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# PROCEEDING

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# Recent Developments in Official Statistics

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**Editor**  
**Dr. Munir Ahmad**

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**Address of  
Dr. Muhammad Hanif  
Senior Vice President, ISOSS**

- **Prof. Dr. Nilofer Shaikh , Vice Chancellor, Shah Abdul Latif University**
- **Prof Dr. Abdullah - Pro-Vice Chancellor**
- **Prof Dr. Miandad - Dean Faculty of Natural Sciences**
- **Respected delegates my Colleagues, Students, Ladies and Gentlemen:**

Assalam-o-Alaikum

Before I say something on Official Statistics, I would like to introduce Islamic Countries Society of Statistical Sciences.

ISOSS was established in 1988 by Dr. Munir Ahmad, but unfortunately he is not with us today because of his illness. May Allah grant him good health. Since that ISOSS has been striving hard for the promotion of research in the Islamic countries.

I feel great joy in informing that ISOSS has achieved international recognition, its membership has expanded over the years and is no longer limited to Islamic Countries only.

ISOSS has organized Six National Seminars and Ten International Conferences in different countries such as Malaysia, Indonesia, Morocco, Egypt and Pakistan. Next Conference will be in Jordon 2012.

We started Pakistan Journal of statistics in 1985 and last year we celebrated its silver jubilee. This journal has achieved its reputation nationally and internationally because of its citation by ISI.

Regarding this seminar, I would specifically like to appreciate the efforts of Prof Dr. Nilofer Shaikh, Vice Chancellor Shah Abdul Latif University for taking special interest in organizing this event.

We would also appreciate the efforts of all members of the department of Statistics and other University professors for taking keen interest in the arrangement of this Seminar.

On this joyful occasion I feel a bit sad to say that there is no International participation this time only, from the brotherly Islamic countries, because of the recent sad events occurred at Lahore.

Research is not a difficult job, you need only determination, material is available. For example National College of Business Administration and Economics, with limited resources has produce 16 Ph.Ds and 50 M.Phils in various subjects, during the last eight years, whereas four Ph.Ds and six M.Phils will be at the end of this year. Insha-Allah, one of them will be Mr. Maqsood Zia, Assistant Professor of Statistics in this University.



I believe that Shah Abdul Latif University with relatively much better resources can take lead in this region.

My suggestion is that This University should develop a survey sampling research center, and ISOSS in this regard can provide technical advice if required. It would be appropriate to mention here that ISOSS has already provided technical help to the University of Gujrat to build a similar research center at Gujrat.

Honorable professors and delegates

Pakistan is a poor country by all standards, and is a part of the third world countries. More than 75% of people are living below poverty line. Pakistan is poor in education, poor in science and technology though we have a nuclear technology but it has not given us any boost in economic development. We are far below many African and south American countries in terms of per capita income. We cannot cross the threshold of poverty by exporting raw materials, selling fruits, rice and vegetables. We need to enter into high tech industry. Simple assembling of cars and other spare parts cannot take us to anywhere.

Scientific research is restricted to Government laboratories but those laboratories are doing only routine research or copying what other people have done. Some of the industries like textiles, fertilizers, sports, surgical goods, gas and oil refineries, are well equipped where scientific and technological research can be rigorously pursued by establishing their own research and development departments. Other industries like glass making, leather, cement, pharmaceutical etc. are also competitive and earn foreign exchange but needs scientific research support.

Pakistan is not a small country, but It is the fastest growing country. We should not worry about its population size. We should be confident of its manpower and talent. They need support in various categories of education and training. Pakistan should work for universal education as education automatically creates jobs and unemployment will be reduced. Manpower planning should be our number one priority. Education sector has to have a huge budget for achieving universal education. Simple literate population will not be useful. Universities lack financial resources and cannot take intensive research activities. We have not been able to visualize the impact of pure and applied research on our daily life. Volume of research activities is very small. Research activities must be accelerated, sooner the better. It takes one or at the most two generations to come up to any standard of research, if there is a will in Government. Big-Bang of IT seems to have started a new information planet.

The core tool of research is statistics and computer is the tool for statistics. Statistics-based computer technologies are the main source of scientific advancement. However, statistics has to become self-reliant. Most of jobs in all sectors have more statistics content than contents of the jobs itself. All workers have to have a fair knowledge of basic statistics and have to have proper statistics language to understand the usefulness of computer software packages. It is worth mentioning here that there are more than 500 statistical offices, branches of statistical organizations. FBS is the largest department of Statistics, though PCO and ACO are also quite large organizations. Every ministry at the

Federal level and every department at provincial level have one or more than one statistical office / bureau / division and their offices at District and Tehsil level.

In order to achieve high technology, Government has to plan and devise skills needed by Government and non-Government workers. We need to determine:

- i) What a statistician can do / cannot do?
- ii) What are the carrier paths?
- iii) What resources are available and what are needed?
- iv) What are the core skills?

It is time to

- i) Develop skills in cross-national data analysis and interpretation
- ii) Work on capacity building for users and producers of data
- iii) Establish centers of excellences in statistics
- iv) We should determine what skills are required for official statistics.
- v) Encourage internship for potential employees in statistical organizations.
- vi) Conduct joint research projects.
- vii) Put Statistics Division experts of university Board of Studies and other relevant university's statutory bodies.
- viii) Arrange lecture by academicians to statistical officials on regular bases.
- ix) Sponsor or Co-sponsor national and international Conferences /Seminars /Workshops / Symposia.
- x) Development of new procedures /methodologies for official statistics.
- xi) Publish Pakistan Journal of Official Statistics at international level.

For all these points, ISSOS with the cooperation of Statistics Division and its allied departments should write a 'White Paper' giving strong points and weak points along with all limitations and shortcomings of Statistics in Pakistan.

At the end, Thanks for the organizers of this seminar.

**WAVELET CHARACTERIZATION OF COMPUTED FARADAY  
ROTATION DUE TO THE INTERACTION OF RADIO WAVE  
WITH IONOSPHERIC PLASMA**

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**ABSTRACT**

Ionosphere is the part of the atmosphere that contains free electrons and ions. The ions are less mobile than the electrons therefore their contribution to affect radio wave propagation is negligible. Ionosphere extends from 70 km to 1000 km. In this study we have presented computation of different parameters of radio wave propagation through this ionospheric plasma that is formed due to the ionization of atoms and molecules. The ionosphere is important because of its role in the radio-communication. We proposed to study the effectiveness of ionospheric dynamics and parametric estimation by developing a quantitative treatment for data covering a specific period of 1987-89. The data are recorded on hourly basis using Digisonde model DGS-256 at Space and Atmospheric Sciences (SPAS) division SUPARCO, Karachi.

It has been explored that almost all the real world phenomena can be represented by the periodic functions. Fourier analysis is a mathematical technique used to obtain the frequency spectrum of a periodic or a-periodic signal. Fourier series approach reduces a complex or composite periodic signal to series of simple sine waves. Similarly, Fourier Transform technique reduces an a-periodic signal to simple sine waves. Wavelets can be of great help in uncovering the presence or absence of certain frequencies in the physical phenomena. Wavelets are a recently developed signal processing tool that enables us to analyze the local properties of complex signals that can represent analysis is not replacing frequency analysis, but is rather important refinement and expansion of it. In this communication, the wavelet analysis will be implemented to investigate diurnal behaviour of the critical frequency ( $f_c$ ) for F<sub>2</sub> layer. The critical frequency will be used to study the fluctuations in Faraday rotation for Ordinary and extraordinary waves. A comparison of both the techniques will also be presented just to emphasize the importance of wavelet analysis. Finally, the model validation will be carried out for accomplishing this study that could be applicable for public, government and private organizations.

**KEYWORDS:**

Radio wave propagation; Ionospheric plasma; Faraday Rotation; Wavelet analysis; Interaction of electromagnetic waves with ionosphere.

Mathematical subject Classification: 2000

## 1. INTRODUCTION

Gauss 1839 speculated on the existence of electrical phenomena in the upper atmosphere, and Balfour Stewart in 1883 postulated a conducting layer as the site of the currents that cause the small daily variations of the earth's magnetic field. This conducting layer now called ionosphere to have been discovered by Marconi when he sent radio signals across the Atlantic in 1901. The actual work began in 1924 when Appleton and Barnett and Breit and Tuve measured the height of the reflecting layers. The space Physics associated with detailed ionospheric structure is relevant to radio wave propagation. This ionosphere forms space plasma that could be defined as also the quasi neutral gas of charged particles that can exhibit collective behavior and also follow the three criteria. The ionization is the greatest in the summer and daytime, least in winter and night. So far as the earth-bound radio communications are concerned, all of the energy radiated would have been wasted if it continued to travel in a straight line off into the space.

However, at certain frequencies and radiation angle, the ionosphere reflects radio waves much the same way a mirror reflects light. It has also been observed that radio waves at other frequencies and angles of incidence are refracted (bent) in such a manner that they return to the earth. The returning of the radio waves or the signals should depend on the amount of refraction that in turn depends on the following factors:

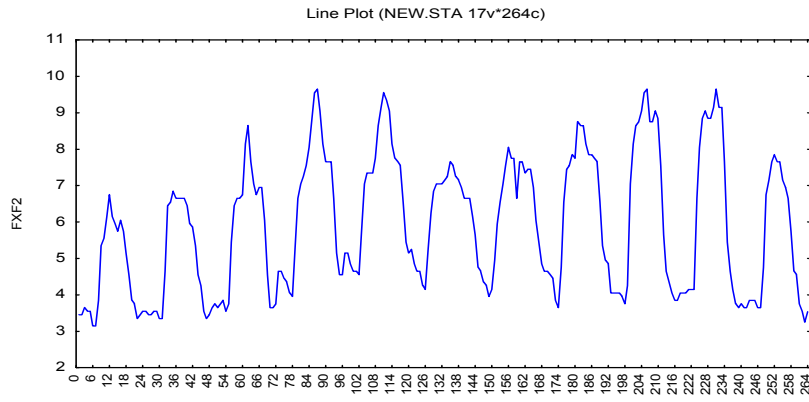
- i) the frequency of the wave,
- ii) the density of the ionized layer,
- iii) the angle at which the wave enters the ionosphere or the angle of incidence
- iv) Refractive index of the layer
- v) Faraday Rotation

When the signals are launched under favorable conditions then the signal will be refracted enough to ground and covering long distance from the point of launch. Therefore, long distance communications makes use of this characteristic by using carrier frequencies in the MF and HF bands. At these frequencies bands the signals are refracted back to earth with greater ease. With certain limitations we current Sky wave communication systems employ one of the three techniques for returning the signals to earth: [1-5]

- a) Meteor scatter
- b) Ionospheric propagation
- c) Artificial satellites

## 2. IONOSPHERIC PROPAGATION PARAMETERS

- i) Critical Frequency,  $f_c$  The highest frequency returned to earth when radiation upward in the vertical direction. Its value is dependent on the condition of ionosphere. The ionospheric conditions change from hour to hour, day to day, month to month, season to season and year to year, therefore, the  $f_c$  also changes constantly. Fig.1 shows the variability in the critical frequency as a function of time for extraordinary wave  $F_2$



**Fig.1: Temporal variation of critical frequency of extra-ordinary Wave  $F_x F_2$**

- ii) Maximum usable frequency (MUF) is the highest frequency that can be used for communication between two points via sky wave – that is, the highest frequency the usable signal strength. The MUF changes constantly with atmospheric conditions, and LUF is on borderline for refraction. [9-11] Therefore, to obtain the most reliable sky wave communication, the *optimum usable frequency* (OUF) is used.
- iii) Fading.
- vi) Virtual height.

