply to the domestic market will be the same irrespective of the cost conditions. Still another implication of the identity is that if marginal cost of production are different i.e $\hat{C}(q_i) \neq \hat{C}(q_j)$ than the above identity would be maintain at different level of outputs. Then if, $\hat{C}(q_i) \leq \hat{C}(q_j)$ this implies that output of firm i will be greater than the output of firm j, that is $q_i \geq q_j$ and vice versa. However $q_i^d = q_j^d$ irrespective of the cost condition as implied by equation (4.2) and (4.3).

The above discussions lead us to the following important conclusion. "The larger firm sells a smaller share of its output in the domestic market and smaller firm sells larger share of its output in the domestic market". This can be seen as

If $\hat{C}(q_i) \leq \hat{C}(q_j)$ then $q_i \geq q_j$ that is firm i larger in size than firm j, but both the firms sell the same amount of output in the domestic market as implied by equation (4.2) and (4.3). This implies that the larger firm sells smaller share of its output in the domestic market as compared to the smaller firm that is $\frac{q_i^d}{q_i} \leq \frac{q_j^d}{q_j}$

As a result, the larger firm sells a larger share of its output in the foreign market and the smaller firm sells a smaller share of its output in the foreign market. Thus this implies that firm size and export to sales ratios are positively related. This can be proved as follow:

If $q_i^d + q_i^f = q_i$ and $q_j^d + q_j^f = q_j$ so that $\frac{q_i^d}{q_i} + \frac{q_i^f}{q_i} = 1$ and $\frac{q_j^d}{q_j} + \frac{q_j^f}{q_j} = 1$ and if $q_i \geq q_j$

And also given that

$q_i^d = q_j^d$ Then the following relationship must hold:

$$\frac{q_i^d}{q_t} \leq \frac{q_j^d}{q_j} \Rightarrow \frac{q_i^f}{q_t} \geq \frac{q_j^f}{q_j} \tag{4.6}$$

Our theoretical model concludes that the firms with higher marginal costs would have less export than those firms that have less marginal costs.

4.1.2 Exchange Rate, Export and Domestic Sales Performance

To derive a theoretical model that captures the effects of changes in a country exchange rate and input prices on firm domestic and foreign supplies, we follow Akbar (unpublished work). In capturing the effects of exchange rate changes on firm domestic and exports supplies Akbar has modified the first order condition by allowing the exports of the industry and imports of inputs into the industry to effects the corresponding exchange rates. This modification has already outlined above. These first order conditions have solved to get the firm supply functions to the domestic and foreign markets as follow.

$$P^d - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} = A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} q^{\beta} - \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right] q_i^d \tag{4.7}$$

$$eP^f - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} = A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} q^{\beta} - \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f q_i^f \tag{4.8}$$

$$q_i^d = \frac{P^d - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}}{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right]} \tag{4.9}$$

$$q_i^f = \frac{eP^f - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}}{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f} \tag{4.10}$$

The expression in equation (4.9) explains the firm supply to the domestic market which is a function of domestic price, imported and domestic input prices and the rate of change in exchange rate and domestic price due to imports of inputs and domestic industrial output, respectively. The changes in exchange rate affect the domestic supply through the channel of cost as the firm uses imported inputs in the production process. Equation (4.10) indicates that the supply to the foreign markets is a function of foreign prices, exchange rate, prices of both the domestic and foreign inputs and the rate of change in exchange rate due to import of inputs and industrial exports.

We can carry out comparative static analysis to investigate the effects of the different factors of the functions on its direction of change. To examine the effect of changes in exchange rate on the supply functions we have differentiated both the functions with respect to the exchange rate respectively.

$$dq_i^d/de = \frac{\left[-\alpha A e^{(\alpha-1)}\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right]\left\{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right]\right\} - A\left[\frac{\partial^2 e^{\alpha}}{\partial e \partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)}\left[P^d - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right]}{\left\{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right]\right\}^2} < 0$$

(4.11)

$$dq_i^f/\partial e = \frac{\left[P^f - \alpha A e^{(\alpha-1)}\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right]\{\partial\} - \left\{A\left[\frac{\partial^2 e^{\alpha}}{\partial e \partial X^m}\frac{\partial X^m}{\partial q_i^f}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial^2 e}{\partial e \partial X}\frac{\partial X}{\partial q_i^f}\right]P^f\right\}\left[eP^f - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right]}{\left\{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right]P^f\right\}^2}$$

(4.12)

As it is evident from equation (4.11), the exchange rate has negative relation with the domestic output supply. This result is plausible. The only effect that exchange rate can bear on domestic

supply is through the changing cost of imported inputs. Higher exchange rate makes imported input expensive and cause the marginal production cost to rise with no effect on the domestic revenues of the firm. This compels the firm to reduce its supply in the domestic market. So for as the foreign market is concerned, the total effects of changes in exchange rate on the supply to the international market is uncertain because exchange rate in this case influence both the revenue and costs structure of the firm. This can be seen from equation (4.12). The first term in the numerator has positive sign while the second has negative. Because these term has opposing effects on the supply, so nothing can be said a priori about the total effect of the changes in exchange rate on the foreign output supply. The reason, as mentioned above, is that if exchange rate depreciated for example, it will benefit the exporter firm because it can now get more revenues from a given amount of sale in terms of domestic currency. In such a situation the firm is provided with the incentive to supply more to the foreign market. At the same time the domestic firm is using imported inputs in the production process. After depreciation the imported inputs become costly for the firm in term of domestic currency which forces the firm to curtail its exports due to higher production cost. Finally, the sign depends on the relative magnitude of this two opposing effects. If the firm is more export oriented relative to the amount of foreign input it uses, the total effect of changes in exchange rate would be positive and for the opposite case the reverse scenario will hold. What does this show is that the question of the effects of exchange rate changes on exports becomes an empirical one. This prediction provides us the rational to empirically chick the final effects of changes in exchange rates on exports volume of the firm.

4.2 Empirical Specification

Following the theoretical framework, we express exports-sales ratio as a function of firm size and exchange rate as follows:

ESR = *f* (Firm size, Exchange Rate, Control variables)

Making this more specific and defining in terms of the variables used in this study for measuring exports-sales ratio, firm size and exchange rate along with control variables, our empirical export performance model (Baseline Regression) is given by:

$$ESR_{it} = \alpha_0 + \alpha_1 TA_{it} + \alpha_2 REERx_i + \alpha_3 REER\_VOL_i + \mu_{it} \quad (4.13)$$

In order to capture the firm-specific effects, we have introduced the variables of capital output ratio and gross profit ratio. In the same fashion to encapsulate the effects of monopoly and economic conditions of our trade partners, the variables of concentration ratio and World GDP have been inserted.

$$ESR_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 REERx_t + \beta_3 REER\_VOL_t + \beta_4 CON_{jt} + \beta_5 K_{it} + \beta_6 GPR_{it} + \beta_7 WGDP_t + \mu_{it} \quad (4.14)$$

Our dependent variable is Export to Sales Ratio (ESR) and our independent variables are Total Asset (TA), Real Effective Exchange Rate for export (REERx), Real Effective Exchange Rate Volatility (REER_VOL), Concentration ratio (CON), Capital-Output ratio (K), Gross Profit Sales Ratio (GPR) and World GDP (WGDP). In domestic sales model, we include Total Asset (TA), Real Effective Exchange Rate for import (REERm), Inflation (INF), Per-capita income (PERC) and Investment (INVES) as explanatory variables. where, i = 1,2,3,…, N represent firms, t = 1,2,3,…, T represents time, j = 1,2,3,…, J represents industry and μ_{it} is the error term.

Our expectations about the relationship of these dependent and independent variables are as follows:

Our first variable of interest is Total Assets. Total Assets is used as a proxy of firm size [Bonaccorsi (1992), Calof (1994), Gabbitas and Gretton (2003), Akbar (2011)]. As we know that if a firm's size is large, this large size makes the firm able to take benefit from economies of scales. Therefore the cost of production of the large sized firm is less than the costs of production of the smaller firm. Then it is obvious that production and exports of the large sized firm will be higher as compared to the smaller firm as our theoretical model predicted above. We have concluded in our theoretical model that "*the larger firm sells a larger share of its output in the foreign market and the smaller firm sells a smaller share of its output in the foreign market and vice versa*". Thus this implies that firm size and export to sales ratios are positively related. Therefore we expect that, Total Assets (firm size) of firm will be having a positive relationship with Exports, and β_1 will be having a positive sign.

The second variable of interest is real effective exchange rate for exports. Exchange rate depreciation makes exports cheaper in international markets resulting in increased demand for exports. But this effect varies across the countries due to domestic macroeconomic instability and issues of quality competition in exports sector. According to theoretical model, the impacts of real effective exchange rate for exports are ambiguous on export sale [Mkenda, Beatrice Kalinda. (2001)]. The empirical literature in macro level studies [Sharma (2000), Majeed and Ahmad (2006), Roy, D. K. (1991).] found positive impact of depreciation. We expect the positive impact of real effective exchange rate for exports on export sales ratio.

When exchange rate is shifted from fixed to the flexible exchange rate then it's facing a volatile real exchange rate, as a result trade reduces because of uncertainty about the future profit from exports. High exchange rate volatility leads to less cost for foreign trade and higher cost for risk adverse traders. De Grauwe, P. (1988). found that exchange rate volatility on exports depends on

degree of risk aversion. According to him there exist a positive relationship between the exchange rate volatility and export because income effect dominates over substitution effect. Recent theoretical and empirical developments suggest that there are situations in which the volatility of exchange rates could be expected to have either negative or positive effects on trade volume [De Grauwe (1988).]

CON is the four firms' concentration and is used as proxy for monopoly power in domestic market. Cowling and Waterson (1976) develop a theoretical rationale for exporting industry and find positive correlation with level of concentration. Moreover, a large amount of empirical works on export-performance relations also show evidence of the theoretical arguments [Hsu et al (2007), Akbar (2011)]. Thus, the coefficient of *CON* is expected to be positive.

World GDP (WGDP) or level of foreign income (measured by weighted average of incomes of Pakistan's top five trading partners) that represent the economic conditions of our trading partners. World demand is considered as an important demand-side factor in export equation. Empirical findings suggest that exports of Pakistan are much sensitive to changes in world demand [Zada et al. (2012)]. The coefficient of WGDP is expected to be positive [Reidel et al. (1994), Zada et al. (2012)].

