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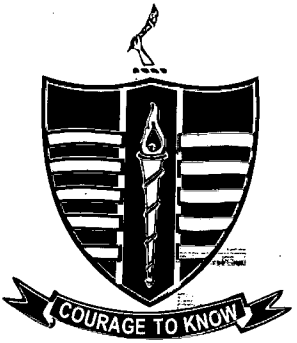

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ARTICLES

BOOK REVIEW

Patterns of Productivity Change in Pakistan's Large Scale Manufacturing Sector

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Abstract: The paper attempts to measure total factor productivity in the large scale manufacturing sector of Pakistan using pooled provincial time series data. A strong evidence of very low Total Factor Productivity (TFP) growth is found in large scale manufacturing sector. The study shows that major industries such as textile and food & beverages exhibit a dismal growth in productivity when compared with other industries. Comparing the results of total factor productivity growth of the three sub-periods, the liberalization period (1981-88) gives highest rate of TFP growth i.e., 0.19%. The study concludes that efficient use of scarce factors can lower cost of production and may provide a hope for increase in total factor productivity in this sector.

1. Introduction

Changes in productivity have become important for developing countries where resources are limited in supply and have a very high social opportunity cost. The analytical literature on productivity growth provides a diverse set of possible explanations for observed change in productivity[1]. The importance of productivity growth in economic development is universally recognized and has been emphasized in the literature by many[2].

Guided by the observation that rich countries tend to be industrialized, economists argued that growth could only be achieved through industrialization because industry grows at a faster pace than agriculture on account of economies of scale, higher capital intensity, and externalities that are not found in the agricultural sector [Hussain (1999)]. Like other developing countries, industrialization has always been

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[1] Solow(1957), Jorgensen and Griliches(1967), and Anne and Tuncer (1980).

[2] Binswanger (1974), Levy (1981), Berndt (1993), Krueger *et al.* (1982), Wolef (1982), and Fare *et al.* (1994).

considered as the key to economic development in Pakistan since its inception.

At the time of its birth, Pakistan had a very low industrial base and government embarked on an ambitious industrialization programme for the improvement of this sector. Economists perceived the idea that the acceleration of investment, the construction of a trade regime that protects local infant industries, resources at subsidized prices, management of imports and foreign exchange, central allocation of key raw material and the supply of critical inputs, i.e., capital, managerial talent, could gear up the industrialization drive.

Different policy measures have been used to promote rapid growth in the large scale manufacturing sector of Pakistan by successive governments. It is of considerable interest to government and policy makers to know if past incentives to the large scale manufacturing sector have led to growth in total factor productivity. A number of studies focused on measurement of total factor productivity of Pakistan's large scale manufacturing in the past.[3] But these studies have their own limitations in many ways.[4] Khan (1998) and Idrees (1997) calculated total factor productivity using aggregate data for manufacturing sector. But in recent years productivity growth at firm level is becoming more popular[5].

The popularity of this emerging data in the emerging research can be ascribed, in part, to the availability of micro-level data, the development of rich microeconomic foundations, and to the displeasure with the aggregate production function. Unfortunately, actual data at micro level production processes is not available to permit an empirical analysis of importance of these issues with the information based on existing firm's behaviour. As a consequence, this study used for our data the cost-minimizing solutions to large scale manufacturing sectors at two digit-level.

Although this study draws considerable inspiration from earlier works, it is different in focus. We examine the manufacturing sector, seeking to measure total factor productivity of large scale manufacturing sector at the

[3] Qazi *et al.* (1976), Kemal (1996), Batttese and Malik (1987), Zahid et al.(1992).
[4] Firstly, they used restrictive functional forms (i.e., Cobb-Douglas and CES production functions). Secondly, these studies have been confined to estimate elasticities of substitution.
[5] For instance, Naidri (1970) examined the factors underlying changes in productivity at firm level.

two digit-level. Hence, the present study is an attempt to measure TFP growth by using more popular flexible functional form, with disaggregated inputs and industry level data. More specifically, we use translog cost function which does not impose *a priori* conditions such as constant returns to scale and relates technological characteristics such as scale economies and technical change in order to observe change in total factor productivity. Our approach is to estimate the translog cost function along with three of four equations using Zellner's iterative method for estimating seemingly unrelated regressions.

The remainder of the paper is as follows. In section 2, we provide data sources and methodology to estimate total factor productivity growth. Section 3, gives details on empirical results based on the translog cost function and compares it with related studies on the manufacturing sector of Pakistan. The last section provides a brief summary of our findings.

2. Empirical Model

The translog specification is used for empirical analysis, which can be viewed as a second order logarithmic approximation to an arbitrary twice-differentiable transformation surface [Christensen and Jorgenson (1973)]. Assuming that the manufacturing firms minimize total cost of production, the aggregate cost function where *C, P,* and *Y* are total cost, a vector of factor prices, and level of output, respectively, while *T* is an index of the level of technology external to the firm.

$$C = f(P, Y, T) \qquad (1)$$

Since in its general form the translog imposes no *a priori restrictions* on the cost structure, it allows the testing of various restrictions, such as homotheticity, homogeneity, unitary elasticities of substitution and the assessment of sensitivity of parameters of interest to those restrictions. In addition, cost function can be used to relate such technical characteristics as scale economies, input substitution and technical change to observed changes in total factor productivity. The translog approximation to the general form of cost function can be written asfollows:

$$\ln C = \alpha_0 + \alpha_Y \ln(Y) + \frac{1}{2}\gamma_{YY}(\ln Y)^2 + \sum_i \alpha_i \ln(p_i) + \sum_i \gamma_{iY} \ln(Y) \ln(p_i) + \frac{1}{2}\sum_i \sum_j \gamma_{ij} \ln(p_i) \ln(p_j) + \alpha_t T + \frac{1}{2}\alpha_{tt} T^2 + \sum_i \alpha_{it} \ln P_i T + \gamma_{Yt} \ln(Y)(T)$$

where *i, j* =*K, L, E, M* indexes four different inputs, while *T* is used here as an indicator of the level of technology. Partially differentiating the translog function (2) and using Shephard's lemma, the following set of cost-share equations is obtained

$$\frac{\partial \ln C}{\partial \ln P^i} = \frac{P_i X}{C} = S_i = \alpha_i + \alpha_{it} T + \frac{1}{2}\sum_j \gamma_{ij} \ln P_j + \gamma_{iy} \ln Y$$

where $i = K, L,$

The translog cost function imposes different parametric restrictions. First, as the cost function is homogeneous of degree one in factor prices at all 777values of factor prices, and level of technology. This implies that

$$\sum_i \alpha_i = 1 \quad and \quad \sum_i \gamma_{iy} = \sum_i \gamma_{ii} = \sum_i \gamma_{ji} = \sum_i \alpha_{it} = 0$$

The immediate consequence of these properties is that one of the four share equations can be dropped. Second, since the translog is viewed as a quadratic (logarithmic) approximation, the cross partial derivatives of the cost function must be equal (Young's Theorem). It implies the symmetry condition

$$\gamma_{ij} = \gamma_{ji} \qquad (5$$

There are some properties of the translog function which are not a priori to satisfy the function, i.e., monotonicity and convexity in factor prices and thus they need to be tested. A cost function is said to be monotonically increasing in prices if

$$C(Y, P_i) > C(Y, \overline{P_i}) \quad \text{where} \quad P_i > \overline{P_i} \quad \text{which implies that} \quad \frac{\partial C}{\partial P_i} > 0$$

and can be written as $$\frac{\partial C}{\partial P_i} = \frac{\partial \ln C}{\partial \ln P_i} * \frac{C}{P_i} \qquad (6)$$

Simmilarly monotnocity in output requires that partial derivative of total cost function with respect to output is positive. This can be translated as

$$\frac{\partial \ln C}{\partial \ln Y} = \alpha_y + \gamma_{yy} \ln(Y) + \sum_i \gamma_{iy} \ln(P_i) + \gamma_{yt} > 0 \qquad (7)$$

2.1 Total Factor Productivity (TFP) Growth

Consequently, the rate of technical change (V_t) is defined as the negative of the rate of growth of the average cost of sectoral output with respect to time, holding all input price constant.[6] In order to measure total factor productivity growth, we logarithmically differentiate the cost function (2) with respect to time and decompose rate of growth of cost function into its source components:

$$\frac{d \ln C}{dT} = \sum_i \frac{\partial \ln C}{\partial \ln P_i} \frac{d \ln P_i}{dT} + \frac{\partial \ln C}{\partial \ln Y} \frac{d \ln Y}{dT} + \frac{\partial \ln C}{\partial T} \quad \text{where } i = K, L, M, E \qquad (8)$$

The rate of growth of total cost can be expressed as the cost elasticity weighted average of rate of growth of input prices, plus the scale weighted rates of growth of output, plus the rate of cost of production due to technical change.

The logarithmic partial derivatives appearing in (8) have particular economic interpretations.

Applying Shephard's lemma, the elasticity of cost with respect to price of each input equals the corresponding input's share (v_i) in total cost:

[6] The rate of technical change is synonymous with TFP growth but it requires homotheticity of cost function in output as well.

$$\frac{\partial \ln C}{\partial \ln P_i}\left[p_i, Y, T\right] = \frac{p_i X_i}{C} = v_i \qquad (i=K, L, M, E) \qquad (9)$$

Consequently, the rate of technical change *(v_T)* is defined as the negative of the rate of growth of the average cost of sectoral output with respect to time, holding all input prices constant:

$$v_T = -\frac{\partial \ln C}{\partial T} = \left[\sum_i v_i \frac{d \ln p_i}{dT}\right] - \frac{d \ln C}{dT} \qquad (i=K, L, M, E) \qquad (10)$$

where $-\frac{\partial \ln C}{\partial T}$ is also defined as dual rate of technical change.[7]

It is well known that the translog cost function often fails to satisfy the concavity property that well behaved cost functions must possess. A necessary and sufficient condition for a twice continuously differentiable cost function to be concave in prices over the positive orthant is negative semidefiniteness of second order partial derivatives of the cost function with respect to prices.[7]

2.2 Data Sources and Variables Description

The analysis of total factor productivity and technical change in Pakistan's large scale manufacturing sector is explored using annual time-series data from 1975-76 to 1987-88 from nine industry groups at the two-digit level.[8] A primary data source for Pakistan's large scale manufacturing sector is the *Census of Manufacturing Industries* (CMI). The industry level data on inputs and output was obtained from the *CMI*. Prices of raw material and energy inputs, e.g., firewood, coal, coke, charcoal, furnace oil, kerosene oil, diesel oil, petrol, natural gas and electricity are taken from the *Energy Year book,* whereas other supplementary information is obtained from various issues of the Economic Survey.[9] Energy price index is calculated

[7] The translog specification is flexible enough to allow patterns of technical change. Neutral technical change acts as a pure shift of the cost function which leaves the factor shares unchanged; it is presented by parameters. Biased technical change on, the other hand, represents shift in the level of technology that alter equilibrium factor shares, holding factor prices constant, and is described by parameters .

[8] Jorgensen and Fruameni (1981).

[9] Which implies that Hessian matrix must alternate in signs as *H1*#0, *H2*$0, *H3*#0 and *H2*$0

by aggregating different energy sources by the divisia index. Output *Y*, is given under the heading of value of production in *CMI*'s. Dividing this output by the base year price (i.e., 1980), we get the real output finally used in analysis. Data on labour *L*, is available from different issues of *CMI*'s and wages of industrial workers were obtained by dividing the total employment cost by numbers of workers employed in different sectors. The obtained values are converted into index, indicating the price of labour. Price of raw material, *M*, is taken from *Economic Survey* of Pakistan. The prices of energy are obtained from energy year book.[10] The total cost of production, *TC*, has been computed by using prices and quantities of four inputs e.g., capital, labour, energy and raw material for the aggregation purposes.

As our study requires, in order to construct cost of capital, we take depreciation rate$_o$ and real rate of interest as a percent of capital stock, which can be written as follows

$$V_K = K_t(\theta + i) \qquad (11)$$

Where V_K *is the cost of capital,* K_t is the value of stock, represents rate of depreciation, and *i* is the real rate of interest.

To derive the price of capital we determine user cost of capital stock by using the following procedure:

$$P_k = P_m(i + \theta - P_m) \qquad (12)$$

where P_K is the user cost of capital, is the rate of interest P_m, is the price index of capital goods, θ is the rate of depreciation and P_m is the rate of growth of index of capital. The price of capital goods (i.e. machinery) is obtained from Monthly Statistical Bulletin and is the same across provinces. The real rate of interest is given in Monthly Statistical Bulletin,

The CMI only gives the data on quantities and values of inputs and output.

[10] Since CMI's are published irregularly, we use data only from 1975-76 to 1987-88 to avoid the gaps in the available time-series. Energy is categorized into 11 components, which includes firewood, coal, furnace oil natural gas and electricity etc.

which is long-run scheduled bank rate. Quantity of capital is taken by dividing cost of capital by the price (i.e., user cost) of capital directly.

2.3 Empirical Estimates and Total Factor Productivity

The analysis is based on estimation of the translog cost function along with three share equations, using provincial pooled time series data for the period 1975-76 to 1987-88. Iterative Zellner efficient (IZEF) technique is used for estimation of the model. The parameter estimates are reported in Appendix Table 1 for all the included industries. It can be seen that most of the parameter estimates are statistically different from zero at the 10% level of significance or better. For the translog to be an adequate representation of the underlying technology the estimated cost function must be monotonically increasing and concave in factor prices over the range of observations. Monotonicity condition is satisfied at all points as the fitted cost shares are positive for all sectors at each data point. The curvature was also checked by computing the Eigen values of the Hessian matrix of second-order derivatives in respective industries. The curvature property was satisfied in some but not in all industries though.[11]

A test of hypothesis of constant returns to scale is rejected at the 5% level of significance for all industries since the computed ^{2} was found to be greater than the critical value. For the hypothesis test by imposing homotheticity condition, it is found that the computed ^{2} values are less than the critical value implying that the homotheticity condition is valid for all the industries.

