Pak J Commer Soc Sci
Pakistan Journal of Commerce and Social Sciences
2015, Vol. 9 (3), 818-836

Firm Size, Exchange Rate and Exports Performance: a Firm Level Study of Pakistan's Manufacturing Sector

Asad Abbas
Government College Qadir Pur Rawan, Multan
Email: asadsargana786@gmail.com

Muhammad Ramzan Sheikh
Bahauddin Zakariya University Multan, Pakistan
Email: ramzansheikh@bzu.edu.pk

Muhammad Nauman Abbasi
Bahauddin Zakariya University Multan, Pakistan
Email: abbasimna@bzu.edu.pk

Abstract

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 influence the export performance of a country. 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 technique over 10 years data focusing 205 manufacturing firms representing fourteen different industrial sectors. Two models are specified to explore the impact of firm size and exchange rate. First model examines the effects on export sales while the second model explored the effects on domestic sales. The findings of the first model suggest positive link among firm size, exchange rate and export sales. The second model exposed positive effect of firm size on domestic sales ratio while real effective exchange rate and domestic sales ratio are found negative.

Keywords: firm size, exchange rate, exports sales, domestic sales, manufacturing sector

1. Introduction

In this age of globalization each country is striving hard 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 because 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. Thus, exports enhance the economic efficiency and productivity gains

of the countries by getting technological transfer and diffusion. Mostly East Asian countries have adopted the export-led growth strategy with more economic integration to achieve growth targets. This gives real insight to policy makers of the developing countries to give more attention to exports.

The export performance of domestic firms is very critical especially for developing countries. Pakistan is focusing to expand its exports but fail to get a large 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. Unfortunately, due to aforesaid factors, Pakistan's exports are undesirable. Despite of the bouncy efforts 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). Pakistan as a developing country is facing many economic challenges. An export led growth strategy can be a better choice to overcome the low economic growth. For this, exports performance must be expedite.

Keeping in view of the above discussion, this study determine the relationship among firm size, exchange rate and export performance and to the best of our knowledge; it is the pioneer study on the connection between firm-size and export performance of manufacturing firms. An attempt has been made to evaluate 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. Moreover, none of the previous studies has formulated exchange rate indices for Pakistan to examine the export performance. A concentration index has also been constructed and its impacts on export performance have been observed to explore whether the domestic monopoly can outperform the competitive firms in the international export market. 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.

2. Review of Assorted Studies

Export is considered an important ingredient of economic growth. Among many other factors, firm-size and exchange rate are the vital factors that can influence the export performance of a country. This section present review of various studies on firm-size, exchange rate and export performance.

2.1 Studies on Firm-size and Export Performance

This section present snapshot of existing studies that have examined the relationship between firm-size and export performance (See Table 1). Surprisingly, all studies portrait positive link between firm size and export performance except Bonaccorsi (1992), Wolff and Pett (2000) and Gabbitas and Gretton (2003), wherein, mixed findings have been observed.

Table: 1 Selected Studies on Firm size and Export Performance

Author(s)	No of Firms	Measurement	Results
Bonaccorsi (1992)	8810	No of Employees Total Assets	Negative Positive
Calof (1994)	14072	No of Employees Sale	Positive Positive
Archarungroj & Hoshino (1998)	500	Sale	Positive
Papadogonas et al. (1999)	1652	Sale No of Employees	Positive Positive
Moen (1999)	-----	Sale	No relationship
Dean et al. (2000)	-----	Sale No of Employees	Positive Positive
Wagner (2000)	348	Total asset	Inversely U-shaped
Wolff & Pett (2000)	157	Sale Sale	Positive Negative
Sterlacchini (2001)	-----	Sale	Inversely U-shaped
Gabbitas and Gretton (2003)	350	Sale No of Employees	Positive Negative
Mittelstaedt &Ward (2003)	2777	Total asset Total asset	Positive Positive
Barua et al. (2010)	750	Total asset	Positive
Esteve et al. (2011)	-------	Sales	Negative
Chandran & Rasiah (2013)	100	No of Employees	Positive
LiPuma,, Newbert, & Doh (2013)	10,000	No of Employees	Positive but with institutional quality
Rajah & Fathimath (2013)	-------	No of Employees	Positive

Source: Authors' Comparative Analysis of Various Studies.