### 3. COMPUTATION OF FARADAY ROTATION FOR ORDINARY AND EXTRAORDINARY WAVES. ( $F_0 F_2$ AND $F_x F_2$ )

The magneto ionic theory deals with the propagation of electromagnetic waves in ionized gases. From the experimental point of discussions, some mathematical expressions have been derived to study ionosphere. If  $N$  denotes the concentration of free electrons,  $m$  and  $-e$ , the electron mass and charge,  $c$  the free space velocity of light, and  $\epsilon_0$  the electric permittivity of free space.  $B$  is the flux density of earth's magnetic field;  $f$  is the radio wave frequency and  $\omega$  is the angular frequency. Two particular frequencies are defined if we neglect the influence of positive and ions on the propagation

$$\text{Plasma : } (2 \pi f_N)^2 = \omega_N^2 = N e^2 / m \epsilon \quad (1)$$

$$\text{Gyro : } 2 \pi f_H = \omega_H = Be / m \quad (2)$$

The three magneto-ionic parameters are defined as follows:

$$X = \omega_N^2 / \omega^2, Y = \omega_H / \omega, Z = \nu / \omega \quad (3)$$

where  $\nu$  is the collision frequency of electrons with heavy particles, If the  $\theta$  is the angle between the direction of the wave normal and the magnetic field, then we can define

$$Y_L = Y \text{ Cos } \theta, Y_T = Y \text{ Sin } \theta. \quad (4)$$

Due to the presence of terrestrial magnetic field, the medium where the wave travels through is bi-refracting that is ionosphere is doubly refracting medium, and two modes

of propagation do exist for they are named as “**Ordinary** ” and “**Extra-Ordinary**” The sign  $\pm$  appears in the formula, the + sign refers to **Ordinary wave** and – sign refers to **Extra Ordinary wave. Ordinary.**

The two above mentioned modes are nearly circularly polarized in opposite senses, and a plane polarized wave traversing the ionosphere can be regarded as the sum of the two modes. Two components have different phase velocities and the plane of polarization continually rotates along the path of the wave. This phenomenon resembles the “Faraday effect” of optics, in which the plane of polarization of light is rotated as it travels through a transparent medium along the direction of an imposed magnetic field, therefore, it is known as “Faraday rotation”.

In this framework, the high frequency case is required where  $X \ll 1$ , and  $Y_L \ll 1$ . Along an element  $ds$  of their path, both the modes undergo phase changes of

$$d\phi_{o,x} = 2\pi\mu_{o,x} \left( \frac{ds}{\lambda} \right)$$

where  $\lambda$  is the free space wavelength. The plane of polarization of the resultant plane wave rotates through an angle

$$d\Omega = \frac{1}{2}(d\phi_0 - d\phi_x)$$

From the above equations we obtained the relation for “Faraday rotation”

$$\theta_F = \frac{d\Omega}{ds} = \frac{\pi}{\lambda} XY_L = \frac{NBe^3}{8\pi^2 m^2 c \epsilon_0 f^2} \cos\theta$$

where  $\omega$  is converted to  $f$  and used  $c = f\lambda$  [6-12]

Fig.2 depicts the variation of Faraday rotation for Extra ordinary mode

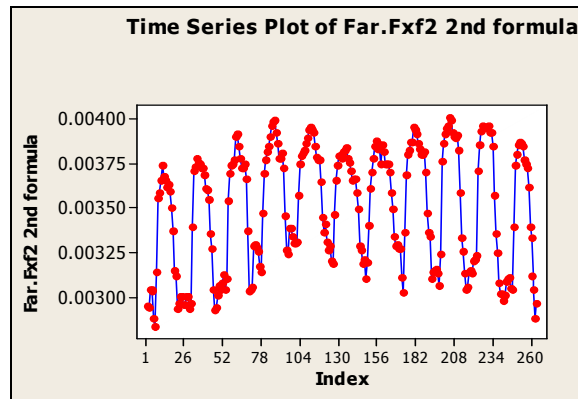
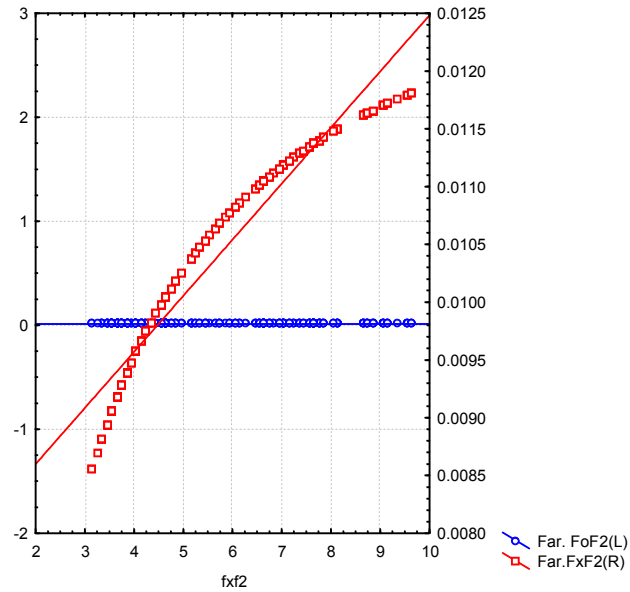


Fig.2: Temporal Variations of Faraday Rotation for Extraordinary wave  
4. THE TREND ANALYSIS OF FARADAY ROTATION

In this figure variability or the modulation of both the modes are displayed as a function of critical frequency just to ensure the utility of the modes. It has been examined that the ordinary modes is not suitable for the process. [13-15]



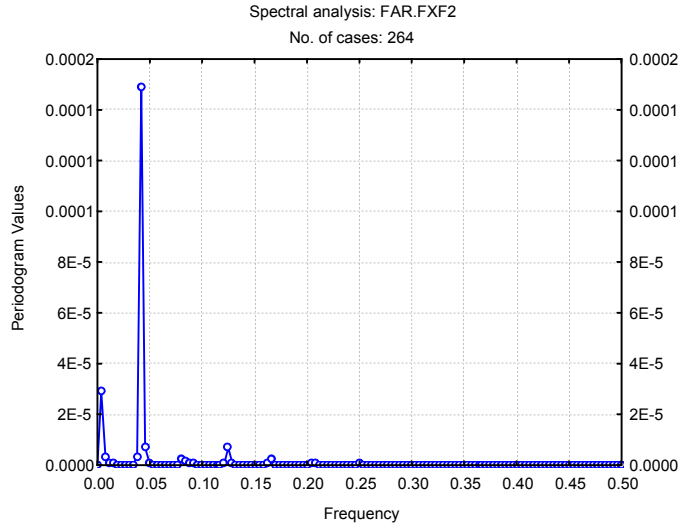
**Fig.3: Modulation of Faraday rotations with respect to critical frequency for ordinary and extra ordinary modes**

Trend equations for Extra-ordinary (a) and ordinary waves (b)

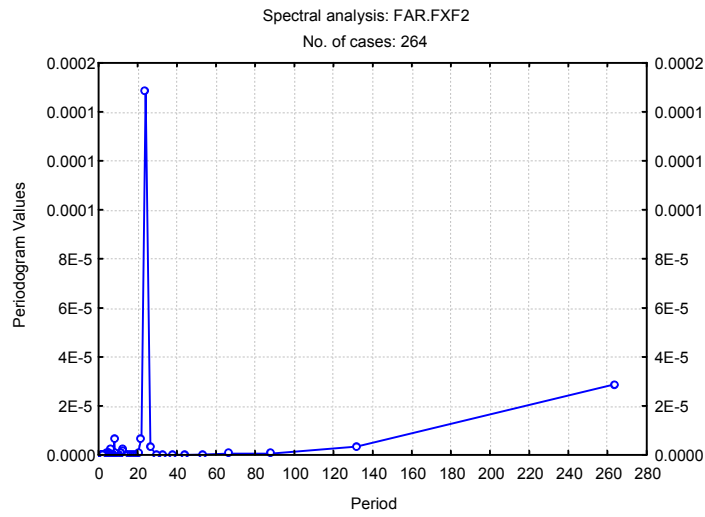
$$(a) \text{ Far. } F_x F_2 = 0.0076 + 0.0005^x, \quad (b) \text{ Far. } F_0 F_2 = 0.0136 + 3.644E-19^x$$

## 5. SPECTRAL ANALYSIS

We have introduced the basic idea of the signals then sampling the characteristics for a parameter as a result of ionospheric interaction such as Faraday rotation for extraordinary and Ordinary waves. For this purpose we have used line spectrum analysis also known as Fourier analysis or (spectral analysis) that uses stationary or detrended data sets with inherent periodicities. The time series can be represented by a superposition of sines and cosines of various amplitudes and frequencies as shown in the table 1 Figure 4 and 5 depict the variations Faraday rotation with time and frequency respectively. The data has been supplied between the year 1987-89.



**Fig.4: Frequency domain aspect of periodogram**



**Fig.5: Time domain display of Faraday rotation**

A temporal variation for Faraday rotation is depicted in Fig.2. Thus with a finite data set as mentioned in this paper we can do the best is approximate  $X_n$  by

$$X_n = \frac{a_0}{2} + \sum_{m=1}^{N/2} a_m \cos \frac{2\pi mn}{N} + b_m \sin \frac{2\pi mn}{N}$$

where  $N/2$  different frequencies or harmonics ( $f = mf_0$ ) have amplitudes

$$a_m = \frac{2}{N} \sum_{n=1}^N X_n \cos \frac{2\pi mn}{N}$$



$$b_m = \frac{2}{N} \sum_{n=1}^N X_n \sin \frac{2\pi mn}{N}$$

These equations constitute the discrete Fourier transform (DFT). The coefficients values as given in the tables (Table 1.) with periodogram and density as well as the Hamming values they contain the data points but are in frequency domain rather than the time domain. These are illustrated in figures

**Table 1: Spectral Analysis Far. F<sub>x</sub>F<sub>2</sub>**

	Frequency	Period	Cosine	Sine	Periodog	Density	Hamming
<b>0</b>	0.000000		-0.000000	0.000000	0.000000	0.000014	0.035714
<b>1</b>	0.003788	264.0000	-0.000467	0.000033	0.000029	0.000015	0.241071
<b>2</b>	0.007576	132.0000	-0.000120	-0.000107	0.000003	0.000009	0.446429
<b>3</b>	0.011364	88.0000	0.000008	0.000064	0.000001	0.000002	0.241071
<b>4</b>	0.015152	66.0000	-0.000051	0.000027	0.000000	0.000000	0.035714

The periodicities in the Faraday rotation has been found using FFT that is equal to 23.9091 as shown in the power spectrum of the Faraday rotation data sets Fig.6 Discrete time Signal processing techniques to collect, store and analyze the data in which Fourier transform, short time Fourier Transform (STFT) or frequency-time spectrograms are found as shown in the above figures. The frequency resolution is achieved by a correlator

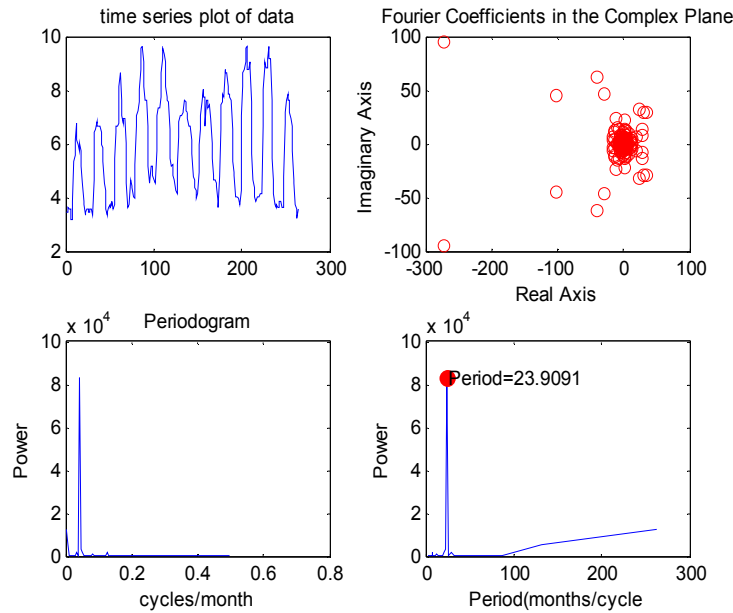


Fig.6: The Top figure is the part of input data steam for the correlator,consisting of waves, randomly located. Also the plot shows the temporal fluctuations, power vs cycles /months, Fourier components in complex planes and power vs period(months / cycle) for Far Fx F2

