The Performance and Structure of Small & Medium Enterprises: An Empirical Evidence from Pakistan

S. Azra Batool
Assistant Professor, Department of Economics
Bahauddin Zakariya University Multan, Pakistan
Email: azrabatools@yahoo.com

Salyha Zulfiqar
M.Phil. Scholar, Department of Economics
Bahauddin Zakariya University Multan, Pakistan

Abstract
The sole purpose of the study is to carve out the performance and structure of the small and medium scale manufacturing sector of Pakistan in terms of employment and productivity. The present study has incorporated the transcendental logarithmic cost function to apply on secondary, cross section data of the 3-digit forty nine SMEs of Pakistan. This functional form allows for and assists in exploring the true production structure of the firms. It has been revealed that structure of SMEs in Pakistan is based on Non-homothetic, Non-homogeneous, Variable returns to scale and Non-unitary elasticities. It has further been found that SMEs are overwhelmingly efficient as the pro- SMEs advocate them, in terms of employment generation and productivity, as capital and labor are found to be substitutes, which means employment generation is possible without the expansion in capital in a densely populated country like Pakistan. The conclusion suggests that although public policy should be targeted to provide parallel support to capital and labor yet distinguished favor should be given to labor to generate employment in SMEs of Pakistan.

Keywords: SMEs; Transcendental Logarithmic (Translog) cost function; Efficiency; Elasticity

I. Introduction
Dynamic and flexible SMEs are said to have served to create employment, help to earn foreign exchange, upgrade the quality of the work force, improve the business management skills, and diffuse technological know-how throughout Pakistan. These enterprises have also helped to mobilize domestic sources towards productive use which otherwise may have remained idle and unutilized. Like many developing countries, Pakistan has also realized the need and importance of SMEs to path out unemployment and to increase output and productivity. The new era challenges the competitive strengths of the SMEs sector. The crisis faced by the SMEs in Pakistan requires a broad based analysis of the factors that impact the competitiveness of the sector, both from the perspective of the industry and that of government policy.

The prime objective of the present study is to delineate the main characteristics of the structure of the SMEs in Pakistan. The main divergence of the present study from the existing literature is that it has utilized the transcendental logarithmic cost function (despite traditional functions: Cobb Douglas and Constant Elasticity Substitution, Leontief etc.), to analyze the actual structure and performance of the SMEs of Pakistan. Here it highlights and examines how cost minimization affects the performance and structure and how the inputs in the production process are related to each other? i.e. check their substitutability or complementarity and the extent of the economies of scale of SMEs under analysis?

The functional form used here minimizes the multicollinearity problem as it carries factor prices rather than their physical quantities. The rest of the arrangement of the present study is as follows: section (ii) is literature review, section (iii) depicts data and methodology and section (iv) carries estimation of models and hypothesis test and final section (v) outlines conclusion and policy implication.

II. Literature Review

The government of Pakistan has declared SMEs sector as one of the four major drivers of growth. There has been consensus among economists and policy-makers that the foundation of industrialization could not be established by large industries without efficient network of SMEs (Economic Survey of Pakistan, 2001-2002). The literature review done, covers the years from 1979 to 2010.

Birch (1979) argues that small firms are important in job creation. Many small firms are more capital intensive than large firms in the same industry (Little, Mazumdar, Page, 1987). Small scale manufacturing industry can contribute to economic development by providing employment: creating jobs with low capital costs (Mahmood and Sahibzada, 1988). Chishti & Mahmood (1988), indicate that energy as an input has a significant role in the production process and substitution possibilities exist between energy and other inputs. Wizarat and Zaffer (1990) find small-scale sector provides jobs to the unskilled and semi-skilled workers, so here, labor productivity is lower than in large-scale sector. Khan (1994) concludes that employment in Small-scale industries in Pakistan; depend upon daily wage, capital labor ratio, and value of product and a little bit on government policy.
Nishat (2000) declares that Small and medium enterprises in countries like Pakistan can provide employment, create jobs with low capital costs, help in developing indigenous technology and raise saving and investment. Khan and Burki (2000) reveal that energy/ labor and capital / energy are good substitutes to each other respectively. But here substitution between the most important factor inputs i.e. capital and labor is not mentioned. Weakness of SMEs such as limited personnel resources, marketing skills, systematic planning and using information available, may outweigh the strengths. In order to stay in business SMEs are seeking higher effectiveness and competitiveness across the entire range of marketing, product design, manufacturing and sales (Marri&Sohag (2004).