2.2 Studies on Exchange rate and Export Performance

This section reviews the studies that have explored the relationship between exchange rate and export performance. All the studies have inferred the inverse relationship between the two variables (See Table 2).

Table: 2 Selected Studies on Exchange Rate and Export Performance

Author(s)	Objectives	Results
Mustafa and Nishat (2004)	To investigate exchange rate volatility and exports growth between Pakistan and leading trade partners	Negative
Majeed and Ahmad (2006)	Determinants of Exports in developing countries	Negative
Hsu (2007)	Exchange rate changes and industry profitability and firms exports volume	Effect of depreciation on exports of individual firm is not clear
Robert Jeong and Ryoo (2007)	Exchange Rates and firm level exports	Negative
Veeramani (2008)	Exchange rate appreciation and Indians Exports	Negative
Cheung and Sengupta (2012)	Exchange rate and Firms Exports	Negative
Shuangshuang (2012)	Real effective exchange rate, inflation and export performance in Switzerland	Negative
Srinivasan and Kalaivani (2013)	Exchange rate volatility and real exports in India	Negative

Source: Authors' Comparative Analysis of Various Studies.

It can be inferred from the aforementioned studies that firm-size and export performance indicate positive relationship, however, some studies have reported negative relationship. These studies have justified conflicting result with various logical reasons. Undoubtfully, there exists consensus among the economists that exchange rate appreciation negatively influences the exports of a country. The existing empirical studies have explored the determinants of exports at macro level but very rare attempts have been made to address the issue in context of Pakistan. It is therefore, using the firm-level data this study examined the export performance of the country.

3. Theoretical Underpinning

3.1 Firm Size and Export Performance

The theoretical foundation of this study is derived from Barua et al. (2010). Following Barua et al. (2010), we consider a domestic firm that tries 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:

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

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 that is 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 (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 returns to scale. Further, 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 than one. The individual firm in 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 (FOCs):

$$\frac{\partial \pi}{\partial q_i^d} = P^d + \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right] q_i^d - \left\{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} q^{\beta} + \beta q^{(\beta-1)} A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right\} = 0 \quad (2)$$

$$\frac{\partial \pi}{\partial q_i^f} = eP^f + \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f q_i^f - \left\{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} q^{\beta} + \beta q^{(\beta-1)} A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right\} = 0 \quad (3)$$

These are the FOC of profit maximization. Here X and X^m are industrial exports and imports of input into to the industry, respectively.

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 FOC mentioned above. From the above two FOCs, we can derive the relations between the firm size and it exports to turn over ratio as follows:

Firstly note that if the marginal costs of firms are indistinguishable, all firms would generate the identical output levels as implied by equation (2) and (3). This further means that export shares of all the firms will also be same, this can be seen as:

Let define export share as q_i for the ith firm.

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

However, if the marginal cost of production is different, the more efficient firm would produce high volume of output, regardless the domestic sales of the firm would be the same i.e. independent of the cost conditions (Barua et al. 2010). This can be proved as follows:

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

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

Or the firm is in equilibrium when the following conditions hold:

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

(4)

For ease of reference let MC is:

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

The equation (4) implies that for two firms *i* and *j* to be in equilibrium, the following identity must hold irrespective of the cost conditions.

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

(5)

It means that at equilibrium, the marginal revenue for each exporter firm will be the same to the marginal cost of production. This identity further implies that the total supply to the domestic market will be the identical in the face of same cost conditions for two exporter firms. Another implication of the identity is that if marginal cost of production is different i.e. $\acute{C}(q_i) \neq \acute{C}(q_j)$ then the above identity would be maintain at different level of outputs. Then if $\acute{C}(q_i) \leq \acute{C}(q_j)$ it means that output of firm *i* will be greater than the output of firm *j*, i.e. $q_i \geq q_j$ and vice versa. However $q_i^d = q_j^d$ irrespective of the cost condition as implied by equation (2) and (3).