## 6. WAVELET ANALYSIS

The word wavelet was adopted to express the idea of small waves in an intuitive which is associated with localized waves like function whose values fluctuate in short period, in order to a function be called a wavelet. Wavelet analysis is a particular time-or space-scale representation of signals that has been found in atmospheric application like here in this case for the characterization of interaction between the ionosphere and the radio waves. As frequently noted in the literature, Fourier analysis does a poor job of dealing with signals of the form  $\varphi(t) = A(\tau) \cos(\omega t)$ , where the amplitude,  $A$ , varies on the slow time scale,  $\tau$ . Wavelet has a number of advantages over Fourier analysis. [23-25] When wavelet analysis is used to study a given signal, it is essential to choose the best wavelet representation for the signal under study. In statistical applications, the wavelet transform is linear and covariant under translation and dilatation transform. Wavelet analysis is not replacing frequency analysis but it is rather an important refinement and expansion of it. The wave let can also be of great help in uncovering the presence and absence of certain frequencies in a physical system as in the process of Faraday rotation. Fourier analysis analyses a signal globally, whereas wavelet analysis looks into the signal locally. [26-27]

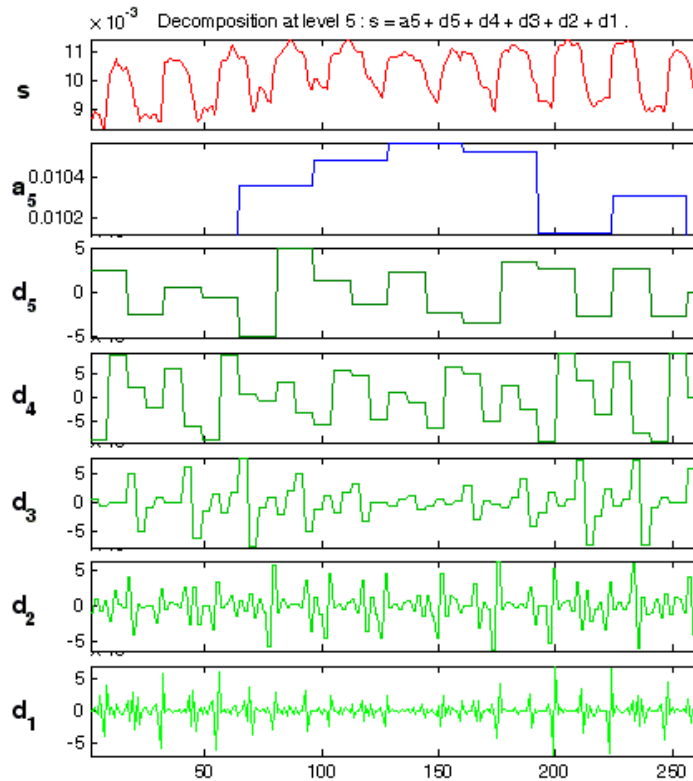


Fig.7: A Far.  $F_x F_2$  signal analyzed by wavelets. A decomposition of order 5. The signal  $s$  lives in  $V_0$  and it is decomposed into its approximation  $a_5$  as a member of  $V_{-5}$  and increasingly finer details  $d_j$  is a member of  $W_{-j}$ ,  $j=5,4,3,2,1$ .

Unlike Fourier transform that generates record average values of the amplitude and phase for each frequency or harmonic,  $\omega$ , the wavelet transform yields a localized, “instantaneous” estimate for the amplitudes and phase of each spectral component in the data set.

Fig.8.

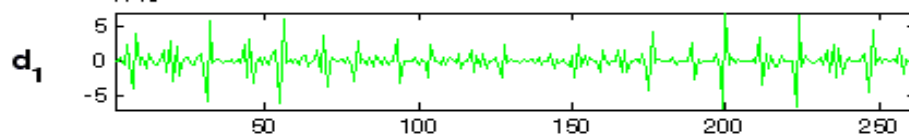
d<sub>1</sub> amplitude Time (t)

Fig.9.

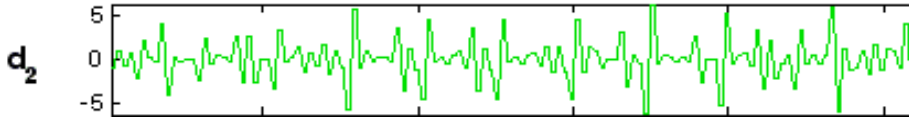
d<sub>2</sub> amplitude Time (t)

Fig.10.

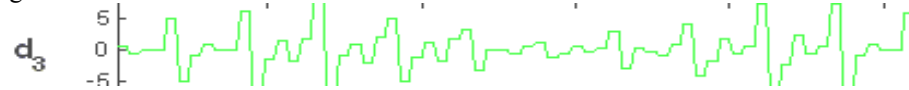
d<sub>3</sub> amplitude Time (t)

Fig.11.

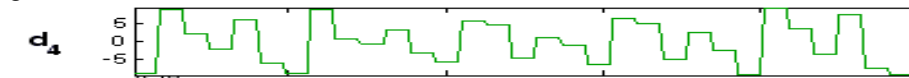
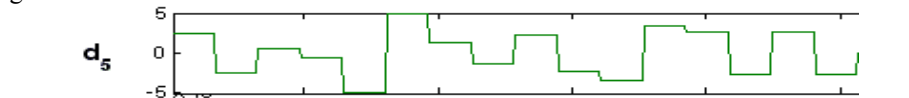
d<sub>4</sub> amplitude Time (t)

Fig.12.

d<sub>5</sub> amplitude Time (t)

**Figures from 8-12(d<sub>1</sub>-----d<sub>5</sub>) indicate the Morlet wavelet,**

$$g(t) = \left( \frac{1}{\sqrt{a}} e^{-[(t-\tau)/a]^2 / 2 \sin^2[c(t-\tau)/a]} \right)$$

where  $t$  is the time in arbitrary units ( $t = t_n, n = 1, \dots, 300$ ), Wavelet is seen in the midway for  $c = 10$ , and time lag  $\tau = 100$ , through the entire time series.

## 7. CONCLUSION

In this communication the influence of ionospheric plasma that comprises different layers on the radio wave propagation has been investigated along with the computation of few parameters. This study has also evaluated results in terms of physical attractiveness and the methodology used. This could be helpful in obtaining the estimates of parameters and establishing a correlation between them. Then suitable predictions can be made for our government, public and private departments.

## ACKNOWLEDGEMENT

I would like to thank the organizers of this conference to provide me the opportunity to present this piece of information before this gathering. The financial supports in the form traveling expenses, accommodation and registration fees have been sanctioned by the University of Karachi and I appreciate this offer on the part of University of Karachi. The ionospheric data sets provided by SUPARCO staff members are highly acknowledged.

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**BIostatISTICS EDUCATION FOR MEDICAL STUDENTS  
PAKISTAN'S PERSPECTIVE PROBLEMS,  
CHANGING APPROACHES AND PERCEPTIONS**

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**ABSTRACT**

Biostatistics is relevant to students and practitioners in medicine and health sciences and is taught as a part of the medical curriculum. The Biostatistical literacy of medical students is a problem all over the world including Pakistan which is actively discussed in different publications. Biostatistics is the subject in the medical curriculum which is unpopular among the undergraduate students. The negativity of the medical students towards Biostatistics is real and their perception can easily be changed through interactive teaching techniques by trained faculty. This paper describes the problems and challenges confront in teaching Biostatistics to medical students. Some suggestions and guidelines are presented which may help to surmount these problems and enhance the teaching of Biostatistics in health sciences.

**KEYWORDS**

Biostatistics; Medical Students; Curriculum; Computer – Based Learning.

**BACKGROUND**

Prior to the twentieth century, medical research was primarily based on trial and empirical evidence. Diseases and the risk factors associated with a disease were not well understood. Drugs and treatments for treating diseases were generally untested. As medicine has moved to become more evidence based, Biostatistics has become ever more important and relevant to the practice of medicine and the education of tomorrow's doctors. It has also become increasingly evident that the interpretation of much of the research in health sciences depends to a large extent on Biostatistical methods. The applications of Biostatistics was started in the 17<sup>th</sup> century on causes of death, births, marriages, construction of life tables and estimating population sizes, which is now known as "**Vital Statistics**". The field of genetics was the second epoch which was most benefited by Biostatistical ideas emerging in the works of Gregor Johann Mendel, William Bateson, Charles Darwin, Karl Pearson and Ronald. A. Fisher.

**INTRODUCTION**

Biostatistics is a branch of applied statistics that is concerned with the application of statistical methods to medicine, clinical trials, demography, epidemiology, population estimation, modeling, community diagnosis and surveys. In general, the purpose of using

Biostatistics is to gather data that can be used to provide honest information about unanswered biomedical questions. Biostatistics is now considered as an essential tool in planning and delivery of health care systems. The knowledge and ability to use Biostatistical techniques have also become increasingly important in health sciences.

The medical practitioner in the 21<sup>st</sup> century will need a far greater ability to evaluate new information than in the past. A good understanding of Biostatistics can improve clinical thinking, decision making, evaluations and medical research.

Undoubtedly, medical professionals are becoming aware of the importance of leaning and applying Biostatistical methods in their research. This wish is not constrained to medical researcher but medical practitioners who read medical literature to keep them abreast also wish to gain a minimum knowledge in Biostatistics. The role of Biostatistics in medical education is now well recognized and the curricula in almost all the medical schools / colleges / postgraduate institutions and universities across globe has provision of teaching Biostatistics to undergraduate and postgraduate medical students / professionals.

In Pakistan medical statistics is non-existent although medical research in Pakistan has gained momentum over the past several years. However, the logical conclusions based on information and data are rarely witnessed. This problem is due to the non-availability of Biostatistics faculty and practically medical students, researchers and doctors are also unaware of its logic, uses and inferences to be obtained.

### TEACHING BIOSTATISTICS TO MEDICAL STUDENTS

The role of Biostatistics in Medicine and Health Care is sometimes only fully understood and appreciated once the end – users are fully qualified in it. As stated supra, almost all health sciences disciplines have the provision of teaching Biostatistics. For a number of reasons Biostatistics is one of those subjects in the medical curriculum that is possibly unpopular among the medical students.

At undergraduate level there is a great difference in terms of organization of teaching and time allotted for Biostatistics Instruction in medical schools / colleges globally. In United States, Canada, Australia and United Kingdom Biostatistics is being taught in 1<sup>st</sup> & 2<sup>nd</sup> year of study with a very small percentage of schools spreading this instruction over more than one term. **While in Pakistan it is taught in 4<sup>th</sup> year of education as a component of Community Medicine subject and the contents are covered in just 3 – 5 lectures.** Besides, for admission in the medical schools of Saudi Arabia, apart from passing the entrance test the students must have also completed a pre-medical course in Biostatistics.

In Pakistan at undergraduate stage, Biostatistics courses are taught in a manner that are generally short and covers only introducing the concepts of descriptive statistics and a very little part of Inferential Statistics which does not help a medical student to groom himself for decision making.



### CURRICULUM OF BIOSTATISTICS AT UNDERGRADUATE LEVEL

Globally the Biostatistics curriculum varies from school to school reflecting the degree of faculty sophistication. In 1975, the American Statistical Association in their meeting proposed the core curriculum for Medical Statistics to be taught at undergraduate level which is being updated in light of the usage of contemporary techniques.