2.4 Evidence on Total Factor Productivity

Using the translog cost function and data from 1975-76 to 1987-1988, the rates of growth of TFP for respective industries are estimated and reported in Appendix Table 2. The average total factor productivity growth in the large scale manufacturing sector is calculated at 0.15% per annum, which is very low. Three out of nine industries (i.e., textile, wood products

[11] Based on depreciation reported in CMI, we use 7% depreciation that is an average rate of depreciation. The holding of concavity condition is not a prerequisite for obtaining good estimates nor does it necessarily undermine the assumption of cost minimization [Wales (1977)].

& furniture and basic metal industries) show negative rate of TFP growth i.e., -0.003%, -0.01% and -0.004% respectively. The remaining industries depict positive rate of productivity growth. The highest rate of productivity growth was observed in the handicrafts, sports & other manufacturing industries i.e., 0.10% per annum. Food, beverages & tobacco industry witnesses 0.003% rate of growth of total factor productivity per annum. Although we find an increasing trend in productivity for most of the sectors, but chemicals, rubber & plastic industry gives fluctuating rate of productivity growth. Surprisingly, the textile sector, which contributes a large share of production to manufacturing sector, exhibits a negative rate of total factor productivity throughout the study period which is consistent with the study by Institute of Development Economics (1994).[12]There might be several reasons for this negative rate of factor productivity growth in our results, which are discussed in the latter part of this section. It is also evident from our results that the import substituting industries (e.g., paper & printing; non-metallic mineral products; and metal products & machinery) do not contribute more production than the traditional industries, but show high rates of productivity compared to other industries.

these results show volatility with respect to year to year fluctuations in outputs and inputs, which may have occurred due to different policies in different time periods. To avoid these fluctuations, a separate analysis on the basis of three-distinct sub-periods has been conducted.

2.5 Explaining Total Factor Productivity in Three Sub-periods

Entire period is divided into three sub-periods, i.e., 1975-77, 1977-81 and 1981-88, based on a clear policy differential observed in respective sub-periods. The period from 1975 to 1977 is considered as a period of nationalization and pro-public sector policies. A number of units were nationalized in early 1970's and the government also took steps to change the management structure of these private enterprises. The nationalization of these units and other forms of direct industrial intervention created

[12] Kemal (1997) calculated positive rate of total factor productivity growth for textile industry from 1982-83 to 1990-91.

considerable uncertainty, which resulted in a sharp fall in net private investment and encouraged the capital flight [Ahmad and Amjad (1984)].

The period from 1977 to 1981 is marked by a transition period. It is well known that the government then gradually restored the confidence of the private sector by withdrawing controls on private investment and moving towards a free market economy. Several structural reforms were carried out such as liberalization of trade, review of investment policy, price liberalization and revitalization of the private sector [Malik et al. (1994)]. Investors became more confident by these measures. The third sub-period from 1981 to 1988 is associated with the liberalization and deregulation of the industrial sector. It was the period of increased private investment in large scale manufacturing sector. The relative investment by public sector fell sharply in this period. Moreover, the divestiture of public sector firms was also initiated during the same period. In this way, government gradually distanced itself from industrial sector and encouraged private sector through deregulation measures. Appendix Table 2 gives the rate of TFP growth in these sub-periods and a detailed discussion on them is given below.

2.5.1 Nationalization Period:1975-77

The most important initiative in this period was the nationalization of heavy industries. A number of industrial units including cement, fertilizers, oil refining, metal, engineering and chemicals were nationalized in early 1970's. During this period, we find that the rate of growth of TFP has been 0.04% per annum for all the industries, which is very low as compared to overall growth in TFP discussed above. It is common knowledge that in 1960's the policy of heavy protection, low rates of interest and over-valued currency had led to a marked bias in favour of capital-intensive large scale industries in the private sector. However, all these protective measures were withdrawn in early 1970's. Moreover, increase in oil price in international market and the resulting international recession might have also been responsible for the observed low productivity.

The public sector drives to make investments in heavy basic industries, e.g., heavy mechanical complex, Taxila and Pakistan Steel Mills in Karachi, diverted investment funds to projects which had a long gestation period. As a result, there was no immediate increase in output. Since

private investment was withdrawn in the same period, increase in output could not come from private sector either. These factors together might also have contributed to the low rate of productivity growth during this period.

2.5.2 Transitional Period:1977-81

This period (977-81) is associated with the private sector confidence building measures for private investors. Moreover, some fiscal and monetary incentives, including the reduction of rate of interest on bank loans advanced to industrial sector, the removal of import duty on machinery, had also been given to these industries in this period. We find that the rate of productivity growth for manufacturing sector increased to 0.05% per annum during this period, which does not show a marked difference as compared to the earlier period. There was a large scale outflow of workers to the Middle East which tightened the labour market by a sharp increase in wages between 1977 and 1981 [Irfan and Ahmad (1984)]. The increase in remittances enhanced the demand for goods and services in different sectors, which increased demand for labour while its supply had become relatively scarce. Wages rose consequently and thus prompted the industrialists to adopt capital-intensive techniques in this sector [Noman (1990)]. At the same time the price of capital has been lowered by a number of measures which also contributed to excessive capital intensity. These all were the reasons which left the manufacturing sector with low rate of productivity.

2.5.3 Liberalization Period: 1981-88

The period from 1981-88 marks a phase in which government disengaged itself from the direct control of industrial sector. The Sixth Five-Year Plan (1983-88), which was the beginning of the process of deregulation and liberalization, also falls in this period. Export led industrialization was introduced as a policy goal for the first time, and there was also an emphasis on the enhancement of manufacturing and export of higher value-added items. The process of granting concessions to manufacturing sector initiated in the earlier period also continued during this period. Moreover, oil prices declined during this period, which lowered the prices

of imported raw materials.[13]This decline in import prices lowered the cost of production and served as an incentive for the investors in manufacturing sector. These might be the reasons which increased the productivity growth to 0.19% which is substantially higher as compared to earlier periods.

2.6 Measuring TFP by Moving Average

The TFP growth was calculated by using moving average in an effort to know whether the results about TFP growth through this method are in line with the previous results or not. After calculating three-year moving averages of inputs, outputs and factor shares, models are again estimated to obtain TFP differences across periods and industries. The results for different sectors based on moving averages are presented in Appendix Table 3. These results entirely support our earlier findings by indicating an increasing trend in overall rate of total factor productivity growth for the entire period from 1975-76 to 1987-88.

Turning to results on individual industries for the three distinct periods, it is found that textile, wood products & furniture industries depict negative rate of productivity growth for all the periods. There was low production of cotton crop due to floods and increase in cotton price in international market during 1970's, which prompted the government to impose a ban on private export of cotton yarn in order to ensure its availability to domestic producers of cotton products [Malik et al. (1994)]. In this adverse and uncertain atmosphere, it was not surprising that textile industry experienced negative productivity growth. The negative productivity during liberalization period was also not unexpected as there were protectionist barriers to export of cloth to countries.[14] Meanwhile, a number of South Asian countries, including India and Thailand, started exporting high quality cotton textiles and thus competition increased. The failure of cotton crops in 1983-84 also decreased the production of textiles. Basic metal industry shows negative rate of productivity growth in first two sub-periods and positive for the third period paper & publishing and chemicals, rubber & plastic show declining trend in productivity in the earlier period, but

[13] Unit value of imports declined from $100 in 1980-81 to $ 78.9 in 198-88 (Economic Survey : various issues).

[14] Textiles and clothing trade was subjected to negotiated MFA (Multi Fibre Agreement) rules involving quota restrictions by U. S., Canada and European countries.

register an increasing trend from 1980 and onwards. There were many reasons for negative rate of productivity growth in different industries such as the policy of heavy protection, low interest rate and fiscal concessions in the earlier period which led to a marked bias in favour of capital-intensive large scale industrial sector with excessive use of scarce capital. It appears from above discussion that some industries experienced fluctuating pattern in their TFP growth throughout the study period while other a rising trend in their TFP, but the magnitude of this rise has always remained very small.

3. Conclusion and Policy Implications

This study was aimed at estimating total factor productivity growth in the large scale manufacturing sector of Pakistan. A strong evidence of low total factor productivity growth in large scale manufacturing sector has been observed. Results show that total factor productivity grew at an annual average rate of 0.15% over the entire study period. It is also evident form the analysis that major industries such as textiles and food & beverages showed a dismal growth in productivity compared with other industries. On the basis of different policy regimes, the study period is classified into three sub-periods. Comparing the results of total factor productivity growth between the three sub-periods, the liberalization period (1981-88) is associated with 0.19% rate of TFP growth, which is substantially higher than that of the earlier two periods (i. e., 0.04% in 1975-77 and 0.05% in 1977-81). A higher rate of productivity growth in this period can be attributed to different policy measures such as removal of quantity restrictions, lifting of bans on capital goods and raw material, etc. These measures led not only to diversification in the manufacturing sector but also have expanded the output levels. The rejection of constant returns to scale hypothesis, in this study, provides the evidence of scale economies. These findings are also consistent with other studies in this area.[15]

From a policy perspective this study has he following implications.

[15] For example, Kemal (1981), Khan and Rafique (1993) and Khan (1998) also found decreasing returns to scale in manufacturing sector of Pakistan.

- The finding that the manufacturing sector of Pakistan is inclined towards capital-intensive technolcgy which is scarce compared to other factor endowments is not surprising if seen in the perspective of trends in the manufacturing sector. Keeping in view the abundance of labour force in Pakistan, it is desirable that the potential of employment generation be increased in this important sector. In its current form and input-mix, there is little hope, if any, that the current trend of over-utilization of capital relative to labour can be averted without government intervention.
- As results indicate industrial sector exhibits decreasing returns to scale which might be due to improper use of factor inputs. So adoption of price rationalization policy would induce proper use of factor inputs and thus lower the cost of production. This would gear up the manufacturing sector towards economies of scale.
- The findings that consumer goods industry which captures a large share of manufacturing sector, but contributes a low rate of factor productivity growth, suggest replacement of such industry with intermediate goods and diversification in industrial output. This would have a favourable effect on productivity growth in this sector.
- In sum, efficient use of scarce factor inputs can lower the cost of production and hence, increase the productivity level in industrial sector. Better use of modern technology by improving skills through research and development will also be a good step towards efficient production. Hence due attention should be paid to training and proper education of human resources.

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Table 1 Estimated Parameters for the Translog Cost Function Industries

Parameter	Industries								
	Food, beverages & tobacco	Textiles, apparel and leather	Wood products & furniture	Paper, printing & publishing	Chemicals, rubbers & plastic	Non-metallic mineral products	Basic metal industries	Metal products, machinery & transport equipment	Handicrafts, sports & other manufacturing
α_M	0.278	0.229	0.247	0.278	0.199	0.185	0.283	0.00001	0.184
	(16.39)*	(24.48)*	(13.31)*	(16.39)*	(9.14)*	(12.69)*	(11.56)*	(25.76)*	(9.14)*
τ	-0.002	0.001	-0.002	-0.002	0.002	-0.001	-0.001	-0.6E-07	0.004
	(-1.38)	(0.99)	(-0.56)	(-1.38)	(1.19)	(-0.10)	(-0.23)	(8.98)*	(2.03)**
γ_{EE}	0.253	0.0276	0.221	0.253	-0.0133	0.123	0.115	0.41E-04	0.123
	(1.96)**	(4.78)*	(4.85)*	(1.96)***		(1.24)	(0.55)	(0.72)	(2.04)**
γ_{KK}	-0.313	0.034	0.095	-0.313	(-0.21)	0.289	-0.505	0.1E-05	-0.426
	(-2.08)**	(0.31)	(1.10)	(-2.08)**	-0.024	(2.20)**	(-3.55)*	(1.67)	(-3.75)*
γ_{LL}	0.143	0.131	-0.019	0.143	(-0.41)	0.040	0.215	0.4E-07	0.230
	(5.31)*	(2.91)*	(-0.77)	(5.31)*	0.087	(2.40)**	(2.69)**	(1.76)***	(4.42)*
γ_{MM}	-0.293	0.140	0.066	-0.293	(4.01)*	0.376	-0.295	0.9E-06	-0.219
	(-2.40)**	(2.09)**	(1.01)	(-.24)	0.294	(3.40)*	(-2.31)**	(3.98)*	(-4.41)*
γ_{EY}	-0.161	-0.80	-0.023	-0.162	(5.57)*	0.348	-0.0495	-0.3E-06	0.085
	(-2.46)**	(-2.31)**	(-073)	(-2.46)**	0.020	(5.48)*	(-0.82)	(-1.24)	(4.89)*
γ_{KY}	0.152	0.022	0.016	0.152	(0.607)	-0.255	0.081	-.3E-06	-0.021
	(3.04)*	(-.68)	(0.81)	(3.04)*	-0.093	(-5.69)*	(1.89)***	(-1.08)	(-1.08)
γ_{MY}	0.014	0.182	0.015	0.014	(-7.81)*	-0.022	-0.009	0.7E-06	-0.066
	(0.24)	(6.22)*	(1.19)	(0.02)	0.143	(-0.63)	(-0.195)	(7.75)*	(-4.98)*
γ_{LY}	-0.005	-0.010	-0.007	-0.005	(5.424)*	-0.070	-0.023	-1.0E-07	0.001
	(-0.20)	(-3.25)*	(-0.56)	(-0.20)	-0.071	(-3.49)*	(90.60)*	(-1.17)	(0.15)
γ_{KM}	0.435	0.72	-0.053	0.435	(-5.62)*	-0.347	0.518	-0.1E-05	0.327
	(3.90)*	(.99)	(-0.76)	(3.90)*	-0.121	(-3.03)*	(4.53)*	(-3.92)*	(5.01)*
γ_{LM}	-0.035	-0.151	0.040	-0.035	(-2.64)**	0.022	-0.095	0.5E-07	0.052
	(-0.90)	(-.3.95)*	(1.34)	(-0.90)	-0.114	(1.064)	(-1.85)***	(1.83)***	(-1.61)