To capture the effects of firm characteristics on export performance, we have used the capital-output ratio (K) and Gross profit sales ratio (GPR). The coefficients of K and GPR are expected to be positive [Akbar (2011)]. Empirical literature indicates that different studies use several variables (i.e. firm age, export experience, foreign market knowledge etc.) and the data of all these variables are almost survey-based. So, due to data constraints, we are unable to use these types of variables.

The theoretical framework highlighted in the previous section implies that the domestic sales of firms depend on firm size and exchange rate. Our extended empirical **Domestic sales model** become as:

$$DSR_{it} = \gamma_0 + \gamma_1 TA_{it} + \gamma_2 REERm_t + \gamma_3 INF_t + \gamma_4 PERC_t + \gamma_5 INVES_{it} + \mu_{it} \quad (4.15)$$

According to our theoretical model, total assets of the firms exhibit the firm size. The relationship between firm size and domestic sales ratio is positively expected because the large firm has cost advantage over the small firms due to economies of scale and learning effects. Real effective exchange rate for imports has negative relationship with the domestic supply. This result is plausible. The only effect that exchange rate can bear on domestic supply is through the changing cost of imported inputs. Higher exchange rate makes imported input expensive and cause the marginal production cost to rise with no effect on the domestic revenues of the firm. This compels the firm to reduce its supply in the domestic market. So, the coefficient of real effective exchange rate for import is expected to be negative. The parameter of inflation is expected negative with the domestic sales ratio because high prices trim down the purchasing power of the local consumers. Per-capita income is also positively expected due to resource effect. Finally, investment is expected to be positive due to the productive capacity of the firms.

4.3 Econometric Technique

We have applied panel data analysis techniques to check our extended structural performance model. Panel data techniques allow us to capture firm heterogeneity (if any) over time; whereas firm specific effects are omitted under the pooled ordinary least square estimation. In such a case, if the unobservable individual specific effects are correlated with the explanatory variables, then OLS estimates will be biased (Hsiao, 2003). Making our empirical model a more general

panel data equation and using the vector X_{ijt} to represent our explanatory variables (for ease of reference), we can write a more general unrestricted equation as:

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_{ijt} X_{ijt} + \varepsilon_{it} \quad (4.16)$$

The intercept has three parts, α_0 common to all firms and all time periods, μ_i are firm specific intercepts and λ_t are time specific intercepts. μ_i depicts those unobservable effects which are specific to the firm but common for all the times. λ_t represents those effects which are specific to particular time periods but common for all the firms. α_0 is the mean of all these unobservable effects. While ε_{it} is the error term which shows all those unobservable effects which varies both over time and across the cross-sectional unites. β_{ijt} are the slope parameters which, according to this specification varies across firms, over time and across industries.

The above equation cannot be estimated in this fashion, but restrictions are to be imposed. Following the tradition we assume that the slope parameters are constant over time as well as over firms and industries. Thus equation (4.16) becomes as

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta X_{ijt} + \varepsilon_{it} \quad (4.17)$$

Where β is now a vector of parameters one for each of the explanatory variables

Rewriting equation (4.14) and (4.15) by incorporating equation (4.17), our final model for estimation becomes as:

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_1 TA_{it} + \beta_2 REERx_t + \beta_3 REER\_VOL_t + \beta_4 CON_{jt} + \beta_5 K_{it} + \beta_6 GPR_{it} + \beta_7 WGDP_t + \mu_{it} \quad (4.18)$$

$$DSR_{it} = \alpha_0 + \mu_i + \lambda_t + \gamma_1 TA_{it} + \gamma_2 REERm_t + \gamma_3 INF_t + \gamma_4 PERC_t + \gamma_5 INVES_{it} + \mu_{it} \quad (4.19)$$

4.4. Data and Description of Variables

The study is based on the data of 205 firms belonging to fourteen different industries of manufacturing sector. Mostly, the data have been collected from 'Balance Sheet Analysis of Joint Stock companies listed on Karachi Stock Exchange', published by State Bank of Pakistan (SBP). The fourteen different industries include: Textile Spinning, Textile Weaving, Polyester, Yarn & Fabrics, Yarn, Cement, Paper and Board, Sugar, Chemical, Engineering, F&D Products, Fuel & Energy, Air Lines, Foam and Power. We have followed the following criterion for the selection of firm,

(i) the data on all relevant variables are available for the whole period.

(ii) the products similar or as close substitute as possible, so that it can satisfy the theoretical definition of industry.

At least five and at most thirty five firms are taken from each sector. If the firms from the different industries are selected by just following the State Bank Classification, we may deviate for away from the theoretical definition of the industry. Because the different firms classified into a specific sector involve in such production activities which, although differentiate it from the other sectors, are quite different so that they cannot be categorize as a homogeneous product. For example, in the SBP Book we have data on 37 firms under the heading of Sugar and Allied Industries involving in production of one two or more than two such activities as Sugarcane crushing, Sugar, Building materials and boards etc. thus it is hard to consider such products as homogenous and rely totally on the State Bank Classification. To avoid such difficulty, we selected 14 such firms which involve simultaneously in the Sugar crushing and Sugar

Production. Now we come to the description of different variables, their definition, the method of their contraction and sources from where the data on the variables are collected. The various variables, their definitions and sources are given in the Table 4.1.

Table 4.1: Description of Variables and Sources

Variable	Definition	Source
ESR_{it}	Defined as the ratio of the specific firm export sales to its total sales and is used as a measure of export performance.	Balance S. Analysis (SBP)
TA_{it}	Total asset of the firm and is used as a measure of Firm Size.	Balance S. Analysis (SBP)
CON_{jt}	Defined as the ratio of the sales of the four largest firms to the total industry sales and is used as a measure of domestic monopoly.	Balance S. Analysis (SBP) Own Calculation
K_{it}	Defined as the ratio of total capital employed to output and is used as a firm characteristics variable.	Balance S. Analysis (SBP)
Y_{it}	Industrial output used as a firm characteristic variable.	Balance S. Analysis (SBP)
GPR_{it}	Gross profit to sales ratio used as a firm characteristics variable.	Balance S. Analysis (SBP)
$REERx_t$	Real exchange rate for export is defined as the ratio of the price of traded goods to non-traded goods.	Own Calculation
$REERm_t$	Real exchange rate for import is defined as the ratio of the price of traded goods to non-traded goods.	Own Calculation
$REER\_VOL_t$	Volatility of REER measured using standard deviation of monthly REER indices of the year.	IFS
$WGDP_t$	World GDP is used as a proxy variable for economic condition of our trading partners on export performance.	World Bank
INF_t	Domestic inflation defined on the basis of whole sale price index and is used to see the effect of domestic input prices on export performance.	Economic Survey of Pakistan.
DSR_{it}	Defined as the ratio of the specific firm Local sales to its total sales and is used as a measure of Domestic sales.	Balance S. Analysis (SBP)
$INVES_{it}$	Defined as the sum of long term and short term investment of the specific firm and is used to see the effect of overall investment on domestic sales.	Balance S. Analysis (SBP)
$PERC_t$	Per-capita Income of Pakistan	Economic Survey of Pakistan.

In this table, the subscripts 'it' shows those variables which varies over firm as well as over time, while the subscripts 'jt' shows those variables which varies over industry as well as over time. The variable C_{jt} is constructed in two ways. In the first method we have taken the average of sales for the 12 years period for each firm. Than those four firms sales are added which have the higher average sales in the respective sector. In the second method we have compared the sales in individual years. In this method we have added the sales of those four firms each year which have the higher sales in that year in the corresponding industry. Thus in this method firms are allowed to enter into the group of the four concentrated firms if it manages to increase its sales in a given year, and go out of the group if it fails to maintain its sales in the consequent years. For the calculation of REER for imports and exports we follow the work of Hinkle and Nsengiyumva (1999),

$$REER_m = \frac{\sum_{i=1}^{k} \alpha_i E_{it} P_{it}^*}{P_j}$$

where, $REER_m$ is the real exchange rate index for imprts, E_{it} is the index of the parallel market exchange rate between country *i* and Pakistan in period *t; i = 1,…,k* denotes the *k* partner countries that are used in the construction of the index. The five largest trading partners were considered in constructing the index. The weight corresponding to partner *i* in the construction of the index is denoted by a_i. The price index of partner *i* in period *t* is P_{it}^* . Its denotes the price of tradables, which is proxied by the wholesale price index of the trading partners. P_j gives the price index for the home country, and it denotes the price of non-tradables. It is proxied by Pakistan's consumer price index. According to Hinkle and Nsengiyumva (1999*a*,*b*), although this measure is called the external real exchange rate, for developing countries, it measure can be used to proxy the real exchange rate for imports. While,

$$REER_x = \frac{\sum_{i=1}^{k} \alpha_i E_{it} (1-\beta) P_{it}^* + P_x \beta}{P_j}$$

$REER_x$ is the real exchange rate index for exports, E_{it} is the index of the nominal exchange rate between country *i* and Pakistan in period *t; i = 1,…,k* denotes the *k* partner countries that are used in the construction of the index. The five largest trading partners were considered in constructing

the index. The weight corresponding to partner *i* in the construction of the index is the total trade share, and is denoted by a_i. *Pit** is the price index of partner *i* in period *t.* It denotes the price of tradables, and it is proxied by the wholesale price index for the trading partners. P_j gives the price index for the home country, and it denotes the price of non-tradable goods, which is proxied by the consumer price index for Pakistan. P_x is the major export prices, β is the weight of major exports in total exports, and (1- β) is the weight of other exports in total exports (see Hinkle and Nsengiyumva, 1999*b*)

Chapter 5

Model Test, Results and Discussions

5.1 Tests of the Data and Model

It is imperative to check the nature of data for selecting the appropriate estimation technique. As we are working on panel data so it is necessary to check the features and description of data before the execution of panel estimations. The panel data require a lot of issues to be addressed. These include checking the stationary of data by applying the unit root tests, individual effect exists or we should estimate a pool equation with both common intercept and slopes, if individual effects exist whether they are period specific or cross-section specific or both, whether the unobserved individual effects are fixed constant or randomly distributed independent of the explanatory variables and the problems of Multicollinearity, auto correlation and hetroskedasticity.

5.1.1 Panel Unit Root Tests

Unit root tests are applied to check the existence of stationarity in the data[3]. Panel unit root tests are developed to deal with panel data. These tests are categorized into two groups: i) persistence parameters ii) parameters as cross-section specific.

First group considers the persistence parameters $\eta_i = \eta$ i.e. constant across the cross-section Levin, Lin, and Chu (LLC), Breitung, and Hadri tests are used for the said group.

[3]Regressing non-stationary series on another non-stationary series is called spurious regression. The results obtained from such regression would be biased and inconsistent.