Kumar and Basu (2008) present the perspective of productivity growth in Indian food industry. The authors collect secondary data during the period from 1988-1989 to 2004-2005 using log linear regression model and a data envelopment analysis technique. The finding reveals that Indian food industry is facing inefficiency due to low rate of technological progress which depends on mode of organization and various economic and institutional factors. Therefore it is necessary to encourage imports along with research and development.

Leitao and Franco (2008) examine the impact of organizational capital and human capital on the performance of SMEs in Portugal. Their finding reveals that non-economic indicators of human capital is enthusiasm at work and non-economic indicators of organization capital are efficient organizational structure, participative management, dialogues, workgroup frequent meetings and incentive for interdisciplinary discussions while economic indicators for human capital are propensity for innovating activities, entrepreneur’s intuitions and economic indicators for organizational capital are efficient organizational structure, using external indicators to improve the performance of the entrepreneurs.

Werner and Moog (2009) observe the impact of entrepreneurial working conditions in small firms and the reasons for the employees that are looking for full employment, in Germany. Their finding reveals that chances of a worker becoming self employed increases, when they work in small and medium firms rather than large firms. Those employees working in small firms have more knowledge than employees working in large firms. The positive relationship exists between entrepreneurial learning and firm’s size.

Amonilo, Mazzanti and Pini (2009) examine the relationship between innovation, working conditions, industrial relations and employee’s outcomes in the Northern Italy. The study reveals that techno-organizational innovation and industrial relation are factors that positively affect working conditions. The stronger the co-operation between management and union delegates, the higher the quality of workers. A good quality employment and industrial relation brings a positive effect of innovation activities on workers wellbeing.

Halkos and Tzeremes (2010) evaluate the relationship between foreign ownership and SMEs’ performance in Greece. The authors have collected a primary data
from a sample of 353 foreign SMEs. The finding reveals that foreign ownership shows a positive effect on the performance of SMEs in Greece.

The above stated literature exhibits that previous researchers have used traditional functional forms like Cobb Douglas, Constant Elasticity of Substitution and Leontief etc. which do not posit true picture of the structure of the firms. The present study diverges from the previous ones in that its major contribution is the use of transcendental cost function which enables the researcher to find the true structure of the firms in a reliable way.

III. Data and Methodology

In the present study we have selected cross sectional, secondary data regarding 3-digit, forty nine SMEs of Pakistan, for the period: 2005-06. The year is important in that it is post establishment of small and medium enterprises development authority (SMEDA), which is source of entrepreneurship development. The source of data is census of manufacturing industries (CMI) of the fiscal year 2005-06. To measure the different characteristics of production technology we find the cost function based upon duality theory in early work of Shepherd (1953,1970), Uzawa (1964). The cost function represents the relationship between total cost and output for cost minimizing firm facing competitive input markets and represents powerful and flexible econometric tool for analyzing such technological characteristics. Based on the duality theory, developed by Christensen, Jorgenson and Lau (1973) this study employs the transcendental logarithmic cost function approach to estimate the input substitution and economies of scale for SMEs in Pakistan.

The model specifies cost as function of output, and the prices of aggregate labor capital and material inputs. Estimation of the system required construction of variables on Quantities of factors of production ,Unit prices of the factors, Quantity of output and the cost shares of the three inputs included in the study. The dependent variables are total cost and the corresponding cost shares.

Data on these variables are not directly available, so has been derived by certain methods. Only Output is directly available in the census of manufacturing industries book but input prices and quantities for each 3-digit SMEs have been developed. The respective cost share of each input is obtained by dividing the expenditures on each factor input by total cost. By definition cost shares must sum to unity at each observation i.e. following relationship must hold.

\[ P_L L + P_K K + P_M M = TC \]
\[ P_L L / TC + P_K K / TC + P_M M / TC = 1 \]

Where TC = total cost ,  \( P_L L / TC \),  \( P_K K / TC \) &  \( P_M M / TC \) are cost shares of labor, capital and material inputs respectively.