γ_{LM}	-0.107	-0.062	-0.052	-0.107	(-5.51)*	-0.051	-0.127	0.21E-06	-0.055
	(-1.13)	(-2.14)**	(0.31)	(-1.13)	-0.058	(-1.070)	(-1.29)	(1.54)	(-1.42)
γ_{KL}	-0.042	0.066	0.053	-0.042	(-1.31)	0.033	-0.072	-0.11E-06	-0.001
	(-0.81)	(1.22)	(1.36)	(-0.18)	0.050	(1.27)	(-1.21)	(-1.20)	(-0.17)
γ_{EL}	-0.066	-.045	-0.074	-0.066	(2.91)*	-0.095	-0.047	0.21E-07	-0.172
	(-2.11)**	(-1.86)***	(0.50)	(-2.11)**	-0.023	(-3.69)*	(-0.50)	(0.19)	(-4.10)*
γ_{EK}	-0.080	-0.171	-0.095	-0.080	(-0.81)	0.023	0.059	0.21E-06	0.104
	(-0.88)	(-4.14)*	(-0.04)	(-0.88)	0.95	(0.362)	(0.48)	(0.31)	(1.842)***
α_{EE}	0.002	-0.005	-0.006	0.002	(3.153)*	-0.008	-0.001	-0.3E-07	-0.008
	(0.79)	(-2.68)*	(-0.06)	(0.79)	-0.001	(-1.88)***	(-0.14)	(-1.60)	(-2.80)*
α_{KE}	0.005	0.007	0.002	0.005	(-0.08)	0.008	0.001	0.81E-07	0.011
	(3.17)*	(4.41)*	(0.30)	(3.17)*	0.001	(3.65)*	(0.95)	(3.13)*	(3.44)*
α_{LE}	-0.004	-0.003	0.006	-0.004	(0.51)	0.001	-0.001	0.11E-08	-0.001
	(-4.52)*	(-2.48)**	(1.75)***	(-0.52)	-0.002	(0.08)	(-0.45)	(0.16)	(-2.37)**
α_E	0.198	0.274	0.110	0.199	(-2.57)**	0.432	0.018	0.9E-06	0.237
	(7.85)*	(16.58)*	(3.14)*	(7.85)*	0.273	(9.47)*	(4.55)*	(7.76)*	(8.96)*
α_K	0.241	0.264	0.338	0.241	(8.80)*	0.196	0.252	0.99	0.199
	(16.30)*	(31.13)*	(11.74)*	(16.30)*	0.252	(8.20)*	(10.53)*	(0.57)	(6.66)*
α_L	0.283	0.233	0.305	0.283	(26.71)*	0.186	0.278	0.1E-05	0.379
	(33.13)*	(39.17)*	(18.11)*	(33.13)*	0.274	(13.52)*	(10.95)*	(22.52)*	(11.89)*
α_0	1.275	1.45	1.412	1.275	(27.18)*	1.814	1.220	13.77	0.997
	(33.70)*	(50.72)*	(15.82)*	(33.70)*	1.560	(19.70)*	(13.21)*	(30.47)*	(6.83)*
γ_Y	0.494	0.225	0.500	0.494	(24.12)	0.925	0.780	0.30	0.344
	(6.301)*	(2.21)**	(6.77)*	(6.301)*	0	(5.02)*	(2.47)**	(2.99)*	(1.20)
α_T	-0.007	0.012	-0.025	-0.007	0.178	0.030	-0.077	0.04	-0.032
	(-0.71)	(0.78)	(-0.60)	(-0.71)	(2.02)**	(0.99)	(-1.48)	(3.11)*	(-0.69)
α_{TT}	0.002	-0.002	0.001	0.002	0.063	-0.105	0.009	0.6E-02	0.205
	(1.30)	(-1.15)	(0.19)	(1.30)	(3.92)*	(-0.25)	(1.17)	(2.44)**	(3.03)*
γ_{YY}	0.130	0.142	0.143	0.130	-0.013	0.213	0.399	0.87	-0.037
	(2.161)*	(1.39)	(1.38)	(2.161)**	(-4.35)*	(1.24)	(1.85)***	(7.83)*	(-0.17)
γ_{YT}	-0.005	0.019	0.005	-0.005	-0.154	-0.006	0.023	-0.07	-0.022
					(-1.37)				
Log Likelihood Function	209.11	234	177.21	115.21	209.71	162.09	114.39	1183.93	123.69
N	26	26	26	26	26	26	26	26	26

*, ** and *** indicate significant at 1%, 5% and 10% level respectively.

Table 2 Weighted Annual Average TFP Growth: Three Sub-periods

Industries	1975-77	1977--81	1981-88	Average Annual Rate 1975-88
1-Food, beverages and tobacco	0	0.001	0.009	0.003
2-Textile, Apparel & Leather	-0.001	-0.002	-0.007	-0.003
3-Wood products & furniture	-0.004	-0.011	-0.025	-0.013
4-Paper, Printing & Publishing	0.02	0.003	0.028	0.017
5-Chemicals, Rubbers & Plastic	0	-0.002	0.056	0.018
6-Non-metallic mineral products	0.005	0.01	0.018	0.011
7-Basic metal industries	-0.004	-0.007	0.001	-0.004
8-Metal products, machinery and equipments	0.013	0.021	0.023	0.019
9-handicrafts, sports, & other	0.006	0.041	0.106	0.043
Average growth rate	**0.035**	**0.054**	**0.193**	**0.151**

Note: 1975-77 represents the period of nationalization.
1977-81 represents the transitional period.
1981-88 represents the liberalization period.

Table 3 Moving Average rates of TFP Growth for Selected Industries

Industries	1975-77	1976-78	1977-79	1978-80	1979-81	1980-82	1981-83	1982-84	1983-85	1984-86	198
1-Food, beverages & tobacco	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.003	.004	0.
2-Textile, apparel and leather	-0.001	-0.001	-0.003	-0.004	-0.006	-0.005	-0.005	-0.002	-0.002	-0.003	-0
3-Wood products & furniture	-0.0001	-0.001	-0.003	0.003	-0.006	-0.005	-0.005	-0.002	-0.005	-0.005	-0
4-Paper, printing & publishing	0.003	0.004	0.003	-0.001	0.003	0.004	0.007	0.010	0.011	0.014	0.0
5-Chemicals, rubbers & plastic	0.000	0.000	-0.005	0.007	-0.001	-0.002	0.003	0.020	0.026	0.023	0.
6-Non-metallic mineral products	0.004	0.005	-0.006	-0.005	0.008	0.008	0.007	0.006	0.007	0.007	0.
7-Basic metallic industries	-0.005	0.005	-0.005	0.011	-0.006	-0.006	-0.004	-0.001	-0.001	0.001	0.
8-Metal products, machinery,	0.009	0.009	0.010	0.052	0.013	0.012	0.012	0.008	0.010	0.008	0.
9-Handicrafts, sports, other	0.014	0.022	0.034	0.052	0.06	0.051	0.081	0.073	0.070	0.032	0.
Average Annual Average Rate	0.017	0.042	0.041	0.061	0.072	0.062	0.103	0.112	0.118	0.123	0

Production Dispersion Comparison Under A Basing Point Pricing Policy and F.O.B. Pricing Policy

Parvez Azim*

Abstract: The objective of this paper is to demonstrate the impact of pricing policies, namely, Basing Point and F.O.B. pricing policies on the optimal location choice of producers when buyers are uniformly distributed along a line of unit length. The assumptions are the same as made by Smithies (1970). This topic is important in regional science regarding optimal location choice of firm in spatial competition. This paper demonstrates that dispersions of firms, all else equal, is greater under a F.O.B. pricing system than under a Basing Point pricing system.

1. Introduction

Industrial experts and economists are aware and understand how firms are located under different pricing policies and other conditions which vary from one location to another. For a production site to be profitable, price must be equal to the average cost of production in the long run. Thus, if the market size is too small to equate average revenue at least with average cost, no industry would survive in that area in the long run. For every industry, there must be some minimized market required by economies of scale for production to be profitable. For these reasons and others, the profit maximizing site may not be at the geographic centre of the market area. The geographic centres of the market are of interest because of their proximity to the buyers, which leads to lowest transportation costs or lowest input supplies. It is believed that as much as 10 percent of plant operating costs can be saved annually by virtue of a proper geographic location choice (Browning, 1980).

This paper deals with an aspect of the location decision to maximize profit by reducing transportation costs. It demonstrates how this objective of optimal location site is achieved by shifting of the producer location site,

* Professor, Department of Economics, GC University, Lahore. This paper draws heavily on chapter 6 of the author's Ph.D. dissertation . The author is highly indebted to Professor Jack Reardon, University of Wisconsin, USA for his very useful comments and suggestions to improve the overall quality of this paper.

assuming the nature of the demand function of the consumers and production cost excluding the transportation costs is identical.

The dispersion of the firms under Basing-Point pricing and Freight-on-Board (F.O.B) pricing for a given 'locational figure triangle' shown by Figure 1 is considered. The locational figure triangle shows how dispersion of producers would take place where the base of the triangle is of a unit length and its hypotenuse represents a continuous rise in the shipping cost as a seller moves towards the boundary (terminus point) shown by point J in Figure 1. Basing point pricing (also known as delivered pricing) refers to a system in which a buyer must pay a price for a product inclusive of freight costs that does not depend on the location of the seller. The freight costs may be calculated from a specific location or "basing point" from standard published freight rate schedules. Under this system customers located near or far from the basing point pay the same price. The freight costs of distant customers are absorbed by the sellers. FOB pricing involves the production cost plus any transport costs to the customers. This implies that customers located nearby will have a lower overall cost than customers that are further away. In this paper the height of the triangle shows the maximum transportation cost beyond which no sale takes place because it becomes too expensive to sell due to high transportation cost, hence, it is a terminus point. For ease of analysis, the base of the triangle is considered to be of unit length interval.

2. The Model

Suppose at the outset that a single firm is located on a transport route with no competition. Its location would be the midpoint of the route for that is the efficient site because at this point the total transportation cost delivering the product to the buyers or inputs to producers would be less than at any other point. If a second firm enters the market next to firm 1 at the median location, firm 1 would no longer remain at the midpoint of the road. In fact, under competition, the sum of the net returns to the firms would be a maximum when both firms are equi-spaced with respect to each other. In case of two firms, firm 1 would locate at ¼ and firm 2 at ¾ of a unit length line in order to minimize total shipping cost. In general equal intervals must separate every pair of firms such that each firm locates at the median of its own market area.

In this paper it is assumed that a single firm is located at terminus point of unit length interval. Let the firm follow F.O.B. mill pricing policy. Additionally, assume a new entrant at point B who follows the basing point price of firm 1. It is also assumed that industry structure does not change from perfect competition to imperfect competition over time and no collusion is allowed.

2.1 Location of the Firms under the Basing-Point System

Determining the optimum location under the basing point system requires the minimization of cost. Assume the demand function facing the firm is:

$q = b - aP$ (1)

q = quantity demanded
P = delivered price
b, a = positive constant

$P = p + rv$ = mill price + transportation cost (2)

p= mill price
rv = transportation cost
r = transportation rate per unit distance
v = distance of buyers from the base point

Since the base point at the terminus of the unit interval point O in Figure 1, v is then both distance from the base point as well as the location of buyers under a linear transport system. Given O as the base point, define the market boundary J, as the point where demand falls to zero due to substantial transport costs. Then we have

$$J = \frac{(ba - p)}{ra} = 0 \qquad (3)$$

The expression (3) is obtained by substituting (2) into (1) and setting q = 0 and v =J

For two firms, total cost T for the entrant in Figure 1 is:
T= total cost from O to B + total cost from B to J
OD = the F.O.B. mill price
DD' = delivered price schedule under the basing point policy

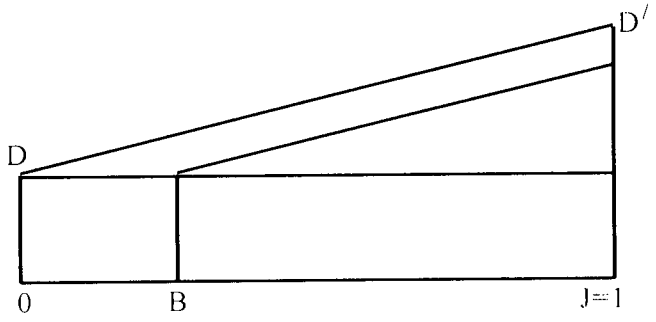

Figure 1. Location of the firms under the Basing Point system

Mathematically, we could write

$$T = \int_{o}^{J} [\,fixed\ cost + (per\ unit\ shipping\ rate)(distance)]\,quanitty\ demanded$$

or

$$T = \int_{O}^{B} [K + r(B - v)]\{b - a(p + rv)\}dv + \int_{B}^{J} [K + r(v - B)]\{b - a(p + rv)\}dv \quad (4)$$

We seek the optimal location of firm 2 on the line extending from O to J. The objective is to determine the location of firm 2 (B) both under a basing point system and under the F.O.B. pricing system and compare the dispersion between them. We assume only firm 1 is at the base point O and the potential entrant (firm 2) will locate at some place B. Under the basing system, all buyers are charged shipping charges as if all sales emanated from firm 1's location. Therefore, demand for all market segments is {b-a(p+rv)}. For simplicity, let a= r =1, thus equation (3) reduces to:

J= b – p (5)

and b – a{p+rv} = (b- p) – v = J – v

substituting this expression into (4) gives us

$$T = \int_{O}^{B}[K + (B - v)]\{J - v\}dv + \int_{B}^{J}[K + (v - B)]\{J - v\}dv$$

or

$$T = JB^2 - \frac{B^3}{3} + \frac{KJ^2}{2} - \frac{BJ^2}{2} + \frac{J^3}{6} \qquad (6)$$

differentiating (6) with respect to B and setting it equal to zero gives us

$\frac{\partial T}{\partial B} = 2JB - B^2 - \frac{J^2}{2} = 0$ *solving it for B gives us*

$$2B^2 + J^2 - 4JB = 0 \quad \Rightarrow \quad B = J\left[1 - \frac{1}{\sqrt{2}}\right] \Rightarrow \quad B = 0.3J$$