Second group consider these parameters as cross-section specific. Im, Pesaran, and Shin (IPS), Fisher-ADF and Fisher-PP tests are utilized for the purpose.

Both tests have their own pros and cons. These assorted tests yield dissimilar results for the same panel series. Generally, three alternative tests have been applied in the literature for checking stationarity of the panel series, namely Andrew Levin, Chien-Fu Lin and Chia-Chang James Chu test (LLC), Im-Pesaran-Shin test (IPS) and Fisher-Augmented Ducky Fuller-Chi-square test.

Levin, Lin and Chu (2002) specified three models alternatively as follows:

$$\Delta y_{it} = \eta y_{it-1} + \xi_{it} \tag{5.1}$$

$$\Delta y_{it} = \alpha_{0i} + \eta y_{it-1} + \xi_{it} \tag{5.2}$$

$$\Delta y_{it} = \alpha_{0i} + \alpha_{1i} t + \eta y_{it-1} + \xi_{it} \tag{5.3}$$

It is assumed that the error process ξ_{it} is independent across the cross-sections and follows a stationary ARMA process for each cross-section:

$$\xi_{it} = \sum_{p=1}^{\infty} \phi_{ip} \xi_{it-1} + \varepsilon_{it} \tag{5.4}$$

They have applied three data generating process in the models. First model of panel unit root test evaluates the null hypothesis of $H_0 : \eta = 0$ against the alternative hypothesis that $H_1 : \eta < 0$. The second model assumes that the series y_{it} has cross-section specific mean with no time trend. This model tests the null hypothesis that $H_0 : \eta = 0$ and $\alpha_{0i} = 0$ for all i, against the alternative hypothesis that $H_1 : \eta < 0$ and $\alpha_{0i} \in \Re$ .The third model demonstrates that the series y_{it} has cross-section specific mean and time trend. This model tests the null hypothesis that $H_0 : \eta = 0$ and $\alpha_{1i} = 0$ for all i, against the alternative hypothesis that $H_1 : \eta < 0$ and $\alpha_{1i} \in \Re$. Three steps are

applied in the test. In first step, separate ADF regressions are run for each cross-section of the panel to get two orthogonalized residuals. Second step involves the ratio of long-run to short-run innovation standard deviation for each cross-section. The third step entails the estimation of pooled t-statistic.

Im-Pesaran-Shin (2003) specified the following model to test the unit root:

$$y_{it} = \alpha_i + \eta_i y_{it-1} + \xi_{it} \tag{5.5}$$

$t = 1,2,3,...,T$

The following Null hypothesis is tested

$H_0 : \eta_i = 1, i = 1,2,3,..., N$

The alternative hypothesis is devised as:

$H_1 : \eta_i < 1, i = 1,2,3,..., N_1; \eta_i = 1, i = N_1 + 1, N_1 + 2, N_1 + 3,..., N$

Im-Pesaran-Shin recommended separate unit root tests for the N cross-sections. The ADF regression is:

$$\Delta y_{it} = \alpha_i + \eta_i y_{it-1} + \sum_{j-1}^{\eta_i} \phi ij \Delta y_{it-j} + \xi_{it} \tag{5.6}$$

After running ADF regression, t-statistics are calculated for testing $\eta_i = 1$. It is assumed that the mean and variance are same for all i and T is same for all cross-sections. Therefore, the use of IPS test is only for balanced panels. IPS suggests the simple DF t-tests for the individual cross-sections and no serial correlation.

The third test i.e. Fisher-Augmented Ducky Fuller-Chi-square test is merely the extension of ADF test for individual series to panel series.

The results of the panel unit root tests are displayed in Table 5.1. These tests point out that all the variables are stationary at level except the square of concentration ratio. Fisher-ADF Chi-square

test fails to reject the null hypothesis of unit root for square of concentration ratio whereas the other two tests reject the null hypothesis of unit root for square of concentration ratio.

From the above analysis, we can conclude that all the variables are stationary at level and there is no existence of spurious regression. These results are in accordance with our expectations as there are no drastic changes in the mean and variances of the series due to the selected time-span are not too long.

Table 5.1: Unit Root Test at Level

Variables	LLC Test	Prob	IPS Test	Prob	Fisher-ADF Chi-square	Prob	Conclusion
TA	-4.2142	0.0000	7.2864	0.0031	245.1621	0.0002	**I(0)**
K	-4717.5	0.0000	-330.19	0.0000	560.19	0.0000	**I(0)**
GPR	23.230	0.0020	-4.8200	0.0000	547.041	0.0000	**I(0)**
CON	-5.5857	0.0000	2.7488	0.0478	280.432	0.0067	**I(0)**
(CON)^2	-3.3410	0.0004	3.8534	0.0098	257.055	0.0841	**I(0)**
WGDP	-33.587	0.0000	-17.483	0.0000	992.062	0.0000	**I(0)**
REERx	-18.052	0.0000	-5.6721	0.0000	470.723	0.0000	**I(0)**
(REERx)^2	-15.682	0.0000	-4.3403	0.0000	420.511	0.0254	**I(0)**
REER_VOL	19.491	0.0051	-11.513	0.0000	716.077	0.0000	**I(0)**
(REER_VOL)^2	119.615	0.0032	-15.029	0.0000	878.297	0.0000	**I(0)**
REERm	-16.347	0.0000	-14.146	0.0000	836.514	0.0000	**I(0)**
INF	-1.2181	0.0034	6.9634	0.0065	119.652	0.0042	**I(0)**
PERC	0.8412	0.0054	16.992	0.0023	36.369	0.0000	**I(0)**
INVES	-3.8741	0.0001	413.747	0.0000	286.871	0.0341	**I(0)**

Source: Author's Calculations

5.1.2 Test for Individual Effects

In pooled ordinary least square estimation, firm specific effects are omitted. Under this situation, OLS estimates would be biased if the unobservable individual specific effects are correlated with the explanatory variables. (Cheng Hsiao, 2003).

Revisit the equation (4.17)

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta X_{ijt} + \varepsilon_{it} \qquad (5.7)$$

Following three forms of restrictions can be imposed on the above unrestricted specification of the model to test the individual effects:

$$ESOR_{it} = \alpha_0 + \lambda_t + \beta\, X_{ijt} + \varepsilon_{it} \tag{5.8}$$

To consider the time specific effects only, we assume no cross-section specific effects and then test the following hypothesis

$H_0 : \mu_1 = \mu_2 = \mu_3 = ... = \mu_N = 0$

Under H_0 the residual sum of squares (RSS_R) of the restricted model (5.8) divided by the variance (δ_ε^2) follow chi-square distribution with $NT-(2K+1)$ degrees of freedom, and the residual sum of squares (RSS_U) of the unrestricted model (5.7) divided by the variance follow chi-square distribution with $N(T-1)-2K$ degrees of freedom. $\frac{RSS_U}{\delta_\varepsilon^2}$ is independent of $\frac{RSS_R - RSS_U}{\delta_\varepsilon^2}$ which follow chi-square distribution with $N-1$ degrees of freedom. The F-test under H_0 is

$$F = \frac{(RSS_R - RSS_U)/(N-1)}{RSS_U/[N(T-1)-2K]} \tag{5.9}$$

If F-test with $N-1$ and $N(T-1)-2K$ degrees of freedom is significant, the null hypothesis will be rejected that leading to estimate a model with cross-section specific terms. The second restriction is to treat the time specific effects equal to zero.

Consider a model with cross-section effects only

$$ESR_{it} = \alpha_0 + \mu_i + \beta X_{ijt} + \varepsilon_{it} \tag{5.10}$$

And then test the following hypothesis

$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = ... = \lambda_T = 0$

By using the following F-test

$$F = \frac{(RSS_R - RSS_U)/(T-1)}{RSS_U/[N(T-1)-2K]} \tag{5.11}$$

If F-test with $T-1$ and $N(T-1)-2K$ degrees of freedom is significant, the null hypothesis will be rejected so we consider the time specific effects in our estimated model. But if the F-statistic turns out to be insignificant, we can pay no attention to the time specific effects. The final restriction is to consider the model as common effects model with no time trend and cross-section specific effects.

$$ESR_{it} = \alpha_0 + \beta X_{ijt} + \varepsilon_{it} \tag{5.12}$$

And then test the following hypothesis

$$H_0 : \mu_1 = \mu_2 = \mu_3 = ... = \mu_N = 0, \lambda_1 = \lambda_2 = \lambda_3 = ... = \lambda_T = 0$$

By using the following F-test

$$F = \frac{(RSS_R - RSS_U)/(N-1)+(T-1)}{RSS_U/[N(T-1)-2K]} \tag{5.13}$$

If F-test with $(N-1)+(T-1)$ and $N(T-1)-2K$ degrees of freedom is significant, the null hypothesis are rejected and common effects model will be the incorrect choice.

To compute the individual effects in Eviews, the unrestricted specification of model with two-way fixed effects is estimated firstly. It is important to note that we drop the variables of REERx, REER_VOL and WGDP in the two-way estimation as it is cross-section invariant and cause perfect Multicollinearity. When we applied the fixed effects test in Eviews, the software gives us three restricted specifications i.e. period specific effects only, cross-section specific effects only and estimation with common intercept. The results of the redundant fixed effects are demonstrated in Table 5.2. Both F-test and Likelihood function (Chi-Square test) reveal the

presence of cross-section fixed effects and absence of period effects. Separate tests are conducted after this step. In first case, our unrestricted model is with cross-section fixed effects only and in second case our unrestricted model is with period effects only. Our results have robustly suggested a model with a cross-section fixed effects only. Consequently, we have moved forward with a model that is cross-section specific with no period specific effects.

Table 5.2: Individual Effects Test

Effects Tests	Statistic	d.f.	Prob.	Conclusion
Cross-section F-Statistic	1.86751	(123,1288)	0.0357	Reject H_0 of redundancy
Cross-section Chi-Square	157.890	123	0.0485	Reject H_0 of redundant effects
Period F-Statistic	0.68001	(123,1288)	0.7608	Fail to reject H_0 of redundancy
Period Chi-Square	8.33745	18	0.6785	Fail to reject H_0 of redundancy
Cross-Section/Period F	1.65788	(123,1288)	0.0654	Reject H_0 of redundancy
Cross-Section/Period Chi-square	183.789	134	0.0345	Reject H_0 of redundant effects

Source: Author's Calculations

5.1.3. Fixed Effects versus Random Effects (Hausman Test)

After deciding to estimate a model with cross-section specific unobservable effects, the next step is the determination of fixed effects model (i.e. whether these unobservable are fixed constant correlated with the other explanatory variables) or random effects model (i.e. randomly distributed independent of the explanatory variables) by applying the Hausman (1978) test. When time span is large, there is no difference between the fixed effects or random effects and both Least Square Dummy Variable and Generalized Least Square estimators yield the same results (Cheng Hsiao, 2003).