The above discussions lead us to the following important conclusion: The larger firm trades a smaller share of its output in the indigenous market and a smaller firm sells a loin's share of its output in the native market. This can be seen as:

If $\acute{C}(q_i) \leq \acute{C}(q_j)$ then $q_i \geq q_j$ i.e. the firm *i* (larger in size) than that of firm *j* but both the firms sell the same amount of output in the local market as implied by equation (2) and (3). It means that the larger firm sells lesser share of its output in the domestic market in comparison with the smaller firm.

Accordingly, the larger firm sells a high volume of output in foreign market and the smaller firm trades a smaller level of output in foreign market. Thus, the firm size and export to sales ratio are positively related. This can be proved as follows:

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 $q_i \geq q_j$ $\frac{q_i^d}{q_i} \leq \frac{q_j^d}{q_j}$

And also given that

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

$$\frac{q_i^d}{q_i} \leq \frac{q_j^d}{q_j} \Rightarrow \frac{q_i^f}{q_i} \geq \frac{q_j^f}{q_j} \quad (6)$$

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

3.2 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 have modified the FOC by allowing the exports of the industry and imports of inputs to affect the corresponding exchange rates. These FOCs have been solved to get the firm supply functions to the domestic and foreign markets as follow:

$$P^d - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} = A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} q^{\beta} - \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right] q_i^d \quad (7)$$

$$eP^f - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} = A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} q^{\beta} - \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f q_i^f \quad (8)$$

$$q_i^d = \frac{P^d - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}}{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial P^d}{\partial Q^d}\frac{\partial Q^d}{\partial q_i^d}\right]} \quad (9)$$

$$q_i^f = \frac{eP^f - A\left(eW^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}}{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q_i^d}\right]\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q_i^f}\right] P^f} \quad (10)$$

The expression in equation (9) explains the firm supply to the domestic market which is a function of domestic price, imported and domestic input prices, the rate of change in exchange rate, 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 (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.

To observe the effects of changes in exchange rate on the supply functions, we have differentiated both the functions with respect to the exchange rate respectively.

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

(11)

$$\frac{dq^f}{de} = \frac{\left[P^f - \alpha A e^{(\alpha-1)}\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right]\left\{-\left\{A\left[\frac{\partial^2 e^{\alpha}}{\partial e \partial X^m}\frac{\partial X^m}{\partial q^f}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial^2 e}{\partial e \partial X}\frac{\partial X}{\partial q^f}\right]P^f\right\}\left[eP^f - Ae\left(W^f\right)^{\alpha}\left(W^d\right)^{(1-\alpha)}\right]\right\}}{\left\{A\left[\frac{\partial e^{\alpha}}{\partial X^m}\frac{\partial X^m}{\partial q^d}\right]\left(W^f\right)^{\partial}\left(W^d\right)^{(1-\alpha)} - \left[\frac{\partial e}{\partial X}\frac{\partial X}{\partial q^f}\right]P^f\right\}^2}$$

(12)

As it is evident from equation (11), the exchange rate has negative relation with the domestic output supply. The only effect that exchange rate can bear on domestic supply is through the changing cost of imported inputs. 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 observed from equation (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.

4. Econometric Specification, Data and Description of Variables

4.1 Model

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

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

The econometric model can be written as:

$$ESR_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 REERx_t + \beta_3 REER\_VOL_t + \beta_4 CON_{jt} + \beta_5 K_{it} + \beta_6 CPR_{it} + \beta_7 WGDP_t + \mu_{it} \quad (13)$$

$$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7 > 0$$

Domestic sales model can be specified as:

$$DSR_{it} = \gamma_0 + \gamma_1 TA_{it} + \gamma_2 REERm_t + \gamma_3 INF_t + \gamma_4 PERC_t + \gamma_5 INVES_{it} + \mu_{it} \quad (14)$$

$$\gamma_1, \gamma_4, \gamma_5 > 0 \quad , \quad \gamma_2, \gamma_3 < 0$$

4.2. Data and Description of Variables

The study is based on the data of 205 firms representing fourteen different industries of Manufacturing Industry of Pakistan. 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). Fourteen industries, which includes, 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, were selected on the following criterion;

(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 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 or 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 have selected 14 such firms which involve simultaneously in the sugar crushing and sugar production. Table – 3 provides complete description of the variables used in this study.