2.2 Location under F.O.B. Pricing Policy

It has been demonstrated that the profit maximizing location B of firm 2 must be 0.3 of the distance J from O. Since we intend to compare location under basing pricing with location under F.O.B. pricing, we must find the optimum location under F.O.B. mill pricing. Firm 1 located at O in Figure 2 and the new entrant firm 2 seeks the profit maximizing site B. Let m_1 and m_2 denote F.O.B. mill price of firm 1 and firm 2, respectively, while S stands for market boundary between the firm 1 and 2. So the total profit under F.O.B. pricing for firm 2 would be:

$$\pi = \int_{S}^{B}[m_2 - K]\{b - a(m_2 + r(B - v)\}dv + \int_{B}^{J}[m_2 - K]\{b - a(m_2 + r(v - B)\}dv \qquad (7)$$

For simplicity, let a = r = 1

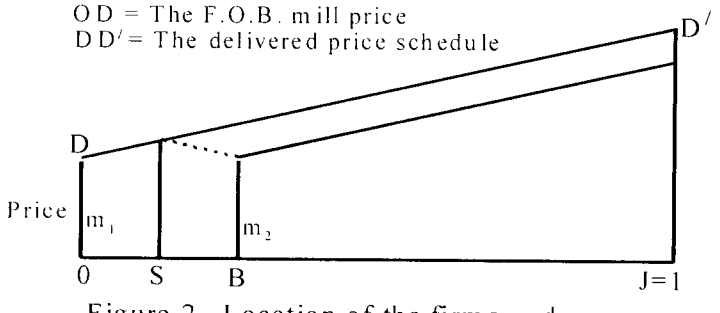

Figure 2. Location of the firms under F.O.B. pricing system

At market division point S the delivered price of the two firms must be equal i.e.
F.O.B. mill price of firm 1 + (shipping rate)(distance) = F.O.B. mill price of firm 2 + (shipping rate)(distance)

$$m_1 + rS = m_2 + r(B-S) \qquad (8)$$

Suppose that the F.O.B. mill prices are the same for both firms, that is, $m_1 = m_2$
Substituting $m_1 = m_2$ into (8) and solving for S gives us $S = B/2$
Analogous to equation (5), we can readily see that $J = b - m_2$
Substituting $J = b - m_2$ and (9) into (7) gives us

$$\pi = (m_2 - K)\left[\int_{\frac{B}{2}}^{B}\{J - B + v)\,dv + \int_{B}^{J}\{J + B - v]dv\right]$$

$$\Rightarrow \quad \pi = (m_2 - K)\left[\frac{JB}{2} - \frac{5B^2}{8}\right]$$

differentiating it with respect to B and setting it equal to zero gives us

$$\frac{\partial \pi}{\partial B} = \frac{J}{2} - \frac{5B}{4} = 0 \quad \Rightarrow B = 0.4J \quad since\ J = 1$$

$$B = 0.4$$

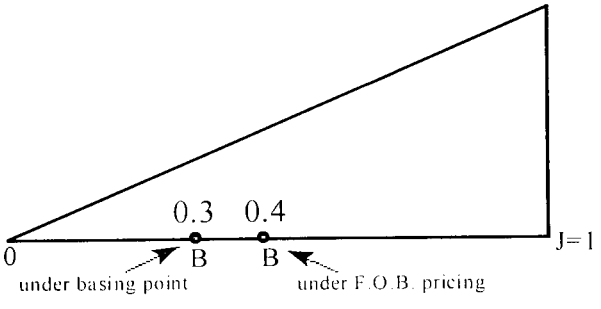

Figure 3. Comparison of dispersion of the firms under Basing Point and F.O.B. pricing

Thus, the profit maximizing location B of firm 2 will be 2/5 of the distance J from O under the F.O.B. mill pricing policy as shown in Figure 3.

3. Conclusion

The profit maximizing location of firm 2 must be 0.4 of the distance J from O. It is evident from the location position both under the Basing Point price system (at 0.3J) and F.O.B. pricing (at 0.4J) that dispersion of firms, *ceteris paribus*, is greater under the F.O.B. pricing system than under the Basing Point pricing system.It may be mentioned that dissolution of the basing point system, in compliance with a country's antitrust law would make it increasingly difficult for the larger plants located at the base point to compete with other plants. Consequently, relocation of many of these large plants will take place. Smaller plants in turn, will disperse more under F.O.B. pricing policy than they do under the basing point system over a given geographic area. Thus, the principal conclusion reached in this paper indicates that dispersions of firms, all else equal, is greater under an F.O.B. pricing system than under a Basing Point pricing system. Needless to say that the conclusions would change if the assumptions are relaxed. It is also to be mentioned that firms do not always base their location decision on this theory of profit maximization, sometimes it is satisfaction maximization and not the profit maximization of the producer that affect the location choice. It merits further research by taking into account changes in industry structure and when customers do not have identical demand functions.

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Gender Discrimination in Demand for Child Schooling

Rana Ejaz Ali Khan*

Abstract: This paper examines the different effects of child, head of household, parents, and household's characteristics on the acquisition of schooling by sons and daughters. Evidence is found that a strong preference for sons' schooling exists in Pakistani households. We compare the demand for schooling for sons and daughters. Birth-order of the child has shown opposite effect on sons' and daughters' schooling while a number of explanatory variables have shown the effect in the same direction for sons and daughters, but a reasonably varying magnitude is observed.
(Key Words: Education J21, Household Behavior D10, Economics and Social Values A13, Household AnalysisR20).

I. Introduction

Pakistan like other South Asian countries is a country having rigidly patrilineal and patrilocal kinship system in the households. Lineages are strictly exogenous and are defined in terms of male alone so men are reproducers and confer an identity to the children. Rights to a woman are transferred to the household's family at the time of marriage. The woman's future productivity and services belong to the husband's family, whatever her parents' needs may be. Consequently, a daughter is far less welcome than a son. The kinship system in these settings leads to strong son preference and accompanying discrimination against daughters. Such type of discrimination may be in the form of distribution of consumption/expenditure in the household. Education of children is one head of resource allocation among children. There is a vast body of literature on child schooling in Pakistan (Summers 1991; Behrman 1994; Khan 1997; Sawada and Lokshin 2000). This literature identifies the causes responsible for low literacy rate, low enrolment, low schooling and high drop-out ratio in the country both for boys and girls. Many of these studies have found evidence of gender differences in schooling (Rosati and Rossi 2001; Burki and Shahnaz 2003), though insufficient attempts have been made to explain gender differences in schooling. In this

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context, we will investigate the possible causes of gender differences in child schooling among 5-15 years old boys and girls in Pakistan, and also to what extent the observed gender differences are explained by the child, head of household, parents and household characteristics.

Investment in education of children is very significant in raising productivity and efficiency of individuals in an economy which largely depends on the household's behavior towards the education of their sons and daughter. One of the factors of low school enrolment of children is the gender bias in child schooling by households. It is also important to analyze the gender discrimination as it is the single most important factor of poverty in South Asia (UNDP 1997:106). For example, if female enrolment in primary schools had been as high as male enrolment in 1960, i.e. 46 percent instead of 13 percent, Pakistan's 1985 per capita income would have been more than 15 percent greater than it was (Birdsall *et. al.* 1993). Pakistan ranked 92nd out of 94 on gender empowerment index (Haq 1997). Ranis et. al. (2000:393) opined that human development in Pakistan has suffered a lot due to discrimination against females. The women literacy rate in the country (for the year 2004) is 41.75 percent as compared to 66.25 percent of men. This is a consequence of low enrolment rate of girls at school level. The fact is that social rate of return on investment on girl's education is the highest in Pakistan (Summers 1991; Khan 1997). Female schooling has an important externality in the sense that it plays a significant beneficial role on fertility (Birdsall *et. al.* 1993; Pall and Makepeace 2003) and child health outcomes (Pall 1999) in low-income countries. Thus boosting female literacy is necessary not only for itself, but also for the wider social and economic benefits (ADB 2002:49).

2. Review of Literature

In literature, a number of studies (Burki and Shahnaz 2003) have found a lower participation rate (unconditional probability) for girls than boys. Akhtar (1996) estimated gender specific conditional probabilities of drop-out from the schools in Karachi. Surprisingly the results indicated that the probability of drop-out of females is lower than boys at institutionally established "exit" points in the schooling system of Karachi. The reason may be that poor male children may leave school to supplement family income. Hazarika (2001) examined the gender differences in the sensitivity of primary school enrolment to the costs of post-primary

schooling in rural areas of Pakistan. Of all the measures of the costs of schooling, only distance from primary school was found to be statistically significant determinant of female primary school enrolment. In contrast to all measures of the costs of schooling, only distance from middle school was statistically significant determinant of male primary school enrolment. Hamid and Siddiqui (2001) have analyzed those characteristics of the households that affect the likelihood of sending the child to school or stopping him. They used the survey data of export-oriented industries of three big cities, Faisalabad, Siakot, and Karachi. They have examined the gender differences in demand for schooling and found that the impact of mother's education is more important as it reflects that the rise in girls' education not only increases the productivity and human capital of present generation but also of future generations. Lloyd *et. al.* (2005) have analyzed the effect of gender differences in primary school access, type (i.e. public versus private), and quality of school on parents' decision to enroll their children in primary schools in rural Pakistan. The study is complement of an earlier study by Alderman, *et. al.* (2001), who have explored the same set of issues in urban Pakistan. The data set used is collected from the province of Punjab and Norht-West Frontier Province (NWFP). The study found that within the same village, girls and boys often face starkly different options for schooling in terms of distance, type and quality. We will examine the households' behavior towards sons' and daughters' schooling by probit model on primary data.

3. Theoretical Background

Conceptually, there are a number of socio-economic variables which affect the schooling-decision of children. In the previous literature the researchers have used a variety of characteristics to explain the schooling decision of children. For instance, child characteristics, i.e. birth-order, gender, relationship to head of household, age, educational stage and nature of education-whether the education is technical or non-technical, and formal or informal- and the opportunity cost of schooling in the form of child labor wages. Child's ability or cognitive skill may also affect the decision of parents for child schooling. The proxy for ability may be the anthropometry of child, vaccination, immunization and nutritional status of child,, and household expenditure on food. Generally, head of household characteristics included are gender, life cycle, profession, education employment and income level and nature of the source of income -

whether the income is permanent or not. The parents' characteristics are parental education, male and female workforce participation, wage rate in the market, income level, mother's non-wage income, contribution of income by parents (separately for mother and father) in the household, bargaining power of the mother and father. The household characteristics include ownership of assets, presence of father, primary language, land size owned by the household, income, poverty status, per capita income, nature of the income, size and composition, ratio of boys and girls, and earning adults, rural and urban locality, and availability of drinking water, electricity supply in the household. Socio-cultural characteristics like the ethnic and linguistic groups, profession, sect, religion, and region of the country in which household is residing. Some community characteristics also affect the schooling of boys and girls, for example, the metal road to school, the presence of social mobilizers like NGOs etc. presence of main road, canal or barren area between the school and household, and accepted standard of the school by community. On the supply side, the schooling characteristics that are likely to affect the schooling are the existence of school in the accessible area, transportation facilities, pupil teacher ratio, provision of educational material in public schools, incentives such as noon-meal scheme[1] (Ranjan and Jaikumar 1992), physical structure of the school, i.e. provision of boundary wall, toilet, specifically in girls schools and furniture.

4. Data and Methodology

The empirical analysis of gender differences in child schooling in this paper is based on the data collected from two districts of Pakistan, i.e. Pakpattan and Faisalabad. Pakpattan is at number 50 and Faisalabad at number 8 out of 94 districts of Pakistan in terms of social indicators in Weighted Factor Score and at 76 and 6 in terms of ranking respectively, taking into account eleven indicators relating to education, health and water supply. Similarly Pakpattan stands in the region of low literacy (with 30.2-45 percent literacy rate) in the age cohort of 10+ years while Faisalabad stands in the region of high literacy with 45-59.8 percent rate (CRPRID 2002). So these two districts represent the average conditions of the country more appropriately. Both districts have rural and urban areas. Pakpattan is not so much urbanized as Karachi, Lahore and Islamabad

[1] Tawana Program for female school-going children and provision of bag and books to primary school children in Punjab may be one programmes.

and not so backward like the far-flung areas of interior Sindh and Balochistan.

In respect of per capita income, the average of both districts is at par with national per capita income. Household is a single person living alone or a group of persons who normally live and eat together under common cooking arrangements and have no other place of residence. Head of household means the representative of the family who has the power to supervise its members and is the main bread-earner of the household. Usually one of the parents is head of the household, but one of grand parents may act as the head of the household in combined family system or in the case of missing of parents.

If the parents or grand parents are not the members of the household then the eldest person in the household acts as head of household and makes decisions of the household. Sometimes parents or grandparents are the members of the household but due to old age they are unable to head their families. In that case headship is shifted to eldest person. So head of the household characteristics may differ from parents' characteristics.

The survey covered 4000 households where households having at least one school-age child were segregated. The questions asked from the heads of the household were about themselves, their parents and children. The distinguishing feature of this survey is that it covers 5-15 years old boys and girls, while previous studies, for instance, Burki and Shahnaz (2003) have covered 10-14 years age group of children for gender analysis of child activities. In the present study lies a child is defined as a person who is 5-15 years old. Age 15 coincides with the end of school age. Likewise, the cut-off age between infancy and childhood is age 5.