In contract, there is a significant difference between the fixed or random effects estimates when time period is finite and cross-section units are large. We have large cross section units in comparison with time period therefore the decision about fixed effects and random effects has more meaning and consequences.

To find out the Fixed Effects and Random Effects Models[4], we have applied Hausman (1978) test. The test depends on the difference between the fixed and random effects estimates. The null hypothesis of Hausman test assumes that the coefficients of fixed and random effects estimators have no significant differences. An essential dissimilarity between fixed and random effects is inferred the indication against random effects model.

The chi-square test for differentiated estimates is:

$$\chi^2_{df} = \left(\hat{\beta}_{FE} - \hat{\beta}_{RE} \right)' \left[\text{var}(\hat{\beta}_{FE}) - \text{var}(\hat{\beta}_{RE}) \right]^{-1} \left(\hat{\beta}_{FE} - \hat{\beta}_{RE} \right) \tag{5.14}$$

There are consistent fixed effects estimators in both the null and the alternative hypotheses. The random effects estimators are more efficient under the null hypothesis but inconsistent under the alternative hypothesis. The rejection of the null hypothesis indicates the correlation of some of the independent variables with the individual specific effects. In that case, the use of the random effects model results in biased results. To perform Hausman test, we have checked hypothesis of independent individual effects after estimating the random effects specification. The results of Hausman test are displayed in Table 5.3.

[4] If the cross-sections specific effects are correlated with the explanatory variables, fixed effect estimators become consistent in relation to the random effects that turn out to be inconsistent and biased. If the individual specific effects are independently and randomly distributed of the explanatory variables, the random effects become consistent but fixed effects remain inconsistent. So, it is important issue to diagnose the correlation of individual effects with the explanatory variables.

Table 5.3: Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section Random	18.0347	8	0.0429

Source: Author's Calculations

The results of Hausman test indicate the rejection of null hypothesis of independent individual effects.

5.1.4 Test of Multicollinearity

The next step is to check the issue of multicollinearity. If multicollinearity (i.e. explanatory variables are relatively highly correlated) exists, it results in large standard errors. To diagnose or detect multicollinearity, the simple correlation coefficients are analyzed. The results of the correlation test are shown in Appendix B. All correlation coefficients values suggest that the degree or strength of correlation is less than 0.20 in absolute terms therefore, it can be claimed that there is no severe multicollinearity problem.

5.1.5 Test of Endogeneity

Our Theoretical model seems to be endogenous; endogeneity may exist through real effective exchange rate for imports in domestic supply equation and via real effective exchange rate for exports in export supply equation. Durban-Wu-Husman test is employed to test endogeneity.

It is good practice to compare OLS and IV estimates. If estimates are very different this may be a sign that things are amiss. Using the idea that IV estimation will always be (asymptotically) unbiased whereas OLS will only be unbiased if Cov(X,u) = 0. econometrics texts discuss the issue of (OLS versus IV) in the context of the Durbin...Wu...Hausman (DWH) tests, which involve estimating the model via both OLS and IV approaches and comparing the resulting coefficient vector.

Consider the linear regression model is $y = X\beta + \mu$. The least square estimator $\hat{\beta}_{OLS} = (X'X)^{-1}X'Y$ is consistent if X and μ are uncorrelated, and with variance of parameters $V(\hat{\beta}_{OLS}) = \sigma^2(X'X)^{-1}$ with $\hat{\sigma}^2_{OLS} = (Y - X\hat{\beta}_{OLS})'(Y - X\hat{\beta}_{OLS})/(n-K)$ If X and μ are correlated, then the least square estimators are inconsistent. Define the matrix $P_z = Z(Z'Z)^{-1}Z$. A consistent estimator is the instrumental variables (IV) estimators $\hat{\beta}_{IV} = (X'P_zX)^{-1}X'P_zY$ which has covariance matrix $V(\hat{\beta}_{IV}) = \sigma^2(X'P_zX)^{-1}$ and $\hat{\sigma}^2_{IV} = (Y - X\hat{\beta}_{IV})'(Y - X\hat{\beta}_{IV})/(n-K)$. If X is uncorrelated with error then the $\hat{\beta}_{IV}$ estimator is inefficient relative to $\hat{\beta}_{OLS}$. In fact it can be quite a bit less efficient, depending on the quality of instruments. If we are not sure about the endogeneity of regressors then we can resort to a test belonging to the Durbin-Wu-Hausman (DWH) family. The test statistic is $(\hat{\beta}_{IV} - \hat{\beta}_{OLS})'\left[V(\hat{\beta}_{IV}) - V(\hat{\beta}_{OLS})\right]^{-1}(\hat{\beta}_{IV} - \hat{\beta}_{OLS})$. Under the null hypothesis that $COV(X, \mu) = 0$ i.e (OLS estimators are consistent and efficient as compare to IV). For the test of Endogeneity we use eview7, in which first we estimate export sale ratio model by Generalized Method of Moment (GMM) and then its results compare with Ordinary least square method (OLS) by using Hausman formula the results of Durbin Wu Hausman (DWH) test are displayed in Table 5.4.

Table 5.4: (DWH) Test

Hypothesis	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
$COV(X, \mu) = 0$	32.0347	12	0.2429

Source: Author's Calculations

The results of DWH test indicate that we fail to reject the null hypothesis of OLS estimators are consistent and efficient as compare to IV.

5.2 Empirical Results and Discussion

5.2.1 Firm Size, Exchange Rate and Exports Performance

We commence our analysis with the examination of the effects of firm size, exchange rate on export performance. The results of final estimation are presented in Table 5.4. The dependent variable is export sales ratio (ESR) to measure export performance of manufacturing sector firms. The explanatory variables specified are total assets, real effective exchange rate for exports, real effective exchange rate volatility, capital- output ratio, gross profit sales ratio, concentration ratio, world GDP[5].

From the Table 5.4, we discuss the variables of interest formerly. We observe that value of parameter Total Assets (TA) is 563.2432 suggesting that one percent increase in total assets of the manufacturing firms result in addition of 5.63 units in export sales ratio. We have used the variable of total assets of the firms to represent the firm size. The sign of the parameter is positive and highly statistically significant. The positive association between firm size and export performance can be justified on the following grounds. The large firm has cost advantage over the small firms due to internal and external economies of scale[6]. First we talk about the internal economies of scale that the larger firm can grasp. The large firm has plant economies of scale i.e. the firm can use larger and more specialized machinery to produce the large undertaking not only to meet the domestic requirements but also for exports consignments. A large firm can use its logistic network at full capacity (with no extra cost) and overcome the indivisibilities. The larger firm can fully utilize its dimensions of plant. They would have the commercial and marketing

[5] It is important to note that we have incorporated some of the variables in square form due the non-linearity of the variables as the review of studies suggests.

[6] Internal economies occur within the firm and external economies arise with the growth of industry. The internal economies are grouped into technical economies, commercial economies, organizational and financial economies.

benefits as well. In fact, the large firm has buying and selling economies along with efficient inventory holding.[7] The organizational economies are also related with the large size firms. They have the centralization of the functions for example administration, research and development that would reduce the overhead costs. Further, they have specialist staff (better quality employees) and efficient management. The larger firms enjoy the financial benefits i.e. better asset turnover ratio and cheaper finance. Similarly, external economies of scale like specialized ancillary industries, government assistance, skilled labor force etc also facilitate the lager firm to enhance the export intensity. The large firm can have learning effect as well. This would reduce the total cost per unit of the larger firms in comparison with smaller firms. So, the larger firm can diversify its operations and enhance its extent towards abroad.

Calof (1993) has discussed three reasons to explain the relationship between firm size and export performance namely i) internationalization ii) management attitudes and iii) firm's growth life cycle. While explaining the positive link between large firm and export Calof (1994) argues that smaller firms are at a resource disadvantage when compared to larger firms and may therefore not be able to invest in the hiring and training of international personnel. Further, he says that smaller firms may be more risk averse due to a lack of information, and, the relatively greater impact of an international mistake versus what it would be for larger firms.

Our results are compatible with the studies that also found the positive relationship between the firm size and export performance [see Hirsch and Adar, 1974; Cavusgil and Nevin, 1981; Maleksadeh and Nahavandi, 1985; Christensen, Rocha and Gertner, 1987; Cavusgil and Naor, 1987; Moen, 1999; Sterlacchini, 2001; Barua et al., 2010].

[7] Economies of scope can also be linked with the large scale firm that is producing a wider range of products.

Table 5.5: Estimates of Firm size, Exchange rate and Exports performance (Fixed Effects)

(Dependent Variable: Export Sales ratio)

Regressors	Coefficient	Std. Error	t-statistic	Prob.
Constant	-48729.83	13968.32	-3.488596	0.0005
TA	563.2432	217.3259	2.591698	0.0096
REERx	4691.820	1649.584	2.844245	0.0045
(REERx)^2	-140.8859	49.07113	-2.871054	0.0041
REER_VOL	433.0497	177.3764	2.441416	0.0147
(REER_VOL)^2	-14.26641	23.18053	-0.615448	0.5383
K	-0.000838	0.000279	-2.999665	0.0027
GPR	-0.035378	0.075678	-0.467483	0.6402
CON	273.0598	119.9352	2.276727	0.0229
(CON)^2	2.354690	0.899782	2.616957	0.0089
WGDP	159.1609	92.33047	1.723817	0.0849

Source: Author's calculations
Note: All the estimations are carried out by Eviews 7.

Another external sector variable to affect the supply side of exports is real effective exchange rate for exports (REERx). This variable incorporates the impact of relative prices on exports sales ratio. It shows the price competitiveness of exports and captures effects of valuation of currency. The value of parameter of real effective exchange rate for exports is 4691.820 suggesting that one unit increase in real effective exchange rate for exports increase the export sales ratio by 4691.820 percentage point. The parameter is highly significant and positive. The possible reason of positive relationship is that if the exchange rate depreciates, exports become cheaper[8] in the international market. Thus demand for exports increases so consequently exports-sales ratio increases. A lot of studies have also explored the positive relationship between the real

[8] If the real exchange rate is high, domestic goods are relatively expensive and foreign goods are relatively cheaper so trade balance would deteriorate due to fall in exports and rise in imports. If the real exchange rate is low, domestic goods are relatively cheaper and foreign goods are relatively expensive so trade balance would improve due to rise in exports and fall in imports.

effective exchange rate and export sales ratio [See Roy,1991; Srinivasan and Wallack,2003; Jeong and Ryoo,2007 and Veeramani ,2008]

Roy (1991) noted that a positive relationship of exports with these variables because an increase in Taka-Dollar exchange rate and effective rate of assistance should improve the price competitiveness of exports and lead to an increase in exports performance. The positive and significant coefficient of dummy variable in the exchange rate indicates that devaluation has some positive effect on the exports performance of Bangladesh.

