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The PAKISTAN DEVELOPMENT REVIEW

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Market Diversification and Firms' Characteristics of Export-Oriented Manufacturers in Pakistan

EJAZ GHANI, TARIQ MAHMOOD, and MUSLEH UD DIN

This paper explores the determinants of market diversification by export-oriented manufacturing firms using the logistic regression framework. The results show that firm level characteristics including age of the enterprise, managerial expertise, type of ownership, and size of the enterprise play a key role in determining the probability of market diversification by firms. These findings highlight the salience of firm level capacities in achieving export diversification in Pakistan.

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Keywords: Exports, Firms, Market Diversification, Manufacturing

1. INTRODUCTION

It is generally recognised that export market diversification is essential for a viable export-led growth strategy. It allows countries to reduce their vulnerability to fluctuations in export markets, helps businesses establish linkages with a diverse set of buyers enabling them to widen their product profiles in line with the varying demand patterns. Export market diversification is an important issue at both macro and micro levels. At the macro level, a diversified export market structure can make a country's exports less sensitive to market fluctuations in specific markets. It must, however, be pointed out that export market diversification at the macro level does not imply that individual firms can also do that. As a matter of fact, diversification at the macro level is perfectly compatible with export market concentration at the firm level. Research has generally focused on this issue from the macro perspective but little is understood in terms of diversification at the firm level. This paper is an attempt to explore the determinants of export market diversification at the firm level focusing on the firms' characteristics that can potentially influence their ability to diversify their trading relations in international markets.

As pointed out by Burki, *et al.* (2010), Pakistan's performance in market diversification is fairly good at the macro level: for the year 2008, the Hirschman concentration index for Pakistan is estimated at 0.2511.[1] However, the decision to diversify has to be made by individual firms and in this sense it is important to

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[1]"The Hirschman index measures the geographical concentration of exports i.e. it shows the degree to which a country's exports are dispersed across different destinations. The Index can take a value between 0 and 1; higher values indicate that exports are concentrated in fewer markets. A value of 1 indicates that all exports go to a single destination. Hence high concentration levels can be interpreted as an indication of vulnerability to economic changes in a small number of export markets." Burki, *et al.* 2010.

empirically examine how different firm-level characteristics affect the pattern of market diversification.[2] The issue of export market diversification at the firm level is important for at least two other reasons. First, achieving export market diversification has been an important goal of export promotion policies in Pakistan. However such policies have not been the result of rigorous research on the determinants of export market diversification at the firm level. Therefore these policies have been ad hoc in nature without a clear understanding of the dynamics of the firms for export market diversification. Second, outsourcing and multinational production have considerably changed the dynamics of production processes. Rapid advances in the means of communication have enabled even relatively smaller firms to target niche markets for higher profits. These circumstances have produced enormous opportunities for competitive firms to earn high profits through market diversification. Against this backdrop, it is important to develop an understanding of what determines the ability of the firms to diversify in international markets.

Firms diversify to maximise their profits. However, market diversification almost always involves many types of extra costs and requires extra skills. First of all there are production costs involved which a firm must incur to modify its product in accordance with the demand of the new markets. This might involve investment in new technologies and human skills. Secondly, market diversification requires managerial and marketing skills, and knowledge about potential markets. On the other hand, besides creating new opportunities of high profits, market diversification makes firms less vulnerable to market-specific demand fluctuations. At the macro-level it induces spill-over effects in the form of new complementarities and growth in related industries through forward- and backward- linkages.

The rest of the paper is organised as follows: Section 2 provides a brief review of empirical literature on the subject whereas data and the econometric model are discussed in Section 3. Section 4 discusses the empirical findings while Section 5 contains the summary and conclusions.

2. REVIEW OF LITERATURE

Trade diversification is quite a well researched area in empirical literature. During 1950s writers like Presbish (1950), and Singer (1950) theoretically built development models which implied correlation between export diversification and growth. Later some empirical studies tried to establish a link between diversification and growth of per capita income, see for example, Al-Marhubi (2000); de Ferranti, *et al.* (2002); Hesse (2006); Lederman and Maloney (2007).

Export diversification has many dimensions and levels of analysis; for instance, there can be diversification in products as well as in markets. In the former it can take both horizontal or vertical forms. Horizontal diversification takes place within the same sector by adding new products. On the other hand vertical diversification implies technological improvement in exports from primary to secondary or tertiary sector. Market diversification means a variety of export destinations, region as well as country-wise. Thus the levels of analysis for export diversification can be both at macro or micro level.

[2]In a preliminary study [PIDE (2007)], export market diversification is correlated with firm size where larger firms are more diversified reflecting gains from economies of scope and exporting experience.

Review of Some Empirical Studies

At the micro level, empirical analysis of *product diversification* is at least three decades old [see, for example, Caves, *et al.* (1980); Goto (1981) and Goudie and Meeks (1982)]. At the micro level, empirical analysis of *market diversification* is a relatively new area of research. Earlier works on market diversification at firm level include Aw and Batra (1998) and Qian and Li (1998). These works, and the more recent studies are briefly reviewed below.

Aw and Batra (1998) analyse the relationship between various forms of diversification and firm size in Taiwan's manufacturing industries. The study covers five manufacturing industries viz., Textiles, Clothing, Plastics, Fabricated metals, and Electric/Electronics. The study uses data taken from Taiwanese Census of Manufactures 1986. Firm-level indices of diversification are developed which include product and geographical diversification. Further, semi-parametric regression techniques are used to analyse the relationship between various forms of diversification and firm size. The technique allows controlling for firm specific characteristics like age, technology investments, foreign ownership and market structure. Separate equations are used to analyse the effect of independent variables on product and market diversification. The results indicate positive relation between firm size and product diversification. However, geographical market diversification is relatively more common among small and medium firms. It is also found that older and more established firms diversify more. The sign of technology variable is found to be positive with respect to product diversification in all five industries implying a close link between innovative capability and product diversification. Foreign ownership is not found to be statistically significant in any industry. The authors attribute this to the small percentage of firms that have any foreign capital in Taiwanese manufacturing.

Qian and Li (1998) analyse two dimensions in which a firm's foreign operations can be defined viz. geographic scale and scope. Geographic scale refers to foreign involvement, whereas geographic scope indicates a firm's expansion into different world regions or markets. The paper especially focuses on US firms' strategic combinations by relating to the risk of profits. Entropy has been used to compose the index for global market diversification which is based on the ratio of a firm's holdings in a region to its global holdings. The data consist of a sample of 125 largest U.S. firms on the *Fortune* 500, covering the period 1983 to1992. The results indicate that the combination of high geographic scale and medium geographic scope of foreign operations outperformed other strategic combinations.

Ang (2007) analyses the effect of diversification on the performance of 152 companies listed in New Zealand and Australia. The study uses cross section data for the year 2004, and only companies registered since 2001 are subjected to analysis.

The data are collected from the Datex Company Information database, and the Aspect Equity Review database for New Zealand and Australia respectively. The Datex Company Annual Report database and the Australian Stock Exchange website are also used to supplement these data sources. The selected variables include, company profitability, sales, composition of sales by countries/regions, total liabilities, shareholder

equity, the year of incorporation, market performance, and industry of participation. The level of market diversification is measured by the proportion of sales carried out beyond the domestic market. Regional as well as non-regional market diversification is included in the analysis. Linear Regression analysis is conducted to test the effect of the company's prior performance on international diversification. The results indicate that in the case of non-regional diversification, the performance has a non-linear effect on market diversification. This indicates a threshold level beyond which the positive effect tapers off. However, in the case of regional market diversification, performance shows a negative effect. The author attributes this to limited economies of scale and scope in the regional market.

Yoshino (2008) analyses export intensity and market diversification of manufacturing sectors of seven Sub-Saharan African countries viz., Benin, Ethiopia, Kenya, Madagascar, Senegal, Tanzania, and Uganda. The study uses the firm-level World Bank Investment Climate Survey (ICS) data to explain how domestic supply constraints and other firm characteristics explain export intensity and market diversification. Exports are analysed at the regional and global levels. The study uses Tobit model for export intensity and a multinomial Probit model for market diversification. Explanatory variables include the firms' age, size, ownership, capital intensity, labour and managerial skills and infrastructural variables, such as custom delays and power outages. The results show that size, foreign ownership, and the technology are important factors in explaining firm-level export performance in terms of intensity and market diversification. Domestic constraints, like inefficiency in customs and inferior quality of infrastructure, have a negative effect.

Gourlay and Seaton (2010) analyse the firms' market diversification by using a bivariate Probit model to examine the market diversification decisions for a panel of U.K. firms. The study uses data for 2307 U.K. publicly quoted firms for the period 1988 to 2001. The Data Stream International is used as the data source. Firm size, wages, R&D, directors' remuneration and the level and variability of exchange rates are used as the explanatory variables to determine the probability of a firm diversifying into foreign markets. All these variables are found to have a significant effect on the probability of the firms' market diversification.

Eaton, Kortum, and Kramarz (2004) analyse the entry behaviour of producers in different industries, and in different export markets. The study uses firm-level data from 16 manufacturing industries in France for 1986. A regression model is used with a number of French exporters in a specific market and for a specific industry as the dependent variable. The independent variables are (i) France's market share (ii) number of French firms in that market, and (iii) industry bias of French exporters in a specific market (defined as the ratio of the number of French exporters of a specific industry in the market and the number of French exporters of all industries in that market). The results indicate high level of heterogeneity across firms in the extent of their export participation, whereas most of the selling is noted to be taking place in the domestic markets. Moreover, an inverse relation is found to exist between firms selling in multiple markets, and the number of export destinations. About 60 percent of variation in market size is explained by firm entry.

3. DATA AND METHODOLOGY

The analysis of this paper is based upon a survey conducted by the Pakistan Institute of Development Economics (PIDE) in collaboration with the United Nations Industrial Development Organisation (UNIDO) for the study titled "Trade Related Challenges Facing Exporters in Pakistan". The survey covers 157 enterprises in the provinces of Sindh and Punjab engaged in manufacturing of exportable goods. This dataset provides information on a variety of aspects of export-oriented enterprises including, for example, export markets, ownership structure, size of business and location.

Before going into the methodology of the analysis, a brief description of the surveyed firms seems appropriate.

As Table 1 shows, the surveyed firms come from four main sectors, namely, textile/apparels, leather, agro-food processing, and fisheries. The textile/apparel sector contains about 50 percent of the surveyed firms, and is subdivided into bed-sheets and towels, garments, knitwear, yarn, textile integrated and fabrics. The leather sector contains about 22 percent of the sample, and consists of leather products/garments, tanning, footwear, and leather integrated. The agro-food processing sector covers about 17 percent of the sample, and has three sub-sectors, viz., Rice (grading and polishing), Horticulture products (fruits and vegetables), and Meat. The fisheries sector covers the remaining 12 percent of the firms, and has no further sub-sectoral division.

Table 1

Distribution of Sub-Sectors in the Sample

Sectors	Number of Reporting Firms	Percentage of Reporting Firms
Textile/Apparel	**77**	**49.04**
Bed Sheets and Towels	16	10.19
Garments	14	8.92
Knit Wear	14	8.92
Yarn	12	7.64
Textile Integrated	11	7.01
Fabric	10	6.37
Leather	**35**	**22.29**
Leather Products/Garments	19	12.10
Tanning	8	5.10
Footwear	4	2.55
Leather Integrated	4	2.55
Agro-food Processing	**26**	**16.56**
Rice (Grading and Polishing)	17	10.83
Horticulture Products (Fruits and Vegetables)	5	3.18
Meat	4	2.55
Fisheries	**19**	**12.10**
Fish Processing and Exporting	19	12.10

Table 2 gives the size and distribution of firms with respect to number of employed labour. A relatively small percentage (about 30 percent) of firms lie in the categories of less than or equal to 49 or greater than or equal to 1000 labourers.

Table 2

Percentage Distribution of Firms w.r.t. Number of Labourers

	Textiles	Leather	Agro-food	Fishery	Total
Less than or Equal to 49	3.28	4.1	5.74	1.64	14.75
From 50 to 99	3.28	9.84	5.74	4.1	22.95
From 100 to 249	9.84	4.92	4.1	4.92	23.77
From 250 to 999	16.39	3.28	2.46	0.82	22.95
Greater than or Equal to 1000	13.93	1.64	0	0	15.57

To analyse the question of market diversification by exporting firms, we assume that the firms' capacity to diversify in international markets depends on firm characteristics including experience of the enterprise, ownership structure, size of its operations, and location. All of these factors combine to determine the ability of the firms to diversify in international markets. Market diversification is treated as a binary variable; a firm either diversifies or it does not. Due to the assumed binary nature of the dependent variable a Logit model is used.

Let P_i be the probability that market diversification by the firm i takes place. Assuming that P_i follows a logistic distribution,

$$P_i = e^z / (1 + e^z)$$

The odds ratio is given by

$$P_i/(1-P_i)$$

Where $1-P_i$ is the probability that market diversification by the firm i does not take place.

The natural log of this odds ratio gives the following Logit Model:

$$Z_i = ln[P_i / (1- P_i)]$$
$$= \beta X$$

Where vector X represents the firms' characteristics and β is a vector of coefficients. Since the probabilities of this Logit Model are not directly observable, we proxy these by a binary variable y_i which takes a value of 1 if the ith firm is diversifying its exports, and 0 otherwise. The unknown parameters can be estimated by the Maximum Likelihood Method. Using y_i as a dependent variable we estimate the following equation:

$$y_i = \beta_0 + \beta_1 Age_i + \beta_2 Ownership_i + \beta_3 Size + \beta_4 SPL + \beta_5 Dtext_i + \beta_6 Dagro_i + \beta_7 Dleather_i + \beta_8 Kar_i + \beta_9 Lhr + \beta_{10} Skt + \beta_{11} DManage_i + u_i$$

Where

Age: Age of firm in years.

Ownership: Dummy variable taking a value of 1 if the firm is domestically-owned and 0 otherwise.

Size:	Size of firm measured by number of labour employed.
SPL:	Sales per labour
Dtext, Dagro, Dleather:	Dummy variables to capture the sectoral effects of Textile, Agriculture, and Leather respectively
Kar, Lhr, Skt:	Dummy variables to capture the location effects of Karachi, Lahore, and Sialkot respectively
DManage:	Dummy variable to assess the managerial capabilities of the firm

These variables are briefly explained below:

The binary variable $y_{i,}$ is used to represent market diversification. If a firm is selling in only one market[3] a value of zero is assigned to y_i, otherwise y_i takes a value of one. The variable 'Age' represents the number of years the firm has been in business. Older firms may have positive impact on market diversification due to their experience and being in a better position to take advantage of opportunities in diverse markets. It is also possible though that newer firms having a modern outlook employing better management, production and marketing techniques may similarly exploit export market opportunities. The evidence in the empirical literature is mixed. In fact the age to diversification relationship can only be determined empirically.

The structure of ownership of the exporting firms is also believed to be a factor in market diversification. For instance, a foreign-owned firm may be in a much better position to diversify in international markets because of its international networking and integration in international supply chains, better product and process technology, and better understanding of global demand patterns. Yet that does not bar domestically owned enterprises from acquiring better management and technology to compete effectively with their foreign-owned counterparts in international markets. Only empirical results can tell whether foreign firms have any advantage in market diversification or not.

Firm size is measured by the number of employees. This is in line with traditional measures of firm size [see, for example, Yoshino (2008)]. Firm size is expected to positively influence the probability of diversification in that larger firms may be better able to cater to different markets in terms of their production capacity and achieving scale economies in the process.

The variable SPL measures sales per labour. Since we do not have direct data on output or value of production, and all firms in the sample are exporting firms, SPL can also be a good proxy for labour productivity. Firms with more productive labour, due to better technology or human skills, are expected to be more competitive in diverse markets. So, this variable is expected to have a positive coefficient.

In addition to the above variables, we use dummy variables for export sectors as well as location: Dtext, Dagro, and Dleather are sectoral dummies representing Textile, Agro-processing industries and Leather respectively. Similarly Kar, Lhr and Skt are dummy variables representing Karachi, Lahore, and Sialkot respectively to capture location specific effects. These three cities represent major industrial hubs having some location specific advantages. For example, Karachi is a major industrial centre with ports,

[3]Seven markets are taken into consideration viz., North Africa and Middle East, Sub-Saharan Africa, European Union, Europe other than Non-European Union, North America, and Latin America. Markets not falling in any of these categories are labeled as "Others".

industrial zones, availability of skilled labour force, and industrial amenities. Similarly, Lahore is a major industrial and commercial centre having a central location and large presence of diverse industrial enterprises. The city of Sialkot is also a cluster of export-oriented industries including sports goods, surgical instruments, leather and related products. The location dummies for these cities would help identify whether the firms are able to take advantage of their location in terms of cluster effects, agglomeration economies and networking and learning among enterprises to leverage their market diversification strategies.

The firms with better managerial expertise are expected to have better marketing plans to sell in different markets. A competent and experienced management, being forward-looking, is well aware of new markets and is better able to develop products in line with market trends. Unfortunately, data on managerial competence are not available. We have thus tried to proxy this variable by a binary variable that captures the firms' responses about their future investment plans. A competent management is more likely to be aware of the available investment opportunities and will have prepared future investment plans in line with their market diversification strategies. We use a dummy variable DManage which assumes a value of one if a firm has prepared such a plan, and zero otherwise. This variable is expected to have a positive coefficient.

4. ESTIMATION RESULTS

The results of Logit regression are reported in Table 3 below. The likelihood ratio test is used to test the null hypothesis that all the slope coefficients are simultaneously equal to zero. The results indicate that the null hypothesis is rejected. The McFadden R-squared figure turns out to be about 0.3; however, it is generally accepted that in binary regression models goodness of fit matters less than the expected signs and significance of the regression coefficients.

Table 3

Results of Logit Regression Equation

LR chi^2_{11} =40.03
Prob > chi^2 =0.0000
Log likelihood = –47.681489
Pseudo R^2=0.2957

y_i	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
cons	–2.8350	1.5204	–1.86	0.062	–5.8151	0.1450
Age	0.0741	0.0263	2.81	0.005	0.0225	0.1257
Ownership	0.8194	0.8235	1	0.32	–0.7946	2.4334
Size	0.0022	0.0012	1.74	0.082	–0.0003	0.0046
SPL	0.0207	0.0088	2.35	0.019	0.0034	0.0379
Dtext	–0.7883	0.9421	–0.84	0.403	–2.6349	1.0583
Dagro	–0.9662	0.9674	–1	0.318	–2.8622	0.9298
Dleather	–1.4352	1.1661	–1.23	0.218	–3.7206	0.8503
Kar	–0.3326	0.9511	–0.35	0.727	–2.1967	1.5315
Lhr	–1.4034	0.9685	–1.45	0.147	–3.3016	0.4948
Skt	1.147481	1.0002	1.15	0.251	–0.8129	3.1079
DManage	1.444089	0.7698	1.88	0.061	–0.0648	2.9530

The variables "Age" and "Size" are significant with positive signs implying that older, more experienced and bigger firms are more likely to diversify in foreign markets. It is to be expected that more experienced enterprises would better be able to profit from diverse market opportunities while larger firms having the advantage of size are able to capture market share in different export markets. The statistical insignificance of "Ownership" is, however, surprising. It appears that firms under foreign ownership are concentrating on single markets for their exports. This might be due to their commitments with the importers of their country of origin. Another possibility could be that foreign firms may be part of a vertically integrated production structure exporting to the market where their production facilities might be located.

Labour productivity proxied by sales per labour comes out to be an important driver of market diversification. Firms in which labour is more productive due to better human skills, and better production technology and organisational strength are more likely to be competitive in international markets helping them to achieve greater market diversification.

The sectoral dummies are found to be insignificant, which means that firms in a particular sector, say textiles, are in no better position to diversify in international markets than firms in another sector, indicating absence of any inherent advantage relating to market diversification in a particular sector. The location dummies also turn out to be insignificant showing that firms located in a specific place have no better prospects of achieving market diversification than firms in another location. Big industrial cities are usually expected to have business association and organisations that help firms to acquire new skills, design new products, explore new markets, and suggest ways to develop an efficient supply chain. It appears that our big cities have not yet fully developed such institutions, and this institutional gap makes firms located at a specific location not better than those located elsewhere. In fact negative sign might be an indication that negative externalities (e.g. congestion, input constraints) are dominating the potential positive externalities. This also holds for sectoral dummies which indicate possible sector-specific institutional gaps.

The robustness of significant variables, viz., "Age", "Size", and "SPL" (Sales per labour) has been checked by running additional regressions. Results (Appendix) show that these variables remain statistically significant without location dummies and/or sectoral dummies. However, the size of the Pseudo R^2 is reduced in these alternative specifications.