4.1 Data Description

The eight clusters taken together capture a good deal of the diversity present in the country. Though there are primary schools in all the clusters, access to high schools is difficult in some clusters. There are also significant differences in adult labour force participation, income and education

4.2 Methodology

In the literature generally, two approaches are applied to detect gender bias in the intra-household allocation of resources: the direct comparison of expenditure on males and females where data is available at the level of individual, and the indirect household expenditure methodology commonly referred to as the Engel curve approach. Since information on the consumption/expenditure on each individual member of the household is typically difficult to get and it is not available in the household surveys, researchers have no other option but to use Engel curve method. It helps to detect differentiated treatment within the household indirectly by examining how household expenditures on a particular good change with household gender composition. However, the reliability of the Engel curve methodology as a way of detecting gender bias has been questioned because it has generally failed to confirm discrimination even where it is known to exist. For example, the use of Engel curve method failed to detect significant treatment in the intra-household distribution of food consumption in Maharashtra, India (Subramanium and Deaton 1990), and in Thailand and Cote d Ivoire (Deaton and Paxon 1998). Similarly, Ahmed and Morduch (2002) found no evidence in favour of boys in Bangladesh, Deaton (1997:240) and Bhalotra and Attfield (1998) in Pakistan, and Case and Deaton (2003) in India. These are the countries from which much of the other evidence emerged regarding differentiated treatment by gender (see Kingdon 2003 for details). To analyze the gender bias, we examined the determinants of schooling for sons and daughters separately by using a series of probit models. In the first regression, son's schooling (SON) is a function of several explanatory variables: 1 if the son goes to school and 0 if he does not. The paper estimated non-linear maximum likelihood for the normal probability (probit model). The function is

$$SON = f(X_1 \ldots\ldots X_n) \qquad (1)$$

Four groups of explanatory variables ($X_1 \ldots\ldots X_n$) have been selected to disentangle the gender bias in child schooling, i.e. child characteristics (birth-order, age, and years of education[2], head of household characteristics (gender, age, education, literacy status and income), parent characteristics (education, literacy status, employment and

[2] We have not included the ability of the child as explanatory variable due to data contstraint.

income), and household characteristics. The household characteristics included in the present study are the ownership of assets, household per capita income, household poverty status, household size, whether the household is nuclear or not, number of children in the household, number of infants, number of school-age children, number of elder siblings of school-age children, and locality of the household. For the second regression, the model has the same modus operandi where daughter's schooling (DAUG) is a function of the same explanatory variables. The dependent variable can take only two binary values: 1 if the daughter is going to school and 0 if she is not going. The function is as:

$$DAUG = f(X_1 \ldots\ldots X_n) \qquad (2)$$

The definitions of explanatory variables are presented in Table 1.

Table 1. Definitions of Explanatory Variables Used in the Models

VARIABLES	DEFINITIONS
	1. Child Characteristics
BORD (Birth-order of child)	• Birth-order of child in his/her brothers and sisters
CAGE (Child's age)	• Child's age in completed years
CAGESQ (Child's age squared)	• Child's age squared
CEDU (Child's education)	• Child's education in completed years
	2. Head of Household Characteristics
HGEN (Gender of the head of household)	•1 if the head of household is male, 0 otherwise
HAGE (Head of household's age)	• Head of household's age in completed years
HAGESQ (Head of household's age squared)	• Head of household's age squared in completed years
HEDU (Head of the household's education)	• Head of the household's completed years of education
HLIT (Head of the household's literacy status)[3]	• 1 if the head of the household is literate, 0 otherwise

[3] The official definition of literacy in Pakistan is "one who can read a newspaper and write a simple letter". The literacy so defined cannot be accepted "functional literacy", that is, an individual needs to function in a society which is becoming increasingly complex. We have defined the adult literacy (for the head of household, father, and mother) as the minimum of five years of formal schooling. To make a comparison of effect of an illiterate and literate person on gender aspect of child schooling, we have included the literacy status of the head of household (as well as father and mother) in the model.

HEMP(Head of household's employment)	• 1 If head of household is employed, 0 otherwise
HY (Head of household's income)	• Head of household's income per month (in 000 Rs.)
	3. Parent Characteristics
FEDU (Father's education)	• Father's education in completed years of education
FLIT (Father's literacy status)	• 1 if father is literate, 0 otherwise
FEMP (Father' employment)	• 1 if father is employed, 0 otherwise
FY (Father's income)	• Father's income per month (in 000 Rupees)
MEDU (Mother's education)	• Mother's completed years of education
MLIT (Mother's literacy status)	• 1 if mother is literate, 0 otherwise
MEMP (Mother's employment)	• 1 if mother is employed, 0 otherwise
MEMP.MLIT (Mother's employment and literacy status simultaneously)	• 1 if mother is employed and literate, 0 otherwise
MEMP.POVTY (Mother's employment and household's poverty status simultaneously)	• 1 if mother is employed and belongs to poor household, 0 otherwise
MY (Mother's income)	• Mother's income per month (in 000 Rupees)
	4. Household Characteristics
ASST (Household's ownership of assets)	• 1 if the household owns of assets, 0 otherwise
HHY (Household's total income)	• Household's total income per month (in 000 Rupees)
HHPCY (Household's per capita Income)	• Household's per capita income (in 00 Rs.) per month
HPOVTY[4] (Household's poverty status)	• 1 if household's per capita income per month is Rs.670 or below, otherwise 0
HHSIZ (Household/family size)	• Number of household/family members
HHSSIZ (Household/family's small family)	• 1 if household members are less or equal to 5, otherwise 0
NCHILD	• Number of children (15 or less than 15 years) in the household
CHILD04	• Number of children ages 4 or less than 4 years in the household
CHILD515	• Number of children (5-15 years) in the household
BOY515	• Number of boys (5-15 years) in the household
GIRL515	• Number of girls (5-15 years) in the household
CHILD16	•Number of elder siblings (16 years or above) of children in the household
BOY16	• Number of male elder siblings (16 years or above) of children in the household

[4] The Official Poverty Line of Pakistan is Rs.848.79 per capita per month [Economic Survey 2003-2004]

GIRL16	• Number of female elder siblings (16 years or above) of children in the household
LOC (Locality of the household)	• 1 if the household is urban, 0 otherwise

5. Results & Discussion

The study has estimated gender differences in child's schooling. We analyze the sub-sample of sons and daughters separately. The summary statistics and sequential probit results for sons are shown in Table-1 and for daughters in Table-2 (Appendix A). The results show the probability of going to school for sons and daughters separately. Here we make a comparison of the impact of explanatory variables on sons and daughters of the household. The analytical conclusions of some of the key variables are given below:

5.1 Child Characteristics

There is extensive literature available on gender differences in human capital investments in children. A number of studies (see, e.g. Behrman 1988; Thomas 1994) have shown that sons are favoured in the intra-household allocation of nutrients, so the sons have better anthropometric outcomes. Ahmed (1990) has shown that in Pakistani society, sons are favoured in the intra-household allocation of resources. Burki and Shahnaz (2003:11) explained that boys get preference over girls in schooling in Pakistan because of their conventional role as chief bread-winners for the family. The first-ever explanatory variable, birth-order, of present study also shows the preference for sons' schooling. It depicts that first-born sons are more likely to go to school while first-born daughters are less likely to attend school (Emerson and Souza 2002l). It may be explained in the case of Pakistan by segregation of household tasks by sex, where women and female children have overlapping household tasks of fetching water, collecting fuel wood, livestock care, and child care particularly in rural areas. The elder daughters usually help their mothers in household tasks.

We have found that probability for going to school for both sons and daughters increases by increase in their age at a decreasing rate, but sons are 24 percent more likely to join school by an incremental change in age, while daughters are 12 percent more likely to go to school. It means the first enrolment of daughters is more delayed as compared to sons.

The school participation of sons is maximum at the age of 9.64 years, while for daughters it is at the age of 8.15 years[5]. It means that drop out of girls are much earlier than boys. Similarly, the current years of education of sons and daughters have a positive impact on their probability to continue schooling. An incremental change in the years of education makes the sons continue schooling by 28 percent, while the girls by 8 percent. It reflects a stark gender disparity in the continuation of schooling; alternatively daughters are more likely to drop out from school than sons. The result is corroborated by the summary statistics, where average years of education of sons are 3.41 years and of daughter s 3.04 years. The possible explanation may be that, due to lack of required facilities for secondary education, girls have to travel long distance to reach school. The problems for girls are augmented because of low value attached to female education coupled with social taboos imposed on their movement after reaching the age of puberty.

5.2 Head of Household Characteristics

It is found that headship of household affects the son's and daughter's schooling in the same way, i.e. sons and daughters (separately) from the female-headed households are more likely to go to school. But the matriarchal households favour daughters' schooling slightly more than sons.

Age of the head of household indicates the stage in life cycle, which is generally expected to influence the schooling of sons and daughters. It is found that the sons' schooling is positively affected by the stage in life cycle of head of household. The older the head of household, the more likely that he/she will send the son to school. For the daughters, there is no significant result of life cycle of head of household.

The head of household's education underlines the trans-generational links of schooling. Lack of education makes the individuals ignorant, unaware of advantages and future benefits of education, inability to avail economic opportunities, social status, unable to plan child's future and change the traditional pattern of life for new generation. Our objective to include the education of the head of household as explanatory variable is to see

[5] The parameter estimates of CAGE (child's age) for sons are 0.0897 and CAGESQ (child's age squared) is –0.0046. For the daughters the CAGE=0.0455 and CAGESQ=-0.0027

whether education affects the schooling decision of boys and girls in the same direction and magnitude. We have included two types of variables related to education of head of household, i.e. continuous variable (number of years of education) and binary variable (whether the head of household is literate or illiterate). Inclusion of both types of variables in the model has significant policy perspective. Generally to increase the school participation of children, adult literacy schemes are recommended. These programes are targeted to achieve some other outcomes like increase in the productivity of labor, slide down the fertility rate, create awareness about health and nutrition and specifically community participation, decision-making and democracy. To make an individual simply literate (at least five years of formal schooling) may be sufficient to obtain these objectives. In the gender aspect of child schooling, whether making the adults literate is sufficient or more than this minimum condition is required leads to include both types of variables in the model. If simply making the adults (head of household and parents) literate is sufficient to eliminate gender disparity in demand for schooling then policies should focus only on adult literacy programs, otherwise more years of education are required.

Whether more years of education affect the gender aspect of child schooling or not guides us to include the years of education as explanatory variable. It is found that education of the head of household[6] (as a continuous variable-number of years of education) enhances the prospects of the education of both sons and daughters (Lokshin et. al. 2000 for Kenya). It means there exists complementarities between the education of the head of household (as a continuous variable) and both sons' and daughters' schooling. The results further indicated an important notion that education of the head of household (as a continuous variable) favors daughters' schooling more than the sons. The literacy status of the head of household (as a binary variable-whether head of household is literate or illiterate) has also shown positive impact on both sons' and daughters' schooling. But sons from literate head of household are more likely to go to school as compared to daughters. It means simply making

[6] The explanatory variables like the education of head of household (HEDU), employment status of head of household (HEMP) and income level of head of household (HY) are likely to be endogenous and thus may result in biased estimation. We have applied the sensitivity test for the robustness of the results, i.e. by including and excluding the income of head of household (HY) the econometric estimates remained almost unchanged.

the adults literate (giving them only five years of education) is not sufficient to eliminate gender discrimination in child schooling. Only five years of education cannot change the attitude of head of household towards gender aspect. Similarly, the employment status and income level of the head of the household also affect both the sons' and daughters' schooling positively. The employment status of the head of household and his level of income supports the sons' schooling more than the daughters'. It may be concluded that enhancing adult literacy (only five years of education), employment and income may be three vital factors to be focused by policy intervention for enhancing child schooling, but not for elimination of gender discrimination in child schooling. The explanation is that sons are viewed as assets worthy of investment for higher returns in future as compared to the daughters who do not promise any long-term financial returns to the parents. However, wittingly or unwittingly daughters are viewed as a liability in economic terms due to high cost of marriage (Burki and Shahnaz 2003).

5.3 Parent Characteristics

Parental preferences are important in explaining gender differences in child schooling. Behrman (1988) argued that parents are generally averse to inequality among children. It is however, difficult to have a direct measure of parental preferences and thus most of the existing evidence in this respect is of indirect nature. For instance, Kingdon (2002) used a variable relating to parental opinion about gender inequality in education and finds that girls whose parents believe in gender equality attained significantly more education than other girls. Furthermore, parental preferences may not always converage, for example, mothers may have more empathy for daughters and fathers for sons. The sequential probit results of the present study show that parent education[7] (separately of fathers and mothers) have positive impact (as a continuous variable---number of years of education) on the sons' and daughters' schooling but the impact on sons' schooling is stronger than daughters'. The sons are 6.3 and 4.7 percent more likely to go to school by an incremental change in years of education of fathers and mothers respectively, but the

[7] We have included father's and mother's education, employment and income as explanatory variables by taking the sensitivity test (see footnote 6)

daughters are 2.7 and 3.6 percent more likely to go to school by the same kind of change for fathers and mothers. At this stage a question arises as to why does parents' education level (as well as head of household literacy status---head of household characteristics) favours sons' schooling? A possible explanation is that the returns from the education of sons are generally higher than that of daughters and parents, who care about the human capital of all children, direct human resources to the children with the highest marginal returns (Kingdon 1998; 2002 for India)[8]. Alternatively, it may be that the opportunity cost of schooling is higher for daughters than for sons as, for instance, household activities are normally performed by daughters. Finally it is general practice that in most families the sons bear the burden of their parents in their old age. This is the reason that both parents may prefer to ensure that their sons have higher human capital as compared to their daughters whose human capital returns may soon be shifted to another family after their marriage. What is interesting to note here is that in the case of sons, father's educational level has a higher effect on school attendance as compared to mother's educational level. On the other hand, mother's educational level has a larger effect on school attendance of daughters as compared to father's educational level. Thus the effect of parents' educational level on school attendance of children is stronger for a given sex than across sexes (Lillard and Willis 1994 for Malaysia; Kambhampathi and Pal 2001 for rural Bengal in India).