Cheung and Sengupta (2012) argued about the positive relationship between real effective exchange rate and exports as:

> "The Indian REER has been mostly in an appreciating phase from 1994-95 onwards. Anecdotal evidence suggests that while until 1993-94, the relationship between REER and total exports is exactly what the textbook prescribes; that is, exchange rate depreciation having a positive effect on exports."

We have also introduced the square of real effective exchange rate to analyze its impacts on export-sales ratio. It appears negative and statistically significant. It shows contradictory results as we have in the case of without squaring the real effective exchange rate.

The next regressor in the specified equation is real effective exchange rate volatility (REER_VOL). The value of parameter is 433.0497 which show that one standard deviation increase in real effective exchange rate volatility increases the export sales ratio by 433.0497 percentage point. The relationship between the real effective exchange rate volatility and export sales ratio is positive and statistically significant. The possible reason of positive relationship between the real effective exchange rate volatility and export sales ratio may be the transaction costs considerations of large firms that enhance exports under auspicious circumstances.

Cheung and Sengupta (2012) argued about the positive relationship between the real effective exchange rate volatility and export sales ratio as:

> "Although the negative volatility effect appears intuitive and is support by, say, models based on risk aversion, a positive volatility is a possibility with models based on transaction costs considerations and view exporting activity an option that is exercised under favorable conditions."

Similarly, the firms can get benefit from exchange rate volatility through hedging and through readdressing the exports to other sites. As Cheung and Sengupta (2012) states that firms which have a large export share would have the incentive and, possibly, the means to benefit from exchange rate volatility via, say, hedging and re-directing its exports to alternative destinations.

They further claim that:

> "On the volatility side, once again firms with below median exports react negatively to REER volatility but curiously enough, firms with larger exports react positively to a rise in exchange rate volatility."

Our results are compatible with the studies [see As Cheung and Sengupta, 2012; Franke,1991]. However, there are many studies that found the negative relationship between real effective exchange rate volatility and export sales ratio [see for example, See Clark,1973; Baron, 1976; Hooper and Kohlhagen, 1978; Côte, 1994]. We have also introduced the square of real effective exchange rate volatility to analyze its intensity on export-sales ratio. It appears negative and statistically insignificant.

The firm specific variable is capital-output ratio[9] (K) that can influence the export performance of firms. The value of parameter of capital-output ratio is -0.000838 indicating that one percentage point increase in capital-output ratio leads to 0.000838 percentage point decrease in export sales ratio. The sign of the coefficient of capital-output ratio is negative and statistically highly significant. There may be many reasons to explain the negative relationship between capital-output ratio and export performance. Firstly, the negative relationship may be the

[9] Capital output ratio show that how much capital is required to produce one unit of output. In other words, capital-output ratio depicts the value of accelerator.

explained in terms of accelerator theory by J.M. Clark (1917). The theory suggests that if the capital output-ratio is high, it would enhance the cost of production of the concerned firm. This would in turn reduce the cost competitiveness of the firm in the international market. Firm with high capital output-ratio has to increase its products' price to meet its cost of production so the prices of exportable would increase and their demand would decrease.

Secondly, Tobin's Q theory indicates that if the relative price of capital rise, Tobin's marginal Q (ratio of value of marginal product of capital to the user cost of capital[10]) falls and resultantly investment level also falls. Due to decrease in investment, output level decreases and the firms' potential to exports reduce. In other words, increase in price of capital would increase the cost of capital and this would enhance the capital-output ratio i.e. more capital is required in monetary terms to produce the same output. This would augment the cost of production and consequently the export performance would deteriorate.

Thirdly, total capital employed which is a sum of shareholders' equity and total fixed liabilities[11] is the liability of a company. Myers and Majluf (1984), while discussing the problems of equity finance argue that external investors cannot distinguish the quality of firms and rank them as average. So the new shareholders implicitly command a premium to buy the shares. This would increase the opportunity cost of internal finance. Therefore, the capital-output ratio increases and export performance of the firm devastates. Third and important reason may be that like other LDCs, the cost of getting and maintaining capital (both physical and financial) are very high in Pakistan relative to labor cost. Finally, firms in Pakistan pay high cost (interest) for getting

[10] User cost of capital also known as unit cost of capital is defined as the product of rental price of capital and price of capital. In other words, it is sum of interest rate and depreciation times the price of capital.

[11] Total fixed liabilities is the sum of preferences shares, debentures and other fixed liabilities where other fixed liabilities include the liabilities which are required to be discharge after a period of more than one year from the data of balance sheets i.e. loans from financial institutions, loans from non bank financial institutions, loans from specialized financial institutions, foreign loans and vendors 'account.

financial capital and are dependent on expensive imported machinery, foreign skills and often raw materials as well, while the return for this capital is low in Pakistan as compared to developed countries. These higher costs may reduce the profits of manufacturing firms. This explanation is likely because in Amjad (1982) study the coefficient of capital-output ratio is negative for Pakistan.

The other firm-specific variable specified in the model is gross profit-sales ratio (GPR). The value of coefficient of gross profit-sales ratio is -0.035378 which exhibits that one percentage point increase in gross profit-sales ratio decreases the export sales ratio by 0.035378 percentage point. The parameter is negative but statistically insignificant. The possible reason of negative relationship between the gross profit-sales ratio and exports sales ratio may be that an increase in profit-sales ratio (due to increase in price level) results in reduction in demand for exportable as these become expensive therefore export sales ratio decreases.

To capture the monopoly in an industry, the degree of concentration[12] is used. It is a matter of interest both for customers, sellers and regulatory authorities to have the information of market concentration. We have used the four-firm concentration ratio (CON) to encapsulate the potential for uncompetitive price fixing in the manufacturing sector firms. The value of the parameter of concentration ratio is 273.0598 which exhibits that one percent point increase in the concentration ratio enhance the export-sales ratio by 273.0598 percent point. The relationship between concentration ratio and the export sales ratio is positive and highly statistically significant. The reason of positive relationship may be that as the concentration ratio increases, the share of the large firms increase. Very large suppliers are able to exert influence over market

[12] Concentration ratio explains the extent to which a market is controlled by a few large firms. Normally, it is calculated for top three, four or five firms.

price. This is because they limit the availability of substitutes and therefore reduce the degree of price elasticity of demand. Faced with a relatively price inelastic demand curve, the firm can then raises the price to increase revenues. This in turn enhances the profitability and export sales of the firm. We have also introduced the concentration ratio in square and it suggests the positive bearing on exports sales ratio as well. Our results are in line with [Hsu and Tasai (2007), Akbar (2011)]. We have also introduced the square of concentration ratio to analyze its intensity on export-sales ratio. It appears positive and statistically significant.

To incorporate the impacts of economic conditions of Pakistan's trading partners on export performance, the external sector variable World GDP (WGDP) has been used as a proxy variable. The value of the parameter of WGDP is 159.1609 that indicate one million addition in WGDP enhances the export sales ratio by 159.1609 percentage point. The relationship between WGDP and export sales ratio is positive and statistically significant. This positive relationship can be defensible because WGDP represents the income potential of the foreigners or trading partners of Pakistan. If the WGDP increases, they would have more resources on spend on Pakistani exports[13]. Therefore, the positive sign is correct and according to our expectations. Further, our results are compatible with [Reidel et al. (1994), Sinha (2007), Zada et al. (2012)].

5.2.2 Firm Size, Exchange Rate and Domestic Sales

Now we examine the effects of firm size, exchange rate on domestic sales. The results of estimation are displayed in Table 5.5. The dependent variable is Domestic Sales Ratio (DSR) to measure indigenous supply performance of manufacturing sector firms. The explanatory variables specified are total assets, real effective exchange rate for imports, inflation rate based on CPI, Per-capita Income and investment.

[13] There may be a case that the trading partners would spend on the other countries' exports and but increase in Pakistani exports can also happen. This in fact depends on a lot factors besides the exports elasticity of demand.

From the Table 5.5, it can be observed that the value of the parameter of total assets of the manufacturing firms (TA) is 110.9951[14] which indicate that one percent increase in total assets of the manufacturing firms result in addition of 1.11 units in domestic sales ratio. Total assets of the firms again represent the firm size. The firm with more total assets can be classified as large firm. The relationship between total assets and domestic sales ratio is positive and statistically highly significant. It means that as the size of the firm increases, its productive capacity increases and it would be able to supply more in the local market. The large firm would have more cost advantage due to economies of scale and scope. So the large firms with low average cost provide more supply in the domestic markets in comparison with the small firms.

Table 5.6: Estimates of Firm size, Exchange Rate and Domestic Sales

(Dependent Variable: Domestic Sales ratio)

Regressors	Coefficient	Std. Error	t-statistic	Prob.
Constant	-2577.287	472.7036	-5.452227	0.0000
TA	110.9951	31.11420	3.567344	0.0004
REERm	-32.21793	8.143843	-3.956109	0.0001
INF	-11.62856	3.860836	-3.011928	0.0026
PERC	5.84E-08	1.22E-08	4.778615	0.0000
PERC^2	-2.78E-19	5.31E-20	-5.240260	0.0000
INVES	0.002530	0.001414	1.790153	0.0736

Source: Author's Calculations
Note: All the estimations are carried out by Eviews 7.

The second variable specified in the equation is real effective exchange rate for imports (REERm). The value of the parameter is -32.21793, suggesting that one unit increase in real effective exchange rate for imports decrease the domestic sales ratio by 32.21 percentage point. The parameter is highly significant and negative. This variable encompasses the impact of relative

[14] If we compare the value of coefficient of total assets in both the equations i.e. export sales and domestic sales, we can infer that the magnitude of the value of total assets is more in export sales than that of domestic sales. This is in accordance with our theoretical model as in equation (4.6).

prices on domestic sales ratio. It shows the price competitiveness of imports and captures effects of valuation of currency. If the real effective exchange rate for imports depreciates, the cost of imported inputs accelerates therefore the firm would be unable to boost its sales locally. In fact, the firms that are using imported raw material, machinery etc more, their production cost is more associated with the real effective exchange rate for imports.