Table 4 reports the marginal effects derived from the Logit regression. The predicted value of dependent variable *y* is reported at the top of the table. This value is estimated at given values of independent variables *X*, which are displayed in the last column of the table. The marginal effects measure the magnitude of change in the dependent variable as a result of a change in the explanatory variables. For example, an addition of one year in the age of the enterprise increased the probability of market diversification by one percent holding other variables constant at their mean values. Similarly, the firms with future investment plans are 26 percent more likely to achieve market diversification as compared with firms having no such plans. This highlights the significance and the need for the firms to develop long-term investment plans to help support their market diversification strategies.

Table 4

Marginal Effects of Logit Regression

y = Pr(y_i) (predict)
= 0.8372

Variable	dy/dx	Std.Err	z	P>z	[95% C.I.]		X
Age	0.0101	0.0044	2.31	0.021	0.0015	0.0186	24.5192
Ownership*	0.1337	0.1582	0.84	0.398	–0.1764	0.4438	0.8462
Size	0.0003	0.0001	2.95	0.003	0.0001	0.0005	569.019
SPL	0.0028	0.0014	2.07	0.038	0.0002	0.0055	32.5011
Dtext*	–0.1106	0.1313	–0.84	0.399	–0.3680	0.1467	0.4519
Dagro*	–0.1605	0.1905	–0.84	0.399	–0.5338	0.2127	0.1731
Dleather*	–0.2436	0.2348	–1.04	0.299	–0.7039	0.2166	0.25
Kar*	–0.0452	0.1295	–0.35	0.727	–0.2991	0.2087	0.5192
Lhr*	–0.2473	0.2036	–1.21	0.225	–0.6464	0.1518	0.1923
Skt*	0.1197	0.0864	1.38	0.166	–0.0497	0.2891	0.1538
DManage*	0.2611	0.1710	1.53	0.127	–0.074	0.5963	0.8365

(*) dy/dx is for discrete change of dummy variable from 0 to 1.

5. SUMMARY AND CONCLUSIONS

The issue of export market diversification has been at the forefront of export promotion strategies. In this paper, we have argued that for a deeper understanding of factors that drive export market diversification, it is important to study the issue at the firm level. This is because while a country may exhibit export diversification at the macro level, its exporting enterprises may still be concentrated in one market. Based on a dataset of exporting firms, the paper has developed a binomial Logit model to analyse the probability of firms to diversify in international markets. It is assumed to be influenced by firm level characteristics including the experience of firms, their ownership structure, labour productivity, location, and managerial expertise.

The results show that older and more experienced firms have a better likelihood of diversification in international markets mainly because of their accumulated experience that enables them to produce according to different market requirements and to establish networking with international buyers. Both size and labour productivity positively influence the firms' probability to diversify in international markets underpinned by scale economies and cost competitiveness. Locational and sectoral dummies do not affect market diversification in a significant way. This may be due to institutional gaps and weaknesses which hamper dissemination of information and mutual coordination of firms.

The results underline the need for taking account of the role of firm level characteristics in export market diversification strategies. For example, our analysis has shown that labour productivity is a significant driver of market diversification at the firm level. In this respect, the development of human resources with the requisite skills can help firms to improve productivity and competitiveness buttressing their capacity to diversify their exports in international markets. Similarly, large scale enterprises have been shown to have a better likelihood of export market diversification. In this context, export promotion policies that are aimed at achieving market diversification need to focus on establishing a business climate that is conducive for private sector investment and business expansion.

APPENDIX

(a) Results of Logit Regression Equation without Location Dummies

LR $chi^2(8)$ = 31.67
Prob > chi^2 = 0.0001
Log likelihood = –51.860809
Pseudo R^2 = 0.2339

y_i	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
cons	–2.3937	1.1305	–2.12	0.034	–4.6095	–0.1779
Age	0.0655	0.0217	3.01	0.003	0.0229	0.1081
Ownership	0.5564	0.7682	0.72	0.469	–0.9492	2.0620
Size	0.0015	0.0008	1.87	0.061	–0.0001	0.0030
SPL	0.0167	0.0084	1.98	0.048	0.0002	0.0332
Dtext	–0.6250	0.7842	–0.80	0.425	–2.1621	0.9120
Dagro	–0.7735	0.8855	–0.87	0.382	–2.5091	0.9621
Dleather	–0.7508	0.8545	–0.88	0.380	–2.4256	0.9240
DManage	1.0302	0.6756	1.52	0.127	–0.2939	2.3543

(b) Results of Logit Regression Equation without Sectoral Dummies

LR $chi^2(8)$ =38.35
Prob > chi^2=0.0000
Log likelihood = –48.523823
Pseudo R^2=0.2832

y_i	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
cons	–3.3923	1.4548	–2.33	0.020	–6.2438	–0.5409
Age	0.0569	0.0207	2.75	0.006	0.0163	0.0975
Ownership	0.6614	0.8028	0.82	0.410	–0.9120	2.2348
Size	0.0023	0.0012	1.96	0.049	0.0000	0.0046
SPL	0.0204	0.0086	2.38	0.017	0.0036	0.0373
Kar	0.2089	0.8229	0.25	0.800	–1.4040	1.8218
Lhr	–1.2287	0.9237	–1.33	0.183	–3.0390	0.5816
Skt	1.0888	0.9669	1.13	0.260	–0.8062	2.9838
DManage	1.2348	0.7182	1.72	0.086	–0.1728	2.6424

(c) Results of Logit Regression Equation without Sectoral and Location Dummies

LR $chi^2(5)$ =30.68
Prob > chi^2=0.0000
Log likelihood = –52.358948
Pseudo R^2=0.2266

y_i	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
cons	–2.6432	1.1054	–2.39	0.017	–4.8099	–0.4766
Age	0.0589	0.0198	2.99	0.003	0.0202	0.0976
Ownership	0.3871	0.7476	0.52	0.605	–1.0782	1.8523
Size	0.0014	0.0007	2.03	0.43	0.0000	0.0028
SPL	0.0161	0.0081	1.98	0.047	0.0002	210.03
DManage	0.9709	0.6624	1.47	0.143	–0.3274	2.2692

(d) Correlation Matrix of Independent Variables

	Age	Ownership	Size	SPL	Dtext	Dagro	Dleather	Kar	Lhr	Skt	DManage
Age	1.00										
Ownership	–0.25	1.00									
Size	0.22	–0.09	1.00								
SPL	0.12	0.03	–0.10	1.00							
Dtext	0.02	–0.15	0.33	–0.12	1.00						
Dagro	–0.02	0.12	–0.18	0.32	–0.42	1.00					
Dleather	0.16	0.12	–0.12	–0.12	–0.52	–0.26	1.00				
Kar	0.14	–0.14	0.06	0.09	–0.05	0.19	–0.38	1.00			
Lhr	–0.16	0.07	0.03	0.00	0.19	–0.09	0.00	–0.51	1.00		
Skt	–0.03	0.03	–0.11	–0.13	–0.12	–0.12	0.37	–0.44	–0.21	1.00	
DManage	–0.12	–0.04	0.11	–0.15	0.19	–0.07	–0.11	–0.01	0.08	–0.17	1.00

REFERENCES

Al-Marhubi, F. (2000) Export Diversification and Growth: An Empirical Investigation. *Applied Economics Letters* 7, 559–62.

Ang, Siah Hwee (2007) International Diversification: A "Quick Fix" for Pressures in Company Performance? *Business Review* 9:1, 17–23.

Aw, Bee-Yan and Geeta Batra (1998) Firm Size and the Pattern of Diversification. *International Journal of Industrial Organisation* 16, 313–331.

Burki, Abid A**.** (2010) Industrial Policy, Its Spatial Aspects and Cluster Development in Pakistan. Volume 1. Analysis Report of the Industrial Policy.

Caves, R. E., *et al*. (1980) *Competition in the Open Economy: A Model Applied to Canada*. Cambridge: Harvard University Press.

de Ferranti, David, Guillermo Perry, Daniel Lederman, and William Maloney (2002) *From Natural Resources to the Knowledge Economy: Trade and Job Quality*. Washington, DC: World Bank.

Eaton, Jonathan, Samuel Kortum, and Francis Kramarz (2004) Dissecting Trade: Firms, Industries, and Export Destinations. *The American Economic Review* 94:2, 150–154.

Goto, A. (1981) Statistical Evidence on the Diversification of Japanese Large Firms. *Journal of Industrial Economics* 29:3, 271–278.

Goudie, A. W. and G. Meeks (1982) Diversification by Merger. *Economica* 29, 271–278.

Gourlay, Adrian and Jonathan Seaton (2010) Modelling Product and Foreign Market Diversification Decisions for UK Firms. *Applied Economics Letters* 17:2, 117–120.

Gujrati, Damodar N. (2003) *Basic Econometrics*. 4th Edition. McGraw-Hill Companies.

Hart, P. E. (1971) Entropy and other Measures of Concentration. *Journal of Royal Stat. Society, Series A* 134, 73–84.

Hesse, Heiko (2006) Export Diversification and Economic Growth. Paper presented at the World Bank workshop on Export Growth and Diversification: Pro-active Policies in the Export Cycle. The World Bank, Washington, DC.

Lederman, D., and W. F. Maloney (2007) Trade Structure and Growth. In D. Lederman and W. F. Maloney (eds.) *Natural Resources: Neither Curse nor Destiny*. Stanford University Press.

PIDE (2007) Trade Related Challenges Facing Exporters in Pakistan. Joint study of Pakistan Institute of Development Economics and United Nations Industrial Development Organisation.

Presbish, R. (1950) *The Economic Development of Latin America and its Principal Problems*. New York: United Nations.

Qian, Gongming and Ji Li (1998) Multinationality, Global Market Diversification, and Risk Performance for the Largest U.S. Firms. *Journal of International Management* 4:2, 149–170.

Singer, H. W. (1950) The Distribution of Trade between Investing and Borrowing Countries. *American Economic Review* 40, 531–548.

Yoshino, Yutaka (2008) Domestic Constraints, Firm Characteristics, and Geographical Diversification of Firm-Level Manufacturing Exports in Africa. (The World Bank, Policy Research Working Paper 4575).

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Effects of Input Composition on Technical Efficiencies of Textile Industries in Pakistan

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This paper studies the technical efficiencies of the textile manufacturing industries in Pakistan using 5-digit level industry data. Technical efficiencies are computed by the Data Envelopment Analysis technique assuming constant as well as variable returns to scale. The efficiency scores thus obtained are analysed by the TOBIT regression technique to determine how input composition influences these efficiency scores. It is found that imported raw material and machinery exercises a positive effect, whereas non-industrial costs affect technical efficiencies in a negative way. Electricity does not play its due role in affecting technical efficiencies.

JEL Classification: C24, D24, L6, O14
Keywords: Technical Efficiency, Data Envelopment Analysis, TOBIT Analysis, Manufacturing Industries

1. INTRODUCTION

Pakistan is the fourth largest cotton producing country in the world after China, India and the USA. It is not surprising that Pakistan's industrialisation began in the 1950s with the textile industry at its core. Over the years, the textile sector has maintained its central role in Pakistan's economy. It contributes about 54 percent of the total export earnings of the country, accounts for 46 percent of the total manufacturing sector, and provides employment to 38 percent of the labour force in manufacturing [Pakistan (n.d.)]. Pakistan's textile exports, which were 9.754 billion Dollars in 2009-10, increased to 13.104 billion Dollars in 2010-11, [Pakistan (n.d.), Table 8.1]. The textile policy (2009-14) targets its exports to rise to $25 billion by the year 2013-14.

Textile industries have certain peculiarities which make them especially suitable for a developing country like Pakistan. First, the raw material used is abundantly available in our agro-based economy. Second, textile industries are labour intensive, and require relatively low level of skill from workers. Uneducated/unskilled men and women

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can also be employed in these industries. Consequently, these industries ease the unemployment problem, alleviate poverty, and promote female empowerment. Third, these industries do not require heavy investment in plants and machinery, making it easier to enter this business. Fourth, they provide a wide range of vertical linkages within various subgroups. Fifth, textiles, especially clothing, both in product material and design are highly value added. Today textile materials have wide variety such as nylon, cotton, polyester, silk, and wool. Special combinations of these materials are used to make high performance clothing and specialty fabrics. Recent developments in microfiber research have opened up new horizons for textile industry. These fibres are especially designed to have desirable attributes of insulation, durability, water and stain resistance etc. They can perform well even in the most demanding situations. Due to these reasons their demand is increasing in areas like sports, military, and industrial clothing.

In view of the importance of the textile sector it would be necessary to explore the factors that contribute to its performance. Empirical research indicates that improvement in technical efficiency is a major contributor to overall factor productivity growth, see e.g. Wadud (2007).

Technical efficiency measures how optimally a firm (or an industry) is using inputs to achieve a given level of output. Normally, a frontier function is estimated to serve as a benchmark against which each firm is compared to get individual efficiency scores. The firms lying on the frontier get a score of one while those lying below this frontier get a score of less than one.

The objective of this paper is to estimate technical efficiency scores of Pakistani textile manufacturing industries and to analyse the factors influencing these efficiency scores. The paper contributes to the empirical literature on technical efficiency of Pakistani textile industries in two important ways. First, we aim to find technical efficiency scores for textile industries *in particular*. Previous studies have measured technical efficiencies of Pakistani textile industries in the broader context of overall manufacturing industries. For example, Din, *et al*. (2007) estimate technical efficiencies of Pakistani manufacturing industries. Their production frontier represents all manufacturing industries. Consequently, their efficiency scores indicate how a particular industry performs in comparison with all other manufacturing industries. This paper constructs the production frontier with reference to textile industries exclusively. Here, efficiency scores indicate how a particular textile industry performs in comparison with other textile industries. Second, this paper goes a step further in exploring the factors which influence these efficiency scores.

From an analytical perspective it would be interesting to observe how technical efficiency behaves in relation to different input compositions. Output is almost always positively affected by inputs (up to certain limits), but how a certain input is used in relation to other inputs may determine whether technical efficiency has increased or decreased.

Returns to scale are important in determining technical efficiency scores. As pointed out by Coelli (1996), in case of constant returns to scale (CRS) we assume that all decision making units (DMUs) are operating at the optimal scale. However, factors like imperfect competition, regulatory requirements and constraints on finance may cause a DMU to operate at less than the optimal level. This fact favours the use of

variable returns to scale (VRS) model. However, the CRS approach has its own advantages. The assumption of CRS allows the comparison between large and small DMUs [Noulas (1997)]. A problem with the VRS model is that in such models where a few large DMUs are present, there is the possibility that the frontier will be dominated by these large DMUs. While in fact these large DMUs may not be efficient [Berg, *et al*. (1991)]. With these considerations we use both the CRS and the VRS assumptions to analyse the data.

The rest of the paper is divided as follows: Section 2 gives a review of theoretical and empirical literature; data, models, and variables are discussed in Section 3; results are discussed in Section 4; and finally Section 5 concludes the paper.

2. REVIEW OF LITERATURE

The theory of production frontier provides a suitable framework for empirical work on technical efficiency. Such work started with Farrell (1957) who used the concept of frontier production function against which the performance of productive units could be compared. Following these early works, many writers tried different techniques to estimate the production frontier and efficiencies. Broadly, these techniques can be divided in two major groups:

- Parametric Techniques, and
- Non-Parametric Techniques

Parametric Techniques are based on econometric regression models. Usually a stochastic production, cost, or profit frontier is used, and efficiencies are estimated with reference to that frontier. Parametric techniques require a functional form, and random disturbances are allowed for in the model. The usual tests of significance can be performed in these models. Non-parametric techniques, on the other hand, do not require a functional form. They do not allow for random factors, and all deviations from the frontier are taken as inefficiencies. Consequently, inefficiencies in non-parametric techniques are expected to be higher than those in parametric techniques. Moreover, tests of significance cannot be performed in non-parametric techniques.

The commonly used parametric efficiency techniques are the stochastic frontier analysis (SFA), the thick frontier approach (TFA), and the distribution-free approach (DFA). Whereas, among non-parametric techniques, data envelopment analysis (DEA) and free disposal hull (FDH) are more commonly used. To keep the analysis simple we shall use a single non-parametric technique viz. DEA assuming both CRS and VRS. The CRS model is attributed to Charnes, Cooper, and Rhodes (1978), while the VRS model was proposed by Banker, Charnes, and Cooper (1984) by imposing an additional convexity constraint to obtain that model.

Once we get technical efficiency scores, the next stage involves the analysis of the factors which may be influencing these efficiency scores. The Ordinary Least Square estimation might appear to be the obvious way. However there is a problem with such estimation; technical efficiency scores are bounded between zero and one, and Ordinary Least Squares with such a dependent variable may predict values greater than one [Coelli, *et al*., p. 194]. Different techniques have been suggested to solve this problem. This paper follows the technique used by Bjurek, *et al.* (1992), and McCarty and Yaisawarng (1993)

who applied a censored regression model to analyse the technical efficiency scores obtained through application of the DEA technique.

Censored regression models are designed to estimate linear relationships between variables when the dependent variable is bounded by either a minimum value or a maximum value (or both). In the case of censoring from above the dependent variable lies at or below some threshold value. Similarly, in the case of censoring from below, values of dependent variable lie at or above some threshold value. The Tobit model developed by James Tobin (1958) is employed here to analyse the factors influencing efficiency scores.

This two-stage approach of efficiency analysis has been widely used in different areas of empirical research. Oum and Yue (1994) use DEA efficiency scores with a Tobit model to analyse the effects of government intervention and subsidisation on the efficiency of railways systems in 19 OECD countries. Chilingerian (1995) analyses the clinical efficiency of 36 physicians in a single hospital using DEA and a multi-factor Tobit analysis. Luoma, *et al*. (1996) examine the efficiencies of Finnish health centres by applying DEA and the Tobit model to find out how the various economic, structural and demographic factors affect these efficiencies.

During recent years quite a few studies have explored the performance of textile manufacturing activities. Some of these are briefly reviewed below.

Murugeshwar (2011) analyses growth in total factor productivity in Indian textile industry. The study is based upon the data collected by Annual Survey of Industries (ASI) and published by Central Statistical Organisation (CSO). There are 6 sub-sectors identified on three and four-digit classification. Cross-sectional and time series data is used for the period 1980-2005. The author estimates Malmquist Productivity Indices, and the break total factor productivity growth in case of change in technical efficiency and change in technology.

Samad and Patwary (2003) estimate technical efficiencies for the textile industry of Bangladesh using translog stochastic production frontier. The study uses panel data for the period from 1988-89 through 1993-94. The data are taken from Census of Manufacturing Industries (CMI) published by Bangladesh Bureau of Statistics (BBS). The value of gross output is taken as the dependent variable whereas, total fixed assets, total number of persons engaged, and the cost of raw material and packaging are used as independent variables. Woolen textiles, jute textiles, and carpets and rugs are found to be highly efficient groups of industries. Cordage, rope and twine, and spooling and thread ball score least in efficiency ranking. The authors attribute these low efficiency scores to low level of technology used in the industries.

Wadud (2004) analyses technical efficiency of Australian textile and clothing firms based on a longitudinal survey covering the period of 1995-1998. The author uses a Cobb Douglas stochastic production frontier to examine firm level technical efficiencies. Analysis of inefficiency effects indicates that firms' age, size, capital intensity, proportion of non-production to total workers and type of legal status significantly affect technical efficiencies of the firms. In a subsequent paper [Wadud (2007)], the author decomposes the total factor productivity growth into changes in technology, changes in technical efficiency, and scale effects. It has been found that changes in technical efficiency mostly dominated the overall growth in total factor productivity in textile and clothing firms.

Din, *et al*. (2007) estimate technical efficiencies of Pakistani manufacturing industries using industry level data from Census of Manufacturing Industries for the years 1995-96 and 2000-01. The efficiencies of textile industries are estimated in the broader context of overall manufacturing industries. The study uses stochastic frontier as well as DEA technique. This technique is used under the assumptions of CRS and VRS. Results show low technical efficiency scores for the textile sector. The average efficiency scores for this sector are 0.12 and 0.30 for 1995-96 and 2000-01 respectively under the assumption of constant returns to scale; whereas, for overall manufacturing industries these scores turn out to be 0.23 and 0.42 respectively.

Khalil (2011) measures technical efficiency of 45 textile processing units located in Karachi. The paper uses data from a survey conducted in 2008. Data envelopment analysis is used to estimate efficiency scores while taking into account both desirable and undesirable outputs (polluting factors which need to be reduced to increase the performance). The results indicate that when undesirable outputs are included in the model, the number of efficient producers increases. From this the author concludes that some producers do give consideration to the reduction in undesirable outputs.

3. DATA AND METHODOLOGY

Data and Variables

The data used in this paper are taken from Census of Manufacturing Industries (2005-06), published by the Federal Bureau of Statistics (now Pakistan Bureau of Statistics). Industries are identified at 5-digit level according to Pakistan Standard Industrial Classification (PSIC), 2007. Twenty-seven industries are included in the analysis.[1] The data used are briefly described below:

Output

Value added reported in CMI reports does not allow for non-industrial costs. However, another variable, contribution to GDP, takes care of industrial as well as non-industrial costs. This definition of output is adopted as it seems more appropriate in the context of the present study.