Table: 3 Descriptions of Variables and Sources

Variable	Definition	Source
ESR_{it}	It is 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}	It is 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}	It is 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 exports 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.	Pakistan Economic Survey
DSR_{it}	It is 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	Pakistan Economic Survey

5. Methodology

The panel data technique has been utilized to investigate the extended structural performance model. The element of firm heterogeneity is covered in panel data techniques which are not captured in pooled least square method. The OLS estimated would be biased in the case of correlation between explanatory variables and unobservable individual effects exist (Hsiao, 2008). The general model of export sales can be written:

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_{ijt} X_{ijt} + \varepsilon_{it} \quad (15)$$

Where α_0 is a common intercept (i.e. for all time periods and all firms), μ_i and λ_t are firm-specific and time-specific intercepts respectively. X_{ijt} is a vector of correlates, β_{ijt} are the parameters of slope that varies across firms, across industries and over time while ε_{it} is the error term.

We are assuming that the parameters of slope do not change with respect to firms, industries and time. With these conditions, the equation (15) becomes:

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta X_{ijt} + \varepsilon_{it} \quad (16)$$

Where β is the common slope for each of the regressors. Considering the equation (13) and (14) along with equation (16), we would estimate the following two equations:

$$ESR_{it} = \alpha_0 + \mu_i + \lambda_t + \beta_1 TA_{it} + \beta_2 REER_t + \beta_3 REER\_VOL_t + \beta_4 CON_{jt} + \beta_5 K_{it} + \beta_6 CPR_{it} + \beta_7 WGDP_t + \mu_{it} \quad (17)$$

$$DSR_{it} = \alpha_0 + \mu_i + \lambda_t + \gamma_1 TA_{it} + \gamma_2 REER_t + \gamma_3 INF_t + \gamma_4 PERC_t + \gamma_5 INVES_{it} + \mu_{it} \quad (18)$$

6. Empirical Results and Discussions

6.1 Econometric Analysis

It is imperative to test the nature of data for selecting the suitable 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 by applying different tests that are discussed below:

6.1.1 Panel Unit Root Tests

Unit root tests are applied to check the existence of stationarity in the data. The results of the panel unit root tests are presented in Table 4.

Table: 4 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: Authors' calculations

These tests point out that all the variables are stationary at level except the square of concentration ratio.

6.1.2 Test for Individual Effects

We have checked the individual effects (see Table 5) for unrestricted specification model with two-way fixed effects. The results exhibit cross-section fixed effects robustly.

Table: 5 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 Cross-Section/Period Chi-square	1.65788	(123,1288)	0.0654	Reject H_0 of redundancy
	183.789	134	0.0345	Reject H_0 of redundant effects

Source: Authors' calculations

6.1.3 Fixed Effects versus Random Effects (Hausman Test)

Now we are applying the Hausman (1978) test to determine the fixed effects and random effects. The results of Hausman test are displayed in Table 6.

Table: 6 Hausman Test

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

Source: Authors' calculations

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

6.1.4 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. The results of Durbin Wu Hausman (DWH) test are displayed in Table 7.

Table: 7 (DWH) Test

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

Source: Authors' calculations

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

6.2 Economic Analysis

6.2.1 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 8. We observe that the sign of the parameter of Total Assets (TA) is positive and highly statistically significant. We have used the variable of total assets of the firms to represent the firm size. 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. 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 benefits as well. In fact, the large firm has buying and selling economies along with efficient inventory holding. 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. Our results are compatible with the studies that also found the positive relationship between the firm size and export performance (See Cavusgil and Nevin, 1981; Maleksadeh 2001;Moen, 1999; Sterlacchini, 2001; Barua et al., 2010).

Table: 8 Estimates of Firm Size, Exchange Rate and Exports Performance

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: Authors' calculations

Note: All the estimations are carried out by using 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 parameter is highly significant and positive. The possible reason of positive relationship is that if the exchange rate depreciates, exports become cheaper 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 effective exchange rate and export sales ratio (See Roy, 1991; Srinivasan ,2013; and Veeramani ,2008).