The parents' education as a binary variable, i.e. literacy status of the parents (whether parents-separately father and mother- are literate or illiterate) has shown positive impact on both sons' and daughters' school participation. The sons from literate fathers and mothers are 18 and 15 percent more likely to attend the school respectively. The daughters from literate fathers and mothers are 13 and 16 percent more likely to join school. It is obvious from the figures that literate parents are more particular about the education of children of their own sex. It suggests that within the household, father's literacy is advantageous to sons' schooling while mother's literacy may favour daughter's schooling. It is obvious that

[8] Duraisamy (2002) and Kingdon and Unni (2001) have found mixed evidence on returns to men and women's education. However, neither study could control for omitted family background bias, which substantially reduces women's returns but not men' (Kingdon 1998). Kingdon (1998) do not conform the worldwide pattern (see for instance Schultz 1993) for higher returns to women's education than mens'.

educated women have better ability to understand the ramifications of being educated. With the same bargaining power, there is a change in preference of literate women, who encourage school attendance of their female children (Jayachandran 2002 for India; Emerson and Portela 2001 for Brazil). The result matches with a number of studies (Thomas 1994 for child health), which show that there exists intra-household gender bias in the allocation of resources with the mother favouring daughters and the fathers favouring sons. In the policy context, female adult education may be devised to eliminate gender discrimination in child schooling.

The present study finds that employment status of father and mother has a positive impact on son's and daughter's schooling, i.e. sons and daughters, separately, from the employed parents (father and mother separately) are more likely to join school. The sons and daughters from employed father are 6.2 and 5.4 percent more likely to go to school. It means the father's employment supports son's schooling more than daughter's schooling. Similarly, the sons and daughters from employed mothers are 8.1 and 6.1 percent more likely to go to school separately. Again the son's schooling is supported more by mother's employment as compared to daughter's schooling. It is evident that impact of father's and mother's employment is stronger for sons as compared to daughters because of the future expectations attached with the sons.

The mother's employment impact on daughters' education is weaker as compared to sons' schooling. The daughters from employed mothers are 6.1 percent more likely to go to school while sons are 8.1 percent more likely to go to school. The possible explanation may be that, although the employment status of mothers positively affects the daughters' schooling, the impact is partially weakened by the fact that when mothers work outside the household, daughters (especially elder daughters) are often expected to stay at home to look after younger siblings and do household chores (Tiefanthaler 1997; Connelly 1996; Lokshin et. al. 2000).

5.4 Household Characteristics

The household characteristics are important to analyze the gender aspect of child schooling as well. The main household characteristics that affect the schooling decision of boys and girls are: the wealth accumulated by the household, poverty, caste status, urbanization, household size

(Jayachanran 2002) household composition, distance of household from school, electricity and water supply to the household, and presence of at least one individual to manage home-work etc. We have used some selected household characteristics like household capital resources, family size and locality of the household, etc. There may persist some complex inter-relation between household resource constraint and household preferences in intra-household allocation of resources. Quisumbing (1993) argued that families with different land constraints have significantly different pattern of schooling investments resulting in inequality among girls' education. We have found that ownership of assets by the household has a positive impact on the schooling of both sons and daughters. If the household owns assets, sons are 6.3 percent more likely to go to school while daughters are 19.6 percent more likely to go to school. The positive relationship of sons and daughters schooling with ownership of assets[9] by household is due to the economic status and capacity to bear the cost of education by the household. It is evident from the figures that daughters from households having assets are more likely to go to school as compared to sons. It means the households having assets are more inclined towards daughters' schooling. The possible explanation may be that households with assets are at liberty to involve their boys in household enterprises, so the daughters are more likely to go to school as compared to sons. Furthermore, in the socio-cultural context of Pakistan, specifically in rural areas, the parents with assets/wealth assume the education to be less-rewarding in financial term for their boys but they consider it more advantageous in financial terms to involve their boys in their own enterprises. Such type of households prefer to give better education to their daughters for marriage in good and educated families. They mostly involve maid servants to manage home work and spare daughters to devote time to education.

Becker and Lewis (1965) argued that investment in the quality of children increases at higher levels of household income. There is also some evidence that the gender gap closes at higher levels of income, especially if households' resources are constrained. On the other hand there is evidence from South Asia that poor parents discriminate less against their daughters. It negates the hypothesis that the resource constraints force poor parents to allocate their resources to the more valued sons. Krishnaji

[9] The assets included in the model are house, shop, agricultural/non-agricultural land, agricultural equipment like tractor, harvester, machinery, etc.

(1997) and Murthi et. al. (1995) using district-level data from India found that the rich discriminate more than the poor (Das Gupta et. al. 1997 for South Korea). We have found that, as the household income and household per capita income increase, the school participation of both sons' and daughters' increases. An increment of Rs.1000 in the household income enhances school participation of sons by 9.7 percent and of daughters, by 3.6 percent. Similarly, an increase of Rs.100 in the household per capita income increases the school participation of sons by 0.08 percent and of girls by 0.04 percent.

There are striking differences in the effects of household's poverty on school enrolment of sons and daughters. The household poverty[10] impacts the schooling of the sons and daughters negatively. The sons from poor households are 9 percent less likely to go to school and daughters from such households are 29.9 percent less likely to go to school. It means that the poverty status of the household brings negative effects on the girls' schooling more severely. When a household's income, or per capita household income decreases or the household falls into poverty, the daughter's schooling is more severely affected. That is, the economic constraints affect the sons and daughters differently in their schooling decisions. For families facing difficulties in survival, daughters' schooling may be considered much less critical. This is mostly true in Pakistani society, where girls' education does not prove beneficial to the poor parents due to their lack of earning while boys' education may guarantee economic relief for such families.

Conceptually the household size and household structure, i.e. combined family structure or nuclear family are important variables for school participation of children. Two alternative hypotheses are postulated about the impact of household size on child schooling. One is that a larger household means a lower probability to go to school for both sons and daughters or lower probability for one of them, usually for daughters (Emerson and Souza 2002b:14 for Brazil) due to household income dilution effect. The other is that larger households have more earning hands; therefore they are more likely to put their sons and daughters in school. We have included two types of explanatory variables in the model to analyze the impact of household size on sons' and daughters'

[10] We have included the household income (HHY) and household poverty (HPOVTY) as explanatory variables in the model after taking sensitivity test (see footnote 4).

schooling. They are (i) continuous variable, i.e. number of household members, and (ii) binary variable, i.e. whether the household is small (having maximum of 5 members) or large. The small family size is a proxy for nuclear family structure[11]. It is found that an incremental change in family size decreases the schooling probability for sons by 3.6 percent while for daughters by 9.9 percent. The impact is more severe for daughters than sons, that is, as the household size increases the possibility of daughters' dropping out of school also increases earlier than sons. It leads to the conclusion that income dilution effect and fertility effect are severe for girls' schooling. Similarly, if the family size is small/ nuclear, the daughters are 14 percent more likely to go to school, while the results are insignificant for sons.

The household composition can also render varying effects on household choice for school participation of boys and girls. Each household has different requirements for different members of the household for household chores. These household requirements are critical in determining whether the boy or the girl will attend school, alternatively who will perform the household chores. This may be explained in the case of Pakistan by bifurcation of household work into male and female, where men and boys work to earn wages generally whereas women and girls manage household work. We have found that the household composition exerts an impact on sons' and daughter's schooling. The magnitude of impact depends on the number of children in the household, their age composition and gender. The number of children (up to the age of 15 years) in the household has shown a negative effect on schooling of school-age children. The effect is stronger for daughters than sons. That is, the larger the number of children in the household, the more likely it is for daughters than sons not to go to school. Similarly, the presence of school-age children (5-15 years) in the household decreases the sons' and daughters' probability for schooling and the daughters are at greater disadvantage. It is likely to be explained by greater demand for daughters for custodial care of younger children. The presence of male school-age children in the household decreases the schooling of both sons and daughters, but the presence of female school-age children decreases the schooling of daughters only.

[11] Household size and family system are inter-related concepts. There are two types of household systems prevalent in Pakistan. One is joint family system and other is nuclear family system.

It is estimated that the presence of prime-age siblings (16 years or above) in the household has positive impact on the schooling probability of both sons' and daughters'. But it supports the sons' schooling more than daughters'. The presence of male prime-age siblings in the household increases the schooling probability for both sons and daughters. On the other hand, the presence of female prime age siblings increases the school participation of girls only.

Locality of the households also matters for sons' and daughters' schooling. We have estimated that from the urban households, both the sons and the daughters are more likely to go to school than from rural households. The sons from urban households are 8.6 percent more likely to go to school as compared to rural households. The daughters for urban households are 18 percent more likely to go to school than those from rural households. It shows that rural-urban disparity is higher for daughters' schooling. It explains the fact that urban areas have adequate schooling facilities unlike the rural areas. It seems that cultural and religious norms and general atmosphere shape the attitude of parents differently in urban and rural areas.

6. Conclusions and Policy Implications

The model and it estimations, we presented above allows to analysis of gender differences in demand for children's education. To test how differently various parameters affect the schooling of children of different gender, we estimated our model separately for sons and daughters. We have found that school participation of sons and daughters is varied, which is linked to a combination of economic, social and cultural factors that shape the attitude of households. Some fundamental causes of gender bias in child schooling are the low value attached to female education, restriction imposed on girl's movement after reaching the age of puberty, poverty, adult illiteracy and larger family size. It appears that socio-economic conditions and cultural norms shape the attitude of households differently, which is reflected in their attitude towards girls' education.

One of the reasons for this bias relates to the traditional expectations of families that sons will provide them economic support in their old age. The other seems to relate to conservative socio-cultural norms, under which

households favour restrictions on movement of girls to avoid some serious problems and thus have real reservations about female children traveling to attend school in the remote areas particularly when schools are not located in their own vicinity. It seems that awareness-raising strategies at the level of communities by local non-governmental organizations are likely to induce parents to increase female school participation as well as opening of girls schools in the localities of smaller population.

Our study also points out the need to consider the supply side of schooling facilities when investigating household's behavior towards their children's schooling. If certain facilities and institutions such as schools are not locally available and there are social taboos, transportation problems or other difficulties about girls' use of non-local educational facilities, household's behavior towards girls may be negatively biased not due to parental discrimination per se but rather due to these supply side conditions.

Our results have shown very significant gender bias regarding son's and daughter's schooling in Pakistan but explanations underlying this differential are not fully explored here. Gender differential could be due to son preference or due to return-oriented investment motive. The investment motive attributes to the children due to differentiated returns from sons and daughters. Differentiated returns may arise from dowry, different labour returns of male and females, or patrilocal family structure (Rose 2000). Foster and Rosenzweig (2000) have found that where there are economic returns to women's human capital, parents do invest in girl's education. Further evidence on return to men and women's education in Pakistani labor market would be useful in analyzing whether gender bias in children's education is attributable to gender differentials in the return to education.

As expected from prior research, our results also confirm that households with educated parents (especially mothers) are better placed to appreciate the need and benefits of educating their children, and hence are more likely to enroll their children in school irrespective of their gender. As a policy perspective the adult education, specifically of females, is imperative from the point of view of the literacy of the next generation.

The results of this study indicate that in addition to increasing the future productivity of children, provision of urban utilities, specifically education, would likely produce the effects of allowing girl siblings to enroll in school. Thus well-targeted rural programs may be seen as optimal economic investment that affects both the current and future welfare of households and children, specifically of girls.

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Appendix A

Table-1 Summary Statistics and Probit Estimation for Sons

Variable	Mean	Standard Deviation	Probability Derivative	Parameter Estimates	T-Statistics
Constant	-	-	-1.8696	-10.2374	(-3.0329)
		1. Child Characteristics			
BORD	2.08527	(1.0310)	-0.0016	0.9141	(-1.4671)*
CAGE	9.1938	(2.7812)	0.2409	1.3519	(4.03975)**
CAGESQ	92.2015	(52.4562)	-0.0121	-0.0846	(-4.6908)**
CEDU	3.4105	(2.5788)	0.2869	0.1569	(1.9046)**
		2. Head of Household Characteristics			
HGEN	0.9794	(0.0734)	-0.1537	-1.2095	(-2.4873)**
HAGE	41.4268	(6.8954)	0.0384	0.2102	(1.4677)*
HAGESQ	1784.58	(579.58)	-0.0003	-0.2138	(-1.3436)*
HEDU	7.9302	(6.1226)	0.1694	6.4070	(10.5253)*
HLIT	0.5675	(0.5914)	0.2486	1.5289	(1.3245)*
HEMP	0.9147	(0.2803)	0.1121	0.6139	(1.1083)
HY	6031.39	(7617.87)	0.0193	0.1746	(1.6640)**
		3. Parent Characteristics			
FAGE	42.2378	(7.6587)	0.0259	1.8176	(2.0861)**
FAGESQ	1891.92	(891.62)	-0.0343	-1.6443	(1.6471)*
FEDU	7.9147	(6.1416)	0.0737	1.0703	(1.5182)*
FLIT	0.6176	(0.5730)	0.1832	1.1283	(2.2465)**
FEMP	0.9147	(0.2803)	0.0627	0.1535	(2.3415)**
FY	5996.51	(7623.19)	-8.5949	-0.4705	(-0.1661)
MAGE	38.9172	(6.7401)	0.0652	1.3051	(1.5067)*
MAGESQ	1562.59	(526.49)	-0.1398	-1.1642	(-1.9537)**
MEDU	7.4573	(6.6930)	0.0477	0.1517	(1.9874)**
MLIT	0.4224	(0.6224)	0.1534	1.1147	(1.7628)*
MEMP	0.9023	(0.2557)	0.0815	0.4462	(1.9296)**
MY	2974.03	(3015.41)	0.0001	0.6371	(0.2846)