Capital

Capital consists of all fixed assets which are expected to have a productive life of more than one year, and are in use by the establishment for the manufacturing activity. These include land, building, plant and machinery etc.

Labour

Labour includes employees, working proprietors, unpaid family workers and home workers. Labour data have been adjusted to allow for number of shifts as reported in CMI.

[1]CMI reports 28 textile industries at 5-digits level. One industry, viz., Carpets and rugs (hand made) turned out to be an outlier in preliminary estimation, so it was excluded from the analysis.

Raw Materials

As defined in CMI (2005-06): 'Raw-materials include raw and semi-finished materials, assembling parts etc., which are physically incorporated in the products and by-products made. Chemicals, lubricants and packing materials which are consumed in the production and spare parts charged to current operating expenses are included. The raw material given to other establishments for manufacturing goods (semi-finished and finished) on behalf of the establishment is included, whereas raw material supplied by others for manufacturing goods on their behalf is excluded. The CMI gives data on imported raw materials as well as on those domestically produced.

Energy

This input is obtained by adding cost on fuel and cost on electricity as reported in CMI. Fuel is defined as 'firewood, coal, charcoal, kerosene oil, petrol, diesel, gas and other such items which are consumed in generating heat and power.'

Industrial Costs

The CMI includes cost of the raw materials, fuels and electricity consumed, payments for work done, payments for repairs and maintenance and the cost of goods purchased for resale in the category of industrial costs.

Non-Industrial Costs

These consist of payments for transport, insurance, copy rights/royalties, postage, telephone, fax and internet charges, printing and stationery, legal and professional services, advertising and selling services, travelling, etc.

Methodology

A two-stage methodology is used to analyse technical efficiency at the industry level. In the first stage technical efficiency scores are obtained using the DEA model. In the 2nd stage the effects of various variables are analysed through the TOBIT model. The models are briefly described below:

DEA Model

We use the DEA model to estimate the technical efficiency score under the CRS and VRS assumptions. It is assumed that the industries try to maximise output with a given combination of inputs. Under the assumption of CRS, the following *n* linear programming problems are solved to get efficiency score for each industry.

$$\text{Max}_{\Phi,\lambda}\ \Phi$$
$$\text{s.t.}$$
$$-\Phi\ y_i + Y\lambda \geq 0$$
$$x_i - X\lambda \geq 0$$
$$\lambda \geq 0$$

Where Φ is a scalar, and λ is a vector of constants. X and Y represent input and output matrices for all industries. The symbols y_i and x_i represent output and input vectors of ith industry respectively. The contribution to GDP is used as output. Five inputs are identified viz, labour, capital, raw materials, energy, and non-industrial costs. The scalar

Φ is the largest factor by which all outputs of industry *i* can be raised. The reciprocal of Φ is the technical efficiency of the *i*th industry.[2] It represents the proportional increase in output that could be achieved by the *i*th industry, with inputs being held constant.

For VRS, additional convexity constraint (*é* $\lambda = 1$) is imposed in the model. The VRS model is written as:

$$\text{Max}_{\Phi,\lambda}\ \Phi$$
$$\text{s.t.}$$
$$-\Phi\ y_i + Y\lambda \geq 0$$
$$x_i - X\lambda \geq 0$$
$$\lambda \geq 0$$
$$é\lambda = 1$$

Where *é* is a vector of one.

The convexity constraint ensures that an inefficient industry is only 'benchmarked' against an industry of a similar size. That is, the projected point for that industry on the DEA frontier is a convex combination of observed industries [Coelli (2005), p. 172].

These models can be computed by running a linear programme for each industry. This study uses the computer programme DEAP developed by Coelli (1996) to compute technical efficiency scores.

Tobit Model

Since technical efficiency scores are restricted by an upper and lower limit, viz. zero and one, but are continuous between the two limits, the two-limit Tobit model is used here.[3] Such a model can be represented in general form by the following equation:

$$z_i^* = \beta' w + \varepsilon_i$$

Where $z_i^*$is unobserved or latent dependent variable. Observed DEA efficiency score of *i*th industry, denoted by z_i in this model are used in place of z_i^*.

w is a vector of explanatory variables,
β is a vector of parameters to be estimated, and
$\varepsilon_i \sim N(0, \sigma^2)$ is the random term.

We denote lower limit by L_1, upper limit by L_2, such that:

$z_i = L_{1i}$ when $z_i^* \leq L_{1i}$
$z_i = L_{2i}$ when $z_i^* \geq L_{2i}$
$z_i = z_i^*$ when $L_{1i} < z^* < L_{2i}$

The model is estimated through the Maximum Likelihood technique. The likelihood function of this model is given by:

$$L(\beta, \sigma \mid z_i, w_j, L_{1i}, L_{2i}) = \prod_{Z_i = L_{1i}} \psi\left[\frac{L_{1i} - \beta' w_j}{\sigma}\right] \prod_{Z_i = Z^*} \frac{1}{\sigma}\phi\left[\frac{Z_i - \beta' w_j}{\sigma}\right] \prod_{Z_i = L_{2i}} \left[1 - \psi\left(\frac{L_{2i} - \beta' w_j}{\sigma}\right)\right]$$

[2]For detail see Coelli, *et al.* (2005), p. 180.
[3]For details on two-limit TOBIT model, see Rosett and Nelson (1975).

The technical efficiency scores obtained in the first stage of the analysis are used as dependent variable in the following empirical equation.

$$z_i = \beta_0 + \beta_1 MachK + \beta_2 DimpRm + \beta_3 ElecEner + \beta_4 NicTc + u_i$$

Where u_i is the random term.

The variables used in this regression are explained below:

z_i is the dependent variable taking values of the *i*th industry's technical efficiency scores obtained from the DEA model. It may take values between zero and one. However, in actual practice, the technical efficiency score is never zero. Hence the lower limit in Tobit estimation is fixed at the minimum value.

MachK is the ratio of value of purchase of plant and machinery to total value of capital. This variable is used to measure the effect of new technology in the production process. Other expenditures on capital like land, building, and furniture and fixtures are also essential for production process, but these forms of capital are often used in production activity in indirect ways. New and modern machines are expected to make efficient use of other inputs like raw material and labour. Liberman and Johnson (1999) find that investment in new equipment by Japanese steel firms led to a higher level of labour productivity in comparison with U.S. firms. In contrast, Dijk and Szirmai (2006) find that plants operating under the latest technologies have lower levels of efficiency than mills operating under outdated equipment in the Indonesian pulp and paper industry. But, such behaviour is not likely to occur at industry level. So, we may reasonably expect that this variable will take positive sign in the regression.

DimpRM is the dummy variable used to capture the effect of imported raw material in the production process. The variable takes the value of one if imported raw material is used, zero otherwise. The sign of this variable is an empirical matter. One might expect that imported raw material, being of better quality, would positively affect technical efficiency. Mazumdar, Rajeev, and Ray (2009) find positive effect of imported raw material on efficiency of Indian pharmaceutical firms. However, if the imported raw material happens to be of low quality, or it does not quite suit domestic technology, then its effect on technical efficiency might be negative.

ElecEner is the proportion of cost of electricity to total energy cost used in the industry. Electricity is usually considered a better option than other sources of fuel. This source of energy is highly flexible and convenient. Literature indicates that electricity-intensive technologies have been replacing other energy-intensive technologies (which rely on fossil fuels to a greater extent) in manufacturing [Doms and Dunne (1995)]. A higher proportion of electricity used is expected to influence efficiency in a positive way. However in Pakistan economy, due to shortage of electricity, this important input may not be able to play its due role. Frequent power failures in electric supply and 'load shedding' may result in disruptions in production process, and may even force industrial users to seek other relatively inefficient sources of energy. The sign and significance of this variable may, therefore, be different from what the theory suggests. In other words, the proportion of electricity in total energy used by the industry indicates the level of dependence on electricity. When the supply of electricity becomes unreliable, the industries which depend more on electricity suffer more. This implies possibility of negative relationship between the proportion of electricity in total energy use and efficiency scores.

NicTc is the proportion of non-industrial costs to total costs (industrial and non-industrial). As described above, CMI includes costs like payments for transport, insurance, copy rights/royalties, postage, telephone, fax and internet charges, printing and stationery, legal and professional services, advertising and selling services, travelling in the category if non-industrial costs. However, other costs like corruption, bureaucratic hassles, litigation, and dispute settlements might also be contributing to this type of cost. All these things are expected to cause hurdles in smooth functioning of a business. So, we might expect this variable to take a negative sign.

All variables used in Tobit regression are in the natural logarithmic form. The computer package STATA is used to run the Tobit model.

4. RESULTS

DEA Model

Technical efficiency scores from DEA models are reported in Table 1. The scores obtained through VRS are slightly higher than those through CRS model. This is due to

Table 1

Efficiency Scores of Textile Industries

	Industries	CRS	VRS
1	Spinning of Natural Textile Fibres	1	1
2	Spinning of Man-made Staple Fibres	0.823	1
3	Textile Yarn and Thread of Natural Fibres	0.762	1
4	Text. Yarn and Thread of Man-made Staple Fibres	0.57	0.783
5	Processing of Textile Waste	0.38	0.387
6	Fabrics Other than Cotton	0.869	0.923
7	Cotton Fabrics	1	1
8	Fabrics of Man-made Filaments	0.716	0.781
9	Pile Fabrics, Terry Towelling etc.	0.777	0.81
10	Weaving of Fabrics on Khadi /Handloom	0.398	1
11	Finishing of Textile Fibres and Yarn	0.703	0.827
12	Bleaching and Dyeing of Fabrics	0.569	0.612
13	Printing Services of Fabrics	1	1
14	Finishing of Textiles (Khadi/Handloom)	0.97	1
15	Other Textile Finishing n.e.c.	0.242	0.468
16	Made-up Textile Articles for Household	1	1
17	Other Made-up Textile Articles	0.562	0.574
18	Carpets and Rugs (other than by hand)	0.497	0.513
19	Cordage, Rope, Twine and Netting	1	1
20	Embroidery and Zari Work by Hand	1	1
21	Narrow Woven Fabrics and Embroidery	0.588	0.604
22	Other Textiles n.e.c.	1	1
23	Knitted and Crocheted Fabrics	1	1
24	Knitted/Crocheted Cotton Text. Articles	0.553	0.555
25	Knitted/Crocheted Woollen Text. Articles	0.722	0.742
26	Knitted/Crocheted Synthetic Articles	0.356	0.605
27	Knitted/Crocheted Articles n.e.c.	0.703	0.736

the fact that the envelop obtained through the VRS model encloses the data in a more compact way than that from the CRS model. Consequently more observations are likely to lie on or near the frontier. The average technical efficiency turns out to be 0.73 in case of the CRS model and 0.81 in the VRS model. These averages are much higher than those reported by Din, *et al*. (2007). Further comparison shows that efficiency scores for individual industries are also, in general, higher in present study. The reason for this discrepancy is that the mentioned study constructs the production frontiers for the whole manufacturing sector, and the technical efficiencies of textile industries are computed with reference to these general frontiers. In the present study the frontiers are constructed for the textile industries only, and technical efficiency scores are computed with reference to these specific frontiers.

Individual efficiency scores (Table 1) indicate that Cotton Fabrics, Printing Services of Fabrics, Made-up Textile Articles for Household, Cordage, Rope, Twine and Netting, Embroidery and Zari Work by Hand, Knitted and Crocheted Fabrics, and Other Textiles n.e.c. are the most efficient industries. Among the least efficient industries are: Carpets and Rugs (other than by hand), Processing of Textile Waste, Knitted/Crocheted Synthetic Articles, and Other Textile Finishing n.e.c.

There may be a number of causes of these differences in efficiency scores. Unfortunately the CMI data is not detailed enough to undertake an exhaustive analysis of the factors influencing technical efficiencies of all textile industries. The present study limits itself to analysis of the effect of input proportions on efficiency scores; i.e., to explore what type of input proportions are beneficial or detrimental to the efficiencies of textile industries. In the following pages we try to tackle this issue through Tobit analysis.

These efficiency scores are quite high in comparison with Din, *et al*. (2007). As mentioned previously, Din, *et al*. (2007) estimate technical efficiencies of Pakistani manufacturing industries. Their production frontier represents all manufacturing industries. Consequently, their efficiency scores indicate how a particular industry performs in comparison with all other manufacturing industries. This paper constructs the production frontier with reference to textile industries. Here, the efficiency scores indicate how a particular textile industry performs in comparison with other textile industries. Due to fewer variations in the nature of industries, the production points do not lie very far from the frontier. Therefore, these efficiency scores are relatively higher.

Tobit Results

The results of Tobit regressions are reported in Table 2 and Table 3. Table 2 shows the results when DEA scores are obtained under the assumption of constant returns to scale. The Likelihood Ratio (LR) Chi-Square test is conducted to check the null hypothesis that all predictors' regression coefficients are equal to zero. The number in the parentheses indicates the degrees of freedom of the Chi-Square distribution used to test the LR Chi-Square statistic and is defined by the number of coefficients in the model. The null hypothesis is rejected at 0.0242 and 0.0009 levels of significance for CRS and VRS cases respectively. This leads us to conclude that at least one of the regression coefficients in both models is not equal to zero. As argued by Coelli (1996), in CRS we assume that all decision making units are operating at optimal scale. However, there are many factors like imperfect competition, and constraints on finance that may cause a decision making unit to operate at less than optimal level.

Table 2

Tobit Regression Results for Constant Returns to Scale

Log likelihood = –15.70
LR $Chi^2(5)$ = 11.22
Prob> Chi^2 = 0.0242
Pseudo R^2 = 0.2632

crste	Coeff	Standard error	t-values	P> |t|	95% Confidence Interval	
Constant	–1.48	0.56	–2.63	0.016	–2.66	–0.31
MachK	0.09	0.09	1.03	0.313	–0.91	0.27
Dimprm	0.48	0.26	1.88	0.074	–0.05	1.01
ElectEn	0.26	0.17	1.52	0.143	0.10	0.61
NicTc	–0.47	0.20	–2.35	0.029	–0.89	–0.05

Table 3

Tobit Regression Results for Variable Returns to Scale

Log likelihood = –9.14
LR $Chi^2(5)$ = 18.63
Prob> Chi^2 = 0.0009
Pseudo R^2 = 0.5047

vrste	Coeff	Standard error	t-values	P> |t|	95% Confidence Interval	
Constant	–1.84	0.51	3.58	0.002	–2.90	–0.76
MachK	0.11	0.06	1.84	0.079	–0.01	0.24
Dimprm	0.65	0.19	3.40	0.003	0.25	1.05
ElectEner	–0.02	0.12	–0.21	0.837	–0.27	0.23
NicTc	–0.54	0.18	–2.98	0.007	–0.92	–0.16

This fact may explain the weak results of the CRS model. The magnitude of Pseudo R^2 also indicates that the VRS model better explains the variations in efficiency scores across industries.

The effect of expenditure on machinery and equipment is positive and significant in case of VRS (Table 3). This is in line with Liberman and Johnson (1999) who find that investment in new equipment by Japanese steel firms led to a higher level of labour productivity in comparison with U.S. firms. The sign of the dummy variable for imported raw material is positive and significant for both CRS and VRS indicating serious issues regarding availability of high quality raw material in domestic market. As mentioned above, Mazumdar, Rajeev, and Ray (2009) also find positive effect of imported raw material on efficiency of Indian pharmaceutical firms.

The proportion of electricity in total energy used has no significant effect on technical efficiency in case of CRS as well as VRS. The sign also turns out to be ambiguous; positive in CRS and negative in VRS. These results indicate that electricity as an efficient form of energy is not playing its due role in our textile industries. In recent years shortages in power supply have adversely affected almost all sectors of the economy. Textile industries are especially hurt due to two reasons. First, they heavily rely on electricity, and second most of them being small scale units find it difficult to produce their own electricity at an affordable price.

The effect of non-industrial costs is also found to be negative. This is probably due to the factors mentioned above viz. corruption, bureaucratic hassles, litigation, and dispute settlements which are contributing to efficiency losses.

The size, sign and significance of the intercept indicate missing factor(s) influencing technical efficiency in a negative way. Unfortunately data on many inputs in the CMI is not detailed enough to include all possible factors. Information on education of entrepreneurs, technical skills of workers, working environment of the factories, labour-management relationships, and grievance resolution procedures are some of the issues about which information is crucial to pinpoint the sources of inefficiencies.

Despite these issues, it must be pointed out that in the complications of the actual world, no regression can provide an exhaustive list of variables affecting technical efficiencies. In fact, studies with significant intercept terms are quite common in the literature on determinants of technical efficiency, see for example, Mazumdar, *et al*. (2009), Wouterse (2008) etc. One of the objectives of this paper is to analyse the effect of input composition on technical efficiencies, and in this regard the exercise is useful.

Like other businesses in Pakistan, textile industries are mostly family-owned enterprises. As pointed by Gani and Ashraf (2005), "The business groups in Pakistan (previously known as twenty-two families) are informal combinations of legally independent business entities run by families. The family patriarch is the dominant shareholder and manager whereas the immediate and distant family-members help operate various firms within the business group". Obviously, when boards of directors and other management structures are riddled with nepotism, efficiency becomes a low priority issue.

5. SUMMARY AND CONCLUSIONS

In this paper we have examined technical efficiencies of textile manufacturing industries in Pakistan using 5-digit level industry data. Technical efficiencies are computed by Data Envelopment Analysis technique under the assumption of constant returns to scale as well as variable returns to scale. The efficiency scores thus obtained are analysed by Tobit regression technique to determine the factors which influence these efficiency scores. DEA results show that Cotton Fabrics, Printing Services of Fabrics, Made-up Textile Articles for Household, Cordage, Rope, Twine and Netting, Embroidery and Zari Work by Hand, Knitted and Crocheted Fabrics, and other Textiles are the most efficient industries; whereas, Carpets and Rugs (other than by hand), Weaving of Fabrics on Khadi /Handloom, Processing of Textile Waste, Knitted/Crocheted Synthetic Articles, and Other Textile Finishing n.e.c. turn out to be the least efficient industries.

In the Tobit model the proportion of machinery in total capital and dummy for imported raw material are found to have positive effect on technical efficiencies, while non-industrial costs as a proportion of total cost have a negative effect. The proportion of electricity to total energy does not seem to play any significant role.

The issue of raw material needs both short-run as well long-run strategies. First, import restrictions on raw material used in textile industries should be removed as a short-run solution. Second, as a long-term strategy domestic production of such raw material should be encouraged through research and development, technology diffusion, and human resource development. Similar policy measures are recommended for

machinery and equipment. The shortage of electricity needs urgent measures. Cheap and reliable supply of electricity is necessary for the survival of our textile industry in present day environment of openness and competition. Eradication of corruption and better governance, especially simplification of bureaucratic and legal procedures, will definitely contribute to efficiency in a positive way.

REFERENCES

Banker, R. D., A. Charnes, and W. W. Cooper (1984) Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30:9&10, 78–92.

Berg, S. A., F. Forsund, and E. Jansen (1991) Technical Efficiency of Norwegian Banks: A Nonparametric Approach to Efficiency Measurement. *Journal of Productivity Analysis* 2, 127–143.

Bjurek, H., U. Kjulin, and B. Gustafson (1992) Efficiency, Productivity and Determinants of Inefficiency at Public Day-Care Centres in Sweden. *Scandinavian Journal of Economics* 94, (Supplement):173–187.

Charnes, A., W. W. Cooper, and E. Rhodes (1978) Measuring the Efficiency of Decision-Making Units. *European Journal of Operational Research* 2, 429–444.

Chilingerian, J. A. (1995) Evaluating Physician Efficiency in Hospitals: A Multivariate Analysis of Best Practices. *European Journal of Operational Research* 80, 548–574.

Coelli, T. J. (1996) A Guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Programme. Department of Econometrics, University of New England, Armidale, Australia. (CEPA Working Paper 96/08).

Coelli, T. J., Parsada D. S. Rao, C. J. O'Donnell, and G. Battese (2005) *An Introduction to Efficiency and Productivity Analysis.* 2nd Edition. New York: Springer.

Dijk, Michiel Van and Adam Szirmai (2006) Technical Efficiency and Embodied Technical Change in the Indonesian Pulp and Paper Industry. *Journal of International Development* 18:2, 163–178.

Din, Musleh-ud, E. Ghani, and T. Mahmood (2007) Technical Efficiency of Pakistan's Manufacturing Sector: A Stochastic Frontier and Data Envelopment Analysis. *The Pakistan Development Review* 46:1, 1–28.

Doms, M. E. and T. Dunne (1995) Energy Intensity, Electricity Consumption, and Advanced Manufacturing Technology Usage. *Technological Forecasting and Social Change* 49, 297–310.