For teaching Biostatistics to medical students the best time to start teaching is in 1<sup>st</sup> year of education. A course in Biostatistics can only be helpful and valuable for the student if Biostatistical concepts and applications are reinforced throughout his / her 5 years of education.

There are numerous Biostatistical procedures & techniques which have proven useful, they are widely used in biomedical sciences and majority of these techniques are not a part of the Biostatistics curriculum in Pakistan.

In May 2002 the National Curriculum Revision Committee on MBBS in its meeting held at University Grant Commission, Islamabad revised the curriculum after due consideration of the comments and suggestions from Universities and Colleges across Pakistan. A comparison of Biostatistics curriculum is given below:

Curriculum of Foreign Medical Schools	Curriculum – Pakistan	Innovations in Pakistan's Curriculum
Definitions & Terms	Concepts & Usage	<ul style="list-style-type: none"> <li>• Experimental Design (ANOVA – one &amp; two way)</li> <li>• Regression Analysis</li> <li>• Correlation Analysis</li> <li>• Logistic Regression Analysis</li> <li>• Probability (Bayesian Statistics)</li> <li>• Relevant Non-parametric tests</li> <li>• Diagnostic Statistics (Sensitivity, Specificity, PPV, NPV, ROC Curve etc)</li> <li>• Introduction to Survival Analysis</li> <li>• Introduction to Biostatistical Software</li> </ul>
Ways of Data collection	Data and its types	
Descriptive Statistics	Descriptive Statistics	
<ul style="list-style-type: none"> <li>• Central Tendency (Mean, Median, Mode)</li> <li>• Measures of Dispersion</li> <li>• Graphical presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Central Tendency (Mean, Median, Mode)</li> <li>• Measures of Dispersion</li> <li>• Graphical presentation</li> </ul>	
Inferential Statistics <ul style="list-style-type: none"> <li>• Z – tests</li> <li>• t – tests</li> <li>• Anova Techniques</li> <li>• Multiple comparison tests</li> <li>• Chi – Square</li> </ul>	Inferential Statistics <ul style="list-style-type: none"> <li>• t – tests</li> <li>• Chi – Square (Introduction)</li> </ul>	
<b>Discrete &amp; Continuous Distributions</b>		
<b>Probability</b>		
<b>Non-parametric tests</b>		
<b>Correlation</b>		
<b>Regression</b>		
<b>Logistic Regression Analysis</b>		
Sampling Survey	<b>Introduction</b> to Sampling Survey	
Vital Statistics	Vital Statistics	

### PROBLEMS IN TEACHING BIOSTATISTICS

The worldwide picture of Biostatistical education in medical schools is far better than that of what is being taught in Pakistan's medical colleges. Nowadays medical students need to be able to understand and interpret Biostatistics so that they can use these techniques both during training and most importantly at postgraduate stage when they will be treating patients. Some of the problems encountered in teaching Biostatistics to medical students are listed below:

- In Pakistan, a student is enrolled in a medical college after completing 12 years of education. At the pre-medical stage the curriculum has no provision of teaching statistical courses. When the student enters into medical colleges they are then introduced to the general concepts of medical statistics and even the introductory concepts are failed to be understood because having no prior knowledge of statistics. This impacts negatively on the importance of Biostatistics.
- Medical students are generally focused towards the study of medicine and to some extent towards basic sciences and have a very little desire of learning Biostatistics.
- The time allotted for Biostatistical teaching is not enough and thus prohibits the explanation of most of the important techniques like Logistic regression analysis, Diagnostic Statistics and Survival Analysis etc.
- Instructors of Biostatistics have varied background and thus presenting the subject in their own understanding makes it difficult for the student to squeeze out the interpretation from the results. In Pakistan, main problem in teaching Biostatistics is the unavailability of trained Biostatistics Faculty. Even with the promoting research culture, the data generated is in a paralyzed state with no one to analyze it.
- The formal teaching in Biostatistics neither engages the students nor meets their needs. A survey conducted on Biostatistics teaching <sup>[20]</sup> showed that the students disliked the subject because it was taught in a formal way (formulas and calculation). Lot of contents were unimportant. The lectures were poorly presented and it was difficult for them to know what they needed to know.

### A PRAGMATIC APPROACH FOR TEACHING BIOSTATISTICS

In this section, some guidelines and tips are given for Biostatistics teaching which may help to overcome some of the problems encountered and enhance the learning in this subject.

- The teacher must convince the medical students about the importance of learning the subject of Biostatistics. The course should be aimed and taught in such a way that increases student's motivation towards it. One of the best ways of motivating the students is to expose them to medical literature with the examples of uses & abuses of Biostatistics. This could be accomplished most readily by preparing some interesting classroom sessions to provide students an opportunity to critique the reporting of Biostatistical procedures reported in the Journals.

- The instruction method should be problem – oriented instead of technique – oriented. The technique – oriented method is now an old style which contains hand calculations, formulas, drawing critical regions, traditional handouts and formal presentations which makes the subject leaning boring for the students. They just take the subject as they have to sit for 40 minutes with eyes open in the class and mind resting.
- Besides, problem – based approach should be introduced as this is a way of constructing and teaching using problems as the stimulus and focus on student's activity instead of presenting the material through a traditional lecture format. Problem based learning requires that students take an active part in their own learning, it is also best suited for motivated students that have the desire for own learning. In addition the students can emphasize their learning on the concepts and interpretations rather than the mathematical details according to their personal strength.
- Biostatistics is a branch of applied statistics and it must be taught in terms of application in biomedical research. The students should be exposed to real – life data instead of using the textbook examples which generally start from the statement “suppose”.
- Medical Students come from different educational backgrounds; some have interest in numerology which most of them dislike the Biostatistics subject. Thus any emphasis on the statistical proofs and probabilistic reasoning should be discouraged. On the other hand if the instructor has no knowledge of teaching applied statistics then the whole course will be a rollercoaster ride for the students.
- Hand calculations should be avoided and for making the teaching interactive Computer – based approach should be introduced. Nowadays a variety of Biostatistical software's (SPSS, STATA, STATISTICA, NCSS and OPEN - EPI) are available. Introducing CBL will also enhance the student's motivation for learning. Use of computers should be encouraged in teaching to allow the student to concentrate on the interpretation of the analysis rather than on hand calculations. On the other hand most major research projects involve a tremendous investment in time and money. This result in a large body of data that needs to be analyzed and the tasks can be easily achieved by using computers.
- For designing of research reading medical literature is a pre-requisite. A student cannot read & understand medical literature without having knowledge of Biostatistics and Research methodology. The study done by (Altman DG, 2000) reports that “statistical errors are so common that 50% of the medical literature have statistical flaws. Another study done by (McGuigan SM, 1995) reported that ‘serious statistical errors were found in 40% of 164 articles published in a psychiatry journal and in 19% of 145 articles published in an obstetrics & gynecology journal.
- The instructor should educate the students about the methodology in designing the research (research design, sampling technique / data collection and sample size etc) including the reporting & reading of Biostatistical language in a research

paper because nowadays, without proper reporting of Biostatistics, the research article is rejected at the initial review. Furthermore, the teaching of Biostatistics should not be limited to the use of data analysis techniques only. It is important that the students should be educated about the data collection techniques because all the Biostatistical techniques are applied on the data collected.

- The important steps in teaching Biostatistics are analysis and interpretation of data. It is the primary responsibility of the instructor to make the students understand about using accurate data analyzing technique(s) under given condition(s). The inappropriate use of Biostatistical methods & techniques may mislead the students understanding at a stage when their minds are fresh to gather knowledge. The instructor should address the questions of Why, Where and How while teaching the techniques. Inappropriate use of Biostatistical techniques can be found in every stage of medical research related to data analysis, design of the research, data collection & compilation, analysis, implementation and interpretation.

The second area at which the instructor should focus on is the interpretation of the data which is heavily dependent on the usage of accurate technique(s), for example comparing means always address the differences, Chi-square tests addresses the associations. This core understanding is essential to be passed on to the students.

- The students should also be made aware of using common words mistakes like association, correlation and differences; all are statistical terms and should not be combined with English language meanings. Moreover, the instructor teaching Biostatistics should strive to present a well-balanced combination of lectures, tutorials and practical's.

### CONCLUSION

There is a substantial disagreement in the course contents of the Biostatistical topics being offered in the medical curricula of Pakistan as compared to other countries. The teaching sessions should be enhanced to cover the major topics. The curriculum contents should also be updated after every 3 years in light of latest advancements both in the subject of Biostatistics and Health Sciences. Biostatistics and Research Methodology should be taught as a continuum, with its relevance to thinking about health and disease. In all medical colleges, there should be a separate dedicated Department of Biostatistics who can teach and guide the students in all phases of conducting research. Students should be taught from a common, same standard, up to date, and self explanatory textbook in order to ensure consistency and avoid conflicting terminology. The negativity of our medical students towards Biostatistics is real and their perception can easily be changed through interactive teaching techniques by trained faculty. One should remember that they want to become doctors and not Biostatisticians. It should be the primary goal of the Biostatistics teacher to offset the phobia of Biostatistics subject among medical students and train them in a way of making them future researchers.

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**OPTIMUM VALUES OF PARAMETER FOR UNEQUAL PROBABILITY  
SAMPLING ON BANKING DATA**

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**ABSTRACT**

In this paper, empirical study has been carried out for the general class of selection procedure for sample of size “n”. General class of selection procedure for sample of size “n” has been derived by Basit and Shahbaz (2007). In this empirical study the ranking of variance of the Horvitz – Thompson estimator (1952) for different values of constant has been calculated. For this study banking data (Advances, Deposits) has been used. The main purpose of the study is to find that which selection procedure provides better results for the banking data.

**KEYWORDS**

Unequal Probability Sampling; Horvitz-Thompson (1952) Estimator; Modified Murthy Estimator; Advances and Deposits of Banks.

**INTRODUCTION**

Survey Sampling is a method of drawing an inference about the population parameter using the information of small part of the population. There are different sampling designs and techniques are available in the literature likes Simple Random Sampling Design (WR, WOR), Stratified Random Sampling, System Sampling, Probability Proportional to size sampling (W.R), Unequal Probability Sampling(WOR) and many others designs and techniques. Unequal probability sampling firstly introduced by Hansen and Huwitz in 1943 but Horvitz and Thompson gives the theoretical framework in 1952 and derived the estimator of population total:

$$Y_{HT} = \sum_{i=1}^N \frac{Y_i}{\pi_i}$$

where  $\pi_i$  is probability of inclusion of i-th unit in the sample.

In this paper empirical study has been carried out using the Basit and Shahbaz(2007) general selection procedure. Basit and Shahbaz(2007) derived a general class of selection procedure for sample of size “n” and also modify the Murthy(1957) estimator.

### GENERAL SELECTION PROCEDURE

The general Selection Procedure is given as:

- Select first unit with probability proportional to  $p_i^\alpha (1 - p_i^\beta) / (1 - 2p_i^\beta)$  and without replacement
- Select a random sample of size  $(n - 1)$  units from the remaining  $(N - 1)$  units with equal probability and without replacement.

Probability of inclusion for i-th unit and joint probability of inclusion for i-th and j-th unit both in the sample is given as:

$$\pi_i = \frac{1}{d} \left[ \frac{p_i^\alpha (1 - p_i^\beta)}{(1 - 2p_i^\beta)} \left\{ \frac{N - n}{N - 1} \right\} + \frac{n - 1}{N - 1} d \right]$$

$$\text{where } d = \sum_{i=1}^N \frac{p_i^\alpha (1 - p_i^\beta)}{(1 - 2p_i^\beta)}$$

$$\pi_{ij} = \frac{(n-1)(N-n)}{d(N-1)(N-2)} \left[ \frac{p_i^\alpha (1 - p_i^\beta)}{(1 - 2p_i^\beta)} + \frac{p_j^\alpha (1 - p_j^\beta)}{(1 - 2p_j^\beta)} \right] + \frac{(n-1)(n-2)}{(N-1)(N-2)}$$

where  $\alpha$  and  $\beta$  are the constant.