We assume that a typical SMEs firm in Pakistan that minimizes its cost of production, so its Translog cost function can be represented as a second order logarithmic approximation to a general cost function such as:

\[ C = f (P_K, P_L, P_M, Y) \]
Here $P_i$ is the price of input $i$; $i = K$ (capital), $L$ (labor), $M$ (material) and $Y$ is the level of output. The Translog cost function, defining the basis of the adopted model, is presented by:

$$\ln C = b_0 + \sum_{i=1}^{3} b_i \ln P_i + b_Y \ln Y + 0.5 \sum_{i=1}^{3} \sum_{j=1}^{3} b_{ij} \ln p_i \ln p_j + 0.5 b_{yy} (\ln Y)^2 + \sum_{i=1}^{3} b_i Y \ln p_i \ln Y \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)$$

In the specific case of this study, this function can be written as follows:

$$\ln C = b_0 + b_K \ln K + b_L \ln L + b_M \ln M + b_Y \ln Y + 0.5 b_{KK} (\ln p_K)^2 + b_{KL} \ln p_K \ln p_L + b_{KM} \ln p_K \ln p_M + 0.5 b_{LL} (\ln p_L)^2 + b_{LM} \ln p_L \ln p_M + b_{MM} (\ln p_M)^2 + 0.5 b_{YY} (\ln Y)^2 + b_{LY} \ln p_L \ln Y + b_{KY} \ln p_K \ln Y + b_{MY} \ln p_M \ln Y \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3)$$

Under the conditions of cost minimization, three share equations are derived from the shepherd’s lemma:

$$\frac{\partial \ln C}{\partial \ln p_i} = \sum_{i=1}^{3} b_i + \sum_{i=1}^{3} b_{ij} \ln p_j + b_Y \ln Y \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4)$$

Where $S_i$ is the share of the $i$th input in total cost, and the cost share sum to unity $\sum_{i=1}^{3} S_i = 1$. In the context of these specific model and Inputs, considered in the present study these shares equations take the following forms:

$$S_K = b_K + b_{KK} \ln p_K + b_{KL} \ln p_L + b_{KM} \ln p_M + b_{KY} \ln Y$$

$$S_L = b_L + b_{KL} \ln p_K + b_{LL} \ln p_L + b_{LM} \ln p_M + b_{LY} \ln Y$$

$$S_M = b_M + b_{MK} \ln p_K + b_{ML} \ln p_L + b_{MM} \ln p_M + b_{MY} \ln Y \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (5)$$

Symmetry of the Translog cost function, which assures that the second order derivatives of the function are independent of the order in which the derivatives are taken, is imposed on the Translog function by restricting the parameters such that:

$$b_{ij} = b_{ji}; \quad b_{YY} = b_{Yi}; \quad i = j = K, L, M \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (6)$$

Symmetry reduces the number of parameters and thus increases the number of degree of freedom. In the absence of symmetry restrictions there are 15 parameters to be estimated five in each of the three share equations.
When the three cross equation symmetry conditions
\( (b_{KL} = b_{LK}; \ b_{KM} = b_{MK}; \ b_{LM} = b_{ML}) \), are imposed the number of parameters decreases to twelve.

Homogeneity of degree one (linear homogeneity) in prices, which is one of the regulatory conditions, is imposed by the restrictions:

\[
\sum_{i=1}^{n} b_i = 1, \quad \sum_{i=1}^{n} b_{ij} = \sum_{i=1}^{n} b_{ji} = \sum_{i=1}^{n} b_{iY} = 0 \quad \text{………………………… (7)}
\]

In the model used in the study, these restrictions are given by:

\[
B_K + b_L + b_M = 1
\]

\[
B_{KK} + b_{KL} + b_{KM} = 0
\]

\[
B_{KL} + b_{LL} + b_{LM} = 0
\]

\[
B_{KM} + b_{LM} + b_{MM} = 0 \quad \text{………………………………………..……..(8)}
\]

Essentially the same set of restrictions follows from adding –up requirement of the factor cost shares. The five restrictions of equations (6) to (7) imply that only two of the three share equations are independent. The adding up feature of the share equation system (4) or (5) has several important econometric implications. The parameters of the model are all identified when the Translog cost function is estimated simultaneously with two of the three share equations. It is decided to eliminate the capital share equation. The model has twelve independent parameters, and four more inferred parameters defined from the independent ones by the restriction equations. This three –factor basic Translog model constitutes the maintained hypothesis in investigating the structure of the production to measure the performance within the SMEs sector of Pakistan.