Gani, W. I. and J. Ashraf (2005) Corporate Governance, Business Group Affiliation, and Firm Performance: Descriptive Evidence from Pakistan. Lahore University of Management Sciences. (CMER Working Paper No. 05-35).

Khalil, S. (2012) Relative Efficiency of Decision Making Units Producing both Desirable and Undesirable Outputs: A Case Study of Textile Processing Units in Pakistan. *The Pakistan Development Review* 51:4.

Liberman, M. and D. Johnson (1999) Comparative Productivity of Japanese and U.S. Steel Producers 1958-1993. *Japan and World Economy* 11, 1–27.

Luoma, K., M. L. Järviö, I. Suoniemi, and R. T. Hjerppe (1996) Financial Incentives and Productive Efficiency in Finnish Health Centres. *Health Economics* 5, 435–445.

Mazumdar, M., M. Rajeev, and Subhash C. Ray (2009) Output and Input Efficiency of Manufacturing Firms in India: A Case of the Indian Pharmaceutical Sector. The Institute for Social and Economic Change, Bangalore. (Working Paper 219).

McCarty, A. Therese and SuthathipYaisawarng (1993) Technical Efficiency in New Jersey School Districts. In H. O. Fried, Knox C. A. Lovell, and Shelton S. Schmidt (eds.) *The Measurement of Productive Efficiency: Techniques and Applications*. Oxford University Press.

Noulas, A. G. (1997) Productivity Growth in the Hellenic Banking Industry: State versus Private Banks. *Applied Financial Economics* 7, 223–228.

Oum, T. H. and C. Yue (1994) Economic Efficiency of Railways and Implications for Public Policy: A Comparative of the OECD Countries' Railways. *Journal of Transport Economics and Policy* 28:2, 121–138.

Pakistan, Government of (n.d.) *Census of Manufacturing Industries (2005-06)*. Islamabad: Federal Bureau of Statistics.

Pakistan, Government of (n.d.) *Economic Survey* (2011-12). Islamabad: Economic Advisor's Wing, Ministry of Finance.

Pakistan, Government of (n.d.) *Strategic Trade Policy Framework (2009-12)*. Islamabad: Ministry of Commerce.

Ray, Subhash C. and Zhang Ping (2001) Technical Efficiency of State Owned Enterprises in China (1980-1989): An Assessment of the Economic Reforms. Department of Economics, University of Connecticut. (Economics Working Paper 2001-05). downloaded from: http://digitalcommons.uconn.edu/econ_wpapers/200105/

Rosett, R. N. and F. D. Nelson (1975) Estimation of the Two Limit Probit Regression Model. *Econometrica* 43:1, 141–146.

Samad Q. A. and F. K. Patwary (2003) Technical Efficiency in the Textile Industry of Bangladesh: an Application of Frontier Production Function. *Information and Management Sciences* 14:1, 19–30.

Tobin, James (1958)Estimation of Relationships for Limited Dependent Variables. *Econometrica* (The Econometric Society) 26:1, 24–36.

Wadud, Mokhtarul (2004) Technical Efficiency in Australian Textile and Clothing Firms: Evidence from the Business Longitudinal Survey. *Australian Economic Papers* 43:3, 357–378.

Wadud, Mokhtarul (2007) Sources of Productivity Growth in Australian Textile and Clothing Firms. *Australian Economic Papers* 46:3, 254–281.

Wouterse, Fleur S. (2008) Migration and Technical Efficiency in Cereal Production Evidence from Burkina Faso. (IFPRI Discussion Paper 00815).

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Learning versus Working; Factors Affecting Adolescent Time Allocation in Pakistan

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This paper explores how family, school and community factors influence adolescents' time allocation among market work, domestic work, learning and leisure. We model adolescents' time use in a multivariate framework, using explanatory variables characterising the household as well as labour demand, school access and school quality at the district level. This research shows that the amount of time children spend working, whether at home or in the market, is strongly correlated with household poverty, as proxied by an asset index. Consistent with the literature on the predictors of school enrolments of adolescents, the time spent on learning is also significantly lower among the poor. In Pakistan the Benazir Income Support Programme (BISP) census poverty score database, which includes information on household assets, would be a very promising tool to target efforts to increase children's time allocated to learning.

JEL classification: D60, I24, I30
Keywords: Pakistan, Education, Child Labour.

I. INTRODUCTION

School enrolment rates of Pakistani adolescents remain among the lowest in Asia. Thus, in the Pakistani context, poverty reduction strategies addressing the long-term needs of children and youth must be centrally tied to the promotion of education and learning.[1] Unfortunately many current realities in the lives of Pakistani children and youth compete with the time required to acquire the knowledge and skills needed to break out of the poverty trap in which they find themselves. These include their families'

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[1]Recognising the need to improve social indicators, Pakistan's 2009 Poverty Reduction Strategy Paper adopts human development as a priority area with a particular focus on education, health, safe water and sanitation, population planning and gender equality.

economic circumstances, which may require children to assist the family either in income generating activities or in domestic chores (including taking care of siblings or the elderly), poor infrastructure that leads to excessive time spent in collection of basic necessities such as water and fuel for cooking and the lack of labour-saving appliances in the home and migration of a breadwinner. In addition, when schools are of poor quality or when educational expenses are excessive due to cost of transport, books, uniforms, private tuition or corruption among teachers, parents may question the value of schooling, with the result that some children never attend school and many drop out after a few grades. The trade-off between short-term pay-offs to child labour and potential long-term benefits to schooling becomes more pronounced when credit markets are unavailable to the poor, limiting their ability to optimise human capital investments in the long term.

In order for poverty reduction strategies to address barriers to school enrolment and retention as well as support effective learning (which often requires time after school for homework and possibly extra tutoring) the economic realities of children's lives within the context of their families and communities need to be more fully understood. The 2007 Time Use Survey (TUS), which can be linked at the district level to the Labour Force Survey fielded in the same year as well as the 2005 School Census, offers us the opportunity to explore some of these factors in depth.

In this paper, we explore the role of potentially critical family, school and community factors affecting how both younger and older adolescents allocate their time between four broad sets of activities—market work, domestic work, learning and leisure—highlighting the differences between males and females. The richness of the time use data allows us the opportunity for a fuller analysis of work and education decisions than is usually possible. This is particularly important in a context where many adolescents are not in school and where out-of-school children are not universally found to participate in either market (particularly true for girls) or domestic work (particularly true for boys). Not only is the enrolment rate among Pakistani adolescents relatively low by Asian standards but the gender gap in enrolment rates, even after some recent decline, remains one of the largest in the developing world. After a brief review of the literature and description of the data, we begin our data analysis with an overview of adolescent time use patterns by age, gender and urban/rural residence. We then model children's time use in a multivariate framework with explanatory variables characterising the household as well as labour demand, school access and school quality at the district level. Our goal in this descriptive analysis is to document the correlates of children's time use patterns, which would be relevant for policies that aim at alleviating both short-term and longer-term childhood poverty in Pakistan through reductions in child labour and increases in time spent learning.

II. REVIEW OF THE LITERATURE

There is growing evidence from around the world that parents' aspirations for their children's education are rising and that even illiterate parents increasingly recognise the value of education. In Pakistan, results from a rural survey conducted 13 years ago in 1997 in Punjab and KP found that a majority of parents thought that their boys should have more than a matric-level education (grade 10) and about a third of parents wished

for more than a matric education for their girls [Sathar, *et al*. (2000)]. Despite these aspirations, educational attainment levels in Pakistan fall short of these aspirations for a variety of reasons among which poverty and school quality are the most compelling.

There is a large literature documenting the positive association between parental income or wealth and children's educational participation and attainment [NRC/IOM (2005)]. In Pakistan, school attendance varies significantly by household economic status. Data from a nationally representative adolescent survey, collected a decade ago, show enormous percentage gaps among adolescents from households in the lowest wealth quartile and those from households in the highest wealth quartile [Lloyd, Mete, and Grant (2007)]. For 15-19 year old boys, the range was 31 percentage points in rural areas and 45 percentage points in urban areas. For girls, the range in attendance rates was 60 percentage points in rural areas and 50 percentage points in urban areas. Despite the evidence of high rates of return to educational investments in the form of future earnings, poverty and lack of access to credit prevent parents from making educational investments because the upfront costs are often too high both in terms of direct cash outlays (even in settings with free primary or basic education) and in terms of the indirect opportunity costs in the form of foregone family labour. Finally, in the Pakistan context, the volatile law-and-order situation and its negative effects on labour markets may add further uncertainty to what returns a child may enjoy to his/her education and skills in the long term.

School access and quality also affect children's school enrolment. Having a school nearby is critical, particularly for girls given parental concerns about protection and safety. Furthermore, even illiterate or poorly educated parents can sense when their children are not learning. Sawada and Lokshin (2001) found that in Pakistan, parents are more likely not to enrol their children if their local schools lack high-quality teachers. Lloyd, Mete, and Sathar (2005) found that enrolment, particularly for Pakistani girls, was affected by the share of local public school teachers who reside in the village (proxy for teacher attendance). Winthrop and Graf (2010) have drawn on a rich literature on education in Pakistan to highlight the need for educational reform, in particular improvements in school quality.

Other important factors affecting enrolment rates include parents' education, (particularly) father's occupation, family size, child health, and rural/urban residence. Parents' better education, fewer siblings, children's better health and urban residence result in higher enrolment rates and grade attainment and conversely lower rates of child labour. Lloyd, Mete, and Grant (2009) found that rural girls living in Punjab and KP were more likely to have dropped out of school from 1997 to 2004 if their mother has had an unwanted birth during the previous six years, indicating the impact of unwanted fertility and family size on children's educational outcomes.

In poor households, the opportunity costs of children's enrolment may be too high for parents given their need for help in the household and in the family business or farm. For example, in an assessment of the pilot phase of the implementation of a conditional cash transfer programme aiming to increase primary school attendance of poor children in three districts in Pakistan, World Bank (2009) found that the greatest barrier to meeting the programme conditions was "need child to help with work at home", that was stated by 75 percent of parents interviewed.

Standard household surveys tend to be unreliable for the measurement of child labour, thus (diary based) Time Use Surveys provide an opportunity to document the scale and implications of time spent on different activities including work and learning.[2] Highlighting this issue, Rustagi (2009) utilises Time Use Survey data from India to show that many more girls than boys are involved in not only unpaid work but also paid work. Mete (2013), analysing differences in children's work time between rural and urban areas in five countries, shows the extent to which children work more in rural areas where labour demands are high, with particularly large effects seen in the lowest GDP per-capita countries, in particular Pakistan.

In settings with limited infrastructure, the time demands of household chores may also leave little time for school. Koolwal and ven de Walle (2010) estimated for Pakistan that a one hour reduction in the time required to collect drinking water would increase girls' and boys' enrolment rates by 18-19 percent. Their analysis included data from nine countries and the estimated effects of water access for children were among the largest for Pakistan.

Children's participation in market work has been found to be strongly associated with poverty in a range of settings including Ivory Coast, Colombia, Bolivia, the Philippines, Ghana and Vietnam [Grootaert and Kanbur (1995); Grootaert and Patrinos (1999); Canagarajah and Coulombe (1997); Edmonds and Pavcnik (2001)]. A family's need for cash will trump their aspirations for their children's schooling if they are poor and if there are opportunities for children to participate in market work nearby, although emerging evidence suggests that relatively small cash transfers can have sizable effects on poor children's school enrolments and attendance [Edmonds and Schady (2012)]. While in some settings it is possible for children to both attend school and participate in market work, this combination of activities is rarely reported in Pakistan.[3]

Within this overall economic framework lie strong gender differences in educational participation and patterns of work that, while influenced by the factors mentioned above, also have a history that lies outside this framework reflecting the influences of culture and religion. A variety of factors have been identified in the literature as important in explaining gender differences in school enrolment and patterns of children's work that depend on the culture and religion. Lloyd, Grant, and Ritchie (2008) review the literature on adolescent time use in developing countries and present findings from the analysis of data sets from five countries where definitions of time use are comparable and separable into the four categories of time use described above. Two major gender patterns are universal only varying by degree from setting to setting. First, while adolescent boys and girls both spend time working, the type of work they do differs with boys spending more time on market work activities and girls on domestic work. Second, girls tend to work longer hours in total than boys when market work and domestic work are combined, leaving girls less time for leisure. These basic realities have implications for gender differences in enrolment. They also have implications for the extent of parental responsiveness to changes in opportunities and costs as they relate to the education of their boys and girls. For example, boys' enrolment is less dependent on

[2]Joyce and Stewart (1999) highlight a number of areas where time-use data would make important contributions, including valuation of nonmarket work, verification and interpretation of existing information, measurement of real income and well-being, education and training.

[3]In a nationally representative survey of adolescents in Pakistan fielded in 2001-2002, it was found that few adolescents combine work and schooling [Sathar, *et al*. (2003)].

the proximity of a school than girls' enrolment [Lloyd, Mete, and Sathar (2005)] and girls are more likely to be withdrawn from school with the arrival of a new sibling than boys [Lloyd, Mete, and Sathar (2009)]. In terms of the transition between domestic work to market work, Aslam, *et al.* (2008) find that it is not until girls in Pakistan complete matric that we begin to see the composition of their work time shift significantly away from domestic work and towards participation in market work.

III. THE DATA

The main data used for this analysis are drawn from the 2007 Time Use Survey undertaken by the Pakistan Bureau of Statistics—a first of its kind in Pakistan. The respondents who reported on their time use were drawn from a nationally representative sample of 19,380 enumerated households. Two individuals over the age of 10 were chosen from each household using a selection grid for all households with 3 or more eligible members to assure randomisation.[4] The final sample consisted of 37,832 individuals of whom 5860 were adolescent boys ages 10-19 and 5638 were adolescent girls of the same ages. The survey was conducted during all 4 quarters of the year so that seasonal variations in time use would be reflected in the data. Each respondent was asked about time use over the previous 24-hour period, in half an hour segments.[5] The time diary allowed for the recording of up to 3 activities in each of 48 time segments. The responses, which were open-ended, were subsequently coded using a detailed activity classification system. While interviews took place every day of the week, including days when schools were not in session or on holidays, fewer interviews took place on Saturday than on the other days of the week. For this analysis we restrict the analysis to weekdays and periods when schools were in operation.

We grouped the activities into four broad categories: (1) market work, (2) domestic work, (3) learning, and (4) leisure. As defined by the survey, the time spent in market work included employment for establishments regardless of location as well as self-employment or work for family business including either primary production activities or services for income and other production of goods.[6] Time spent in domestic work included household maintenance, management and shopping for own household, care for children, the sick, the elderly and disabled for own household and community service or help to other households. We broadened the definition of learning beyond that used in the survey to include not only a diverse list of activities grouped for the survey under learning (including general education, homework, studies and course review, non-formal education, additional study and courses, preparation for exams, work-related training, travel related to learning and exams, waiting for learning and other learning not elsewhere classified) but also several other activities including participation in arts, sports, reading, visiting library and accessing information by computer. Leisure included other non-work and non-learning activities such as participation in cultural or religious activities, sports, watching TV, etc. Personal care that includes sleep and personal hygiene is the residual category.

[4]In households with either one or two eligible members, all eligible members were interviewed.

[5]It is interesting to note than less a third of the sample had a watch. 42 percent of males had a watch but only 17 percent of females.

[6]The employment patterns of children who reside within households are captured here. The TUS instrument would not capture, for example, bonded labour arrangements where the child workers may be detached from their households.

Box 1

Comparison of Enrolment Rates from 2007 LFS with Education and Learning Participation Rates Derived from the 2007 TUS Data

The Time Use Survey data on participation in learning are broadly consistent with the school enrolment rates derived from the Labour Force Survey (LFS) data for the same age groups, as summarised by the table below, while as discussed previously the Time Use Survey data provide one an opportunity to work with a much more complete definition of child work. The questions included in the two surveys are not fully comparable, however, and thus some differences between the two surveys are expected. For example, since LFS inquires about school enrolment but not school attendance, one could expect higher LFS enrolment statistics as opposed to TUS participation rates that are more likely to reflect school attendance. On the other hand, the LFS school enrolment question is likely to capture primarily formal school enrolment (not enrolment in religious schools or participation in non-formal education), which could underestimate participation-in-learning relative to the TUS data. Variations in the quality of fieldwork may also explain some of the differences. In our data, the TUS statistics are comparable but always lower than LFS statistics (particularly when only time in formal school is counted) except in the case of the youngest girls using the broadest definition of learning. In addition, the gender gap among older adolescents is much greater using the TUS education participation rate suggesting possibly lower attendance rates in formal schooling among older girls.

	10-14 Boys	10-14 Girls	*G/B 10-14*	15-19 Boys	15-19 Girls	*G/B 15-19*
Rural						
Enrolment (LFS)	77	54	*0.70*	42	24	*0.57*
Participation in Learning (TUS as defined in text)	69	56	*0.81*	35	21	*0.60*
Participation in Education (TUS, considers only time spent on formal schooling including home work, studies and course review)	68	49	*0.72*	34	16	*0.47*
Urban						
Enrolment (LFS)	87	84	*0.97*	56	54	*0.96*
Participation in Learning (TUS as defined on page 4.)	81	79	*0.98*	51	48	*0.94*
Participation in Education (TUS, considers only time spent on formal schooling including home work, studies and course review)	79	75	*0.95*	46	36	*0.77*

The TUS statistics are for normal weekdays.

In addition to detailed data on time use for each respondent, the Pakistan Time Use Survey also collects basic information on household characteristics. These data allow us to create a proxy for long-term wealth using an additive index of 20 household assets.[7] Other data gathered at the household level which captured features of the local community included travel time to fuel and water, whether or not the household had access to electricity and/or gas, whether or not a primary school and a secondary school were located within 30 minutes. Data on the household size, number of dependents, and sex and age of household head were also collected.

Since some of the factors impinging on time allocation decisions operate beyond the level of the family and household at the community level, we were interested in capturing relevant characteristics of the labour market. We relied on the national Labour

[7]Two separate indices were developed—one based on principle component analysis and one using a simple additive index ranging from 0-20 (scaled to vary between 0 and 1). The correlation coefficient between the two indices was .96 so we decided to stick with the simpler additive index which reflects the possession of any or all of the following items: sewing machine, washing machine, kerosene oil stove, electric/gas stove, pressure cooker, microwave oven, vacuum cleaner, refrigerator, telephone, mobile phone, TV, radio, car, clock, cable TV, computer, internet, cycle, motorcycle, VCR/DVD.

Force Survey (2007) for indicators of labour demand measured at the district level. Since the Labour Force Survey is not representative at the district level, we also used 2008-09 Pakistan Social and Living Standards Measurement Survey (representative at district level) to confirm the robustness of the findings. We considered two indicators of labour demand: (i) the district unemployment rate; and (ii) the share of the employed who are fully employed.[8] These two indicators turned out to be highly (negatively) correlated, with a correlation coefficient of 0.885; thus only district unemployment rate was used in the empirical models. The correlation coefficient between the unemployment rate by survey type was also high at 0.7.

In order to capture some aspects of the school environment at the district level, we used data from the School Census that was conducted in 2005. We recognise that things will have changed over the 2-year interval between the School Census and the 2007 surveys but we are assuming that these changes do not measurably affect the cross-district ranking of various measures of school quality. We created measures of school quality by averaging information across schools within a district. These measures include the student/teacher ratio (as a proxy for class size),[9] the proportion of students with drinking water at the school, and an index of the adequacy of classroom furniture, including tables and chairs for teachers, desks or benches for students as well as carpets and cupboards for students.[10] Because most but not all formal schools are single sex, we estimated separate school quality measures for primary and middle girls' schools, boys' schools and mixed schools as well as for secondary girls' schools, boys' schools and mixed schools by district.

IV. TIME USE PATTERNS AMONG ADOLESCENTS

The TUS allows us to explore a much fuller range of learning activities for adolescents than just participation in formal schooling (or what the survey labelled "general education"). This is important as it is precisely during adolescence that learning paths diversify with some adolescents following a more conventional path from primary to middle to secondary school within the formal system while others pursue non-formal learning alternatives including literacy and vocational training programmes as well as distance courses, computer training and self-education.

Table 1 presents enrolment rates from the Labour Force Survey (LFS) to provide a context within which we can interpret the time use data. In early adolescence at ages 10-14, we can see that roughly three quarters of the boys and only slightly more than 50 percent of the girls attend school in rural Pakistan. By later adolescence at ages 15-19, rural enrolment rates drop precipitously so that only 42 percent of the boys and 24 percent of the girls are still in school. The gender gap in rural enrolment remains extremely wide by international standards at 23 percentage points among those aged

[8]This was based on a compilation of involuntary reasons for underemployment including exogenous factors such as strike or lockout or layoff holiday, off season inactivity, bad weather, shortage of raw materials or fuel or other involuntary reasons.