		4. Household Characteristics			
ASST	0.8759	(0.3309)	0.0631	0.3459	(1.6273)**
HHY	9877.63	(4361.67)	0.0971	1.4318	(2.7496)**
HHPCY	1720.62	(2088.29)	0.0008	0.4674	(1.8214)*
HPOVTY	0.4092	(0.5284)	-0.0916	-1.0628	(-1.7539)**
HHSIZ	6.4031	(1.7832)	-0.0362	-0.1986	(-1.8126)**
HHSSIZ	0.3720	(0.4852)	0.0405	0.2219	(0.4958)
NCHILD	3.4263	(1.3737)	-0.0552	-0.3021	(-1.6181)*
CHILD04	0.4418	(0.6835)	-0.0694	-0.3799	(-1.9733)**
BOY04	0.1924	(0.5409)	-0.1692	-0.3527	(-0.9765)
GIRL04	0.2143	(0.5457)	-0.1936	-0.8271	(-0.9254)
CHILD515	3.0000	(1.1792)	-0.0618	-0.5289	(-1.6339)**
BOY515	1.9379	(0.9333)	-0.0509	-0.2789	(-0.6592)
GIRL515	1.0620	(1.0133)	0.0097	0.0536	(0.1339)
CHILD16	0.9491	(0.8941)	0.1854	1.2568	(2.6391)**
BOY16	0.3023	(0.5810)	0.0487	0.2669	(1.9595)**
GIRL16	0.3255	(0.6016)	0.0627	0.2332	(0.9569)
LOC	0.7241	(0.6754)	0.0863	1.2564	(1.5342)*

Log of Likelihood Function -3274.4871
Number of Observation 6911
R-Squared 0.7553
Percent Correct Prediction 0.8296

** Indicates significant at 5 percent level and * indicates significant at 10 percent level.

Table-2 Summary Statistics and Probit Estimation for Daughters

Variables	Mean	Standard Deviation	Probability Derivative	Parameter Estimates	T-Statistics
Constant	-	-	-0.7515	-5.8396	(-1.4503)
		1. Child Characteristics			
BORD	2.4770	(1.3023)	0.0019	-0.1492	(1.1580)*
CAGE	8.9082	(2.5910)	0.1207	0.9383	(2.0494)**
CAGESQ	86.0091	(50.7757)	-0.0674	-0.8462	(-3.2719)**
CEDU	3.0412	(2.569)	0.0803	1.6243	(3.5587)**

2. Head of Household Characteristics					
HGEN	0.9808	(0.0957)	-0.1824	-0.5128	(-1.9735)**
HAGE	41.3669	(8.9749)	0.0066	0.7150	(0.5333)
HAGESQ	1791.03	(671.0702)	-0.0001	-0.1347	(-1.0749)
HEDU	8.6146	(6.2448)	0.1842	5.6279	(1.4683)*
HLIT	0.5293	(0.7382)	0.2175	1.2306	(1.2963)*
HEMP	0.9541	(0.2101)	0.0482	0.3746	(0.9878)
HY	7646.78	(11250.46)	0.0018	1.444	(1.2971)*
3. Parent Characteristics					
FAGE	42.2561	(8.3124)	0.0456	0.9747	(1.9743)**
FAGESQ	1869.63	(783.75)	-0.0237	-0.8409	(-1.0541)
FEDU	8.5963	(6.2688)	0.0274	5.4896	(1.4568)*
FLIT	0.6937	(0.6547)	0.1386	1.2147	(2.8739)**
FEMP	0.9541	(0.2101)	0.0543	0.5059	(1.9643)**
FY	7851.37	(11247.82)	0.0017	0.1385	(1.8491)**
MAGE	39.5672	(6.9616)	0.2385	1.4694	(1.0098)
MAGESQ	1597.39	(624.95)	-0.2156	-0.5136	(-0.9564)
MEDU	7.4954	(6.6647)	0.0696	0.6539	(1.5156)*
MLIT	0.5276	(0.7548)	0.1639	1.1213	(1.6286)*
MEMP	0.9449	(0.2291)	0.0610	0.4747	(1.5718)*
MY	3627.06	(5421.18)	-0.0004	-0.3686	(-0.9805)
4. Household Characteristics					
ASST	0.8715	(0.3361)	0.1961	1.5238	(3.3957)**
HHY	10684	(4872.87)	0.0362	1.3082	(1.4813)*
HHPCY	2114.61	(3601.27)	0.0004	0.3409	(1.2781)*
HPOVTY	0.3386	(0.4854)	-0.2995	-1.5942	(-2.4564)**
HHSIZ	6.8807	(1.7623)	-0.0995	-0.7734	(-1.3752)*
HHSSIZ	0.3119	(0.4654)	0.1407	1.0938	(1.1865)**
NCHILD	3.9541	(1.4362)	-0.0346	-0.2694	(-0.5737)
CHILD04	0.4311	(0.6578)	-0.0303	-0.2357	(-0.3551)
BOY04	0.2386	(0.5287)	-0.0648	-0.6721	(0.8743)
GIRL04	0.2343	(0.4765)	1.7675	1.2942	(0.0975)
CHILD515	3.5504	(3.5504)	-0.0954	-0.0764	(-1.9635)**
BOY515	1.5137	(1.1754)	-0.0283	-0.6455	(-2.0902)**
GIRL515	2.0367	(1.0357)	-0.0857	-0.6660	(-0.9109)
CHILD16	0.8654	(0.9876)	0.1765	1.4220	(1.9432)**

BOY16	0.3211	(0.6509)	0.0946	0.7355	(1.2643)**
GIRL16	0.3201	(0.6365)	0.0395	0.3072	(1.4888)*
LOC	0.7532	(0.6423)	0.1823	1.0234	(1.6295)*

Log of Likelihood Function -2242.48
Number of Observation 6655
R-Squared 0.6874
Percent Correct Prediction 0.9125

** Indicates significant at 5 percent level and * indicates significant at 10 percent level.

Economic Determinants of Foreign Direct Investment in Pakistan

Khair-uz-Zaman, Shumaila Hashim and Zahid Awan

Abstract: This paper estimates the economic determinants of Foreign Direct Investment in Pakistan by using time series data for the period 1970-71 to 2002-03. To check stationarity in the levels of data, we applied Augmented Dickey Fuller Test and then estimated data by using an Error Correction Model (ECM). Unit labor cost and inflation were statistically significant with negative and positive signs respectively. Both market size and trade balance were also found statistically significant with positive signs. Service sector was insignificant with positive sign. Thus these tests proved that all variables were significant except service sector.

1. Introduction

The growth of foreign direct investment (FDI) in recent decades has generated three main currents of thought which have attempted to explain this phenomenon. First the market imperfection hypothesis [(Kindleberger (1969), Hymer (1972), Horaguchi and Toyne (1990)], which postulates that FDI is the direct result of an imperfect global market environment. Second, the internationalisation theory [Rugman (1985,1986)] where FDI takes place because multinationals replace external markets with more efficient internal ones. Third, the eclectic approach to international production [Dunning (1986, 1988)] where FDI emerges because of ownership, internationalisation and location advantages. These theories are steps towards the development of a systematic framework for the emergence of FDI.

The growth of world FDI in recent years has been exceptional. The value of the world FDI inflows reached a record US$ 1.3 trillion in 2000 from just over US $ 200 billion in 1993. In 1980, the FDI stock represented the equivalent of only 5% of world GDP; this percentage has almost tripled to 14% by the end of 1990s (UNCTAD 2000).The changing perceptions and more attractive policies of the host developing nations have changed the destinations of FDI flows from industrially developed countries to high

growth developing countries. FDI stock held by developing countries has risen from $132.9 billion in 1980 to $1438.5 billion in 1990. Their share in world stock has reached to 30.1% in 1999 as against 26.2% in 1980. Since 1980, attracting FDI has been one of the most important policy goals of both developing and developed countries. To achieve this objective a number of countries have not only lifted restrictions on FDI, but also provided incentives to attract FDI. Previous researchers have studied the contribution of FDI to domestic productivity and there is general agreement about its positive impact FDI on economic development [Aitkin and Harrison (1999)]. Though some found negative results [Levine *et al* (2000)] but most empirical studies found a positive relationship between FDI, productivity and growth [Markusen and Venables (1999); Borensztein *et al* (1998); OECD (1998); Blomstrom *et al* (1994)].

Generally, the FDI brings the most needed capital, improved managerial skill, modern production and marketing techniques, global links, etc. Many factors affect FDI in Pakistan social, political and economic. It FDI is important from Pakistan's viewpoint to fill the resource gap. FDI in Pakistan remained volatile during the last fourteen years (1990-91 to 2003-04) ranging between US $ 246 million and US$ 1001.7 million. The bulk of FDI has come in oil and gas, transport and communication and other service sectors.

Pakistan's investment policy is recognized as one of the most favourable in the region. It has been characterized by steady moves towards liberalization, deregulation and privatisation. This policy has been consistent, market led and friendly, [Pakistan Economic Survey (2003-04)] The purpose of this paper is to study the impact of economic factors on FDI in Pakistan. Section II reviews the literature by including the theoretical and empirical findings from the past studies on FDI and its determinants. Section III describes research methodology and dependent and independent variables. Section IV explains the regression results. Finally, Section V summarizes the study's findings.

2. Literature Review

Here we outline the work of other researchers on various determinants of FDI, such as social and economic.

2.1 Social Factors

The social status of the host country has long been considered an important determinant of FDI [Root and Ahmad (1978, 1979); Agarwal (1980)].

Investment in human capital and the extent of urbanization have a positive effect on FDI as multinationals require adequate supply of skilled labour and benefit from the existing infrastructure in urban areas. [Dunning (1981), Schneider and Frey (1985), Root and Ahmad (1979), Nunnenkanp (1979); Boreisztein (1998); Nishat and Anjum (1998); Ghura and Goodwin (2000)].

Degree of human capital development is approximated by the host country literacy rate. The number of the cities in the host country, which exceed 500,000 inhabitants, measures the extent of urbanization. The quality of life [(Levis (1979)] and the adequacy of health care system [Petros (2000)] of the host country are also very important. The quality of life is approximated by the energy consumption per capita and health care system by population per physician. Both are expected to exert a direct impact on the flow of FDI into the host country.

2.2 Economic Factors

Economic factors that determine FDI can be viewed in many ways. One set of factors includes domestic market characteristics expressed by the market size and the direction of trade flow. A positive relationship has been seen between FDI and market size. [Scaperlanda and Maure; (1969); Rubio and Rivero (1994); Dunning (1973); Friedman (1992); Lucas (1993); Moor (1993); Goldberg (1972); Nishat and Anjum (1998); Cheng and Kwan (2000); Akhtar (2000); and Ghura and Goodwin (2000)]. The relationship between the direction of host country trade balance and FDI inflow appears to be complex [Yannopoulos (1990); Torrisi (1985)]. Trade surpluses are indicative of a strong economy and may encourage the inflow of FDI.

The various other economic factors like cost of capital, relative wage rate, transportation costs and fiscal incentives in the form of tax expenditure

provisions (tax concession) offered by the host country. Empirical studies have found negative relationship between FDI and cost of capital in both developed and developing countries [Root and Ahmad (1979); Khan (1997); Love and Hidalgo (2000); Auerabach (1990); Lucas (1993); Gallagher and Zarsky (2004); Rubio and Rivero (1994); Wang and Swain (1997); Lusting.(1998)]. Studies have found a direct relationship between FDI and fiscal incentives offered by the host countries [Nishat and Anjum (1998)]

Root and Ahmad (1978) have presented evidence that an effective service sector in terms of adequate infrastructure in the areas of banking, finance, insurance, telecommunication, transportation and distribution has a positive impact on the ability of the host country to attract FDI.

Inflation is also very important factor. Sayek and Selin (1999) studied the US investment in Canada, a low inflation country and in Turkey, a high inflation country. The results support the theoretical model, showing that a 3% increase in Canadian inflation reducing US FDI in Canada by 2% Similarly a 7% increase in Turkish inflation reduces US FDI in Turkey by 1.9%. Thus the indicates a negative relationship between the two variables. This negative relation was also observed by Elizabeth (2000) and Bashir (1991).

3. Research Methodology

Secondary data has been used for the entire research, taken from various issues of the Pakistan Economic Survey for the analysis of data we used the software Micro Fit version # 4.0 (Interactive Econometric Analysis).

Due to non-availability of data, only those variables are selected which can be quantified and are easily available from published sources. Details of independent variables are given in the following paragraph:

Two variables are domestic market characteristics expressed by the market size and the direction of trade flows. Market size is measured by the host country gross domestic product and emphasizes the importance of large market for efficient utilization of resources and exploitation of economies of scale. The host country trade balance is also an important

factor. Trade surpluses are indicative of a strong economy. Trade deficits, on the other hand, may stimulate inward FDI as a result of export diversification and important substitution policies.

Next come the host country cost considerations in terms of the unit cost of labour measured properly by hourly wages corrected by hourly productivity [Culem (1988)]. Due to data limitations, the latter is measured by value added per worker. Unit labour cost is an important factor that can affect the ability of the host country to attract FDI.

For measuring the overall financial performance of the host country, inflation rate. High inflation indicates inability of government to balance its budget, and the failure of the central bank to conduct appropriate monetary policy [Schneider and Frey (1985)]. Thus, it is expected that high inflation will inhibit inward FDI. The host country GDP deflator measures the inflation rate.

Effectiveness of service sector in terms of an adequate infrastructure in the areas of banking, finance, insurance, telecommunication and transportation, and has a positive impact on the ability of the host country to attract FDI. The effectiveness of the services sector is measured by the percentage of GDP generated in services.

The functional equation is based on theoretical formulation developed earlier in this section. The linear formulation of FDI is given as:

$FDI = \alpha + \beta_1 ULBC + \beta_2 INF + \beta_3 MS + \beta_4 SS + \beta_5 TB + Ut$

FDI= Foreign Direct Investment

α= Constant Term

ULBC= Unit Labour Cost

INF=Inflation Rate

MS=Market Size

SS=Service Sector

TB=Trade Balance

Ut = Error term capturing the left over effects. It is assumed as distributed independently and normally with zero (0) mean and constant variance.