The next variable that can influence the domestic sales ratio is investment (INVES). The value of the parameter of investment is 0.002530 suggesting that an increase in the investment level increase the domestic sales ratio by 0.002530 percentage point. The parameter is positive and highly significant. It shows that when there is an increase in the investment expenditures, the domestic sales ratio increases because due to increase in investment, the productive capacity of the firms would increase and they can supply more in the domestic market.

To capture the resource effect of the country on firms' domestic sales, we have included the variable of per-capita income (PERC) in the specified equation. The value of parameter is 5.84E-08 that exhibits that one unit increase in per-capita income augment the domestic sales ratio by 5.84E-08 percentage point. The coefficient of per-capita income shows that when the per-capita income of the country increases, people would have more resources to spend on firms' offerings. The same we have observed in the parameter of per-capita income. Moreover, we have introduced the square of per-capita income to encapsulate the long term effect of per-capita income on firm domestic sales ratio. This appears with opposite sign i.e. negative sign interestingly. The negative relationship between the square of per-capita income and local sales ratio may be justified with the reason that doubling the per-capita income would induce the consumers to tilt their expenditures towards the foreign goods rather than the indigenous products. In fact with the double of per-capita

income, local products become inferior for the people and they tend to purchase the imported commodities due to demonstration effects.

Finally, we have the variable of inflation rate (INF) in the equation. The value of the parameter is -11.62856 indicating that one percentage point increase in inflation rate decreases the domestic sales ratio by 11.62 percentage point. The parameter shows negative relationship with statistical significance. The possible reason of negative relation between the inflation rate and domestic sales ratio may be that CPI based inflation rate reduces the purchasing power of the local consumers. They demand less when the inflation rate increases because their real income falls and resultantly the sales of firms condense.

5.3 Conclusion

This chapter has been organized to analyze the impacts of firm size, exchange rate on the domestic and exports sales. For this we have specified two models: one shows the impacts of firm size and exchange rate on exports performance of the firms and other model explores the relationship among firm size, exchange rate and domestic sales of the firms. The study has focused only on the manufacturing sector. In order to show the firm size, we have used the variables of total assets in both the models. To observe the exchange rate effects on exports sales and domestic sales, exchange rate for exports and imports have been devised. Exchange rate for exports has been used in the exports sales model while the exchange rate for imports has been introduced in domestic sales model. The results of exports sales model suggest that larger firms have more exports sales than the smaller ones. The variable of total assets has found positive and significant in the exports sales model validating the economies of scale and learning effects. Exchange rate is other focused variable to capture price competitiveness of exports and valuation of currency. It is also found

positive and highly significant in our model suggesting that exchange rate depreciation makes the exports cheaper in foreign market and resultantly exports-sales ratio escalates.

In the same fashion, second model i.e. domestic sales model also shows that total assets of the firms are positively related with the domestic sales due to reasons mentioned in the exports sales model. Another concentrated variable exchange rate for imports has been found negative and highly significant due to the fact that exchange rate depreciation increases the cost of imported inputs therefore the firm would be unable to boost its sales locally.

In a nutshell, we can claim that larger firms have more potential of enhancing both levels of sales. And real effective exchange rate for exports boosts the exports sales while real effective exchange rate for imports retards the domestic sales.

Chapter 6

Conclusion and Policy Recommendations

This study has attempted to investigate the effects of firm size and exchange rate on domestic and exports sales. The study has used panel data for the period 1998-2010 focusing 205 manufacturing firms belonging to fourteen industries. The data have been collected from SBP publication i.e. 'Balance Sheet Analysis of Joint Stock Companies listed on Karachi Stock Exchange'. This chapter has been set to summarize the findings of the study and to give policy implications.

We have specified two models to explore the impacts of firm size and exchange rate. First model investigates the effects on exports sales while the second model shows the effects on domestic sales. To measure the firm size, we have used the proxy variable i.e. the total assets of the firms and for exchange rate, real effective exchange rate for both exports and imports have been devised.

The results of the first model suggest that the relationship between firm size and export sales ratio is statistically significant and positive. It means that large firms are more inclined to exports. Indeed, the large firms have cost advantage and competitiveness due to economies of scale and scope. The large firms split their operations on the principle of division of labor and specialization to produce more efficiently. These firms have also financial, marketing and organizational economies. Therefore the large firms, through allocative and productive efficiencies, are dominant in boosting the exports performance. Exchange rate is another focused variable in the model to capture the price competitiveness of exports and effects of valuation of

currency. The parameter of real effective exchange rate is found positive and statistically significant. The possible reason of positive relationship is that as the exchange rate depreciates, the relative domestic price level falls and resultantly exports sales ratio increases due to cheaper exports in the international market.

Now we come towards the results of second model that encapsulates the effects of firm size and exchange rate on domestic sales ratio. Again the parameter of firm size appears with positive sign suggesting that as the size of the firm increases, its productive capacity increases and it would be able to supply more in the local market. So the large firms with low average cost provide more supply in the domestic markets in comparison with the small firms.

Another variable of interest was the exchange rate to encompass price competitiveness of imports on domestic sales ratio. The relationship between real effective exchange rate and domestic sales ratio is found negative and statistically significant. It means that if the real effective exchange rate for imports increases, the cost of imported inputs accelerates therefore the firm would be unable to boost its sales locally.

In a nutshell, we can conclude that firm size is a vital factor to improve the export performance. The large firms possess a lot of managerial and financial resources than the smaller firms and can participate easily in the international market. Exchange rate also plays an important role in determining the export performance of the firms due to the price competitiveness in the domestic and foreign markets.

This study has also spelled out two policy implications based upon its findings.

i) The study shows the importance of scale in promoting the domestic and exports sales. The policy makers can focus on the scale of production to increase the productive efficiency for boosting the domestic and exports sales ratios.

ii) From Pakistan's economy perspective, our results indicate that exchange rate policy affects the domestic and exports sales. So the policy makers must on device an effective exchange rate policy to enhance the domestic sales that are affected by imported raw material and exports sales that are also affected by exchange rate fluctuations and volatility.

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Appendices

Appendix A: Some Evidence on the firm size and export performance of Pakistan's Industries of Manufacturing Sector

Table A1: Industrial Wise Export Sale Ratio(%)

Year	Cement	Paper and Board	Sugar	Textile Spinning	Textile Weaving	Chemical	Engineering	F&D Products	Fuel & Energy	Air Lines	Foam	Polyester	Power	Yarn & Fabrics	Yarn
1998	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0	0.74	4.66	45.56	49.62	0.83	0.72	4.98	0.00	2.27	25.27	28.91	0.00	67.14	23.46
2002	0.472436	9.24	8.64	45.23	44.83	1.33	0.18	4.29	0.00	2.43	14.65	28.64	0.00	68.68	17.89
2003	1.263704	13.09	5.16	38.96	38.73	1.30	0.38	6.99	0.84	1.98	25.53	29.45	0.00	68.01	18.24
2004	1.649313	0.16	11.04	35.85	38.07	1.47	0.59	3.18	0.84	1.42	14.60	4.94	0.00	59.32	19.70
2005	5.229273	0.18	11.90	32.92	37.76	1.75	0.23	5.32	0.65	1.34	3.71	27.32	0.00	72.00	19.58
2006	7.968596	0.34	9.58	31.50	37.34	1.85	0.12	4.04	1.11	1.74	13.86	25.37	0.00	65.09	12.16
2007	8.46927	0.27	9.36	42.20	41.45	1.56	0.06	2.80	1.01	1.37	13.61	26.71	0.00	64.43	15.69
2008	15.63207	0.57	21.08	36.38	41.60	1.56	0.11	2.75	1.79	0.69	13.91	27.99	0.00	59.75	12.68
2009	22.18175	0.67	8.49	36.06	43.77	1.44	0.02	2.52	1.80	1.58	30.21	64.74	1.69	57.76	11.10
2010	25.5912	0.77	8.21	43.87	42.55	1.62	0.05	10.39	3.39	1.98	34.53	135.95	2.32	57.34	12.34
2011	21.37509	0.14	14.98	52.90	46.35	1.53	0.34	4.31	3.78	1.32	44.32	48.15	2.54	57.76	15.52
Average	7.845194	1.87	8.08	31.53	33.00	1.16	0.20	3.68	1.09	1.29	16.73	32.01	0.47	49.81	12.74
S.D	9.077641	3.87	5.74	17.34	17.55	0.65	0.22	2.74	1.19	0.80	13.24	33.89	0.91	26.38	7.43

Source: Author's calculations

Table A2: Industrial Wise Domestic Sale Ratio (%)

Year	Cement	Paper and Board	Sugar	Textile Spinning	Textile Weaving	Chemical	Engineering	F&D Products	Fuel & Energy	Air Lines	Foam	Polyester	Power	Yarn & Fabrics	Yarn
1998	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	117.58	100.00	100.00	100.00	940.31
1999	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	115.76	100.00	100.00	100.00	935.63
2000	100.00	100.00	200.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	112.61	100.00	100.00	100.00	835.94
2001	100.00	99.26	195.03	54.44	50.38	99.17	99.28	95.02	100.00	97.73	91.32	71.09	100.00	32.84	868.95
2002	99.53	90.76	191.36	54.77	55.17	98.67	99.82	95.71	100.00	97.57	102.49	71.36	100.00	31.32	718.41
2003	98.74	86.91	194.84	61.04	61.27	98.70	99.62	93.01	99.16	98.02	90.28	70.55	100.00	31.87	898.97
2004	98.35	96.13	188.96	64.15	61.93	98.53	99.41	96.82	99.16	98.58	115.84	95.06	100.00	40.68	1517.48
2005	94.77	96.11	182.46	67.08	62.24	98.25	99.77	94.68	99.35	98.66	130.79	72.68	100.00	33.67	1124.13
2006	92.44	95.95	190.42	68.50	62.66	98.15	99.88	95.96	98.89	98.26	118.13	74.63	100.00	37.62	1713.05
2007	91.53	96.02	190.64	57.80	58.55	98.44	99.94	97.20	98.99	98.63	125.01	73.29	100.00	38.31	858.88
2008	84.37	95.72	178.92	63.62	58.40	98.44	99.89	97.25	98.21	99.31	123.66	72.01	100.00	42.83	304.51
2009	77.82	95.62	191.51	63.94	56.23	98.56	99.98	97.48	98.20	94.90	104.43	108.50	180.13	42.24	228.83
2010	74.44	97.87	191.79	56.13	57.45	97.82	99.95	89.61	96.61	98.02	104.75	137.20	97.68	42.66	171.72
2011	78.66	98.50	185.05	47.10	53.65	98.03	99.66	95.69	96.22	98.68	94.96	106.12	89.20	42.24	168.53
Average	92.19	96.35	191.50	68.47	67.00	98.77	99.80	96.32	98.91	98.45	110.54	89.46	104.79	51.16	806.10
S.D	9.07	3.56	6.16	17.34	17.55	0.71	0.22	2.74	1.19	1.26	12.30	19.59	21.08	25.80	453.73