The Allen elasticity of substitution varies with the values of cost shares and the estimated parameters. Economic theory of concavity of the production function implies that own elasticities of substitution, \( \sigma_{ii} \), are negative. In other words it is expected a priori that \( \sigma_{ii} < 0 \). However, there is no priori expectation, about \( \sigma_{ij} (i \neq j) \), it can be either positive or negative. If \( \sigma_{ij} > 0 \) then inputs i and j are substitutes; if \( \sigma_{ij} < 0 \), they are complements.

Two additional theoretical considerations are instrumental in determining the best models for the SMEs sector are monotonocity and concavity conditions. To ensure that the estimated cost function is monotonically increasing, one must verify that the fitted values of the input cost shares are positive whereas Concavity requires that substitution elasticities, be negative semi definite at each observation. This means that the derived demand curve for this input is downward sloping. For the acceptance or rejection of the set of hypothesis, log likelihood-test would be conducted; to take the results “Eviews 3.1” software would be utilized.

No restriction other than homogeneity and symmetry are imposed in estimating the simultaneous system of the Translog cost function parameters. This set of estimates for the unrestricted model (1) is considered to be as the final specification of the model and will be adopted for further analysis. Estimates of the coefficients are available for only forty nine, 3-digit SMEs of Pakistan. The constraint (8) for linear homogeneity is
incorporated in the estimated share equations system. This method is adopted in order to obtain the standard errors and the t-values for all the estimated parameters.

<table>
<thead>
<tr>
<th>Maintained Hypothesis (H₀)</th>
<th>Alternate Hypothesis (H₁)</th>
<th>Parameter Restrictions</th>
<th>Number of Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Translog cost function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homotheticity</td>
<td>Model II Homotheticity</td>
<td>bLY= bMY=0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Non-Homotheticity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homogeneity</td>
<td>Model III Homogeneity</td>
<td>bLY= bMY= bYY=0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Non-Homogeneity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model IV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant Return to Scale</td>
<td>Model IV Variable Return to Scale</td>
<td>bLY= bMY= bYY=0, bY=1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobb Douglas</td>
<td>Model V Non-Cobb Douglas</td>
<td>bLY= bMY= bYY=0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>bLL=bLM=bMM=0</td>
<td></td>
</tr>
</tbody>
</table>

IV. Estimation of the Models: Testing of Hypothesis

Table (2) exhibits that most of the explanatory variables are significant and R² of the total cost equation is quite high i.e. 0.9552 and adjusted R² = 0.9518. The degree of freedom is indicating a very good fit of the model. It shows Translog cost function is a good approximation of the structure of SMEs in Pakistan. Whereas adjusted R²s for labor capital and material equations are 0.04448, -0.9369 & -0.4056 respectively i.e. shows not good fit of the model. But it should be cleared here that due to restrictions imposed on parameters during the estimation process, the traditional R² is not necessarily confined to values between zero and one. For each equation of the simultaneous system the traditional R² can take negative values too. And when all the null hypotheses checked against alternate hypotheses mentioned in table(1), it has found that log of likelihood ratios are 51.10, 54.23, and 80.47 and 37.33 for homotheticity, homogeneity, constant returns to scale and Cobb-Douglas hypotheses respectively. While at 5%-per cent level of significance, critical values of Chi-square are: 5.99, 7.81, 9.48 and 12.54, for homotheticity, homogeneity, constant returns to scale and Cobb-Douglas hypotheses respectively. Hence all the null hypotheses are rejected in favour of alternate hypotheses.

So we announce that the structure of SMEs in Pakistan has proved to be Non-homothetic, Non-homogeneous, Variable returns to scale and Non-unitary elasticities of substitution.
Table 2: Estimated Translog Cost Function
Small and Medium Enterprises in Pakistan (2005-2006)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Estimated Values</th>
<th>T-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>$b_0$</td>
<td>-1.98</td>
<td>-1.06945</td>
</tr>
<tr>
<td>$b_L$</td>
<td>0.27</td>
<td>2.0874</td>
</tr>
<tr>
<td>$b_M$</td>
<td>0.64</td>
<td>4.1783</td>
</tr>
<tr>
<td>$b_Y$</td>
<td>1.24</td>
<td>5.7591</td>
</tr>
<tr>
<td>$b_K$</td>
<td>0.10</td>
<td>0.4297</td>
</tr>
<tr>
<td>$b_{LK}$</td>
<td>0.003</td>
<td>0.3542</td>
</tr>
<tr>
<td>$b_{LM}$</td>
<td>-0.005</td>
<td>-4.121</td>
</tr>
<tr>
<td>$b_{LL}$</td>
<td>0.05</td>
<td>3.4898</td>
</tr>
<tr>
<td>$b_{KM}$</td>
<td>-0.11</td>
<td>-7.2037</td>
</tr>
<tr>
<td>$b_{CK}$</td>
<td>0.14</td>
<td>5.9302</td>
</tr>
<tr>
<td>$b_{MM}$</td>
<td>0.18</td>
<td>9.2232</td>
</tr>
<tr>
<td>$b_{LY}$</td>
<td>-0.001</td>
<td>-1.4613</td>
</tr>
<tr>
<td>$b_{MY}$</td>
<td>0.02</td>
<td>1.7093</td>
</tr>
<tr>
<td>$b_{KY}$</td>
<td>-0.003</td>
<td>-0.2695</td>
</tr>
<tr>
<td>$b_{YY}$</td>
<td>-0.01</td>
<td>-0.7047</td>
</tr>
</tbody>
</table>