4. Regression Results and Cointegration

This empirical investigation of the determinants of FDI in Pakistan uses the time series data for the period of 1970-71 to 2002-03. First to determine the order of the integration of the variable, we employ Augmented Dickey Fuller (ADF) test for unit roots to find out that the variables are concluded to be integrated of the same order. Time Series data has the property of non-stationarity in levels. First unit root tests are performed for the stationarity in the levels and in first/second difference of the variables.

4.1 Results of ADF Test

Table 1. Regression Results

Variable	Level / Difference	Without trend	With Trend	Conclusion
FDI	Level	0.21064	-1.6677	
	First Difference	-6.1542	-6.5680	1(1)
ULBC	Level	2.3634	-0.92737	
	First Difference	-2.9258	-3.4216	
	Second Difference	-8.0407	-7.9046	1(2)
INF	Level	1.3990	-1.2264	
	First Difference	-8.1897	-8.0439	1(1)
SS	Level	2.7564	-2.8834	
	First Difference	-6.4035	-6.2987	1(1)
MS	Level	2.5310	-0.67537	
	First Difference	-2.5936	-3.2273	
	Second Difference	-7.5925	-7.4586	1(2)
TB	Level	-1.9268	-3.8217	
	First Difference	-6.6246	-6.5089	1(1)

95% critical value for ADF Statistic for all variables: -2.9558(without trend) and - 3.5562 (with trend).

ADF Tests show that all variables have stationarity at the 95% level of critical values with and without trend. However four variables (FDI, INF, SS, TB) are in first difference and two variables (ULBC, MS) are in second difference are having stationarity at 95% level of critical value.

From the Unit Root Tests we conclude that all of the variables integrated of order 1(1) except ULBC and MS which are integrated of order 1(2).

4.2 Regression Results

The estimated regression results of the FDI model are shown in Table 2 below. The dependent variable is FDI. The time period of analysis is 1970-71 to 2002-03.

Table 2. Ordinary Least Squares Estimation

Dependent variable FDI
33 observations used for estimation from 1971 to 2003

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
Constant	-30368.0	5857.4	-5.1845[.000]
ULBC	-767.1174	131.1248	-6.8503[.000]
INF	799.2875	127.0337	6.2919[.000]
SS	-122.1741	119.0162	-1.0265[.313]
MS	.026257	.0034303	7.6544[.000]
TB	.082784	.038412	2.1552[.040]

R^2 .93735	R^2 .92616
S.E. of Regression 360.25	F-stat F(5,28) 83.7834[.000]
Mean of Dependent Variable 11289.5	S.D. of Dependent Variable 13257.6
Residual Sum of Squares 3.63E+08	Equation Log-like lihood-323.3826
Akaike Info. Criterion –329.3826-	Schwarz Bayesian Criterions 333.9617
DW- Statistic	

Ordinary Least Square (OLS) estimation shows that Unit Labor Cost (ULBC) is statistically significant, with the negative sign. This shows that when unit labor cost increases; foreign investors will feel discouraged because of increase in cost of production and vice versa.

Inflation (INF) is also found statistically significant, with positive sign. It means rising price levels attract the foreign investors to sell their products and services at higher prices than their original cost.

Market Size (MS) was found statistically significant, too with positive sign. Results show that increase in Market Size which is the representation of efficient and effective utilization of resources, always has a charm for FDI and vice versa.

Trade Balance, an important variable, is found to be significant as well, with a positive sign. As trade deficits are more frequent in Pakistan, than trade surpluses, positive sign here is showing increase in the negative. To correct deficit trade balance, the country requires FDI which in turn will increase our exports and improve the balance of payments position.

Service Sector is important variable. and studies show it has positive relation with FDI. Our finding is that it is insignificant, with negative sign. So from Pakistan's viewpoint lack of Service Sectors efficiency provides an opportunity to foreign investors to increase investment in these sectors. It means infrastructure provision has negative effects on inward FDI but according to our results this variable is insignificant i.e. can't affect FDI in an effective manner.

4.3 Estimation of an Error Correction Model (ECM)

An Error Correction Model (ECM) can be built to determine the short-run dynamics of the regression model. The following ECM is found to be the most appropriate and fits the data best.

$$\Lambda FDI = \alpha + \beta_1 \Lambda ULBC + \beta_2 \Lambda INF + \beta_3 \Lambda MS + \beta_4 \Lambda SS + \beta_5 \Lambda TB + \beta_6 \Delta SF(-1)$$

Where SF (-1) is an error correcting term.

We have applied the Error Correction Model (ECM), and present the results in the table 3. Results show that ULBC, INF and MS have the same level of significance and the same signs as obtained previously.

The level of significance declined in case of SS, with the same sign as obtained previously.

In case of TB, although level of significance has declined but still it is significant and with the same sign as obtained previously.
SF (Residual) also found significant, with positive sign.
Table 3. Ordinary Least Squares Estimation

Dependent variable is FDI
33 observations used for estimation from 1971to 2003

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
Constant	-31634.5	5777.4	-5.4756[.000]
ULBC	-779.8906	124.9446	-6.2419[.000]
INF	803.2549	121.2564	6.6244[.000]
SS	-60.2213	117.3278	-.51327[.612]
MS	.026560	.0032862	8.0823[.000]
TB	.067103	.037181	1.8048[0.83]
SF(-1)	.43506	.19540	2.2265[.035]

R^2	.9673	R^2	.93444
S.E. of regression	3422.2	F-stat F (6,26) 77.0119 [.000]	
Mean of Dependent Variable	11563.5	S.D. of Dependent Variable	13365.0
Residual Sum of Squares	3.04E+08	Equation Log- likelihood	-311.4464
Akaike Info. Criterion	–318.4464	DW- statistic	1.8606

5. Conclusion

The major focus of this paper was to investigate the economic determinants of FDI in Pakistan. Out of a long list of variables affecting FDI in Pakistan we selected five: unit labor cost, inflation, market size trade balance and service sector. Secondary data, Time Series (1970-71-2002-03), was used and manipulated to derive cogent conclusions.

In some aspects our findings are different from the work of other researchers as we found that increase in inflation leads to rise in FDI, when assuming that rising inflation rate has least effect on cost of production. Our study also reveals that improvement in service sector does not contribute to FDI. This factor is not important from foreign

investor's point of view. The above results can be of great interest to the FDI theorists and can open new ways for further research.

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Book Review

Behind the Scenes at the WTO: The Real World of International Trade Negotiations

by Fatoumata Jawara & Aileen KWA.

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this book represents a valuable contribution to the study of WTO negotiations and understanding of current multilateral policies and North-South relations, as played out in the WTO. The book depicts the lopsided playing fields on to which the developing countries were thrust by the North after the establishment of WTO.

The book starts with the sentence, 'Until 1999, relatively few people outside the ranks of economists, diplomats and political analysts and commentators had heard of the WTO, or even knew that the initials stood for the World Trade Organization. That changed dramatically in November 1999, with the Third Ministerial Conference in Seattle – not because of the conference itself, but because of what went on outside it'.

The WTO, based in Geneva, is made up of 146 member countries. The WTO establishes the rules governing the international trading system, which have a major impact on people's livelihoods. According to the authors, these rules often require that member countries change their intellectual property legislations, industrial and agricultural policies, basic service provisions and sometimes even their constitutions. These rules of WTO affect unemployment, incomes and prices for imports and locally produced goods that compete with imports. These rules extend into a number of areas that had been outside the GATT system – notably agriculture, textiles, trade in services and intellectual property rights like patents and copyrights. The authors write, that this greatly increases the potential effect of WTO decisions on people's everyday lives, particularly in developing countries, not only by extending the scope of the effects on employment, incomes and prices, but also by introducing measures affecting trade in services that affect the provisions and regulation of public services such as health, education, water and sanitation etc. In

short, the WTO is a key part of the globalization process, which affects everyone's life.

The WTO is unique among international bodies in including mechanisms to enforce its agreements with sanctions – although in practice these sanctions are largely ineffective in the hands of most developing countries. On the question of Trade Liberalization, the authors write that WTO is being interpreted as being the progressive liberalization of international trade among its members. Many developing nations have lowered their trade barriers further than required by WTO, under the structural adjustment programmes supported by IMF and The World Bank.

On the question of accession, the authors write that accession process which member countries have to go through in order to join WTO is vigorous and time consuming – it took China no less than 15 years to accede, from its application to join GATT in 1986. No least developing country has acceded since the inception of the WTO. Moreover, any existing member has the right to veto accession by any new member – Iran's request for accession has been vetoed by the USA since 1996. Developed countries like USA also make demand on newer members (Iran) that go beyond the commitment required of the existing members or scope of existing WTO agreements on the routine trade and economic requirements for accession.

On the question of Dispute Settlement Mechanism, the authors write that a major problem of the dispute settlement mechanism is that the enforcement of its decisions is through the sanctioning of retaliatory trade restrictions. Trade sanctions by USA or EC against any other country would have a real impact on its economy, but the effect of trade restrictions by small nations on these economic giants would have no effect at all. In addition, there are serious obstacles to developing countries using the mechanism effectively. The South Centre in 1999 highlighted three key areas in which such obstacles arise:

On the question of Democracy in the WTO, the authors write that Ian Wilkinson of the EC asked whether the institution was democratic, and went on to say, "It is not democratic in the sense that people can just come in and say what they think... The Organization itself has no policy or

mind of its own". The Malaysian ambassador to the WTO, M. Suppermaniam says, "well, the WTO is supposed to be democratic... In practice, there have been complaints that the agenda is dictated by very few powerful countries". The major obstacle faced by developing countries in the WTO is the discrepancies between human resources available to them and those available to the developed countries. The US mission in Geneva has fourteen professional staff devoted exclusively to the WTO. The EC – eighteen in addition to the staff in the missions of its fifteen member countries. Japan – twenty-three and Canada – Twelve. While a handful of developing countries have between eight and thirteen professional staff, most have between two and five. Pakistan has five professional staff in its Geneva mission in 2001. Countries like Burkina Faso, Guyana, Malawi, Mali and Mozambique have zero.

The book points out that the major issues at the Doha Ministerial Conference were

- Industrial tariffs and market access for non-agricultural goods;
- Agriculture
- Trade in services
- Trade-Related aspects of Intellectual Property rights (TRIPs)
- The New Issues (competition, investment, transparency in government procurement and trade facilitation)
- Implementation Issues, and
- Special and Differential treatment

Some 3,800 delegates from 142 countries spent a week in Doha. In the end, despite the principle of consensus, and the reservations of many developing countries, the text was published. Doha offered minimal concessions to the developing countries while the Quad prevailed and got what they wanted – a new round, including a major advantage in the decision to be taken on 'new issues'. For the Northern delegates, Doha represents a bit of a gain and a bit of a loss for everybody, allowing all governments to claim some degree of victory. For the Southern delegates, Doha work programme has enhanced the imbalance in the WTO system significantly, because it was not the result of any serious negotiations among members of WTO, because the agenda of the Doha Work

programme had been totally set out by the major developed countries guided by their own economic interests.

What happened to the Old Issues at Doha, was the key question put forward by the authors in their book. According to them, much of the discussion was on the 'new issues', but apart from that one of the most important issues was that of the TRIPs and Public Health issue and this was a small success for the developing countries. The developing countries also did extract considerable concessions in terms of other issues.

As far as the Like Minded Group proposals at WTO meetings were concerned, the book points out that the more formal reaction to Doha process came from Like Minded Group and in January 2002 they (LMG) circulated a draft proposal, focusing on how the process leading up to and at ministerial meeting could be improved, through the introduction of checks and balances. Several developed and richer developing countries opposed the LMG proposal and Chile, Costa Rica and Singapore rejected the proposal.

At another place the authors write that, after Doha, it became clear to most developing countries that a basic set of rules and procedures was necessary to give effect to transparency, inclusiveness and the effective participation of all member states in negotiations. The process leading to Cancun in September 2003 and after resembled the process leading to Doha. The major powers clearly continue to control the process, hoping to repeat the successes. They carry on loading the agendas relentlessly with their own issues, and use their political muscle to secure the negotiation framework and the committee chairs that they want, irrespective of the WTO rules and in the face of stiff and now more unified resistance from the LMG countries, most other opposition and criticism from developing nations is put down.

The authors conclude that the WTO dispute settlement system is supposed to protect the weak. In reality, the high resource and monetary cost of litigation only let the developed nations to use the system. The veto on the accession process allows the developed countries to put inverse

pressure on developing countries wishing to join WTO. The TRIPs agreement has provided the basis to force many developing countries into adopting patents and copyright legislation in the interest of major developed nations and their MNC's. GAT in services offers means to make liberalization in service sector almost irreversible, giving developed countries a new tool in taking over the services market of the less developed nations. Agreement on Agriculture (AoA) ties the hands of developing countries to protect themselves against dumping by OECD countries.

The authors sum up their book with the words, "In short, instead of protecting the weak WTO, currently as it operates, does help the richer and more powerful countries to take over the markets of the less developed nations. Instead of increasing employment and income opportunities for the poor in the developing countries it is helping drive out of businesses and employment the very people that it is said to protect and help secure a better lifestyle". They go on to state that, failure to stop the new round, for example by blocking negotiations on the 'new issues', in Cancun and beyond, will lead only to the creation of more highly inequitable trade rules, which will be hatched behind closed doors and only among a small minority, and the majority will be 'persuaded' (in a variety of ways) to accept. The results of these anti-democratic processes will be a wider repertoire of devices used to subordinate developing countries' economies. When implemented, this will increase the contradictions within the WTO, as well as erode – quite possibly beyond repair – its legitimacy.

The authors have with this study revealed the inner contradictions and workings of the WTO rounds and negotiations, at least those that are in the North-South context and have quite successfully put forward the issues which might make or break the WTO as a credible pro-developing countries organization. The book should be an interesting reading for a wider public, especially students and researchers interested with WTO and developing economy's issues.

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