Source: Author's calculations

Table A3: Industrial Wise Concentration Ratio (%)

Years	Cement	Paper and Board	Sugar	Textile Spinning	Textile Weaving	Chemical	Engineering	F&D Products	Fuel & Energy	Air Lines	Foam	Polyester	Power	Yarn & Fabrics	Yarn
1998	35.61	92.40	83.17	40.92	48.47	79.43	72.88	74.82	82.93	99.10	84.97	100.00	100.79	47.28	30.39
1999	51.01	93.32	77.30	38.97	56.42	80.13	66.15	76.25	81.95	98.88	82.26	100.00	102.35	51.19	30.85
2000	53.61	94.80	88.78	44.93	53.08	77.92	61.91	77.78	80.60	98.65	78.76	99.99	101.07	52.42	29.15
2001	50.80	95.24	96.72	45.39	51.59	76.57	60.41	79.88	80.39	98.77	85.08	100.00	102.86	55.60	30.41
2002	51.75	94.53	74.42	48.82	56.09	81.09	71.42	80.32	80.66	98.73	87.28	100.00	102.19	58.22	31.33
2003	53.19	94.59	82.59	51.96	52.30	84.57	74.51	79.07	80.41	98.86	89.03	100.00	102.10	57.42	33.72
2004	53.79	94.54	78.80	58.42	51.17	84.87	76.09	79.21	79.71	99.00	87.68	100.00	109.80	60.85	36.33
2005	38.54	94.43	97.61	55.01	56.33	83.81	78.17	78.81	80.01	98.76	87.84	100.00	108.97	57.66	32.85
2006	60.19	94.46	108.19	51.42	50.39	83.07	80.18	79.14	80.08	98.46	90.46	100.00	103.19	57.93	31.16
2007	65.97	95.06	105.90	59.60	50.00	83.51	80.51	79.20	80.62	98.26	90.61	100.00	107.61	58.84	35.63
2008	73.68	96.01	100.72	60.80	54.01	82.57	76.24	79.29	81.47	98.59	89.30	100.00	101.92	61.55	37.62
2009	75.66	95.59	104.05	60.63	51.42	81.04	64.33	80.16	83.03	98.67	89.46	100.00	107.67	61.35	38.93
2010	77.57	96.00	116.47	61.14	78.11	93.56	74.92	82.85	69.97	98.66	93.40	100.00	105.42	62.93	37.92
2011	74.78	95.86	111.48	61.66	79.80	94.41	76.60	83.45	68.94	98.63	97.55	100.00	104.40	64.16	39.70
Average	58.30	94.77	94.73	52.83	56.37	83.33	72.45	79.30	79.34	98.72	88.12	100.00	104.31	57.67	34.00
S.D	13.50	1.01	13.81	7.96	9.88	5.14	6.66	2.22	4.32	0.21	4.60	0.00	3.04	4.74	3.61

Source: Author's calculations

Table A4: Industrial Wise Profit to Sale Ratio (%)

Years	Cement	Paper and Board	Sugar	Textile Spinning	Textile Weaving	Chemical	Engineering	F&D Products	Fuel & Energy	Air Lines	Foam	Polyester	Power	Yarn & Fabrics	Yarn
1998	1.11	18.23	14.05	11.15	12.18	23.55	-3.92	26.64	14.77	29.90	13.55	37.25	282.99	13.71	5.24
1999	2.63	16.78	21.30	12.71	12.13	23.90	-4.74	17.48	13.53	29.27	21.94	-17.03	27.30	13.44	3.93
2000	7.57	14.10	17.75	20.40	16.93	23.19	-15.48	11.90	14.76	28.21	21.32	-12.49	24.35	17.73	16.87
2001	4.21	19.80	7.19	14.57	10.86	25.54	9.09	18.16	11.31	32.95	16.72	-13.43	17.94	12.21	10.22
2002	8.65	3.29	4.25	11.64	10.76	24.95	3.23	9.28	11.88	34.24	17.33	-13.52	18.05	13.70	7.53
2003	1.37	21.64	8.68	9.29	0.49	19.31	12.02	2.74	11.44	34.10	19.57	-34.31	16.14	17.86	-2.99
2004	16.24	18.11	10.96	9.06	1.78	26.17	14.44	16.46	12.71	27.05	12.16	-35.26	14.72	9.24	-341.14
2005	17.64	15.80	16.65	12.37	10.34	19.90	11.23	6.23	10.25	34.64	11.01	-36.48	9.21	13.94	6.96
2006	25.42	15.73	6.56	12.38	9.92	19.70	11.03	12.54	-9.12	19.72	15.73	-135.23	-8.72	13.32	8.54
2007	4.33	15.83	-8.80	11.64	9.32	26.29	11.14	15.61	-2.08	23.88	0.46	0.24	-3.83	11.73	1.88
2008	-4.09	9.75	-143.85	10.58	9.11	29.22	10.28	17.42	7.02	14.08	12.66	-79.88	4.26	8.31	1.15
2009	7.47	9.53	-33.17	10.81	11.09	27.09	10.17	19.60	5.39	29.42	18.29	-146.10	11.86	8.53	0.92
2010	-2.24	13.37	87.30	17.70	14.79	27.04	18.40	25.01	14.18	21.19	13.34	359.26	13.51	9.60	-6.46
2011	8.63	12.50	120.19	14.18	12.25	27.96	18.42	25.02	13.15	27.23	-561.61	-102.31	9.42	2.37	-10.84
Average	7.07	14.60	9.22	12.75	10.14	24.56	7.52	16.01	9.23	27.56	-26.25	-16.38	31.23	11.83	-21.30
S.D	7.80	4.59	56.25	3.02	4.20	3.03	9.22	6.78	6.73	5.83	148.57	115.80	70.46	3.89	88.97

Source: Author's calculations

Table A5: Industrial Wise capital-Output Ratio (%)

Years	Cement	Paper and Board	Sugar	Textile Spinning	Textile Weaving	Chemical	Engineering	F&D Products	Fuel & Energy	Air Lines	Foam	Polyester	Power	Yarn & Fabrics	Yarn
1998	139.43	46.91	92.61	32.97	39.78	71.27	129.90	93.00	32292.67	107.40	371.78	93.53	337.17	39.38	43.67
1999	-1515.52	62.38	83.37	41.54	40.17	66.43	153.79	82.45	40524.69	104.42	73.43	1138.51	2827.95	32.83	45.88
2000	64.29	134.99	100.69	39.42	50.09	79.27	210.18	46.88	215.16	94.47	55.45	387.39	2685.95	43.96	41.73
2001	79.15	98.21	106.36	39.19	42.99	65.62	106.56	235.84	103.98	91.42	433.95	382.62	239.38	53.06	37.03
2002	102.31	315.42	72.35	44.21	37.38	69.80	55.70	84.95	114.27	97.44	289.23	388.56	2072.69	44.45	37.05
2003	92.75	50.06	62.08	38.46	31.02	64.16	25.55	54.10	86.42	97.67	115.01	379.83	472.72	42.28	38.67
2004	94.05	53.04	85.23	42.77	29.77	88.67	53.04	52.17	99.06	190.59	84.68	384.51	923.64	51.53	54.35
2005	96.13	64.97	78.75	60.08	83.96	623.61	45.06	125.01	86.68	69.35	91.98	390.13	943.61	82.68	62.16
2006	111.53	70.09	131.41	59.23	70.65	340.63	40.48	23.85	255.36	167.94	145.52	4157.55	839.58	70.43	43.49
2007	206.20	85.99	134.28	41.14	66.08	133.29	54.26	16.48	344.07	84.76	395.97	290.24	968.22	56.64	-6.16
2008	183.08	68.27	2022.65	48.24	50.55	65.73	45.96	24.15	100.14	107.20	189.09	1455.61	882.00	62.24	45.75
2009	1218.47	218.67	1374.17	39.08	34.06	77.97	63.92	26.71	135.56	137.83	75.78	5064.94	449.26	80.98	267.62
2010	-796.41	1313.60	54520.72	225460.95	49.97	67.07	62.98	37.94	124.79	246.99	119.38	4496.18	2361.89	72.97	25.85
2011	-10403.4	11373.96	48779.57	359479.03	38.54	58.25	65.16	36.26	100.55	206.98	20640.57	4134.73	472.23	360.56	14.45
Average	-737.71	996.90	7688.88	41819.02	47.50	133.70	79.47	67.13	5327.39	128.89	1648.70	1653.17	1176.88	78.14	53.68
S.D	2741.01	2895.65	17988.82	105415.58	15.39	152.98	50.17	55.78	12784.10	51.43	5268.91	1820.30	873.36	79.76	61.52

Source: Author's calculations

Table A6: Industrial Wise Total Asset

Years	Cement	Paper and Board	Sugar	Textile Spinning	Textile Weaving	Chemical	Engineering	F&D Products	Fuel & Energy	Air Lines	Foam	Polyester	Power	Yarn & Fabrics	Yarn
1998	319022	109521	154091	71654	216226	509925	134063	47997	1167151	2124590	78821	166053	1250625	70197	50497
1999	303885	111538	147059	83950	239224	503221	162223	63333	1194586	2236559	115497	176423	1174923	73720	54597
2000	304501	109484	145719	89221	273404	593920	152428	67762	1295356	2288871	115020	179485	1284975	75304	54047
2001	306400	114883	171754	100726	320780	375671	155321	72610	1368428	2325755	117767	181208	1367640	91122	57521
2002	329581	117963	171873	118650	326185	487249	221508	79917	1420578	2254134	115856	201400	1387586	96558	57205
2003	338893	138013	185154	135736	391002	485969	303519	91196	1425708	2455229	116254	226968	1373929	123315	61506
2004	391919	160493	228015	169946	451720	503846	417977	119386	1569822	3028364	122987	248660	1595932	163355	78434
2005	566003	229428	273063	227202	630260	557232	580785	155307	1771240	2876743	200396	307660	1871888	232233	94215
2006	871535	393713	324474	267026	725468	612784	651235	203623	2281271	3494858	209769	309558	2354340	262246	111378
2007	1120775	568578	362066	293328	923103	814004	630822	250558	2514488	3682920	221598	318423	2632831	279656	117797
2008	1323242	649028	415446	349473	977740	993945	593844	304410	3548582	4376308	245937	373988	3508950	316164	135270
2009	1399050	658721	459825	357126	846405	1339324	675503	334303	4109313	5146162	237737	389563	3042933	317325	126666
2010	1882835	593607	436958	342958	728007	1486546	771035	360167	3346338	4609589	381629	385974	4562767	321656	127175
2011	1244556	2708379	720919	434247	843168	2206033	794681	478717	3491265	4572419	404811	455928	3474685	365477	155148
Average	764443	475953	299744	217232	563764	819262	446067	187806	2178866	3248036	191720	280092	2206000	199166	91532
S.D	534570	679970	166340	122739	275165	522172	250569	136724	1034794	1059465	101491	95949	1079145	110528	36603