### RESEARCH METHODOLOGY

For the empirical study banking data has been used. There are different types of banks available in Pakistan. State Bank of Pakistan divides the banks in five different groups according to their nature. These groups are:

1. Specialized Banks
2. Public Sector Banks
3. Foreign Banks
4. Islamic Banks
5. Private Sector Banks

For the empirical study each group is consider as a population and each population has the different population size. In the study Advances is the targeted variable and Deposits variable is the measure of size ( $P_i = z_i = Z$ ).

### EMPIRICAL STUDY

The empirical study has been carried out for the selected 5 populations and for various values of the constant  $\alpha$  and  $\beta$  in the range of -2 to 2 with an increment of 1.0. Empirical study has been carried out for the sample of size  $n = 2$ . In this study Horvitz Thompson (1952) estimator has been used rather than the modified Murthy (1957)



estimator. In the study variance of the Horvitz Thompson (1952) estimator has been calculated. After calculating the variance, assigned the rank 1 for the least variance and rank 2 for the 2<sup>nd</sup> least variance and so on. At the end average rank for each pair of the constants  $\alpha$  and  $\beta$  has been computed. These average ranks have been given in the following table:

**Table:**  
**Average Ranks of the Variance of Horvitz and**  
**Thompson Estimator for Different Values of Constant**

$\alpha$	$\beta$			
	-2	-1	1	2
-2	10	12	13.2	15
-1	9	12	13.2	14.6
<b>1</b>	<b>4</b>	<b>3</b>	<b>1.2</b>	<b>1.8</b>
2	5	6.4	7	8.6

### CONCLUSION

Above table shows that  $\alpha=1$  provides the least average ranks for all values of  $\beta$ . The pair  $\alpha = 1$  and  $\beta = 1$  shows the minimum average rank. This means that  $\alpha = 1$  and  $\beta = 1$  is the optimum values for the constant using the Horvitz Thompson (1952) estimator. On the other hand, in modified Murthy (1957) estimator case  $\alpha = 1$  also provides the least average ranks for all values of  $\beta$ . The mathematical expression of  $\pi_i$  for the pair ( $\alpha = 1, \beta = 1$ ) for sample of size  $n = 2$  is given as:

$$\pi_i = \frac{1}{d} \left[ \frac{p_i(1-p_i)}{(1-2p_i)} \left\{ \frac{N-2}{N-1} \right\} + \frac{d}{N-1} \right]$$

$$\text{where } d = \sum_{i=1}^N \frac{p_i(1-p_i)}{(1-2p_i)}$$

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**Table 1:**  
**Average Ranks of the Variance of the modified Murthy Estimator**  
**for the different values of  $\alpha$  and  $\beta$**

$\alpha \backslash \beta$	-5	-4	-3	-2	-1	1	2	3	4	5
-5	96.00	97.00	98.00	99.00	100.00	91.00	92.00	93.00	94.00	95.00
-4	85.90	86.90	87.90	88.90	90.00	80.90	81.90	82.90	83.90	84.90
-3	73.60	74.70	75.70	76.70	77.80	67.60	69.60	70.70	71.90	72.60
-2	56.90	57.90	58.90	59.50	61.00	50.10	52.80	53.80	54.80	55.80
-1	36.90	37.75	38.25	38.75	39.65	28.65	32.35	33.85	34.95	36.10
1	<b>6.50</b>	<b>6.60</b>	<b>6.80</b>	<b>7.10</b>	<b>7.70</b>	<b>6.60</b>	<b>5.40</b>	<b>5.80</b>	<b>6.00</b>	<b>6.10</b>
2	14.10	13.10	12.00	10.90	9.70	21.70	18.30	17.20	15.70	15.20
3	28.10	27.10	26.10	25.10	24.00	34.20	31.30	31.10	30.10	29.10
4	42.70	44.10	43.10	42.10	40.00	53.80	49.20	48.10	46.90	49.40
5	62.20	61.20	60.20	59.20	58.10	71.80	67.20	65.50	64.40	63.40

**Table 2:**  
**Population Size**

<b>Population Name</b>	<b>Population Size (<math>N</math>)</b>
Public Sector Banks	4
Specialized Banks	4
Private Banks	20
Islamic Banks	5
Foreign Banks	7

## SELECTION OF RESEARCH PROBLEM AND PUBLIC OPINION SURVEYS IN EDUCATIONAL RESEARCH

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### ABSTRACT

Opinion is a thought of an individual about any issue. An opinion may be the result of feelings, perceptions or understanding. Arguments affect opinion positively. Opinion provides direction for future. It is experts' opinion which point out the gaps and suggest the possible solutions. Opinions help in findings and findings leads to recommendations. On the basis of opinion, decisions are taken and these decisions set rules or tell what strategy may be defined. Research in education shows the existing situation of education and describes the new trends in the field of education. In educational research selection of a problem is the most important step. After selecting a problem, if it is not properly designed in relation with the nature of the data and later the analysis treatments, researcher faces difficulty in tackling it. Students also think, how they decide about the problems? There are many approaches to collect data on any problem in educational research. Opinion surveys helps a lot in the educational research. Opinion gives agreement or disagreement to the statements and help in making decision on the basis of opinion. The aim of the present study was to find the difficulties in designing as well as analyzing of data collected through opinion surveys by M.Phil. level students in social sciences' research. A questionnaire was developed for the students of M.Phil. level for knowing the problems in selection of research problem and selecting a tool for its solution. Each statement was be checked by using t-test. Recommendations are made on the basis of findings.

### INTRODUCTION

The role of Education in the development of a nation is very unique. Education provides the paths towards progress and prosperity. Invention of Information and Communication Technologies (ICTs) add new directions in the field of education and change the teaching and learning styles. Now, education is not merely memorization of some facts and figures but education is to think in different dimensions to find the reality and ultimate truth. No doubt, new innovations add much more in the education, in addition, there also appeared some problems which were never exist in the past. Research work is essential to meet these challenges and problems. Khanzode (2004, p. 6) argues Research assist to think and act on the scientific base...it is useful to find out the solutions, where various fundamental problems are arrived. Research in Social Science is as important as in Science subjects. Social sciences' subjects deal with the behaviors of human beings. "Learning through social sciences enriches students' understanding of governance, law, the electoral process, conflict resolution, and even humanity's

relationship to the environment” (Xhaferri and Iqbal, 2008). Use of Statistics is a necessary part of social sciences’ research. Students of social sciences often confused in selection of appropriate test, they learn statistics as a subject in the course work and the only aim of these students is to pass the subject. Students of social sciences memorize some of the common formulae of statistics and reproduce them in the examination. When these students meet the research work for the first time, they come to know the importance of statistics. They join research work with shallow knowledge of statistical design and methods of collection data. Survey method is the most common for collecting data in social sciences’ research. Upton and Cook (2001, p.85) documented that the most common method for collecting social science data is by means of a questionnaire or survey which consists of a series of questions concerning the facts of someone’s life or their opinion on some subject. There are three principal methods of collecting the data using a questionnaire:

- Face-to-face Interview
- By post
- By mail

After selecting the problem, selection of sample is the focus of the researcher. Which technique of sampling is appropriate for their study and sample size is the main problem for the students of social sciences. The researcher often met the following situations during the research:

- Which statistical design is appropriate?
- How to develop the questionnaires for the study?
- Which test may be used?
- What are the conclusions of the results?

Commonly, t-test, z-test, chi-square, ANOVA and correlation are used in the research of social sciences. The main problems with the researchers are, in which situation which test is appropriate or which one is more significant. The social sciences’ researchers have not sound knowledge of these tests, due to which they face different problems in research.

### **LITERATURE**

Research is essential to move ahead, necessary to accelerate the pace of progress and for enhancing the decision making power. Selection of problem is an issue in the social sciences’ research. In view of Fraenkel and Wallen (2000) “A research problem is exactly that a problem that someone would like to research. A problem can be anything that a person finds unsatisfactory or unsettling, a difficulty of sort, a state of affairs that needs to be changed, anything that is not working as well as it might”. There are no standard rules on which a problem should tested and declared as a good problem. Sidhu (1987) listed thirteen characteristics of a good research problem, which are:

1. Novelty
2. Interesting
3. Importance

4. Feasibility or Amenability
5. Availability of data.
6. Availability of cooperation
7. Availability of guidance
8. Availability of other facilities
9. Immediate application
10. Aim of research
11. Level of research
12. Experiences and Creativity
13. Courage and confidences

Gay (2005, p. 36) states that selection of a problem is the most difficult step in the research process. Further states that a researchable problem is one that can be investigated through the collection and analysis of data. Khanzode (2004) describes the following points must be taken into consideration while selecting a problem:

- It is not desirable to choose the same subjects on which lot of research work is already done.
- Vague problems should be avoided.
- The subject selected for research work should be easy, workable, informative and within the jurisdiction of a researcher.
- Research work should be economical and time saving.
- Preliminary study is necessary for choosing any research problem.

Sukhia, Mehrotra and Mehrotra (1991) says Educational research shares some of the main characteristics of scientific research. They may be analyzed as below:

1. Research is highly purposive. It deals with problems to be solved.
2. Research is expert, systematic and accurate investigation. Data are gathered, recorded and analyzed with as complete accuracy as possible.
3. Research usually involves, as a step, a hypothesis or a set of hypotheses concerning the explanation of phenomenon or the solution of a problem.
4. Research collects facts, i.e. gathers new knowledge or data from primary or firsthand sources.
5. Research is logical and objective. The data gathered and procedures employed are verified at each step. Emphasis is always on testing rather than proving the hypothesis through close observation and/or accurate experiment.
6. Research endeavours to organize data in quantitative terms as far as possible, and to express them in numerical measures.
7. Research places emphasis upon the discovery of general principles and scientific generalizations that can be applied to the solution of a wide range of problems.
8. research is patient and unhurried and requires great courage and persistence.

Lauer (2004, p.34) documented the quality of education research is influenced by whether the research is:

1. Valid: High quality education research studies have conclusions that can be trusted. Research design match research questions, and data collection and analysis follow accepted technical standards.
2. Connected to prior research: High quality education research studies build on prior research studies and conclusions.
3. Ethical: High quality education research studies follow established rules of research ethics. Procedures are used to avoid researcher bias.
4. Peer reviewed: High quality education research studies are reviewed by other education researchers before the findings and conclusions are communicated broadly.

In social sciences' research, commonly the following instruments are used to collect data:

- Tests
- Scaled Questionnaires
- Surveys
- Observation

Descriptive research used for social sciences' research. Descriptive research involves collecting data in order to test hypotheses or to answer questions concerning the current status of the subject of the study (Gay, 2005). Survey method is often used for collecting data in social sciences. Best and Kahn (1992) defines survey as "The survey method gathers data from a relatively large number of cases at a particular time. It is not concerned with characteristics of individuals as individuals". James (1997) states that Survey studies are used for the following purposes:

**School Surveys** - Used to gather data concerned with internal or external characteristics of a school system

**Job Analysis** - Used to gather information to be used in structuring a training program for a particular job.

**Documentary Analysis** - Closely akin to historical research; deals with documenting present situations.

**Public Opinion Surveys** - Used to enhance the decision making process by government organizations.

**Community Surveys** - Used to gather data concerned with internal or external characteristics of community government officials.

Commonly, questionnaires are used for survey method. Best and Khan (1992) describes the following characteristics of a good question:

1. It deals with a significant topic.... The significance should be clearly and carefully scaled on the questionnaire, or in the letter that accompanies it.
2. It seeks only that information which cannot be obtained from other sources such as school reports or census data.