[9]Some schools that were assessed as functional in the census did not report either the enrolment and/or the number of teachers. However, the percent of all schools with missing data on either enrolment or teachers represented less than 2 percent of all schools.

[10]The options available for the interviewer to choose for each element included: "according to requirements", "inadequate" or "not available".

Table 1

School Enrolment Among Adolescents by Sex and by Rural/Urban Residence (LFS 2007)

Age Group	10-14 Boys	10-14 Girls	10-14 Gender Gaps (Boys-Girls)	15-19 Boys	15-19 Girls	15-19 Gender Gap (Boys-Girls)
Rural	77	54	23	42	24	18
Urban	87	84	3	56	54	2

10, 14 and 18 percentage points among those aged 15-19. In urban Pakistan, the situation is very different. Over 80 percent of young adolescent boys and girls are enrolled in school and the gender gap is negligible. Again enrolment rates fall by 30 percentage points in later adolescence so that no more than a slight majority of boys and girls are attending school at ages 15-19.

Behind these data lie a more detailed and nuanced story about the daily lives of adolescents as revealed by their daily time use data as reported in the Time Use Survey. In Table 2 we show the percent of adolescents by age, sex and residence who participated in market work, domestic work and learning in the previous 24 hours as well as the mean number of minutes per day spent in each activity for those who reported any participation in that activity. As explained above, learning encompasses a range of activities beyond school attendance.

Table 2

Participation Rates and Average Minutes Spent Among Participants in Market Work, Domestic Work and Learning by Age, Sex and Residence (TUS 2007)

Age Group	10-14 Boys	10-14 Girls	15-19 Boys	15-19 Girls
Participation Rates				
Rural				
Market Work	37	32	67	49
Domestic Work	19	72	22	92
Learning	69	56	35	21
Urban				
Market Work	15	10	42	20
Domestic Work	21	58	25	87
Learning	81	79	51	48
Mean Minutes per Day for those who Participate in the Activity				
Rural				
Market Work	281	189	409	214
Domestic Work	70	182	104	279
Learning	378	351	383	339
Urban				
Market Work	329	163	490	177
Domestic Work	75	125	90	223
Learning	399	375	370	334

In terms of participation rates, we can see that, for boys in rural areas, roughly two-thirds report participating in learning activities in the 24 hours before the survey during the early adolescent years (10-14). Participation in learning activities among rural boys falls to only a third during the later adolescent years (15-19). While no more than a fifth of the boys report any domestic work activity in the previous day, participation in market work rises to roughly two-thirds in the later adolescent years (15-19). The biggest gender gap in participation rates in rural areas is in participation in domestic work with over 70 percent of younger girls (10-14) reporting domestic work in the previous day and 90 percent of older girls (15-19). A detailed exploration of the types of domestic work which are most commonly reported by adolescent girls includes time spent in food preparation including grinding, milling, culling, heating water and chopping wood, cooking, cleaning up as well as household cleaning and upkeep and the care and washing of clothes, and the care of children. Roughly a third of the younger rural girls participate in market work rising to nearly a half among older girls. However, those girls who do report participation in market work spend significantly fewer hours than boys on this activity. While older boys doing market work spend on average almost 7 hours daily, girls report an average of about 3 and a half hours of work. For those who report participation in learning activities, these are the most time consuming activities, averaging 6 to 6.5 hours daily.

In urban areas, the rates of participation in learning are much higher, particularly for girls with the result that we see almost no gender gap. To balance more time spent on learning, urban boys and girls report much less time spent in market work. Participation in domestic work remains highly feminised with only a fifth of the boys reporting participation in the previous day (the same participation rates as reported by rural boys) and participation rates for urban girls rising to almost the same level as reported by rural girls at 87 percent. However, urban girls who do domestic household work report fewer hours than the rural girls.

It is clear that learning activities encompass much more than formal school attendance which was defined by the TUS as participation in general education. As we can see in Table 3, there are strong pay-offs to taking into account learning activities at home. Learning at home encompasses homework, studies and course review related to general education, preparation for exams and additional study and courses. Significant time is spent at home on learning as a result of homework and exam preparation. Participation rates in informal education, which include not only enrolment in non-formal education programmes but also participation in arts, sports, reading, computer and library, is very low except among older urban adolescents where participation rates are 12 percent. A large percentage of younger adolescents (fewer girls than boys) report time in travel to school or "waiting for learning" and for those who report time in this activity, the time spent is roughly an hour. The category "other learning not elsewhere classified" appears to be quite important for younger adolescents and is likely to relate to religious education that many Pakistani children participate in on a part-time basis to learn the Quran. Roughly, a quarter of the rural boys and girls participate in "other" learning and roughly a third of the younger adolescents in urban areas. For those who report participating in this activity on the previous day, this unclassified learning activity consumes roughly an average of 2 hours daily. Table 3 does not include participation in work training which was reported by very few but, for the few who do participate, work training absorbs significant time particularly for older rural boys.

Table 3

Participation Rates and Mean Daily Minutes Spent Among Participants in Selected Learning Activities by Age, Sex and Rural/Urban

	Boys 10-14	Girls 10-14	Boys 15-19	Girls 15-19
Participation Rates				
Rural				
General Ed.	51	35	23	11
Home Work	48	41	26	16
Informal Ed.	1	1	2	2
Travel/Waiting	60	46	27	14
Other	24	21	7	4
Urban				
General Ed.	59	53	34	24
Home Work	60	61	35	32
Informal Ed.	4	4	12	12
Travel/Waiting	70	64	37	30
Other	36	30	10	10
Mean Minutes per Day for those who Participate in the Activity				
Rural				
General Ed.	293	286	291	294
Home Work	91	107	130	150
Informal Ed.	92	63	103	84
Travel/Waiting	63	62	70	61
Other	122	109	154	151
Urban				
General Ed.	279	278	269	282
Home Work	97	115	140	151
Informal Ed.	102	62	82	70
Travel/Waiting	70	67	68	68
Other	122	107	125	125

V. EMPIRICAL FRAMEWORK

An heuristic model to illustrate the key concepts of interest is offered by Edmonds (2007) briefly summarised here. In this utility maximisation framework Y is income from parents' labour supply, M is child's work outside of household at wage w, E is education and e is direct schooling costs, H is value obtained from the input of child's time, P is play/leisure. Thus the first component of the utility function considers purchased inputs and also input of the child's time, while the second component of the utility function captures the value attached to child's future welfare that is a function of time allocated to education and play/leisure.

$$\max_{E,P.M.H.} u(F(Y + wM - eE, H), R(E, P)$$

Subject to $E + P + M + H = 1$, $E \geq 0$, $M \geq 0$, $H \geq 0$

It is useful to highlight two implications of this framework here. Labour market conditions (through parental earnings and wage rates that apply to child work) are explicitly part of the model. Indeed, not only the adult wages are likely to have an impact on child labour but also the sectoral distribution of labour, the skilled versus unskilled labour supply mix, unemployment and underemployment rates etc. It is possible to further model such relationships, for example allowing child labour to be a substitute to unskilled adult labour [Doepke and Zilibotti (2005)]. In our empirical model we are able to take into account district level unemployment rates, via merging TUS data with LFS and PSLM data as discussed earlier. Also, education quality is implicitly included since the value that parents attach to children's time spent on learning will depend on the quality of schools. By merging TUS data with school census data, we included district level school-characteristics variables in the model.

The reduced form equations that we estimate are:

$$T_i = \beta_{1i}X_1 + \beta_{2i}X_2 + \beta_{3i}X_3 + \varepsilon_i$$

Where T_1,T_2, T_3 and T_4 are time (minutes) spent on market work, domestic work, learning and leisure in the previous 24 hours respectively. The vector of explanatory variables, X_1, includes the household head's age and its square; the household head's gender; an asset index as a proxy for household wealth; urban residence dummy; number of children as a percent of all household members; child's gender, age and its square. The district level unemployment rate and school characteristics are captured by X_2 and X_3 respectively.

VI. MULTIVARIATE RESULTS

Multivariate tobit models are used for the estimation, since not all children report spending time on three of the four categories of interest (all observations have non-zero time values for the leisure category). This approach also allows each equation's error term to be correlated with other error terms, which provide useful information on the extent to which children who spend time on one activity are more (or less) likely to spend time on another activity, after taking into account the effects of explanatory variables. Tables 4 and 5 present the results.

Regressions were run separately for younger and older adolescent girls and younger and older adolescent boys. Household variables include the head's age, whether or not the head was female, the percent of dependents in the household, and an index of household assets. The school variables included a measure of school access assessed at the household level (whether or not a primary school or a secondary school was within 30 minutes' travel time of the household) and sex-specific measures of school quality more objectively assessed at the district level. Measures of school quality for primary and middle schools are introduced as potential determinants of time use among younger adolescents and measures of school quality for secondary schools as determinants of time use for older adolescents. Other community variables measured by the household data include whether or not the household has electricity, and indices to measure the household's distance to fuel and water. Measures constructed at the district level capture various aspects of school quality and labour demand as described in the data section above.

Table 4

Multivariate Tobit Estimates of Time Use Patterns for Children Aged 10 to 14

	Girls 10-14				Boys 10-14			
	Market Work	Domestic Work	Learning	Leisure	Market Work	Domestic Work	Learning	Leisure
HH head's age	0.8891	–0.1659	–0.0286	–0.4693	0.1786	–0.7164*	–0.4098	–0.0347
Female-headed HH	–23.03	–15.90	45.47*	–15.12	–17.50	–7.94	51.87***	2.64
Household Possessions Index (0-1)	–325.21***	–219.28***	484.27***	22.38	–418.54***	–49.64*	335.21***	–1.68
Percent of dependents in HH	0.3718	0.467	–0.347	–0.2479	1.6141**	–0.0765	–0.8117	0.0491
Urban dummy	–47.42**	13.51	21.41	–18.17*	11.77	11.44	–7.21	–1.00
Primary school within 30 minutes	–75.77*	–53.09*	69.94*	37.19	–106.23**	–33.33	113.96**	–21.73
Distance to fuel (0 to 5)	81.87***	56.41***	–79.31***	–7.57	70.71***	19.20	–61.45***	0.92
Distance to water (0 to 5)	64.37**	–6.38	–30.85	–8.34	35.04	–4.02	–48.31	14.28
HH has electricity	–113.53***	–1.83	98.00***	3.41	–86.52***	34.89**	46.60*	15.69
Province: Sindh	–37.41	–32.43**	–126.48***	84.05***	22.72	32.76***	–146.00***	41.04***
Province: N.W.F.P. (KP)	15.70	61.90***	–138.79***	1.27	60.57*	33.49*	–13.85	–27.66*
Province: Balochistan	34.13	28.74	–113.81***	–5.15	–13.95	87.30***	–52.90	–10.43
Proportion girls primary schools with drinking water	68.98	176.56***	–160.68*	–75.24**				
Girls primary school furniture index	–263.65*	–12.53	199.24	31.64				
Student/teacher ratio: primary school for girls	–0.57	–1.69***	0.4869	0.5725				
Proportion boys primary schools with drinking water					33.79	2.16	31.46	–28.85
Boys primary school furniture index					–178.3	–72.40	203.24**	84.16
Student/teacher ratio primary school for boys					–0.0557	0.6881	–1.89**	–0.1385
District unemployment rate, %	–1.19	–4.97	11.56**	–2.15	–3.99	1.45	–4.27	4.04
Constant	110.10	99.15*	24.60	214.90***	171.60	–89.45*	175.68*	236.68***
σ_1	5.4001***				5.6193***			
σ_2	5.0942***				4.6633***			
σ_3	5.6153***				5.4726***			
σ_4	4.8425***				4.8610***			
$P_{marketw\_domesticw}$	0.0893***				–0.0591*			
$P_{marketw\_learning}$	–0.4205***				–0.7003***			
$P_{marketw\_leisure}$	–0.1463***				–0.3135***			
$P_{domesticw\_learning}$	–0.6375***				–0.1578***			
$P_{domesticw\_leisure}$	–0.1148***				0.0768**			
$P_{learning\_leisure}$	–0.4438***				–0.4164***			
N	1947				2155			

*** Statistically significant at 1 percent level; **Statistically significant at 5 percent level; * Statistically significant at 10 percent level.

Table 5

Multivariate Tobit Estimates of Time Use Patterns for Children Aged 15 to 19

	Girls 15-19				Boys 15-19			
	Market Work	Domestic Work	Learning	Leisure	Market Work	Domestic Work	Learning	Leisure
HH head's age	0.5992	–1.9917***	1.8967*	0.2773	–0.7231	–1.6933***	–0.2276	0.2201
Female-headed HH	–25.18	–9.24	74.16**	–8.07	–67.91*	–30.325	18.73	22.58
Household Possessions Index (0–1)	–344.05***	–190.34***	752.47***	86.89***	–563.15***	78.61	516.19***	129.06***
Percent of dependents in HH	–1.28**	2.12***	–2.22**	–0.41	2.01**	–0.1441	–1.68	–0.3654
Urban dummy	–70.74***	–18.71	32.86	5.85	–8.92	33.03*	3.39	–0.54
Secondary school within 30 minutes	–58.59***	9.14	34.21	3.63	60.56**	–25.39	–61.26*	–9.34
Distance to fuel (0 to 5)	39.12	20.79	–40.97	–9.66	13.74	75.45***	–87.26**	15.43
Distance to water (0 to 5)	36.27	–5.44	–44.95	–1.38	–21.57	–1.27	4.70	–7.18
HH has electricity	–84.20***	1.51	32.11	34.54**	–84.96***	37.41	67.24	33.27**
Province: Sindh	–27.34	–25.09*	–22.93	52.46***	—2.648	–15.69	–64.15**	47.18***
Province: N.W.F.P. (KP)	–9.89	32.17	–98.74**	0.8896	–58.59	27.53	110.81***	26.53
Province: Balochistan	36.96	–9.90	–53.40	–10.37	–18.58	35.45	–74.55	30.02
Proportion girls secondary schools with drinking water	149.08**	–78.07	–105.59	22.69				
Girls secondary school furniture index	–228.44***	108.35*	229.66	–108.75**				
Student/teacher ratio secondary school for girls	1.40	0.58	–1.71	–0.36				
Proportion boys secondary schools with drinking water					134.25	–53.43	–284.26*	–54.06
Boys secondary school furniture index					–339.57**	14.54	50.05	18.88
Student/teacher ratio secondary school for boys					3.38	–3.95	–3.37	–2.30
District unemployment rate, %	–8.49	–3.17	13.64*	1.48	–1.83	–3.59	–7.68	6.37*
Constant	138.94*	380.91***	–428.47***	142.13***	401.42**	–55.95	233.75	182.88***
σ_1	5.4399***				5.7770***			
σ_2	5.1751***				5.1060***			
σ_3	5.8289***				5.8512***			
σ_4	4.8226***				4.9410***			
$P_{marketw\_domesticw}$	–0.2187***				–0.2075***			
$P_{marketw\_learning}$	–0.1491***				–0.9167***			
$P_{marketw\_leisure}$	–0.3279***				–0.4646***			
$P_{domesticw\_learning}$	–0.6751***				–0.0647*			
$P_{domesticw\_leisure}$	–0.1255***				0.0725*			
$P_{learning\_leisure}$	–0.3709***				–0.1440***			
N	1672				1614			

*** Statistically significant at 1 percent level; **Statistically significant at 5 percent level; * Statistically significant at 10 percent level.

Table 6 provides sample means and standard deviations for all the household, school and community variables used in the multivariate models. While time spent on learning exceeds time spent in other activities among younger adolescents, this is no longer true among older adolescents at which point girls spend the most time on average on domestic work and boys spend the most time on average on market work.

Table 6

Sample Means and Standard Deviations for the Variables in Multivariate Tobit Models

	Girls 10–14		Boys 10–14		Girls 15–19		Boys 15–19	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Time spent: Market Work (min)	47.36	110.74	89.16	180.51	90.51	147.21	268.52	265.82
Time spent: Domestic Work (min)	107.24	140.04	11.51	32.33	238.26	175.41	17.11	56.77
Time spent: Learning (min)	261.33	228.66	330.47	212.83	113.62	204.74	179.81	231.31
Time spent: Leisure (min)	213.21	132.76	244.13	131.70	196.60	129.09	229.54	144.29
HH head's age	46.12	11.02	45.84	10.66	48.84	12.10	49.12	11.09
Female-headed HH	0.10	0.30	0.08	0.27	0.09	0.28	0.09	0.29
Household Possessions Index (0-1)	0.24	0.16	0.25	0.17	0.27	0.17	0.27	0.17
Percent of dependents in HH	13.82	13.18	13.55	13.25	11.18	12.42	9.32	11.93
Urban dummy	0.35	0.48	0.35	0.48	0.38	0.49	0.41	0.49
Primary school within 30 minutes	0.97	0.16	0.97	0.18	0.97	0.17	0.98	0.15
Secondary school within 30 minutes	0.65	0.48	0.65	0.48	0.68	0.47	0.70	0.46
Distance to fuel (0 to 5)	0.43	0.40	0.44	0.40	0.41	0.40	0.40	0.41
Distance to water (0 to 5)	0.07	0.20	0.08	0.22	0.07	0.21	0.06	0.19
HH has electricity	0.92	0.27	0.90	0.30	0.93	0.25	0.92	0.27
Province: Sindh	0.24	0.43	0.27	0.44	0.26	0.44	0.30	0.46
Province: N.W.F.P. (KP)	0.15	0.36	0.12	0.32	0.14	0.34	0.12	0.32
Province: Balochistan	0.04	0.19	0.05	0.22	0.03	0.17	0.05	0.21
District unemployment rate, %	2.34	2.15	2.26	2.03	2.44	2.13	2.41	2.09
Proportion girls primary schools with drinking water	0.74	0.12	–	–	–	–	–	–
Girls primary school furniture index	0.32	0.07	–	–	–	–	–	–
Student/teacher ratio primary school for girls	36.65	11.29	–	–	–	–	–	–
Proportion boys primary schools with drinking water	–	–	0.75	0.16	–	–	–	–
Boys primary school furniture index	–	–	0.30	0.08	–	–	–	–
Student/teacher ratio primary school for boys	–	–	42.12	11.85	–	–	–	–
Proportion girls secondary schools with drinking water	–	–	–	–	0.93	0.10	–	–
Girls secondary school furniture index	–	–	–	–	0.41	0.09	–	–
Student/teacher ratio secondary school for girls	–	–	–	–	10.44	4.47	–	–
Proportion boys secondary schools with drinking water	–	–	–	–	–	–	0.92	0.08
Boys secondary school furniture index	–	–	–	–	–	–	0.37	0.08
Student/teacher ratio secondary school for boys	–	–	–	–	–	–	8.15	2.14

On average, households score about .25 on the household wealth index which ranges from 0 to 1, indicating that they possess no more than 5 of the 20 possessions included in the index. While no more than 6 to 8 percent of households are situated near drinking water, almost all households have electricity (over 90 percent), slightly less than half have nearby access to fuel. Almost all households live within 30 minutes of a primary school and roughly two thirds on average live within 30 minutes of a secondary school but for the secondary school access indicator, the standard deviation is large suggesting that the proximity of a secondary school is highly variable, with sizable differences between rural and urban areas.

Our three indicators of school quality show considerable variation within districts suggesting that district averages for school quality may not fully capture school quality effects even when district averages vary substantially, which they do. Ninety percent of the variance in school quality takes place within rather than across districts.

Household Wealth: We will begin our discussion of the results with the household variables and we can see immediately that the most important variable associated with adolescent time use is the economic status of the household as measured by the index of up to 20 durable household possessions. Figures 1 and 2 illustrate the critical importance of household wealth in children's participation in certain activities such as learning, as well as time spent on these activities, using projections based on the multivariate tobit estimates (Tables 4 and 5). The projections involve setting all the right hand side variables, other than the household wealth index, to their average values and then projecting the variation in time use predicted by the models at each level of the household wealth index, ranging from 0 for households with no household assets to 1, for households having all 20 assets. About 66 percent of households in our sample have scores of 0.3 or less.