Determinant Residual Co Variance = 1.14 E -05

<table>
<thead>
<tr>
<th>Equation</th>
<th>R-squared</th>
<th>Adjusted R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost</td>
<td>0.955274</td>
<td>0.951876</td>
</tr>
<tr>
<td>Labor Share</td>
<td>0.044481</td>
<td>-0.01922</td>
</tr>
<tr>
<td>Capital Share</td>
<td>-0.936993</td>
<td>-1.066126</td>
</tr>
<tr>
<td>Material Share</td>
<td>-0.405677</td>
<td>-0.499389</td>
</tr>
</tbody>
</table>

Monotonocity is satisfied so if the estimated cost shares $S_{ij}$ are positive. Concavity is satisfied when the Hessian of the second order derivatives of the cost function is negative semi-definite. A less significant test is applied, in that positive own price elasticities arise only if the cost function exhibits non-concavity. Lack of non-concavity is not regarded as problem if the own price elasticities are non-positive. In the present study, it is found that the fitted cost shares from seemingly unrelated regression estimates for all three-share equations are positive and monotonocity is satisfied for the estimated Translog cost function. In addition all the own price elasticities of demand are negative (–ve) over the sample observations. This means that non-concavity (non-convexity of isoquants is not a problem). The fulfillness of monotonocity and concavity regularity conditions confirms the appropriateness of the specification and estimation procedures adopted.

Small standard errors of most of the estimated parameters (as obtained from t-values of table 2) and high $R^2$’s values imply that these results are statistically acceptable. All the co-efficient related to the three factors’ prices and output have expected signs. This means total cost is directly affected by factor’s prices and output. All of the interaction terms between factor prices ($b_{ij}$’s)

$b_{KM} = -0.11$
$b_{KL} = 0.003$
$b_{LM} = -0.05$
are statistically significant i.e. this suggests that partial elasticities of substitution are different from unity. Since total cost and regressors are expressed in natural logarithms and have been normalized, the first order co-efficient are all interpretable, as cost elasticities evaluated the sample mean. The estimated cost elasticities with respect to mean factor prices \( bj; j=K, L, M \) represent the mean factor shares in the total cost as follows:

\[
\begin{align*}
\beta_K &= 0.01 \\
\beta_M &= 0.64 \\
\beta_L &= 0.27
\end{align*}
\]

The estimated three cost elasticities with respect to factor prices as shown above, all have positive signs and their sum is equal to unity. But this does not mean that the production structure is characterized by constant return to scale. This last property of homogeneous production function, through the dual cost function is measured by the scale elasticity under conditions of cost minimization.

(a) **Elasticities of Substitution**

An important parameter that relates the technology of an economic production unit is the partial elasticities of substitution between a pair of factor inputs. It represents the percentage change in factor proportions due to a one percent change in their relative factor prices.

(b) **Input substitution and price elasticities**

Input substitution and price elasticities can be determined by using the parameter estimates of the Translog cost function. The Allen–Uzawa partial elasticities of substitution, \( \sigma_{ij} \) are easily derivable in terms of the first and second derivatives of the cost function with respect to the prices of the \( i \)th and \( j \)th inputs. Partial elasticities of substitution estimates can vary with output levels and input shares. And the cross effects of various combinations of inputs on outputs are not assumed zero. The estimated share elasticities with respect to price \( (\beta_{ij}) \) describe the implications of the pattern of substitution among labor, capital and material inputs for the relative distribution of the value of output among the three inputs.