3. It is attractive in appearance, neatly arranged and clearly duplicated or printed.
4. It is as short as possible and only long enough to get the essential data.
5. Direction for a good questionnaire are clear and complete. Important terms are defined.
6. The questions are objective, with no leading suggestions as to the responses desired.
7. Questions are presented in good psychological order, proceeding from general to more specific responses.
8. It is easy to tabulate and interpret. It is advisable to pre-construct a tabulation sheet.

Statistics guides how to manage the collected data and helps in drawing conclusions from the data. The principal purpose of statistics is the drawing of conclusions about large population (Human or otherwise) from comparatively small amounts of data. (Upton and Cook, 2001).

According to Alistair ,Howard & Stephen (2002).

Deciding upon the most appropriate methodology for an investigation depends upon the question being asked. The research question and the hypotheses provide guidelines to the researcher about how to go about collecting data...Once data have been collected, statistical analyses can be performed so that the hypotheses put forward by the researcher can be objectively tested....The final stage of the research process involves relating the results back to the literature from where the question was generated and attempting to offer a clear explanation for what happened in the investigation.

Beg and Mirza (2000) states that Statistics play an important role in psychology and education. In experimental psychology whenever a problem has to be studied, it has to be based on a sample. Statistics helps in the selection of representative and unbiased samples.

#### **OBJECTIVES OF THE STUDY**

To investigate the problems of social sciences' researchers

- In selection of problems
- Use of statistics for data collection and drawing conclusions from the collected data.

#### **POPULATION AND SAMPLE FOR THE STUDY**

The population for the study was the students of M. Phil (Education). A total of 100 students were randomly selected as sample for the study.

#### **METHODOLOGY**

A questionnaire consisting 12 items was developed on five point Likert scale (Strongly Agree= SA, Agree = A, Uncertain = UNC, Disagree = DA, Strongly Disagree = SDA). Initially, the questionnaire was distributed to 20 students for pilot study. Some statements were revised in the light of students' suggestions. Finally, the questionnaire was distributed to the sample by the researchers themselves. The collected data was managed and each statement was checked by using t-test.

**RESULTS**

<b>Item No.</b>	<b>Statement</b>	<b>SA</b>	<b>A</b>	<b>UNC</b>	<b>DA</b>	<b>SDA</b>	<b>t-value</b>	<b>Significant/ Non-Significant</b>
1	Educational Research is necessary to meet the challenges in the field of Education.	25	54	10	5	6	8.36	Significant
2	Selection of problem area in Educational Research is a difficult task.	12	74	5	8	1	11.64	Significant
3	It is difficult to control all the variables affecting the Educational environment.	5	42	38	9	6	3.34	Significant
4	To narrowing down the problem area to a specific area is very important for reliable results	15	37	25	20	3	3.85	Significant
5	In social sciences' research, selection of appropriate statistical design is very necessary.	10	47	12	21	10	2.18	Significant
6	Poor knowledge of statistical procedures leads to unwanted results.	23	58	16	1	2	12.61	Significant
7	Descriptive research is the best selection for investigating the problems in social sciences.	14	65	15	3	3	10.33	Significant
8	Opinion surveys are best technique to knowing the agreement or disagreement of Significant a population about an issue or Significant problem.	25	36	21	10	8	5.01	Significant
9	Developing questions for survey study needs careful thoughts.	12	60	5	13	10	4.37	Significant
10	Well defined and manageable questions may produce reliable results.	21	34	15	23	7	3.13	Significant
11	A small change in the wording can make a change in the theme of the question.	11	42	24	16	7	3.11	Significant
12	In social sciences' research, Selection of sample size in very important and difficult task.	15	52	29	2	2	9.44	Significant

df= 99

t-value at 0.05 level= 1.96



## DISCUSSION

Education is the most important area for a nation. Education plays multidimensional role in the development of a nation. Educational research is very important for the development in the field of education; it tells what should be added to make the existing situation more powerful and more effective. The respondents agreed that educational research is essential to meet the challenges which are appearing due to globalization. There are many factors affecting the whole educational system across the world and to investigate the problem area is a difficult task, the respondents think that to overcome all the variables which are affecting the education is not an easy work. After defining the problem, narrowing it to the present situation is also difficult. The social sciences' researchers are of the opinion that selection of appropriate statistical design is very necessary otherwise unwanted results may be appeared. The respondents agreed with the statement "Descriptive research is the best selection for investigating the problems in social sciences" and opinion surveys are the most common for collecting data in social sciences' research. The respondents believe that developing questions for survey need special care, only understandable statements can provide acceptable results and a small change in the wording of the questionnaire may change the theme of the statement. The respondents' reaction shows that selection of sample size is a difficult job for them.

## FINDINGS

1. Research in the field of Education is necessary for healthier system.
2. To overcome all the factors affecting education is not easy task.
3. Good knowledge of statistics is needed for research work.
4. Opinion surveys are the best tools for collecting data in social sciences' research.
5. Only manageable and clearly defined questions may produce effective results.
6. Selection of sample size is a difficult task for the social sciences' students.

## RECOMMENDATION

Analyzing data is the major problem with the educational researchers, which may be due to the fact that researchers are not frequent user of the statistical techniques. Statistics is not taught in an application manner most of the researchers are familiar with the statistical test but may not able to generate knowledge from the statistical numbers. Therefore it is recommended that:

- Statistics may be taught in context of social sciences to apply it in real life situation.
- Students may be explained the core ideas of statistical designs and tests for social sciences' research.
- Social sciences' Researchers may be taught in different situation which statistical design will work effectively.
- Current knowledge should be imparted to the novice researchers by the resource persons and the supervisors so that they may able to state the problems in an effective manner.

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## AN ANALYSIS OF TREND TOWARDS WEB SURVEYS: A PAKISTANI SITUATION

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### ABSTRACT

No doubt, Twenty first century has brought many unbelievable events for human beings. Now, one can see or talk with others in any corner of the world. The invention of Computer has changed the whole scenario of the world. This is computer which is facilitating human beings in every field of life and serving in different unique fashions. Computer is serving as a fire hose to spray information from the internet into learners' mind (Siddique, 2004). Web interlinks all the computers across the world and brings all the information at a single place. Web enables man to find every nook and corner with a single click. Currently, web is not only the source of information but also a place of knowledge sharing, ideas sharing and marketing. Organizations may ask about the quality of their products or may invite opinions from people around the world. Survey is a method used for collecting data about items from any population. Surveys show the trend of people who are geographically different. Web provides a forum to organizations and institutions for surveys. In the light of surveys, these organizations and institutions may define directions for themselves. The aim of the present study is to find the trend of Pakistani students towards web surveys. The sample for the study were the students of Master level who used web for different purposes. A questionnaire was developed to know the opinion of the university students about web surveys.

### INTRODUCTION

21<sup>st</sup> century is known as the century of technologies. New and new technologies change the life style as well as affect the culture values. Technologies made the whole world a globe. Within seconds, one can talk and see the person who is in the other corner of the world. Technologies are the real power behind the globalization. Computer is the backbone of the technologies. Isani and Virk (2005, p.346) states that It [technologies] makes geographical distance irrelevant, for when the speed of light is the mode of transport, all places on the earth are the same. The national boundaries would no longer be hurdles. Currently, computer is serving human beings in all fields, and is bringing more and more facilities to human beings. National Education Policy (1998- 2010) has documented that computer technology has the fastest rate of return. It with proper education and minimum hardware usually leads to most effective source. Also, information technology lowers the time spent on a job, thus lowers labor cost, increases productivity, reduces spoilage, scrap work, etc. Computer provides opportunity to combine all the internets at one place that is Internet. Internet connects the million of

computers all around the world and currently is the huge source of information and knowledge. Of communication, Internet has created countless challenges, which seriously gained the attention of the experts in the field (Nawaz, 2006). Dayal (2008, p.211) states that Internet helps students get acquainted with professional scientist's working methods making ever increasing use of computers, computers software and the Internet. At school level Computer is introduced as a subject so that young generation joins college or university with the basic knowledge of computer. Government is providing opportunities of computer training to its employees to work efficiently and accurately. Pakistan is among one of those countries in which the use of Internet is increasing with the passage of time. With the help of Internet, one can find material on related topics. Higher Education Commission of Pakistan (HEC) has provided Internet to the universities for research work. In research, opinion of the people is a matter of interest for the researchers. The major purpose of the survey research is to describe the common characteristics of a population through the opinion of selected sample from that population. Internet offers different services. Web survey is a unique way of knowing the opinion of the people from all around the world. With the help of web survey, organizations can find opinion of people about their products.

### LITERATURE

Without any doubt, one can say that it is the age of technologies. Technologies bring those changes in the history of humankind which one can never imagine. At one time, it was unbelievable that man would go in the depth of the sea or would go to the moon. Technologies enabled man to do those miracles. Now, it is believed that man can do anything which never has been done in the past history. Computer is the backbone of the technologies. Currently, computer is serving humankind in all fields of life. Computer shows new horizons to mankind and helps in attaining these horizons. Long and Long (1999, p.4) stated that technological revolution is changing our way of life: the way we live, work and play. The cornerstone of this revolution, the computer, is transforming the way we communicate, do business and learn, and an explosion of computing advances is speeding this change.

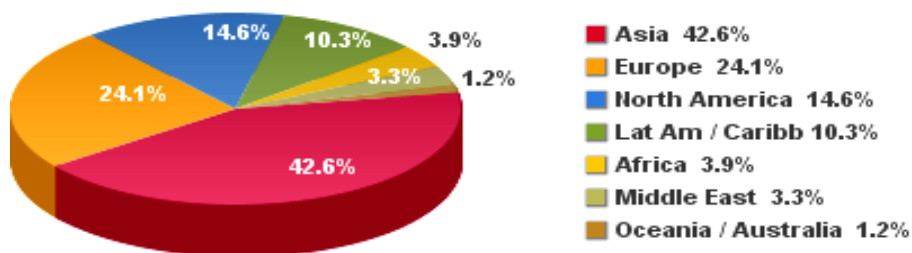
Wolcott & Goodman (2000) in a report describe the inception of Internet as:

In 1969, the experimental ARPANET (Advanced Research Projects Agency Network) being developed by the US Department of Defense consisted of four host computers all located in United States....In 1980, 213 host computers in less than a half dozen North Atlantic Treaty Organization (NATO) countries were connected. By 1989, ARPANET migrated out of the Department of Defense and became the Internet; connectivity jumped to more than 20 countries and 100, 000 host computers. ...Today there are over 200 countries with full TCP/IP connectivity, approaching 350 million users.

Internet provides opportunity to approach any type of material within one click. Watson (2003) corroborate that the net encourages interactivity and it provides specificity. You wish to look up an exact item within a particular field of information, the dictionaries and reference books. Internet reduces the distances and increases the opportunities of relations across the world. Jensen (1990) agreed with traditional life was

marked by face to face intimate relationships among friends , while modern life is characterized by distant in personal content among strangers. International Telecommunication Union (2010) in its reports entitled “Measuring the information Society” states that in 2009, an estimated 26 per cent of the world’s population (or 1.7 billion people) was using the Internet. In developed countries the percentage remains much higher than in the developing world where four out of five people are still excluded from the benefits of being online. China alone accounts for one-third of Internet users in the developing world. While Internet penetration in developed countries reached 64 per cent at the end of 2009, in developing countries it reached only 18 percent.