Fig. 1. Estimated Participation by Household Wealth

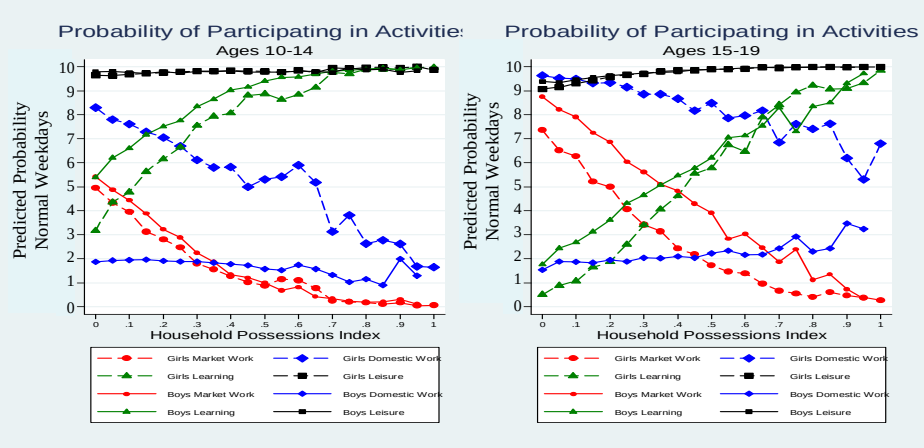
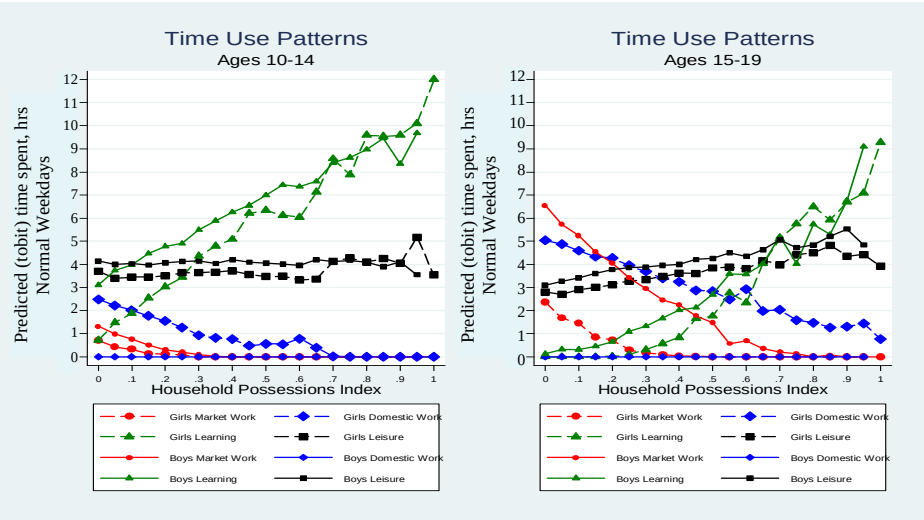


Fig. 2. Estimated Time Use Patterns by Household Wealth



The likelihood that a 10-14 year old living in the poorest households will participate in a *learning activity* is somewhere between 30 percent (for girls) and 55 percent (for boys). Even those who report a learning activity spend only 1 hour (for girls) or 3 hours (for boys). In contrast, almost all children from wealthier households with a household possessions index of 0.7 or above participate in learning, with small differences for males and females. For this wealthier group, the estimated time spent on learning related activities on a school day is around 8 hours for both boys and girls. Similar patterns can be observed for the 15 to 19 age group. In fact, if anything, the differences between the poorest and wealthiest children are starker for this age group.

Figure 2 suggests a household possessions index set at around 0.3 (indicating households with 6 of the 20 possessions listed) might be a cut-off point for targeted policy interventions aiming to increase time spent on learning, since at or below that cut-off point children are estimated to spend less than 4 to 5 hours of learning (on a normal school day). At that cut-off point, girls are particularly disadvantaged. To give some perspective on what this proposed cut-off might mean, the national safety net programme -the Benazir Income Support Programme (BISP) utilises a poverty-score index similar to the one used here[11] to identify the poorest households, covering 15 to 20 percent of households in Pakistan. The trends documented here suggest that this programme's database can be very beneficial in identifying children who are disadvantaged in terms of schooling, but they also reveal that (to the extent that resources allow) a much more generous eligibility cut-off point can be considered for education sector interventions, such as conditional cash transfers.

The probability of the poorest 10-14 year olds' participating in *market work* is quite high at around 50 percent for both males and females, while the odds of market work is close to 0 for those with a household possessions index of 0.7 or more. Having said that, even for the poorest, the time spent on market work is estimated at no more than 1 hour per day for this group on average. However, for the poorest 15 to 19 year olds, the odds of participating in market work are at 90 percent for boys and over 70 percent for girls; who spend over 6 hours and 2 hours per day on this activity respectively. For the 15 to 19 year olds too, the wealthiest children basically do not participate in market work.

The gender differences are most pronounced for time spent on *domestic work.* Even though boys may report carrying out some domestic work, time spent on that activity remains negligible at around 0 hours for both age groups. Over 80 percent of the poorest girls between ages 10 and 14 carry out domestic work, spending about 2.5 hours per day on this activity. The likelihood of domestic work declines to about 20 percent for the wealthiest girls, similarly average time spent on this activity converges to 0 as wealth increases. Almost all poor girls in the 15 to 19 age group report doing domestic work, interestingly even over 50 percent of the wealthiest girls also report the same. The estimated time spent is over 5 hours for the poorest girls and about 1 hour for the wealthiest.

[11]The BISP poverty scorecard, a proxy means test instrument, considers selected household possessions as well as other household characteristics such as the schooling of household head, ownership of livestock and land.

All children report spending time in *leisure* activities. The gender differences are small, with boys spending about 30 minutes more time on leisure than girls regardless of household wealth. Wealth effect is not visible for the 10-14-age group, but the wealthiest 15 to 19 year olds spend about 2 hours more time on leisure compared to the poorest children.

Household Composition: The variables in this category are the household head's age, female-headed households' head dummy and percentage of dependents in the household. All these variables are clearly endogenous, thus some caution needs to be exercised for interpreting their correlations with children's time use patterns (the main findings for other explanatory variables are not affected if these variables are excluded from the model). The estimated coefficients for *household head's age* are mostly not statistically significant at 10 percent level, with the exception of a robust negative relationship with time spent on domestic work. Even then, a 10 year increase in the household head's age is linked to somewhere between 7 minutes to 20 minutes less time devoted to domestic work, which is a relatively small effect. As the percentage of dependents in the household increases, boys (both age groups) become more likely to participate in market work, while older girls (ages 15 to 19) spend more time on domestic work. Thus in order to deal with the dependency burden, parents put boys to work and older girls assume child and elderly care duties. Finally, children in *female headed households* spend significantly more time on learning: 10 to 14 year old boys and girls spend 51 and 44 minutes more on learning, while for the 15 to 19 year olds the corresponding statistics are 18 and 74 minutes (although in this case the estimate for boys is not statistically significant at 10 percent level). Also, older boys in female-headed households are less likely to participate in market work. These effects, after controlling for household wealth and other characteristics, are consistent with previous research showing that women are more child-oriented in their decisions about household resource allocation than men.

Schooling Environment: Schooling environment variables included measures of availability of primary and secondary schools within 30 minutes, average student/teacher ratios in the district for specific types of schools including girls' schools, boys' schools and mixed schools, the percent of schools in the district with drinking water on the premises, and an index of furniture which was averaged across schools in the district. As girls could attend an all-girls' school or a coed school, the characteristics of both were included in the regressions for girls and the same was true for boys. The characteristics of primary or middle schools were aggregated for the regressions for younger adolescents and the characteristic of secondary schools were aggregated for the regressions for older adolescents.

Adolescents spend more time learning and less time working when schools are nearby. The presence of a primary school is associated with 70 minutes' more time spent on learning for girls and 114 minutes' more time spent on learning for boys. Surprisingly, for 15 to 19 year olds school availability is not correlated with more time spent on learning.[12]

[12]We also experimented with alternative specifications where availability of both primary and secondary schools were considered. The combined effect of the presence of both primary and secondary school for 10 to 14 year olds on learning is over 100 minutes per day. For 15 to 19 year old girls, the availability of school coefficients were not statistically significant at 10 percent level.

The index of the extent to which the classroom is properly furnished has the expected and large effect, associated with about 200 minutes increase in time devoted to learning for 10 to 14 year olds (for older children the coefficient estimates are positive but they are not statistically significant at 10 percent level). The student/teacher ratio is statistically significant (at 5 percent level) in only one of the four specifications, the one for 10 to 14 year old boys. The effect is in the expected direction, but small in magnitude: the doubling of student/teacher ratio is estimated to reduce time allocated to learning by less than 5 minutes only. Finally, the proportion of schools with drinking water is negatively correlated with time spent learning in 3 out of 4 specifications, which is puzzling.

Other community characteristics considered are availability of electricity, distance to fuel and water, urban and province dummies, and district unemployment rate. The presence of electricity in the household has a positive association with time spent on learning and a strong negative association with time spent on market work, possibly because electricity makes it easier to do school work at home in the evenings but also because access to electricity might be capturing other features of the community that are not included in the model. A greater distance-to-fuel reduces time spent on learning and increases time spent working, particularly market work time. The estimated coefficients for distance-to-water on learning are not statistically significant in our specifications.

Urban residence is associated with 47 minutes less time spent on market work for 10 to 14 year old girls (statistically significant at 5 percent level) and 71 minutes less market work for 15 to 19 year old girls (statistically significant at 1 percent level). The province-dummies are also often statistically significant and large in magnitude. In particular, 10-14 year old girls in KP are estimated to spend 138 minutes less on learning compared to their counterparts with similar household, community and school characteristics in Punjab. The corresponding statistic for Balochistan is spending 113 minutes less on learning when compared to Punjab; and 126 minutes less compared to Sindh.

Finally, the higher the district unemployment rate, the less time spent on market-work in all models. This effect is never statistically significant at 10 percent level though. The district unemployment rate is associated with increased time allocated to learning by girls (statistically significant at 5 percent level), as well as increased leisure time for 15 to19 year old boys (statistically significant at 10 percent level).

After taking into account this set of explanatory variables, we need to know if children who spend more time on certain activities more or less likely to spend time on other activities?

The last rows of Tables 4 and 5 provide the correlation coefficients among the error terms of the four tobit time use equations that are estimated, to illustrate the extent to which children who spend time on one activity (e.g., market work) are more likely to spend time on another activity (e.g., learning), after taking into account the effects of explanatory variables. A robust finding that emerges from this analysis is that a child who spends more time on any one of the activities is less likely to spend time on another activity. In particular, those who do either domestic or market work are significantly less likely to spend time on learning. The trade-off between time spent on domestic work and learning is particularly severe for girls. There are two

exceptions to this rule, however. First, boys who spend more time on leisure are also more likely to spend time on domestic work. Second, 10 to 14 year old girls who spend more time on domestic work are also likely to spend more time on market work.

VII. CONCLUSIONS

This research shows that the amount of time children spend working, whether it be at home or the market, is strongly correlated with household poverty (as proxied by an asset index) in Pakistan. Consistent with the literature on the predictors of school enrolments of adolescents, time spent on learning is also significantly lower among the poor. The national safety net programme, BISP, has completed a nationwide census of households in Pakistan to collect poverty-score information, which includes information on household assets. This database would be a very promising tool to target efforts to increase children's time allocated to learning.

Our analysis, when combined with impact evaluation results on the effectiveness of Pakistan Bait-ul-Mal's pilot conditional cash transfer programme, also reveals that a much more generous eligibility cut-off point (compared to BISP's current eligibility threshold for unconditional cash transfers) can be considered for supplementary education sector interventions such as conditional cash transfers. The findings from the pilot conditional cash transfer programme in Pakistan not only support the need to compensate the poorest households for their children's time that would be used for labour as opposed to learning, but also suggests that a small additional amount to the base unconditional cash transfer might be sufficient to increase school attendance of children from most households (but the poorest of the poor, who would require full compensation of the value of the child's time to forego work).[13]

Considering the increased responsibilities of provinces in the delivery of health and education services after the passage of the 18th constitutional amendment, financing of such complementary programmes are likely to be through provinces, which in turn would need to consolidate existing ad hoc social protection interventions to free up resources for targeted programmes. It seems there may be pay-offs to providing larger benefits for girls' school attendance, especially in KP and Balochistan where, even after taking into account the effects of other explanatory variables in our model, girls remain at a significant disadvantage in terms of time devoted to learning.

This analysis also shows, by allowing for correlations among the four time-use equations, that those who do market or domestic work are significantly less likely to spend time on learning after controlling for other explanatory variables to capture household and community characteristics. The trade-off between time spent on domestic work and learning is particularly severe for girls.

Such demand-side conditional cash transfers would need to be a part of a comprehensive set of actions, including the implementation of regulations to discourage child employment especially in industries where employment conditions tend to be risky and unsafe. Labour market regulations would not have any direct effect on domestic work

[13]As discussed previously, World Bank (2009) reports 75 percent of poor parents interviewed indicating "need child to help with work at home" as the most important barrier to meet the conditional cash transfer programme's school attendance requirements.

undertaken by girls, however, which is very much determined by household conditions including the fertility trends and dependency ratio. In this paper we only noted the correlation between dependency ratio and girls' time spent on domestic work, which is consistent with the causal effects associated with the arrival of an unexpected/unwanted sibling identified elsewhere using panel household survey data from Pakistan [Lloyd, Mete, and Grant (2009)].

Finally, this analysis provides some evidence suggesting that parents also consider the schooling environment when they make decisions about children's time use; for example there is a relationship between better-furnished schools and children's time spent on learning.

The time-use effects of other indicators that we considered are either small (e.g., student/teacher ratio) or in the "wrong" direction (availability of water in school). Thus while this study provides some evidence that suggests school environment might be a potential important factor to consider for understanding time use decisions, causal effects are yet to be studied carefully with adequate survey instruments that survey households over time and ideally take advantage of random variations in school characteristics.

REFERENCES

Aslam, Monazza, Geeta Kingdon, and Mans Soderbom (2008) Is Female Education a Pathway to Gender Equality in the Labour Market? Some Evidence from Pakistan. In Marcy Tembon and Lucia Fort (eds.) *Girls' Education in the 21st Century; Gender Equality, Empowerment and Economic Growth.* Washington, DC: World Bank. 67–92.

Canagarajah, Roy and Harold Coulombe (1997) Child Labour and Schooling in Ghana. World Bank. Washington, D.C. (Policy Research Working Paper Series No. 1844).

Doepke, Matthias and Fabrizio Zilibotti (2005) The Macroeconomics of Child Labour Regulation. *The American Economic Review* 95:5, 1492–1524.

Edmonds, Eric V. (2007) Child Labour. In T. P. Schultz and J. Strauss (eds.) *Handbook of Development Economics.* Vol 4. Amsterdam, Holland: Elsevier Science.

Edmonds, Eric V. and Nina Pavecnik (2002) Does Globalisation Increase Child Labour? Evidence from Vietnam. Cambridge MA, National Bureau of Economic Research. (NBER Working Paper No. 8760).

Edmonds, Eric V. and Norbert Schady (2012) Poverty Alleviation and Child Labour. *American Economic Journal: Economic Policy* 4:4, 100–124.

Grootaert, Christian and Harry Patrinos (1999) *The Policy Analysis of Child Labour: A comparative Study.* New York: St. Martin's Press.

Grootaert, Christian and Ravi Kanbur (1995) Child Labour; An Economic Perspective. *International Labour Journal* 134, 187–203.

Joyce, Mary and Jay Stewart (1999) What Can We Learn from Time-use Data? *Monthly Labour Review* August, 3–6.

Koolwal, Gayatri and Dominique van de Walle (2010) Access to Water, Women's Work and Child Outcomes. The World Bank. (Policy Research Working Paper No. 5302).

Lloyd, Cynthia B., Cem Mete, and Monica Grant (2007) Rural Girls in Pakistan: Constraints of Policy and Culture. In Maureen Lewis and Marlaine Lockheed (eds.) *Exclusion, Gender, and Education: Case Studies from the Developing World* 99–118. Washington, DC: Centre for Global Development.

Lloyd, Cynthia B., Cem Mete, and Monica J. Grant (2009) The Implications of Changing Educational and Family Circumstances for Children's Grade Progression in Rural Pakistan: 1997–2004. *Economics of Education Review* 28, 152–160.

Lloyd, Cynthia B.,Cem Mete, and Z. A. Sathar (2005) The Effect of Gender Differences in Primary School Access, Type, and Quality on the Decision to Enrol in Rural Pakistan. *Economic Development and Cultural Change* 53:3, 685–710.

Lloyd, Cynthia B., Monica J. Grant, and Amanda Ritchie (2008) Gender Differences in Time Use Among Adolescents in Developing Countries: Implications of Rising School Enrolment Rates. *Journal of Research on Adolescence* 18:1, 99–120.

Mete, Cem (2013) Children's Work, Study and Leisure Time in Five Countries: Implications for Human Capital Accumulation. World Bank, Washington, DC. (Unpublished).

National Research Council and Institute of Medicine (2005) Growing Up Global: The Changing Transitions to Adulthood in Developing Countries. In Cynthia B. Lloyd (ed.) *Panel on Transitions to Adulthood in Developing Countries*. Washington, DC: The National Academies Press.

Pakistan, Government of (2009) Poverty Reduction Strategy Paper (PRSP) II. Finance Division, Islamabad, Pakistan.

Rustagi, Preet (2009) Rural Child Work, Labour and Daily Practices: A Time Use Survey Based Analysis. *The Indian Journal of Labour Economics* 52:3, 451–471.

Sathar, Zeba A, Cynthia B. Lloyd and Minhaj ul Haque (2000) *Investments in Children's Education and Family-Building Behaviour in Pakistan: Findings from Rural NWFP and Punjab.* Islamabad: Population Council.

Sathar, Zeba A., Cynthia B. Lloyd, Minhaj ul Haque, Judith A. Diers, A. Faizunnissa, Monica Grant, and M. Sultana (2003) *Adolescents and Youth in Pakistan 2001-2002: A Nationally Representative Survey*. Islamabad: Population Council.

Winthrop, Rebecca and Corinne Graff (2010) Beyond Madrasas; Assessing the links between Education and Militancy in Pakistan. Centre for Universal Education, Brookings Institution. Washington, D.C. (Working Paper No. 2).

World Bank (2009) Rapid Assessment Report on Child Support Programme of Pakistan Bait-ul-Mal. Washington, DC, World Bank. (Unpublished).

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Pakistan, Politics and Political Business Cycles

GERNOT SIEG and IREM BATOOL

This paper studies whether in Pakistan the dynamic behaviour of unemployment, inflation, budget deficit and real GDP growth is systematically affected by the timing of elections. We cover the period from 1973-2009. Our results can be summarised as follows: (1) Unemployment tends to be lower in pre-election periods and tends to increase immediately after elections, perhaps as a result of politically motivated employment schemes. (2) Inflation tends to be lower in pre-election periods, perhaps as a result of pre-electoral price regulation. (3) We find increase in the governmental budget deficit, financed by heavy government borrowings from the central bank and banking sector during election year. (4) Real GDP growth and real governmental investment growth declines during pre and post election terms possibly as a result of inefficient resource allocation.

JEL Classification: D72, D78, H50, H61, E51
Keywords: Opportunistic Political Business Cycle, Fiscal Policy, Macro-economics, Elections, Pakistan

1. INTRODUCTION

Political business cycle theory formalises the common perception that politicians use expansionary economic policies in a pre-election period to enhance their chances of re-election.[1] Opportunistic politicians are primarily interested in retaining office. When they face an electorate that prefers high growth, low unemployment and low inflation, politicians may use expansionary fiscal or monetary policies to create a short term economic boom before and during the election campaign. Naive voters are unable to understand the politician's manipulation of the economy and it's adverse after effects. On the contrary, they enjoy the boom and re-elect the politician.

Rational voters, of course, anticipate manipulating behaviour and may not reward politicians. However, theoretical models [Rogoff (1990); Sieg (1997)] including rational voters and time inconsistent [Kydland and Prescott (1977)] policies find cycles that are similar to the naive cycles postulated by Nordhaus (1975). In this "rational" line of literature, politicians create booms before elections as a signal of competence. Because

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[1]Following the seminal papers by Nordhaus (1975, 1989) and MacRae (1977) many authors developed a deep understanding in the political business cycle. See Drazen (2000), Gärtner (2000), Alesina, *et al.* (1992, 1993), and Paldam (1997) for surveys, and Blomberg and Hess (2004), Caleiro (2009), Saporiti and Streb (2008) and Sieg (2006) for current theoretical papers.

inexperienced voters should not be assumed to be highly rational in the game theoretical sense of rational expectations, the common view is that political business cycles in the Nordhaus (1975) style are more a phenomenon of newly developed than established democracies [Brender and Drazen (2005)].

In the literature there are numerous multi-country studies analysis on this subject [Alesina (1978); Ginsburgh and Michel (1983); Alesina, Roubini and Cohen (1992, 1993); Schuknecht (1996) and Brender and Drazen (2005, 2008)], however, the political business cycle (PBCs) is such a phenomenon that may or may not occur in a country. For example different governments have different populist reforms package near the election terms acknowledging the needs and demands of their people living in these countries. To prove the existence and the significance of a PBC for a specific country a single country analysis is much worthwhile and without an alternative. Therefore, the present study investigates the existence and significance of political business cycles in case of Pakistan during the period 1973-2009. However, following this research strategy we have to pay a price as a single-country study of the PBCs often suffer from a small number of elections. We discuss the resulting caveats when we present the econometric results.