**Table 3: Mean Values Elasticities of Substitution**

Small and Medium Enterprises of Pakistan: 2005-2006

<table>
<thead>
<tr>
<th>Elasticity of Substitution</th>
<th>Mean Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own Elasticity</td>
<td></td>
</tr>
<tr>
<td>( \delta_{KK} )</td>
<td>-10.3649</td>
</tr>
<tr>
<td>( \delta_{LL} )</td>
<td>-3.6202</td>
</tr>
<tr>
<td>( \delta_{MM} )</td>
<td>-0.9776</td>
</tr>
<tr>
<td>Cross Elasticity</td>
<td></td>
</tr>
<tr>
<td>( \delta_{KL} )</td>
<td>1.1137</td>
</tr>
<tr>
<td>( \delta_{KM} )</td>
<td>-0.8508</td>
</tr>
<tr>
<td>( \delta_{LM} )</td>
<td>0.7029</td>
</tr>
</tbody>
</table>
The Allen Uzawa partial elasticities of substitution (or elasticity of technical substitution which shows to what extent two inputs can be substitutes for one another) and price elasticities of demand for factor inputs are calculated for each observation based on the parameter estimates of the Translog cost function given in table (2). In table (3) quantitative estimates of average own and cross elasticities of substitution are presented. From the examination of the substitution elasticities in table (3), it can be observed that production technology of SMEs in Pakistan is flexible. The cross elasticities of substitution are significantly different from zero and this is consistent with the rejection of the hypothesis regarding the Cobb – Douglas functional form.

Due to the concavity in input prices of cost function, the Hicks Allen elasticities are expected to be negative. The estimated elasticities have right signs for all inputs. Overall the estimated elasticities suggest that the technology of production in Pakistan SMEs sector is very flexible. The estimated elasticity of substitution between labor and capital is 1.1137, the positive sign and greater than unity shows that capital and labor are strong and very good substitutes in the production process of SME sector in Pakistan i.e. capital and labor can work without the presence of each other. This result can be compared with Khalil (2000), who revealed that capital and labor are weak substitutes of each other. As the capital and labor are substitutes, prices may be responsible for significant portion of employment changes, if we want to increase the employment level, so we should follow the direction, whenever there is an increase in the price of capital, the use of capital will be reduced, whereas its substitutes i.e. labor, whose price is constant, so therefore the quantity of labor is increased i.e. quantity of labor would be substituted for capital and employment may be generated by SMEs in Pakistan. This leads to our theme of the research i.e. performance of SMEs.

Economies of Scale (average estimates) can be calculated, by observing the average output and factor prices. The average value obtained is -0.1628, which means decreasing economies of scale. The factor price output term \( b_{IYS} \) shows that scale is capital and labor saving and material using. The values are: \( b_{IY}; LY = -0.0064, \ KY = -0.0033, MV = 0.0147 \).

The result shows that in Pakistan SMEs have decreases in return as the output is increased, thus share of capital and labor inputs are decreasing and share of material input is increasing. The estimated elasticity between material and capital is -0.8505, the negative sign shows that capital and material are complementary inputs, i.e. capital and material cannot work without the presence of each other. The estimated elasticity between material and labor is 0.7029, the positive sign shows that capital and material are substitutes inputs i.e. labor and material can be substituted from time to time. So if again labor is used instead of material, it means more chance would be given to labor to be employed.

(c) Price Elasticity of Input Demand

The price elasticities of input demands take into account the effects of technology as described by elasticities of substitution and the importance of factor cost shares. The estimated price elasticities of factor demand are evaluated at sample means that appear in table (4). The own price elasticity of demand for a factor is very important parameter because the behavior of factor demand with respect to price changes indicates how the decisions on factor mix and technology are influenced by local and foreign prices. All the
own price elasticities calculated for each three factors have negative signs, indicating that they are downward sloping. In addition, the (absolute values) of the own price elasticities of demand for material ($e_{MM} = -0.0772$), capital ($e_{KK} = -0.5836$) and labor ($e_{LL} = -0.5382$) factor input are less than unity i.e. relatively inelastic.