### World Internet Users by World Regions



Source: Internet World Stats - [www.internetworldstats.com/stats.htm](http://www.internetworldstats.com/stats.htm)  
1,733,993,741 Internet users for September 30, 2009

#### TOP 20 COUNTRIES WITH HIGHEST NUMBER OF INTERNET USERS

S#	Country	Population in 2009 Estimated	Users Latest Data	% Population (Penetration)	Growth 2000-2009	% of World Users
1	China	1,338,612,968	360,000,000	26.9 %	1,500.0 %	20.8 %
2	United States	307,212,123	227,719,000	74.1 %	138.8 %	13.1 %
3	Japan	127,078,679	95,979,000	75.5 %	103.9 %	5.5 %
4	India	1,156,897,766	81,000,000	7.0 %	1,520.0 %	4.7 %
5	Brazil	198,739,269	67,510,400	34.0 %	1,250.2 %	3.9 %

Source: <http://www.internetworldstats.com/top20.htm>

Economic Survey of Pakistan (2007-08, p.238) states that Internet service is becoming an integral part of the life in Pakistan particularly in urban areas where large portion of population is using it for different purposes. It further states that there are about 3.5 million Internet subscribers all across in Pakistan where total users crossed 17 million marks. Currently, around 3,008 cities are connected to Internet cities. According to PTA, there are totally 564,352 broadband users in Pakistan until October 2009, with WiMAX and DSL technologies dominating the broadband market with ease (<http://www.techreaders.com/tag/internet-users>). Internet speeds up all business of

life. There is no need to go to every one to ask their choice or preference. Web is a platform on Internet consisting of internet sites with vast knowledge of every type and graphics , animations through the hypertext transfer protocol (HTTP). The World Wide Web, abbreviated as WWW and W3 and commonly known as The Web, is a system of interlinked hypertext documents contained on the Internet ([en.wikipedia.org/wiki/The\\_Web](http://en.wikipedia.org/wiki/The_Web)). There are many issues and problems for which the opinion of others is needed. To know the opinion of others, Surveys are conducted. Fraenkel and Wallen (2000) state that it [survey] involves the researchers asking questions about a particular topic or issue to a large group of people. This asking of questions, all related to the issue of interest, is called a survey. There are many types of survey, e.g. Customer Satisfaction Surveys , Educational Surveys etc. Internet has changed the scenario of the whole world. It provides all the facilities at the doorstep. Internet provides the opportunity to collect the opinion of people from all around the world. The survey which is conducted through web is known as web survey. The following are the features of web surveys:

- Advanced Reporting and Analysis
- Export Results to Power point or PDF
- Graph and Chart Survey Results
- Statistics and Comparison Reports
- Share Survey Results
- Import Surveys From Text or Word (<http://www.zoomerang.com/>)

Mahsud and Riaz (2007) conducted a research under the title “The net and the native youth using Habits: A Case Study of Dera Ismail Khan (Pakistan)” with a sample 200 youngsters who use Internet and found that 43 % of the youngsters used Internet daily, 34 % once in a week and 23 % used Internet twice a week. The study also reveals that 91 % respondents agreed that Internet was the best source of information. Safdar et al. conduct a survey study to investigate the use of computer and its related technologies in teacher training institutions. The main findings were:

- 88 % University teachers use e-mail.
- More than 57 % university students use e-mail

Ali and Aslam (2008) conducted a research study entitled “A study about the Uses of Internet in Pakistan” on university students and university teachers to find their view about internet in Pakistan, 65 % university students agreed that Internet enhanced the educational capabilities of the students while 54 % teachers agreed with this idea.

On Internet, there are options to create free account for web surveys. Sample surveys are also available there. Different organizations and institutions launch different web surveys to know the opinion of the people about their products. These sites also give options to create a new blank survey, Create survey from available template or direct upload questionnaire.

#### **OBJECTIVES OF THE STUDY**

- To find the trend of students towards the use of Internet
- To find the trend of Internet users towards web surveys.

### RESEARCH METHODOLOGY

At first stage, a total of 100 students of different disciplines of universities of Province Punjab were found who used Internet daily for their education purposes. A questionnaire consisting nine items was developed on five point Likert Scale (Strongly Agree= SA, Agree = A, Uncertain= UNC, Disagree= DA, Strongly Disagree= SDA) to know the opinion of the Internet users about the web survey. The questionnaire was pilot tested on 20 students and the observations given by the respondents were carried out and the final questionnaire was distributed among the sample students by the researchers personally. Each statement was checked by applying t-test at 0.05 level.

### DATA COLLECTION AND RESULTS

The questionnaires were collected by the researchers themselves. Each statement of the questionnaire was tested by using t-test.

S #	Statement	SA	A	UNC	DA	SDA	t-value	Significant/ Non-Significant
1	Internet affects the learning style.	54	25	13	7	1	18.6	Significant
2	Use of Internet is helpful in research activities.	28	65	5	1	1	22.7	Significant
3	You use Internet for educational purposes.	35	42	15	6	2	24.6	Significant
4	You interact with web survey while searching.	13	46	17	15	9	16.0	Significant
5	Web survey is an effective way to interact with different peoples to know their opinion about some issue or problem.	22	32	28	10	8	26.4	Significant
6	Web survey guides institutions in the right direction for future developments.	62	18	5	12	3	16.8	Significant
7	Web surveys are more reliable and unbiased.	32	26	23	11	8	26.9	Significant
8	You participate in web surveys, while interact with.	11	63	14	5	7	15.9	Significant
9	In Pakistan, Web surveys can be useful in receiving enquiries from different strata of population.	12	23	42	22	1	22.6	Significant

df = 99

t-value at 0.05 level = 1.96

## DISCUSSION

The invention of Computer is the most prominent achievement in the modern era. Computer is offering different services to the human kinds. Attachment of new and new technologies with computer is increasing the performance of the computer. Today's computers are much faster than the previous ones. Internet affects all the dimensions of life. Currently, Internet is used for business purposes and it offers opportunities to make the rapid changes with the help of clients. Through web surveys, organizations can find the trend of the people and can alter their products. Internet gives occasion for better learning. The respondents agreed upon that Internet affects the learning styles and is very useful in research and they use it for learning purposes. The respondents are of the opinion that they met web surveys while using the Internet and they think it is a platform for effective communication with peoples to know their opinion about some issue or problem. When they were asked "Web survey guides institutions in the right direction for future developments", they show their trend towards agreement and also agreed that surveys through web are more reliable and unbiased. The respondents confirm that they participate in web surveys and web surveys may be helpful for inquiries from different people.

## FINDINGS

- Internet changes the learning styles among the university's students.
- Use of Internet is helpful in research activities and university students use Internet for research purposes.
- Web surveys are effective for knowing opinion of different people and show path for improvement.
- University's students participate in web surveys.
- In Pakistan, web surveys can be useful for inquiries from different people.

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**ANALYSIS OF WELFARE EFFECTS OF SOUTH ASIA FREE TRADE  
AGREEMENT (SAFTA) ON PAKISTAN'S ECONOMY BY USING CGE MODEL**

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**ABSTRACT**

The current research investigates the Welfare impact of SAFTA on the economy of Pakistan in general and South Asia in particular. This research analyzes the potential economic costs and benefits of Pak-India trade in exporting various consumer goods. The first scenario is when normal trading relation with India will be restored; it means that both countries will give the MFN (Most Favored Nations) status to each other. In the second scenario, the SAFTA will be operative and there will be free trade between India and Pakistan and both countries will remove all tariffs and custom duties from each others' imports. The Global trade analysis GTAP model is used to analyze the possible impact of SAFTA on Pakistan in a multi country, multi sector applied General equilibrium frame work. After employing the simplified static analysis framework, the analysis based on simulations reveals that current demand for Pakistani Basmati Rice and other consumer items like leather and cotton-made garments will expand after the FTA and consumer surplus will increase. The drop in the domestic prices of Rice will increase the production of many downstream industries, which will have pleasant multiplier effects on the economy of Pakistan. The government may reduce MFN tariffs on industrial dates before implementing the FTA. A key rule of multilateral trade system is that the reduction in trade barriers should be applied on a most-favored nation basis (MFN) to all WTO members the countries which are part of the SAFTA. The only exception to the MFN principle built into the GATT legal framework is the provision for reciprocal free trade within customs unions and free trade areas (GATT article XXIV). The objectives of the present study are to analyze and quantify the potential economic cost and benefits of the prospective trade between India and Pakistan to consumers, producers and government of the two countries. The export of Rice, leather and cotton-made garments may be conducted by two scenarios, i.e. when normal trading relations between Pakistan and India will be restored and when there will be a free trade between Pakistan and India in the presence of South Asian Free Trade Agreement (SAFTA). Results based on this research reveal that on SAFTA, grounds, there will be net export benefits in Pakistan's economy.

**KEY WORDS**

Agriculture; Trade liberalization; FTA; SAFTA; Welfare gain; Economy.

**INTRODUCTION**

The world trade has become more competitive because most of the countries they prefer to trade among their block trade. Pakistan introduced extensive economic reforms in 1971-

72 becoming the first country in the South Asian region to do so. The economy was freed from the inward-oriented strategy, and adopted an outward-oriented export-led development strategy, which was followed by many East Asian countries at that time. Trade liberalization was the key element of this new policy package and it entailed reliance on tariffs, replacement of quantitative restrictions including import licensing by a revised system of tariffs as well as the relaxation of other controls on trade. In order to encourage both domestic and foreign investment, the Government offered a series of incentives, while attempting to create an environment conducive to investment. In recent years, however, the focus of Pakistan's trade policy has seemingly shifted towards regionalism, which Pakistan considers a springboard for broader trade liberalization. The rationale for regional cooperation is based on a number of factors, not all of which are necessarily economic in nature. The formation of **EU, NAFTA, MERCOSUR and ASEAN**, and the recent emergence of other regional trading blocs may have given rise to a revival of interest in regionalism in Pakistan. This also explains the country's desire to avoid marginalization as more and more countries become members of various RTAs (Baldwin, 1993). Further, an RTA facilitates the choice of a selective liberalization policy as mutually agreed by all member economies, keeping them protected from global competition. Thus, Pakistan continued to promote international trade through active participation in several regional trading agreements such as South Asian Preferential Trading Agreement (SAPTA),<sup>7</sup> India-Sri-Lanka Free Trade Agreement (ILFTA),<sup>8</sup> Bangkok Agreement (BA)<sup>9</sup>, the Bay of Bengal Initiative for Multi sectoral Technical and Economic Cooperation (BIMST-EC)<sup>10</sup> comprising Bangladesh, India, Myanmar, Pakistan and Thailand and Indian Ocean Rim Association for Regional Cooperation (IORARC). The Free Trade Agreement (FTA) between Pakistan and Pakistan (PLFTA) became operational from June 2005.<sup>12</sup> SAFTA was the first major step in moving towards a free trade area and higher forms of regional economic integration among the member states of the South Asian Association for Regional Cooperation (SAARC). SAARC was established in 1985 by member countries consisting of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Pakistan. The population of SAARC countries accounts for one fifth of the world population and almost half of the world's poor. The original rationale for preferential trading among SAARC countries stems from the conviction that these countries needed to pursue a policy of rapid industrialization in order to overcome their economic backwardness. Both industrial and agricultural sectors of the SAARC countries need vast technological improvements to take advantage of the global market. It is also expected that regional co-operation in South Asia will become an important means of accelerating trade and investment in the region. The agreement on SAFTA was signed in Dhaka in April 1993 by the SAAC members, providing a legal framework for trade liberalization and strengthening intra-regional economic cooperation. In 1995, SAFTA had been ratified by all contracting states and in accordance with Article 22 of the agreement SAFTA became operational on 7th December 1995. SAFTA followed a positive list approach, including flexible provisions for least developed countries (LDCs). At the Ninth SAARC Summit held in Male in 1997, the Heads of Governments decided to accelerate the pace of transition of SAFTA to South Asian Free Trade Agreement (SAFTA) by the year 2001 or Consumption is also quite high during Christmas. Similarly, the fruit enjoys enormous significance on the occasion of Dial and such festivals another religion. In Europe and North America, the fruit is particularly preferred during the dark winter month. Usual sales of dates are spread to a period from October to April.