In Pakistan, general elections are held every five years to elect members for the national and provincial assemblies. In addition to the national and the provincial assemblies, Pakistan also has more than five thousand elected local governments. In this study, we have focused only on the national assembly and provincial assembly general elections that are held in 1973, 1988, 1990, 1993, 1997, 2002 and 2008.[2]

We assume that voters in Pakistan have remained naive and inexperienced for the entire duration of the period being studied. Why have they not learned to expect PBCs and react accordingly? Suzuki (1992) illustrates the mechanism through which transition from naive to sophistication may occur with the passage of time. However, he looks only on democratic societies where political systems run smoothly. Suzuki (1992) found that Japanese voters learned over time and react accordingly, and he did not detect any sign of PBCs in the post-sophistication period. In view of this process, Pakistani voters remained naive because of unstable democratic and political system. They even did not yet realise the fact that price reliefs given on consumer goods in Ramzan (Holy Month) and price cuts on electricity and expenditures on various income support programmes are financed by bank borrowing. Such type of ad hoc reliefs will return to them in the forms of inflation and accumulation of long term debt along with market distortions.

Another strong assumption of PBCs theory postulates that politicians know when it is the election year, however it is not true in case of Pakistan as the elections 1988, 1990, 1993 and 1997 held unexpectedly, before the completion of the term. Furthermore, endogenous timing of election assumption is not justified here as Pakistan's Constitution describes election term is fixed i.e., 5 years by law and no government can call an early election to take advantage of their boom period. However, even though the politicians do not know the exact date of election, as they approach near to the completion of term i.e., five years, they would engage in political manipulation. And if there is a probability that

[2]The elections in 1988 and 2002 were held on non-party bases, however the mechanism followed and the faces shown up are the same as in case of party basis elections, therefore no distinction has been made in this regard. The referenda held during 1985 by the military leader General Zia-ul-Haq to legitimise its rule has not been included in this analysis.

elections could be due in the future, then politicians can react by inducing expansive policies.

A number of studies have analysed politically motivated business cycles for both developed and developing countries. Generally, the empirical political business cycle literature can be divided into three main categories. The first category attempts to locate political cycles in macroeconomic outcomes. These models have focused, almost exclusively, on four macroeconomic indicators: growth, inflation, unemployment and income. The observed empirical evidences in this case are not very much supportive for the PBCs as uncovered by McCallum (1978), Paldam (1979), Golden and Porterba (1980), Beck (1982), Alt (1985), and Hibbs (1977). However, Nordhaus (1989), Haynes and Stone (1989, 1990), Krause (2005) and Grier (2008) confirm the PBCs existence in macro outcomes, whereas Alesina and co-authors [Alesina (1987, 1989); Alesina and Rosenthal (1989); Alesina and Roubini (1992) and Alesina, *et al.* (1992, 1997)] associated it with the Partisan Effects. The reasoning behind this is that in the short run policy results on growth and unemployment may not be obvious enough to voters, so governments may try to stimulate those policy variables that have direct monetary benefits to voters like government transfers, tax cuts, subsidies, special employment schemes etc. [Hibbs (2000) and Batool and Sieg (2009)].

The second major category of Political Business Cycle research concentrates on the policy instruments instead of macroeconomic outcomes. The evidence for this type of a political business cycle is generally stronger than that for macroeconomic outcomes. Alesina, Roubini, and Cohen (1992), have investigated the 18 OECD countries and found a very little evidence of pre-electoral effects of economic outcomes, in particular, on GDP growth and unemployment; although they observed some evidence of "political monetary cycles" and political budget cycles prior to the election and in election years. Inflation also exhibits a post-electoral jump, which they explained by either the pre-electoral "loose" monetary and fiscal policies and/or by an opportunistic timing of increases in publicly controlled prices, or indirect taxes. Similarly, Andrikopoulos, *et al.* (2004) found an increase in the budget deficits during the election year in the European Union countries; furthermore they found a significant but small partisan effect on fiscal policy outcomes. Brender and Drazen (2005, 2008) investigated a large panel of countries and traced the fact that political budgets cycles are more likely to occur in the newly established democracies than established democracies as the voters from developed democracies may be well informed about fiscal outcomes. Gonzalez (2002) and Shi and Svennsson (2002) has discussed these outcomes as an effect of transparency. The high would be the degree of transparency; the less likely would be the political cycles in aggregate expenditure or in deficit to appear. However absence of political cycles in budget aggregates in established democracies does not, however, mean that there are no electoral effects on fiscal policy. Established democracies appear to be characterised by cycles in the composition of spending rather than cycles in its overall level. This argument is empirically observed in United States [Peltzman (1992)], Canada [Kneebone and McKenzie (2001)], Colombia [Drazen and Eslava (2005)], Israel [Brender (2003)] and in India [Khemani (2004)].

The third major category of research focuses on a unique policy instrument i.e. monetary policy (also known as the political monetary cycle). A number of empirical studies are found on central bank monetary policy and political business cycles. Sieg (2006) found that both left wing and right wing governments with partisan preferences use opportunistic policies through an expansion in the money supply. Such an expansionary policy would help in stimulating the economy by generating employment opportunities and induce inflation. The existence of monetary political cycle has been uncovered in Abrams and Iossifov (2006) for US and in Ferris (2008) for Canada, if and only if there found to be some party affiliations between government and the central bank decision maker. However, such empirical evidence has not been found in case of European countries. In the European Union (EU), politicians are not empowered to use monetary policy instruments, because this policy is delegated to the independent European Central Bank. In line with this scenario, PBCs hypothesis has been rejected by Berger and Woitek (1997) for Germany and by Leertouwer and Maier (2001) for 14 OECD countries. In contrast, Taekoi (2009) studied the existence of opportunistic cycles in Brazilian economy subject to country's exchange rate regime and central bank independence. He found the existence of electorally induced fiscal cycles under fixed and crawling peg exchange rate regimes and electorally induced monetary cycles under floating exchange rates in Brazil only when the nation's central bank is not independent. To sum it up, political monetary cycles can be utilised by the opportunistic politicians in both cases either central bank share some party affiliations or remain less independent in terms of its monetary operations. To cover all three categories, this study focuses on growth, unemployment, inflation and some fiscal and monetary policy indicators.

Despite plenty of empirical evidence found on political business cycles for both developed and developing countries, this area of research remains untouched in case of Pakistan. The present study fills the gap. The paper is organised as follows. Section 2 discusses the model specification and the research methodology. Section 3 provides empirical evidence using annual data from 1973 to 2009 for various macroeconomic variables. Section 4 gives a summary of our findings and a conclusion.

2. MODEL AND RESEARCH METHODOLOGY

Turning to the empirical literature, politico-economic models have been tested with a time-series approach. The usual research strategy is to isolate a key macroeconomic variable and ascertain whether or not in election and pre-election years this variable behaves differently than in non-election years. The earlier procedures entailed simple comparisons of the average value of the actual unemployment and inflation rates in election and non-election years, or according to the party in power. Generalising this approach, Mc-Callum (1978) and most of those who followed estimated uni-variate time series models and tested for shifts in the intercept parameter [Pack (1987) and Keil (1988)]. According to this procedure the impact of the political sector is viewed as an exogenous intervention in the economic process, producing a cyclical (Political Business Cycle) or temporary shift in the mean value of the time series. Accordingly, the test is for the significance of an appropriately defined dummy variable, the intervention variable that is added to a uni-variate ARMA (ARIMA) representation of the series.

$$X_t = c + \sum_{p=1}^{n} \theta_p X_t - p + \sum_{q=1}^{m} \phi_q \delta_t - q + \sum D_i + \delta_t \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

To illustrate, let X_t be a variable of interest and assume that X_t can only be positive and follows a stationary first-order autoregressive moving average process. Where $\theta_1, \ldots \ldots \theta_p$ are the parameters of autoregressive terms of the model, while $\phi_1, \ldots \ldots \phi_q$ are the parameters of moving average terms of the model, c is a constant, and δ_t is the error term assumed to be independent identically-distributed random variables (i.i.d.) sampled from a normal distribution with zero mean: $\delta_t \sim N(0, \sigma^2)$ where σ^2 is the variance. We begin with the construction of a benchmark Autoregressive Moving Average (ARMA) for unemployment and inflation i.e., Phillips curve hypothesis and Autoregressive Integrated Moving Average (ARIMA) models for other fiscal and monetary policy indicators, as the fiscal and monetary variables including GDP are integrated of order one. To test the impact of politics on macroeconomic variables we have defined the following three political dummy variables

$$ED_1 = \begin{cases} 1, & \text{election year} \\ 0, & \text{otherwise} \end{cases}$$

$$ED_2 = \begin{cases} 1, & \text{if it is election year or one year preceding to election} \\ 0, & \text{otherwise} \end{cases}$$

$$ED_3 = \begin{cases} 1, & \text{if it is one year after election} \\ 0, & \text{otherwise} \end{cases}$$

ED_1 and ED_2 are the pre-election dummies, and ED_3 is the post election dummy variable. ED_2 is defined in a way that can capture the pre-election year and election year effect, because it may happen that politically motivated policies take start one year ahead, or it may happen that they take place only during the election year. Therefore, we defined two pre-election windows and tested each one by one, and reported which one is valid in that particular case. The positive and negative signs of these dummy variables will determine the positive and negative impact of elections on macroeconomic outcomes and aggregate demand driven by monetary and fiscal policy instruments. For example, if a government tries to increase growth and employment before an election and uses expansionary fiscal and monetary policies, then ED_1 or ED_2 or both should be positive in the estimated equations of growth, budget deficit, monetary aggregates and government's budgetary borrowing. If the government adopts a contractionary policy shift in the post election year, then these instruments show the downward trend that can be measured by a negative sign of ED_3. It should however be noted that in case of inflation and unemployment, pre-electoral variables should denote decrease and should have negative signs, while the post-election variables should have a positive sign to reflect the impact of pre-election expansionary policies.

Quarterly or high frequency data is recommended to investigate the issue of political business cycle. But in the case of Pakistan the national income accounts and unemployment data is available only in annual frequency.[3] Therefore, we have used the

[3]Although high frequency data on financial sector such as exchange rate and stock market prices are available; however in this study we have constrained the analysis to the national income accounts and unemployment data.

annual time series data from 1973-2009[4] for the proposed variables. The underlying study period covers seven elections: 1977, 1988, 1990, 1993, 1997, 2002 and 2008. The election dates and corresponding fiscal years are shown in Table 5 in the Appendix.

3. EMPIRICAL RESULTS

First we test predictions of the classic opportunistic political cycle model by Nordhaus (1975). The model predicts political manipulation in unemployment and inflation. Analogical political behaviour implies cycles in macroeconomic variables such as growth, money supply, fiscal deficit, and budgetary borrowing etc.

3.1. Unemployment, Inflation and Opportunistic Business Cycle

Estimated ARMA model results for unemployment (see Table 1) show that ED_2 is significant and has a negative sign. During the election year and one year prior to the election year the unemployment rate was reduced by 19 percent in comparison to other years. The political dummy variable ED_3 for the post-election year is positive but not statistically significant.

This result may attribute to the switch from expansionary to contractionary policy when an incumbent party wins the election and cancellation of old employment generation schemes if the opposition is elected into office. Both results fully support the political business cycle theories.

Table 1

Unemployment, Inflation and Political Business Cycles

Variables	Unemployment (U)	Inflation (ΔP)	
Constant	1.1133***	0.0864***	0.0769***
Deterministic Trend	0.0265***		
AR(1)	0.9522***	0.6029***	0.4767***
AR(2)	–0.3255*		
MA(5)		–0.8984***	–0.8885***
MA(7)	–0.9027***		
ED_1		–0.0228***	
ED_2	–0.1911***		
ED_3	0.0207	0.0033	0.0157**
n	35	35	35
R^2	0.95	0.74	0.66
D.W stat	1.97	1.88	1.97
S.EE	0.10	0.102	0.026

***, ** and * denote rejection of null hypothesis at 1 percent, 5 percent and 10 percent level of significance respectively. Unemployment rate has been taken in logarithmic form.

[4]Before 1971, the present Bangladesh was part of Pakistan called West Pakistan. Therefore, we have excluded the earlier time period from the analysis.

Inflation is another important key to understand the political business cycles. Election periods cause great sensitivity on the side of the government to keep quiet about increases of regulated prices by deferring them to the post-election period. Thus after each election it is common to hear oppositional parties accusing the returned party for exploiting the myopic expectations of voters to boost their probability of winning the election. However, if the incumbent party looses the election despite deferring price increases, then the winning party would again accuse the former incumbent party for leaving a huge economic burden by not increasing the regulated prices. This has to be fulfilled by the new government who would immediately receive a negative point in its honeymoon period.

Estimated ARIMA model for inflation (see Table1) shows $ED_1$with a negative sign that means during the pre-election year the inflation has been kept lower by 2.2 percentage points in comparison to other years. Non-realised price increases in regulated sectors are subsidised by the government through debt financing. Consequently, the budget deficit rises and creates an inflationary pressure and debt sustainability problem in the post-election period. The post-election year dummy variable found to be insignificant, however if we estimate the ARIMA model and incorporate only the post-election year dummy and ignore the pre-election effect then the post-election dummy is found to be statistically significant (see Table 1, column 4).

Both unemployment and inflation results are consistent with the pre-election political manipulation as the politicians try to maximise their chance of re-election by increasing the employment conditions and controlling the inflation artificially during the election and prior to the election period. But the post-election year dummy variables are found to be statistically insignificant but have correct signs, employing that post-election effect is less pronounced. The evidence supports the argument by Ginsburgh and Michel (1983), pointing the fact that if there is government fall and resultant early election as in case of Pakistan in 1990, 1993 and 1997 before the legal term, the political business cycles would be less pronounced.

The GDP growth estimated ARIMA model (see Table 2) does not provide any supporting evidence for the Nordhaus (1975) opportunistic business cycle theory as political variable ED_2 and ED_3 both estimated to be negative i.e., have the wrong sign. Miss-allocation of resources during and after the election period could be the reason. Although the results seem to be fine to some extent, there is concern regarding the stationarity assumption of the variable series raised by Enders (2004).

The basic underlying assumption of the ARMA model is the stationarity of the variable over time. The simple ADF/DF test shows that inflation and GDP growth are stationary at level, while the unemployment is found to be integrated of order one which makes the unemployment ARMA model results suspicious. Therefore, the discussion remains inconclusive and there is a need for further exploration of the phenomena.

Table 2

Fiscal and Monetary Variables and Opportunistic Business Cycle

Variables	ΔY	ΔI_g	$Fisb$
Constant	0.0619***	0.0919***	1.6219***
AR(1)			–0.7198**
MA(2)	0.2968***		
MA(4)	0.1919**		
MA(5)	–0.8061***	–0.9544***	
MA(6)			–0.8820***
MA(9)		–0.857***	
ED_1		–0.1434***	0.1423***
ED_2	–0.014***		
ED_3	–0.032***	–0.1351***	0.0157**
n	36	36	36
R^2	0.50	0.68	0.65
D.W stat	2.05	1.61	2.22
S.EE	0.015	0.07	0.17

***, ** and * denote rejection of null hypothesis at 1 percent, 5 percent and 10 percent level of significance respectively.

3.2. Fiscal and Monetary Variables and Opportunistic Business Cycle

The original opportunistic business cycle model by Nordhaus (1975) focuses on political cycles in inflation, employment and growth which are induced by monetary policy. However, Rogoff's (1990) model is grounded in the use of fiscal policy tools. More recent, Drazen (2000) has argued that PBC models based on monetary surprises are unconvincing, among other reasons, because of their implicit assumption that the incumbent party directly controls the monetary policy.[5] Instead Drazen (2000) builds on Rogoff (1990) to derive a model in which PBC arises from active fiscal policy interventions that are later accommodated by the monetary expansions. Various empirical studies being in line with that approach have been carried out on monetary and fiscal budget political cycles [Brender and Drazen (2008)]. Following Schuknecht (1996) we concentrate on fiscal deficit, government investment, monetary aggregate ($M2$) and government budgetary borrowing. We first apply the unit root test. The ADF results show that all variables are integrated of order one that requires 1st difference for the series to be stationary (see Table 4). In a second step we have estimated the parsimonious ARIMA model for these fiscal and monetary variables. The results are shown in Tables 2 and 3.

The ARIMA model result for real government investment states that ED_1 and ED_3 are both negative which implies that government investment has declined by 14 (13) percent during the election (post-election) year.

[5] See, however, Sieg (1997), for monetary cycles even if central banks are independent.

Table 3

Fiscal and Monetary Variables and Opportunistic Business Cycles

Variables	$\Delta Gbbn$	$\Delta Gbbs$	$\Delta M2$
Constant	0.1060***	0.1085***	0.1339***
AR(5)		–0.5937***	
AR(10)	–0.4828***	–0.8654***	
MA(1)	0.3088**		
MA(3)	0.3077**	0.8353***	
MA(4)	0.8605***		
MA(5)			–0.987***
ED_1	0.1196***	0.1381***	0.0481***
ED_3		–0.077***	–0.0233**
n	26	26	35
R^2	0.62	0.59	0.59
D.W stat	2.23	1.85	2.05
S.EE	0.08	0.08	0.03

***, ** and * denote rejection of null hypothesis at 1 percent, 5 percent and 10 percent level of significance respectively.

In contrast, the pre-electoral variable ED_1 is positive in the budget deficit as percentage of GDP equation, which can quantify a 14 percent increase in the budget deficit during the election year. This may be attributed to the fact that during the election campaign the government uses expansionary policies and spends more on current expenditures like tax cuts, subsidies, price supports and election campaigns etc. and not for investment purposes. For example despite the global oil price inflation during 2005-2008, Pakistan government heavily subsidies the energy sector i.e., petrol prices to control the inflation artificially in the pre-election period of election 2008. Consequently the development expenditures are approximately 4.4 percent of GDP (5 percent in 2007) while current expenditures are about 18 (15.8 percent in year 2007) percent of GDP in year 2008.[6] These current expenditures help the government to realise their short term objective i.e., collect votes, but do not have any significant impact on macroeconomic growth. Such fiscal deficits are financed by internal or external sources especially accommodated by the countries banks and create additional impact on monetary policy variables. In this regard we have expanded our analytical framework to the monetary sector by including $M2$, net government budgetary borrowing and budgetary borrowing from the banking sector.

The ARIMA model results show that ED_1 has the expected signs, in case of net government budgetary borrowing and borrowing from the banking sector, showing 11 and 13 percent increase during the election years (see Tables 2 and 3). Both effects demonstrate clear patterns of opportunistic politically motivated fiscal expansion accommodated by the monetary sector. This type of government borrowing can cause a sudden rise in money supply and induce inflationary pressures in the economy.

Post-election effect i.e., ED_3 turned out to be insignificant, implies that in the post election period there is no significant contraction in the government borrowing to offset the pre-election manipulation. Estimated ARIMA model results for $M2$ confirm this

[6]However, econometric results are unable to detect any statistical significant results regarding the composition changes in the total expenditures during the election timings.

monetary expansion as it registered a 4 percent rise during the same period, however this is less than the rise in the budgetary borrowing.[7] During the post-election year, $M2$ growth registered a contraction by approximately the same percentage (2 percent), consistent to (7 percent) decline in the budgetary borrowing from the banking sector, representing a tight monetary stance taken to curtail the inflation in the post-election year.

4. SUMMARY FINDINGS AND CONCLUSION

Inexperienced voters are a well known breeding ground for opportunistic political business cycles. In this study we prove that Pakistani society suffers from politically motivated inefficient economic policies. We have used annual data for unemployment, inflation, growth and other macroeconomic indicators for the period 1973-2009. The paper has used simple intervention analysis in time series data to examine the fluctuations during the election and non-election years. Results show that unemployment rate has been significantly reduced during the election and one year before the election year. Inflation shows similar patterns as during the election period it is kept down by 2.2 percent. The reason could be that the ruling party keeps the regulated prices artificially low before election and delays the cost push inflation by the post-election period. This is consistent with the recent surge in energy prices in Pakistan, where just after the election of 2008, the government cut all subsidies and raised energy prices which were deliberately kept low up to the end of the election. However, the post-election manipulation is absent or we can say less pronounced in both unemployment and inflation case. On the fiscal side, we see election year increases in the budget deficit accommodated by net government budgetary borrowings, and borrowing from the banking sector resulting in monetary expansion and inflationary pressure on the economy.

Overall, our results coincide with the results Alesina, Roubini, and Cohen (1992) found for 18 OECD countries. To summarise, our findings of substantial electorally motivated policy distortions without associated impacts on real GDP and investment suggest that Pakistan's society pays the cost of political business cycles in terms of inefficient allocation of resources and market distortions. However, the incumbents are unable to realise the potential benefit in terms of re-election, as every time the opposition party takes the turn.