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 relationship between the real effective exchange rate volatility and export sales ratio is statistically significant and positive. 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) confirmed the positive relationship between the real effective exchange rate volatility and export sales ratio. Similarly, the firms can get benefit from exchange rate volatility through hedging and through readdressing the exports to other sites. Cheung and Sengupta (2012) claim that "the firms with high exports can get more benefit through exchange rate volatility." Our results are compatible with the studies [Cheung and Sengupta, 2012]. However, there are many studies that found the negative relationship between real effective exchange rate volatility and export sales ratio (Clark, 1973; Baron, 1976; Hooper and Kohlhagen, 1978). 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 (K) that can influence the export performance of firms. 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 explained in terms of accelerator theory. 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) falls and resultantly investment level also falls. Due to decrease in investment, output level decreases and the firms' potential to exports reduce. Therefore, the capital-output ratio increases and export performance of the firm devastates. Finally, the maintaining and procuring cost of capital in Pakistan (like other developing countries) is more than that of labor. Amjad (1982) also found the negative capital-output ratio in Pakistan.

The other firm-specific variable specified in the model is gross profit-sales ratio (GPR). 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 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 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 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, 2008). 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 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. 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. Therefore, the positive sign is correct and according to our expectations. Further, our results are compatible with (Zada et al., 2012).

6.2.2 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 9. It can be observed that the value of the parameter of total assets of the manufacturing firms (TA) is positive. 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. 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: 9 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: Authors' 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 parameter is highly significant and negative. This variable encompasses the impact of relative 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 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 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 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.

7. Conclusion and Policy Recommendations

This study 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: first shows the impacts of firm size and exchange rate on exports performance of the firms and other model explore 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 brief, 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.

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.

REFERENCES

Amjad, R. (1982). Private Industrial Investment in Pakistan 1960-1970, Cambridge University Press.

Archarungroj, P., & Hoshino, Y. (1998). The Impact of Firm Size on Export Performance and Attitudes: An Empirical Study on Thailand Exporters. *Japanese Journal of Administrative Science, 12*(2), 79-88.

Baron, D. P., (1976). Fluctuating exchange rates and the pricing of exports. Economic Inquiry 14 (3), 425-438.

Barua, A., Chakraborty, D., & Hariprasad, C.G. (2010). Entry, Competitiveness and Exports: Evidence from Firm Level Data of Indian Manufacturing, MPRA paper 22738.

Bonaccorsi, A. (1992). On the relationship between firm size and export intensity. *Journal of International Business Studies*, *23*(4), 605–35.

Cavusgil, S. T., & Nevin, J. R. (1981). Internal determinants of export marketing behavior: an empirical investigation. *Journal of Marketing Research, 18* (1), 114-119.

Chandran, V. G. R., & Rasiah, R. (2013). Firm size, technological capability, exports and economic performance: the case of electronics industry in Malaysia. *Journal of Business Economics and Management*, *14*(4), 741-757.

Cheung, Y. W., & Sengupta, R. (2012). Impact of exchange rate movements on exports: an analysis of Indian non-financial sector firms. CESifo Working Paper No. 4214.

Clark, Peter B., (1973). Uncertainty, Exchange Risk, and the Level of International Trade, *Western Economic Journal 11*(3), 302-13.

Côté, Agathe, (1994). Exchange Rate Volatility and Trade, Working Paper No. 94-5, Bank of Canada.

Calof, Jonathan L., (1994). The Relationship between Firm Size and Export Behavior Revisited. *Journal of International Business Studies*, *25* (2), 367-387.

Cowling, K and Waterson M, .(1976). Price-Cost Margins and Market Structure, *Economica*, *43*, 267-74.

De Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade. *Staff Papers-International Monetary Fund*, *35* (1), 63-84.

Dekle, Robert & Ryoo, Heajin H., (2007). Exchange rate fluctuations, financing constraints, hedging, and exports: Evidence from firm level data. *Journal of International Financial Markets, Institutions and Moneyr*, *17*(5), 437-451.