| Table 4: Mean Values of Factor Demand Price Elasticities  
Small and Medium Enterprises of Pakistan: 2005-2006 |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Own Elasticity</strong></td>
</tr>
<tr>
<td><strong>Price Elasticity</strong></td>
</tr>
<tr>
<td>$e_{KK}$</td>
</tr>
<tr>
<td>$e_{LL}$</td>
</tr>
<tr>
<td>$e_{MM}$</td>
</tr>
<tr>
<td><strong>Cross elasticity</strong></td>
</tr>
<tr>
<td>$e_{KL}$</td>
</tr>
<tr>
<td>$e_{KM}$</td>
</tr>
<tr>
<td>$e_{LK}$</td>
</tr>
<tr>
<td>$e_{LM}$</td>
</tr>
<tr>
<td>$e_{MK}$</td>
</tr>
<tr>
<td>$e_{ML}$</td>
</tr>
</tbody>
</table>

The above mentioned mean values of own price elasticities of three inputs are less than unity i.e. relatively inelastic. However $b_{KK}$, $b_{LL}$, $b_{MM}$ are statistically significant. The results suggest that changes in the price of material, labor and capital do not have significant influence on the quantity demand of these factor inputs in the SMEs sector during 2005-2006. It is also observed that changes in the capital, labor and material share are due to the estimated biased character of technical change and scale of production and by other factors e.g. market share, expectations etc.

(d) **Cross price elasticity**
Cross price elasticity of factor demand shows the demand for factor (i) due to the changes in the price of factor (j), if other things remain constant. The cross price elasticities depend on the input shares and are not symmetric. In the table 4, it is observed that mean value of cross elasticity of $e_{LK}=0.0957$, which shows that demand for labor has not been more responsive to changes in the price of capital. However the cross elasticity $e_{KL}=0.2976$, which means capital demand is inelastic to changes in the price of labor input. The cross elasticity $e_{KM} = -0.5413$ which also reflects the inelasticity of capital demand to changes in the price of labor input. The cross elasticity of $e_{LM}$ is 0.4487 and $e_{ML}$ is 0.1878, which shows that demand for labor is inelastic to changes in the price of material and vice versa. In other words $e_{LM} > e_{ML}$ which mean elasticity of labor with respect to price of material is more powerful than the elasticity of material with respect to price of labor.
V. Conclusion and Policy Implications

Translog cost function utilized in the present study has an edge over the traditional functional forms in terms of using more than two variables namely labor, capital and material, not their physical quantities but their respective prices and output. Whereas most of the previous studies regarding SMEs used any one pair of input factors i.e. labor and capital and ignored material or vice versa due to the helplessness of the functional forms they have chosen.

Following main conclusions emerge from the present study: It is indicated by hypothesis tests that the structure of production of SMEs in Pakistan is well approximated by Translog cost function that allows for Non-homotheiticity, Non-homogeneity, Variable return to scale and Non-unitary elasticities of substitution. It implies that neither Cobb Douglas production function nor constant elasticity of substitution production function is valid representation of the structure of production to measure the structure and performance in this sector. As regards the performance of SMEs, the study has revealed that SMEs in Pakistan work under decreasing return to scale. And the scale is capital and labor saving and material using. The substitutability among the factors shows that production technology in SMEs of Pakistan is quite flexible. Capital and labor have been found to be strong substitutes, which may allow for flexibility in production process of SMEs in Pakistan and may play an important role in generating employment. But relationship between capital and material is found to be complementary that is both are necessary for each other in production process. Whereas material and labor are found to be substitutes, so if more labor is used instead of material, employment generation can be attained.

The own price elasticity of labor is inelastic i.e. if wage rate increases its demand would not decrease. Hence high wage rate would not be a hindrance in employment generation. Similarly any change in price of capital and material would also not affect their demand.

In Pakistan, due to high population, the unemployment rate is increasing and the majority of the labor force is unemployed. SMEs are considered as an effective source of generating employment, therefore different measures should be taken by the government of Pakistan to restore the employment rate by training and educating the workers of SMEs, so that they should be able to get skilled and trained jobs, which would not only increase their wages but also SMEs will be benefited by having educated and trained labor force. The government must develop a hand holding policy measures to provide funds to SMEs through financial institutions. SMEs have been major contributor of export and a greater potential for foreign exchange earnings. Searching new markets and competition with rest of the world can only be possible if the reasonable price and quality control of the products must be ensured.

The study can further be extended to consider some neglected issues in relation to SMEs in Pakistan. The lack of good quality data that are needed for such an analysis is a major obstacle. However studies can be done for other developing countries where the needed data set is available.
References