The policy implication derived from the results is that the State Bank (central bank) of Pakistan needs to be institutionally strong enough to face the political pressures. Although, during 1990 decade, various reforms were introduced to strengthen and empower the State Bank of Pakistan in its monetary operations, however SBP is still unable to defend its policies against the political pressures. Another solution is establishment and strict compliance of fiscal rules that means to dampen the political cycles. In this regard, there is an on-going debate among the policy-makers with relevance to the amendments and implementation of Fiscal Responsibilities and Debt Law Act 2005. The central bank authorities have proposed some changes regarding the automatic monetisation of fiscal deficit. There is no prescribed limit on government borrowing from the State Bank of Pakistan defined in the SBP Act and in the Fiscal

[7]This may be due to the fact that Pakistan's current $M2$ definition has two main components, Net Domestic Assets (NDA) and Net Foreign Assets (NFA). Therefore, it might be possible that the budgetary borrowing rise is offset by the contraction in the other component such as NFA, and not exactly depicted in the M2 expansion.

Responsibility and Debt Limitation (FRDL) Act 2005,[8] therefore this unrestricted access to central bank borrowing provides a room for the political authorities to use it for own interests. In short, the lesson drawn from this research study is that there is a need to develop and set-up a knowledge-based economy, proper accountability system, strong and independent institutions to foster the real economic and political development in Pakistan.

APPENDIX

Table 4

Data Variables and Sources

Name	Description	Unit	Sources
U	log(Unemployment Rate)	in percentage	Labor Force Survey
P	log(consumer price index)	Base at 1999-00	State Bank of Pakistan
Y	log(Real GDP)	Base at 1999-00 prices	State Bank of Pakistan
I_g	log(Real Government Investment)	Base at1999-00	State Bank of Pakistan
$Gbbn$	log(Net Government Budgetary Borrowing)	PKR in Millions	State Bank of Pakistan
$Gbbs$	log(Government Budgetary Borrowing from the Banking Sector)	PKR in Millions	State Bank of Pakistan
$M2$	log(Broad Money Supply)	PKR in Millions	State Bank of Pakistan
$Fisb$	log(Fiscal Deficit as percentage of GDP)	PKR in Millions	State Bank of Pakistan

Table 5

Unit Root Test Results

Variable Series	DF/ADF Test Value	lag	Deterministic	Decision
U	–1.917812	0	c	I(1)
ΔP	–3.606487**	0	c	Stationary
ΔY	–3.942443***	0	c	Stationary
ΔI_g	–4.520618***	1	c	Stationary
$\Delta Gbbn$	–3.640938***	0	c	Stationary
$\Delta Gbbs$	–5.019487***	0	c	Stationary
$\Delta M2$	–3.456143**	5	c	Stationary
$Fisb$	–3.3672*	0	c, *t*	Stationary

Table 6

Election Dates

Election	Date	Corresponding Fiscal Year
General Elections 1977	January 7, March 7 and 10, 1977	1976-77
Legislative Elections 1988	November 16, 1988	1987-88
General Elections 1990	October 29, 1990	1989-90
General Elections 1993	October 6, 1993	1992-93
General Elections 1997	February 3, 1997	1996-1997
General Elections 2002	October 10, 2002	2001-2002
General Elections 2008	February 18, 2008	2007-2008

[8]Fiscal Responsibility and Debt Limitation Act 2005 states following principles: (a) reducing the revenue deficit to nil not later than the thirtieth June, 2008, and thereafter maintaining a revenue surplus; (b) ensuring that within a period of ten financial years, beginning from the first July, 2003 and ending on the thirtieth June, 2013, the total public debt at the end of the tenth financial year does not exceed sixty percent of the estimated gross domestic product for that year and thereafter maintaining the total public debt below sixty percent of gross domestic product for any given year; (c) ensuring that in every financial year, beginning from the first July, 2003, and ending on the thirtieth June, 2013 the total public debt is reduced by not less than two and a half percent of the estimated gross domestic product for any given year.

REFERENCES

Abrams, B. and P. Iossifov (2006) Does the Fed Contribute to Apolitical Business Cycle? *Public Choice* 129:3-4, 249–262.

Alesina, A. (1978) Inflation, Unemployment and Politics in Industrial Democracies. *Economic Policy* 8, 55–98.

Alesina, A. (1987) Macroeconomic Policy in a Two-party System as a Repeated Game. *Quarterly Journal of Economics* 102, 651–678.

Alesina, A. (1989) Inflation, Unemployment, and Politics in Industrial Democracies. *Economic Policy* 8, 55–98.

Alesina, A. and H. Rosenthal (1989) Partisan Cycles in Congressional Elections and the Macroeconomy. *American Political Science Review* 83, 373–398.

Alesina, A. and N. Roubini (1992) Political Cycles in OECD Economies. *Review of Economic Studies* 59, 663–688.

Alesina, A., G. D. Cohen, and N. Roubini (1992) Macroeconomic Policy and Elections in OECD Democracies. *Economics and Politics* 4,1–30.

Alesina, A., G. D. Cohen, and N. Roubini (1993) Electoral Business Cycles in Industrial Democracies. *European Journal of Political Economy* 9,1–23.

Alesina, A., G. D. Cohen, and N. Roubini (1999) Political Cycles and the Macroeconomy. *The Economic Journal* 109:459, 821–823.

Alt, J. (1985) Party Strategies, World Demand, and Unemployment: Domestic and International Sources of Economic Activity. *American Political Science Review* 79, 1016–1040.

Andrikopoulos, A., Ioannis L., and K. Prodromidis (2004) Fiscal Policy and Political Business Cycles in the EU. European *Journal of Political Economy* 20:1, 125–152.

Batool, I. and G. Sieg (2009) Bread and the Attrition of Power: Economic Events and German Election Results. *Public Choice* 141:1-2, 151–165.

Beck, N. (1982) Parties, Administrations and Macroeconomic Outcomes. *American Political Science Review* 76, 83–93.

Beck, N. (1987) Elections and the Fed: Is there a Political Business Cycle? *American Journal of Political Science* 31:1, 194–216.

Berger, H., and U. Woitek (2001) The German Political Business Cycle: Money Demand Rather than Monetary Policy. *European Journal of Political Economy* 17:3, 609–631.

Blomberg, S. Brock, and G. D. Hess (2004) Is the Political Business Cycle for Real? *Journal of Public Economics* 87(5-6):1091–1121.

Brender, A. (2003) The Effect of Fiscal Performance on Local Government Election Results in Israel: 1989–1998. *Journal of Public Economics* 87, 2187–205.

Brender, A. and A. Drazen (2008) How do Budget Deficits and Economic Growth Affect Reelection Prospects? Evidence from a Large Panel of Countries. *American Economic Review* 98:5, 2203–2220.

Brender, A. and A. Drazen (2005) Political Budget Cycles in New versus Established Democracies. *Journal of Monetary Economics* 52:7, 1271–1295.

Caleiro, A. (2009) How Upside Down are Political Business Cycles when there is Output Persistence? *Research in Economics* 63:1, 22–26.

Cerda, R. and R. Vergara (2008) Government Subsidies and Presidential Election Outcomes: Evidence for a Developing Country. *World Development* 36, 2470–2488.

Chappell, H. W. Jr., Thomas M. Havrilesky, and R. R. McGregor (1993) Partisan Monetary Policies: Presidential Influence through the Power of Appointment. *The Quarterly Journal of Economics* 108:1,185–218.

Coelho, C.r, F. J. Veiga and L. G. Veiga (2006) Political Business Cycles in Local Employment: Evidence from Portugal. *Economics Letters* 93:1, 82–87.

Drazen, A. (2000) *The Political Business Cycle after 25 Years, Political Economy in Macroeconomics.* New Jersey, Princeton: Princeton University Press.

Drazen, A. and M. Eslava (2005) Electoral Manipulation via Voter-friendly Spending: Theory and Evidence. Cambridge, MA: NBER. (NBER Working Paper 11085).

Enders, W. (2004) *Applied Econometric Time Series*. John Wiley & SonsInc. USA.

Gärtner, M. (2000) Political Macroeconomics: A Survey of Recent Developments. *Journal of Economic Surveys* 14(5):527-561.

Ginsburgh, V. and M. Philippe (1983) Random Timing of Elections and the Political Business Cycle. *Public Choice* 40:2,155–164.

Golden, D. and J. Porterba (1980) The Price of Popularity: The Political Business Cycle Re-examined. *American Journal of Political Science* 24, 694–714.

Grier, K. B. (1987) Presidential Elections and Federal Reserve Policy: An Empirical Test. *Southern Economic Journal* 54:2, 475–486.

Grier, K. B. (1989) On the Existence of a Political Monetary Cycle. American *Journal of Political Science* 33:2, 376–389.

Grier, K. B. (2008) US Presidential Elections and Real GDP Growth, 1961–2004. *Public Choice* 135:3-4, 337–352.

Havrilesky, T. M. (1993) *The Pressures on American Monetary Policy*. Norwell, MA: Kluwer Academic Publishers.

Haynes, S. and J. Stone (1989) An Integrated Test for Election Cycles in the US Economy. *Review of Economics and Statistics* 72, 426–434.

Haynes, S. E., and J. Stone (1990) Political Models of the Business Cycle should be Revived. *Economic Inquiry* 28, 442–465.

Hibbs, D. (1977) Political Parties and Macroeconomic Policies. *American Political Science Review* 71,1467–87.

Hibbs, D. (2000) Bread and Peace Voting in U.S. Presidential Elections. *Public Choice* 104:1, 149–180.

Keech, W. R. (1991) Politics, Economics, and Politics Again. *Journal of Politics* 53, 597–611.

Keil, W. (1988) Is the Political Business Cycle Really Dead? *Southern Economic Journal* 55:1, 86–99.

Khemani, S. (2004) Political Cycles in a Developing Economy: Effect of Elections in the Indian States. *Journal of Development Economics* 73, 125–54.

Kneebone, R. and K. McKenzie (2001) Electoral and Partisan Cycles in Fiscal Policy: An Examination of Canadian Provinces. *International Tax and Public Finance* 8,753–74.

Krause, George A. (2005) Electoral Incentives, Political Business Cycles and Macroeconomic Performance: Empirical Evidence from Post-War US Personal Income Growth. *British Journal of Political Science* 35;1, 77–101.

Kydland and Prescott (1977) Rules Rather than Discretion: The Inconsistency of Optimal Plans. *The Journal of Political Economy* 85:3, 473–492.

MacRae, C. D. (1977) A Political Model of the Business Cycle. *Journal of Political Economy* 85:2, 239–263.

Maloney, J., A. C. Pickering, and K. Hadri (2003) Political Business Cycles and Central Bank Independence. *Economic Journal* 113:486, C167–C181.

McCallum, B. T. (1978) The Political Business Cycle: An Empirical Test: Southern *Economic Journal* 44:3, 504–513.

Nordhaus, W. D. (1975) The Political Business Cycle. *Review of Economic Studies* 42:2, 169–190.

Nordhaus, W. D. (1989) Alternative Approaches to the Political Business Cycle. *Brookings Papers on Economic Activity* 2, 1–68.

Pack J. R. (1987) The Political Policy Cycle: Presidential Effort vs. Presidential Control. *Public Choice* 54, 231–259.

Paldam, M. (1997) Political Business Cycles. In D. C. Mueller (ed.) *Perspectives on Public Choice. A Handbook.* Cambridge: Cambridge University Press 342–379.

Peltzman, S. (1992) Voters as Fiscal Conservatives. *Quarterly Journal of Economics* 107, 327–61.

Persson, T. and G. Tabellini (2003) *The Economic Effects of Constitutions*. Munich Lectures in Economics. MIT Press: Cambridge.

Rogoff, K. (1990) Equilibrium Political Budget Cycles. *American Economic Review* 80, 21–36.

Saporiti, A. and J. Streb (2008) Separation of Powers and Political Budget Cycles. *Public Choice* 137, 329–345.

Schuknecht, L. (1996) Political Business Cycles and Fiscal Policies in Developing Countries. *Kyklos* 49:2, 155–70.

Sieg, G. (1997) A Model of Partisan Central Banks and Opportunistic Political Business Cycles. *European Journal of Political Economy* 13:3, 503–516.

Sieg, G. (2006) A Model of an Opportunistic-partisan Political Business Cycle. *Scottish Journal of Political Economy* 53:2, 242–252.

Suzuki, M. (1992) Evolutionary Voter Sophistication and Political Business Cycles. *Public Choice* 81:3-4, 241–261.

Taeko H. (2009) Exchange Rate Regime, Central Bank Independence and Political Business Cycles in Brazil. *Studies in Comparative International Development*. 44, 1–22.

Tufte, E. R. (1978) *Political Control of the Economy*. Princeton University Press.

Williams, J. T. (1990) The Political Manipulation of Macroeconomic Policy. *The American Political Science Review* 84:3, 767–795.

Woolley, John T. (1994) The Politics of Monetary Policy: A Critical Review. *Journal of Public Policy* 14:1, 57–86.

Book Review

Ernst G. Frankel. *Managing Development: Measures of Success and Failure in Development*. Palgrave, USA. 2005. 303 pages.

In this book, Ernst G. Frankel has reviewed development programmes, plans and agendas, initiated by the developed world for the developing countries. He has recounted numerous examples from the developing world to provide a well-structured commentary, which helps the reader to appraise the practical application of development theory, development financing and development management over the last fifty years.

Author has himself been involved in development projects and missions for a long time therefore, he explicitly accounts for the causes of the enormous failures and the meagre success rate of development projects. He primarily forms his argument on the call of incorrect perception of local context and thus inappropriate planning, funding and implementation of development projects. Overall, he has taken an unconventional view of development and making development happen. He describes development as a *dynamic process,* which is flexible and iconoclastic in nature and, thus, should incorporate the mutable nature of human behaviour, culture, science and technology over time.

This book has eleven well-defined sections, each focusing on a number of relevant issues.

The Section 1 ("Development Economics or Unrealistic Dream?") begins with historical perspective of development, its definition and deficiencies in practices. It questions the assumption of considering monetary gains as an indicator of happiness and tranquillity and also the conventional approach of concentrating all development funds into building physical infrastructure and provision of civic facilities while ignoring the need to develop individuals economically and socially. Basic dilemma, as he points out, is the infiltration of Western capitalism that has caused a rift between idealism and individualism in the Eastern and Asian societies.

Similarly, Section 2 ("Economic Trends") talks about how rich nations can help the poor world become independent and productive instead of becoming handicapped due to utter reliance on international aid and welfare funds. It presents democracy and free market as ends rather than means to development. Furthermore, author takes economic growth as one of the factors that lead to development but stresses profoundly on human development, cultural preservation and good governance as a means of longstanding growth and success.

Section 3 ("Asia – The Future Center of the World Economy") is a broad study of Asia and Japan in particular. It refers to adaptation strategies, which can help a country grow. It also depicts how lesser reliance on West is needed for future prosperity of developing world. Section 4 ("Developing Africa – The Global Basket Case"), on the other hand, concentrates on Africa and using Congo, Chad and Nigeria as examples,

shows that Africa's root cause of underdevelopment is internal conflict, lack of human values and extensive dependence on the rest of the world.

Interestingly, in Section 5 ("Developing Europe") Frankel discusses Europe and its process of development. This section is consistent with the writer's earlier comment that even economically prosperous countries cannot be labelled as fully developed since they too face issues such as demographic transition, distribution and heterogeneity.

In Section 6 ("America's Achievements and Hopes") the author provides a detailed account on America's economic growth and development. This study shows the contrast between two regions' development (central and south America) due to the differences in their factor endowments and political institutions.

Sections 7 and 8 ("Development Financing or "Take from the Poor and Give to the Rich"" and "Actors in Public Development Financing", respectively), knit together the financing agencies and financial management of development projects. These chapters show how development investment goes wasted because conventional approach has ignored the effects of packaged policies on culture and lifestyles of the local masses. It is vital to understand the relationship between government and society. Moreover, corruption, wrong assessments of local realities and use of top-down approach are also evident reasons for causing failures of development projects.

Section 9 ("Strategies for Future Economic Development") and Section 10 ("The Future of Development"), signify the importance of sustainable development which can be achieved through cooperation and effective management. He views globalisation, especially in bondage with technology and communication spree, as a bundle of opportunities, which can help bring *progress and prosperity* for all. However, this success is conditioned to competent and transparent governance, greater cooperation, and efficient management. Author highlights the need to understand the value system and priorities of a country before formulating any strategy and also to make sure development projects are *stand-alone activities* that generate further input resources on their own.

Section 11 ("Postscript") concludes the entire thesis presented in the previous sections and so discusses the need to change development management procedures, identify the success in private sector led indigenous growth and giving importance to human development and institutional setup. Writer, in this section, demonstrates China and India as a success story.

"Managing Development" confers to the contemporary school of thought and hence advocates investment in human development as a means of long-term achievement. It focuses on people and institutions of the nations, which are caught in the vicious cycle of poverty and underdevelopment. It advises to emphasise on other problems mentioned such as growth of sectarianism, religious intolerance and racism. It points out the dilemma of unavailability of a comprehensive, universal definition of development, which can help determine its scope and nature of development interventions. Moreover, the writer briefly hinges the characteristics of those countries, which have shown growth over the period and are no more underdeveloped. It also shows a reliance on geography and historical events, which shape a country's boundaries, cultures and institutions. This book reinforces the theses presented by Jeffery Sachs (2005) that development has to be attained through human, business and knowledge capital building along with strengthening physical infrastructure and governance; and Paul Collier (2007) that *factor*

endowments do determine a country's development path and *geography matters*. It further propagates the usefulness of adaptation, bottom-up approach, trade and cooperation for encompassing inherent diversities.

Ernst G. Frankel, however, presents a slit-eye view of cultural perspectives since I find it based on the evidence gathered from Africa and west America, mainly. While he provides recommendations for new process of development, he emphasises on the need of "untraditional approaches including direct interference in their national affairs and governance." This approach, certainly meant for good, poses an open challenge to developing countries' sovereignty and authenticates the existence of western ethnoscience in development paradigm. The concept of *"rational countries"* is not only abstract but also misleading, and I believe utopian.

Similarly, the structural changes suggested seem to be a legacy of Washington Consensus and Structural Adjustment Programmes. And the fact that they need to be aimed at changing the very foundations of a society puts writer's earlier suggestion, to consider local preferences and informal structures, in irony.

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REFERENCES

Collier, P. (2007) *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It*. Oxford University Press.

Sachs, Jeffrey D. (2005) *The End of Poverty: Economic Possibilities for Our Time*. New York: Penguin Books.

Shorter Note

McNeill, Desmond, Nesheim Ingrid, and Brouwer Floor (eds.). *Land Use Policies for Sustainable Development—Exploring Integrated Assessment Approaches.* Edward Elgar Publishing. 2012. 320 pages. Rs 12,000.00.

This book is the agglomeration of research, based on land use policies for sustainable development in African, Asian and Latin American context. It has three parts which focus on problems and theories about sustainable development, case studies of different countries and conclusions as well as policy recommendations. The first part of this book provides explanation about food security and institutional framework for sustainable development. It evaluates the threat to the agriculture sector and its extreme vulnerability in the presence of climate change. Further, it discusses how huge population growth compels competition to acquire natural resources for agriculture and industrial expansion which have severe implications on food security of the third world nations. In these countries, the agriculture sector demands sustainable scientific developments which ultimately improve productivity and make the food secured for food-insecure people. This part also critically examines the institutional economic growth, land usages and sustainability threats under changing environmental perspective. The second part presents case studies of different countries which take into account the central issue of sustainable development, its problems, socio-economic growth and land use policies. It explains the role of agriculture, sustainable development and environmental degradation in the Chinese and Indian economies. The case study of China shows how economic development in China has broad impact on environment in the form of air and water pollution, while intensifying role on land reforms, its deforestation and farming system. In addition, rapid urbanisation in Brazil has increased the land conversion into roads, worst deforestation and its grabbing which appears in form of unsustainable environmental conditions. The issues prevailing in Tunisia, Mali, Indonesia and Kenya are also highlighted, where economic and social development has exacerbated the environmental as well as land degradation process. Furthermore, it shows how increasing population in Tunisia requires more agriculture and natural resources which is another reason of land degradation and has threatened the contemporary scenario. Droughts and floods have been inevitable in Kenya where deplorable growth of agriculture sector and increasing population burden has generated the major land degradation and its subdivision. In the last part, the book discusses the comparative features of case studies and presents some important policy recommendations based on the conclusion that economic growth leads to the environmental degradation. It explains the role of deforestation which ultimately affects global climate condition, degradation of irrigation, water pollution and land degradation due to soil erosion and declining level of soil nutrients. In the closing chapter, it delivers the integrated policy lessons, based on protection of natural resources as well as economic development in the context of sustainable development. In order to achieve these imperative development targets, it suggests increase in the role of stakeholders, farmers and forest owners, involved in land management. (*Muhammad Nawaz*).