Din, M., Ghani, E., & Mahmood, T. (2009). Determinants of Export Performance of Pakistan: Evidence from the Firm-Level Data. *The Pakistan Development Review*, 48(3). 227-240.

Esteve-Pérez, S., Gil-Pareja, S., Llorca-Vivero, R., & Martínez-Serrano, J. A. (2011). The impact of the euro on firm export behaviour: does firm size matter?. *Oxford Economic Papers*, *63*(2), 355-374.

Gabbitas,owen and Gretton,Paul.(2003). Firm size and export performance: some empirical evidences. Productivity Commission Staff Research Paper, Canberra.

Hassan, M. Kabir & Tufte, David R. (1998). Exchange rate volatility and aggregate export growth in Bangladesh. *Applied Economics*, *30* (2), 189 -201.

Hinkle, L.E., Nsengiyumva, F., (1999). The real exchange rate: concepts and measurement. In: Hinkle, L.E., Montiel, P.J. (Eds.), Exchange Rate Misalignment: Concepts and Measurement for Developing Countries. World Bank Research Publication, and Oxford University Press, Washington, D.C., and Oxford, 41-215.

Hooper, Peter, and Steven Kohlhagen, (1978). The Effect of Exchange Rate Uncertainty on the Prices and Volume of International Trade, *Journal of International Economics,* 8 (4), 483-511.

Hsu, S. K., Tsai, M. F., & Yang, C. H. (2008). Market structure, external exposure and industry profitability: evidence from Taiwan. *International Economic Journal*, *22*(2), 201-214.

Krugman, (1984). Completing the internal market in the European Community: Some industry simulations. *European Economic Review*, *32*(7), 1501-1525.

LiPuma, J. A., Newbert, S. L., & Doh, J. P. (2013). The effect of institutional quality on firm export performance in emerging economies: a contingency model of firm age and size. *Small Business Economics*, *40*(4), 817-841.

Majeed, M. T., Ahmad, E.(2006). Determinants of Exports in Developing Countries. *The Pakistan Development Review*, 45(4)1265-1276.

Mittelstaedt, J. D., & Ward, W. A. (2003). Location, Firm Size and International Trade: Simultaneous Measurement of the Effects of Internal and External Scale Economies on Exporting. *Clemson University Center for International Trade, Working Paper, 30115.*

Mkenda, B. K. (2001). Long-run and short-run determinants of the real exchange rate in Zambia. *Göteborg University, Department of Economics, working paper*.

Moen, Oystein. (1999). The relationship between firm size, competitive advantages and export performance. *International Small Business Journal, 18* (1), 53–72.

Mustafa, K., Nishat, M.(2004). Volatility of Exchange Rate and Export Growth in Pakistan: The Structure and Interdependence in Regional Markets. *The Pakistan Development Review, 43* (4), 813-828.

Papadogonas, T., Voulgaris, F., & Agiomirgianakis, G. (2007). Determinants of export behavior in the Greek manufacturing sector. *Operational Research, 7*(1), 121-135.

Rasiah, R., & Rasheed, F. (2013). Firm size, export intensity, and technological capabilities in Sri Lankan manufacturing firms: an evolutionary analysis. *Innovation and Development*, *3*(1), 89-101.

Roy, D. K. (1991). Determinants of export performance of Bangladesh. *The Bangladesh Development Studies*, 19(4), 27-48.

Srinivasan, P., & Kalaivani, M. (2013). Exchange rate volatility and export growth in India: An ARDL bounds testing approach. *Decision Science Letters*, *2* (3), 191–202.

Sterlacchini, A. (2001). The determinants of export performance: a firm-level study of Italian manufacturing. *Weltwirtschaftliches Archive*, *137*(3), 450-472.

Veeramani, C. (2008). Impact of Exchange Rate Appreciation on India's Exports. *Economic and Political Weekly*, XLIII (22) 10-14.

Wagner, Joachim (2001). A Note on the Firm Size Export Relationship. Small Business Economics, 17(4), 229-237.

Zada, N., Mhammad, M. and Bahadar, K. (2012). Determinants of Exports of Pakistan: A Country-wise is aggregated Analysis. *The Pakistan Development Review*, 50(4), 715-732.