Source: Author's calculations

Appendix B: Correlation Matrix: Test for Multicollinarity

	LTA	CO4	KO	WGDP	GPOR	REERX	REER_VOL
LTA	1.000000	0.275828	0.048451	-0.040775	0.061730	0.187592	-0.087730
CO4	0.275828	1.000000	0.001491	-0.012613	0.031127	0.110934	-0.058305
KO	0.048451	0.001491	1.000000	0.016857	-0.015953	0.005050	0.004617
WGDP	-0.040775	-0.012613	0.016857	1.000000	-0.001450	0.042718	-0.174411
GPOR	0.061730	0.031127	-0.015953	-0.001450	1.000000	-0.030934	0.024519
REERX	0.187592	0.110934	0.005050	0.042718	-0.030934	1.000000	-0.567338
REER_VOL	-0.087730	-0.058305	0.004617	-0.174411	0.024519	-0.567338	1.000000

Appendix C

Cement Industry	Cherat Cement Company Ltd. Dadabhoy Cement Industries Ltd D.G. Khan Cement Company Ltd. Dandot Cement Company Ltd. Fauji Cement Company Ltd. Fecto Cement Ltd. Gharibwal Cement Ltd. Kohat Cement Company Ltd. Lucky Cement Ltd. Maple Leaf Cement Factory Ltd. Pioneer Cement Ltd. Zeal Pak Cement Factory Ltd. Javedan Cement Ltd.
Paper And Board Industry	Abson Industries Ltd. Baluchistan Particle Board Ltd. Central Forest Products Ltd. Century Paper & Board Mills Ltd. Cherat Papersack Ltd. Dadabhoy Sack Ltd. Merit Packaging Ltd. Packages Ltd. Pakistan Paper Products Ltd. Security Papers Ltd
Polyester Industry	Al-Abid Silk Mills Ltd. Gatron (Industries) Ltd. Noor Silk Mills Ltd. Pakistan Synthetics Ltd. Tri-Star Polyester Ltd

Sugar Industry	Adam Sugar Mills Ltd. Chashma Sugar Mills Ltd. Dewan Sugar Mills Ltd. Faran Sugar Mills Ltd. Fecto Sugar Mills Ltd. Haseeb Waqas Sugar Mills Ltd. Husein Sugar Mills Ltd JDW Sugar Mills Ltd. Khairpur Sugar Mills Ltd. Kohinoor Sugar Mills Ltd. Mirpurkhas Sugar Mills Ltd. Sanghar Sugar Mills Ltd. Sindh Abadgar's Sugar Mills Ltd. Tandlianwala Sugar Mills Ltd. The Frontier Sugar Mills & Distillery Ltd Al-Abbas Sugar Mills Ltd. Al-Noor Sugar Mills Ltd. Ansari Sugar Mills Ltd. Baba Farid Sugar Mills Ltd. Bawany Sugar Mills Ltd. Crescent Sugar Mills And Distillery Ltd. Mehran Sugar Mills Ltd. Mirpurkhas Sugar Mills Ltd. Mirza Sugar Mills Ltd. Noon Sugar Mills Ltd. Pangrio Sugar Mills Ltd. Sakrand Sugar Mills Ltd. Shahmurad Sugar Mills Ltd. Shahtaj Sugar Mills Ltd. The Premier Sugar Mills & Distillery Co. Ltd. The Thal Industries Corporation Ltd.
Textile spinning Industry	Al-Qadir Textile Mills Ltd. Allawasaya Textile & Finishing Mills Ltd. Bhanero Textile Mills Ltd. Colony Mills Ltd. (Colony Textile Mills Ltd.) Din Textile Mills Ltd. Fazal Cloth Mills Ltd. Gadoon Textile Mills Ltd. Gulshan Spinning Mills Ltd. N.P. Spinning Mills Ltd. Nagina Cotton Mills Ltd. Paramount Spinning Mills Ltd. Reliance Cotton Spinning Mills Ltd.

	Sargodha Spinning Mills Ltd. Saritow Spinning Mills Ltd.
Textile weaving Industry	Fatima Enterprises Ltd. Hamid Textile Mills Ltd. Ideal Spinning Mills Ltd. Kohinoor Textile Mills Ltd. Nishat Mills Ltd. Reliance Weaving Mills Ltd. Sapphire Textile Mills Ltd. Suraj Cotton Mills Ltd. The Crescent Textile Mills Ltd. Zahidjee Textile Mills Ltd
Chemical Industry	Abbott Laboratories (Pakistan) Ltd. BOC Pakistan Ltd, Bawany Air Products Ltd. Berger Paints Pakistan Ltd. Buxly Paints Ltd. Engro Corporation Limited (Engro Cheml Pakistan Ltd.) Fauji Fertilizer Company Ltd. Glaxosmithkline (Pakistan) Ltd. Highnoon Laboratories Ltd. ICI Pakistan Ltd. Sardar Chemical Industries Ltd. Shaffi Chemical Industries Ltd. Sitara Chemical Industries Ltd. Wyeth Pakistan Ltd
Engineering Industry	Ados Pakistan Ltd. Atlas Battery Ltd. Atlas Engineering Ltd. (Allwin Engineering Industries Ltd.) Bela Automotives Ltd. Atlas Honda Ltd. Ghandhara Nissan Ltd. Hinopak Motors Ltd. Honda Atlas Cars (Pakistan) Ltd. Indus Motor Company Ltd. Al-Ghazi Tractors Ltd. Pak Suzuki Motor Company Ltd. Millat Tractors Ltd

Food and Dairy Products Industry	Clover Pakistan Ltd. Goodluck Industries Ltd. Indus Fruit Products Ltd. Ismail Industries Ltd. Mitchell's Fruit Farms Ltd. Murree Brewery Company Ltd. National Foods Ltd. Nestle Pakistan Ltd. Noon Pakistan Ltd. Rafhan Maize Products Co. Ltd. Shezan International Ltd. Unilever Pakistan Foods Ltd. Rafhan Bestfoods Ltd.
FUEL & ENERGY Industry	Attock Refinery Ltd. Generteck Pakistan Ltd. NOT in panel Ideal Energy Ltd. Japan Power Generation Ltd. Karachi Electric Supply Corporation Ltd. Kohinoor Energy Ltd. Kohinoor Power Company Ltd. Mari Gas Company Ltd. Pakistan Oilfields Ltd. Pakistan Refinery Ltd. Pakistan State Oil Company Ltd. Shell Pakistan Ltd
Air lines Industry	Pakistan International Airlines Corporation Ltd. Pakistan National Shipping Corporation. Pakistan Telecommunication Company Ltd. Telecard Ltd. Emco Industries Ltd. Frontier Ceramics Ltd. Gammon Pakistan Ltd. 8. Karam Ceramics Ltd
Foam production Industry	Al-Khair Gadoon Ltd. Bata Pakistan Ltd. Diamond Industries Ltd. Fateh Industries Ltd. Gillette Pakistan Ltd. Leather Up Ltd. Pak Leather Crafts Ltd. Pakistan Services Ltd. Service Industries Ltd. Zulfeqar Industries Ltd.
Polyester production Industry	Al-Abid Silk Mills Ltd.

	Gatron (Industries) Ltd. Noor Silk Mills Ltd. Pakistan Synthetics Ltd. Tri-Star Polyester Ltd.
Power production Industry	Ideal Energy Ltd. Japan Power Generation Ltd. Kohinoor Energy Ltd. Kohinoor Power Company Ltd. Pakistan Refinery Ltd. Pakistan State Oil Company Ltd. Shell Pakistan Ltd. Sitara Energy Ltd. Southern Electric Power Co. Ltd. Sui Northern Gas Pipelines Ltd. Sui Southern Gas Company Ltd.
Yarn production Industry	Adil Textile Mills Ltd. Ali Asghar Textile Mills Ltd. Ayesha Textile Mills Ltd. Azam Textile Mills Ltd. Crescent Spinning Mills Ltd. D.M. Textile Mills Ltd. Dar Es Salaam Textile Mills Ltd. Data Textiles Ltd. Glamour Textile Mills Ltd. Globe Textile Mills (OE) Ltd. Globe Textile Mills Ltd. Gulistan Textile Mills Ltd. Haji Mohammad Ismail Mills Ltd. Hajra Textile Mills Ltd. J.K. Spinning Mills Ltd. Janana De Malucho Textile Mills Ltd. Jubilee Spinning & Weaving Mills Ltd. Karim Cotton Mills Ltd. Khalid Siraj Textile Mills Ltd. Khurshid Spinning Mills Ltd. Khyber Textile Mills Ltd. Sajjad Textile Mills Ltd. Salfi Textile Mills Ltd. Sally Textile Mills Ltd. Salman Noman Enterprises Ltd. Resham Textile Industries Ltd. Ruby Textile Mills Ltd. Service Industries Textiles Ltd. Shadab Textile Mills Ltd. Shadman Cotton Mills Ltd. Shahzad Textile Mills Ltd. Shams Textile Mills Ltd.

	Tata Textile Mills Ltd. Yousaf Weaving Mills Ltd .
Yarn & Fabric Industry	Ahmed Hassan Textile Mills Ltd. Artistic Denim Mills Ltd. Ashfaq Textile Mills Ltd. Blessed Textiles Ltd. Faisal Spinning Mills Ltd. ICC Textiles Ltd. Mian Textile Industries Ltd. Mohammad Farooq Textile Mills Ltd. Nishat (Chunian) Ltd. Prosperity Weaving Mills Ltd. Quetta Textile Mills Ltd. Redco Textiles Ltd. Shahtaj Textile Ltd.