The objective of this study is to present a quantitative assessment of trade liberalization exercises in Pakistan in terms of economic trade, with other south Asian countries. This paper begins with a review of Pakistan's economic reforms and their coverage. Section II discusses the methodology, offering a brief description of CGE Modeling including the GTAP. The experimental designs are discussed in Sections III. Apart from unilateral and regional trade liberalization, as a founding member of the WTO, Pakistan remained firmly committed to the multilateral trading system and has already established a large number of reforms in keeping with the GATT/WTO principles. However, the paper does not review the outcome of multilateral trade Liberalization. In Section IV, GTAP model simulation results are analyzed. Section V concludes. **Section I** Until the late 1970s, Pakistan's economic development centered on an inward-oriented development strategy based on import substitution industrialization performed mainly by state owned firms. Both tariff and non-tariff barriers were widely used to protect domestic economic activities. Trade restrictive policies were accompanied by other regulatory policies such as control on foreign exchange, finance and foreign direct investment. These restrictive economic policies had severe adverse implications on overall economic growth, in particular growth of exports.

### METHODOLOGY

It is widely acknowledged that applied general equilibrium (AGE) or computable general Equilibrium (CGE) modeling has become the tool of choice for analysis of a wide range of trade policy issues such as tariffs and non-tariff barriers (NTBs) in both developed and developing countries in a variety of settings. In particular, AGE modeling is useful for analyzing the welfare effect of trade policy that needs to address second-best issues, where there are significant interactions between policy measures for one sector and distortions elsewhere in the economy. Such models have two distinctive features: they incorporate a number of distinct sectors, and the behavioral equations of the model deal with the response of industries and consumers to changes in relative prices (Adams et al., 1998). This development is explained by the capability of CGE models to provide an elaborate and realistic representation of the economy, including the linkages between all agents, sectors and other economies (Brockmeier, 1996) AGE analysis also provides a valuable tool for putting things in an economy-wide perspective (Hertel, 1999). The general equilibrium framework contains all commodities, factor markets together with decision-making agents who respond to price signals and are internally consistent through capturing the many important feedback effects. Therefore, conceptually, these models can explicitly capture all the economy-wide interactions and inter-sectoral linkages. Hence, these models are very useful for analyzing the changes in sectoral output, product prices, factor usage, and factor prices as well as changes in national welfare measures consequent to changes in trade regimes. CGE evaluations typically work with theoretical models, and allow for more interaction among endogenous variables in that they can capture the numerous complex relationships between variables of policy interest in the model economy. The usefulness of a partial equilibrium approach is limited in analyzing the effect of trade policy changes, which are propagated throughout the economy. For example, the changes of tariff policy affect the consumption, production and relative prices of imports and their domestic equivalents, and ultimately, allocation of resources within the policy-changing country. Partial

equilibrium approach can not capture these market interactions and quantify in a sensible way the impact of policy changes on all affected economic agents in the economy under consideration. On the other hand, economy-wide econometric models pay less attention to economic theory and more attention to time series data and typically manage to estimate all parameters by focusing on only a few endogenous variables. Econometric evaluations can be appraised with standard statistical criteria but they do not capture the complicated interactions in product and factor markets throughout the economy.

### LIMITATIONS OF THE CGE MODEL

Despite the importance of CGE modeling in policy analysis, a series of questions have been raised about the empirical validity of these models. The core of the critique is focused on unsound parameter selection criteria, because the choice of elasticity values critically affects the results of policy simulations generated by these models. In the calibration method, some parameters are determined on the basis of a survey of empirical literature, some chosen arbitrarily, and the remainders are set at values, which force the model to replicate the data of a chosen benchmark year (Shoven and Whalley, 1992). Most often the estimated elasticities for commodity and/or industry classifications are based on econometric studies, which are not totally consistent with the countries represented in the model or they may even be “guesstimates” when no published figures are available. Therefore these models face two trade-offs, between transparency and complexity because on one hand, to implement large complex models the researchers are forced to choose parameters using ad hoc methods and, on the other, it is hard to understand what is driving the results in such complex models (Baldwin and Venables, 1995). Hence, one key issue with these models is how robust the results are to alternative parameter values, because there is no meaningful statistical method to test the significance of the calibrated benchmark parameter values in CGE models. Another critique related to the calibration procedure of the contemporary CGE modeling focuses on the over-reliance on non-flexible functional forms (those in the Constant Elasticity of Substitution (CES) class), and a convenient separability structure on technologies that imposes influential restrictions on the model’s structure. McKittrick (1998) found that the choice of functional structure strongly influences the results from a policy simulation at both the industry specific and macroeconomic levels. Despite all these criticisms, however, the CGE models have already made contributions to trade policy issues in a wide variety of settings and therefore one can argue that these criticisms are somewhat misguided. The database and numerical results of the CGE models are intended to be more than merely illustrative and provide the internal consistent framework for policy evaluation with many implications and feedback effects that are based on solid microeconomic foundations. The key behavioral parameters in these models are related to econometric work in the literature and the careful use of a systematic sensitivity analysis approach would clearly indicate how robust the findings are with respect to the uncertainty in parameter values. An evaluation of the robustness of model results can certainly help to increase the creditability of model conclusions. As Scollay and Gilbert (2000, p. 177) point out “Distortions in an economic system will generally have repercussions far beyond the sector in which those distortions occur, and where the distortions are wide-ranging, general equilibrium is perhaps the only method which is capable of capturing the relevant feedback and flow-through effects.”

### THE GTAP MODEL

In this study, the widely used Global Trade Analysis Project (GTAP), a multi-country, multisector AGE model (Hertel, 1997) 14 has been employed to empirically assess the impact of trade liberalization reforms in Pakistan. Multi-country, economy-wide CGE models are designed to work out the relative prices of various inputs and outputs mixes of the economies of interest as well as indicating the global changes in world trade patterns. Thus, the strength of a global AGE model lies in its ability to help us understand the linkages between sectors, countries and factors on a global scale. The general equilibrium structure recognizes that all parts of the world economy hinge together in a network of direct and indirect linkages. This means that any change in any part of the system will, in principle, have repercussions throughout the entire world. As McDougall (1995, p. 88) clearly points out “its characteristics are that it is economy-wide, it is multi-sectoral, and it gives a central role to the price mechanism. These characteristics differentiate it from partial equilibrium modeling (not economy-wide), macroeconomic modeling (not multi-sectoral), and input-output modeling (agents don’t respond to price signals).” The GTAP model was designed for comparative-static analysis of trade policy issues in an economy-wide framework. Since the changes in trade policies and production levels in any of the regions and sectors will have impacts on other regions and sectors, even though my main focus of this study is on results for Pakistan, it is possible to incorporate the policy changes of other countries within a global CGE modeling framework. It is only through a general equilibrium evaluation that economic policies can be assessed in terms of their impacts on welfare. It is also easy to make a comparison between different trade policy options through a global CGE model. The GTAP facilitates such multi-country, economy-wide analysis. Since this study focuses on global trading relations and detailed sectoral and regional trading activities of the Pakistan economy, many of the simulations we need to consider require a global perspective. For example, in the case of membership of SAFTA, it is needed to consider the effects on Pakistan of a reduction of domestic import tariffs on other SAFTA members. I also need to assess the impact of the reduction or elimination of import tariffs on Pakistan’s exports by SAFTA members on the Pakistan economy and on its sectoral distribution. Using a global model like GTAP, we can endogenously capture the effects of policy changes of other countries explicitly on Pakistan. This ensures that changes abroad in combination with Pakistan’s changes are used to generate new terms of trade for Pakistan.

Figure 1 gives a graphical exposition of the GTAP model structure by focusing on the accounting relationship of all agents in the multi region open economy. There is a regional household associated with each country or composite region of the GTAP model. Firms (producers), private households, and governments are represented as economic agents in each region of the model. The regional household collects all income that is generated in the economy. Regional income consists of *VOA* (*Value of Output at Agent’s prices*) paid by producers for the use of endowment commodities (factor income), and the sum over all taxes net of subsidies. All taxes (*TAXES*) levied in the economy always accrue to the regional household. In each region, a regional household allocates regional income over the three forms of final demand: private household expenditure (*PRIVEXP*), government expenditure (*GOVEXP*), and savings (*SAVE*). Thus

the final demand is represented by total utility, which is derived with a simplified Cobb-Douglas utility function to aggregate total household consumption, total government spending, and total saving. This approach represents the standard aggregation of GTAP, in which each component of final demand gets a constant share of total regional income. Thus, an increase in regional income causes an equiproportional change in private expenditures, government expenditures and savings. Each region of the GTAP model has a single representative private household. The private household supplies endowment commodities to producers, and obtains factor income in return. In GTAP, endowment commodities are non-tradable goods, which include land, unskilled labor, skilled labour, capital, and natural resources. Within each region, the model distinguishes between primary factors that are perfectly mobile across productive sectors and those that are sluggish. In the standard aggregation of the GTAP database, skilled and unskilled labour and capital are treated as perfectly mobile across industries within each region, whereas natural resources and land are treated as sluggish factors of production. The responses of the supply of factors to changes in relative sectoral returns depend on the value of the transformation elasticities parameters. The household buys bundles of commodities to maximize utility, subject to its expenditure constraint. The bundles are nested CES combinations of domestic goods and import bundles, with the import bundles being CES aggregations of imports from each region. The elasticity of substitution between imported and domestically produced goods in this composite nest of the utility tree is assumed to be equal across uses. In GTAP, the government revenues come from household income taxes, producers' taxes, and taxes on international transactions (minus subsidies, if they exist). As can be seen from Figure 1, 12 the government spends its income on domestically produced goods-VDGA (value of domestic government purchases, evaluated at agents' prices) and imported goods - VIGA (value of expenditure on imported tradable commodities by the government). The total government expenditure on each commodity category i.e. domestically produced and imported supplies, is allocated across commodities by a Cobb-Douglas constant budget share. In GTAP, savings is derived by assuming a Cobb-Douglas utility function and is treated as a function of regional total income and price, so that all savers in the model face a common price for the savings commodity (*PSAVE*). In particular, savers enter a regional utility function, along with composite private consumption and aggregate government purchases. This reflects an implicit assumption of fixed savings rates. Savings are included as *GLOBAL Savings* in Figure 1. Thus, the regional income in excess of regional expenditure is saved and used as investments by producers. In the GTAP model, economic welfare is measured in terms of EV (equivalent variation), which indicates the reduction/increase in the external transfer, which would be equivalent in its effects to the tariff increase/decrease. Thus EV takes the old equilibrium incomes and prices, and computes the change needed to achieve new equilibrium utilities. There are two global sectors in the GTAP model for international consistency of trade and financial flows. The global transportation sector that provides the services account for the difference between FOB(Freight on Board) and CIF(Cost in land freight) values for a particular commodity shipped along a specific route. The global banking sector intermediates between global savings and investment. Investment in each region is financed from a global pool of savings. Each region contributes a fixed proportion of its income to the savings pool. Thus, regional savings are gathered by the global banking sector to create composite



investment good (*GLOBINV*), based on a portfolio of net regional investment (*NETINV*), and offers this to regional households in order to satisfy their savings demand (Hertel and Tsigas, 1997). Since the size of the portfolio of global investment adjusts to accommodate changes in global savings, the global closure in this model is neo-classical. Thus, when global equilibrium is reached, all firms earn zero profits (including the global transport sector), and all households are on their budget constraint, then global investment must equal global savings and Walras' Law will be satisfied. Both factor and commodity markets are assumed to be perfectly competitive in the GTAP model. The representative firm in each industry produces goods subject to constant returns to scale technology, and every sector produces a single output. In this model, firms' behavior depends largely on the assumption of separability in the production structure. It is assumed that primary factors of production and intermediate inputs are separable, and hence, there is no substitution between primary factors and intermediate goods. The overall elasticity of substitution among primary factors determines the ability of the economy to alter its output mix in response to changes in relative prices, or changes in the endowments of these factors. Thus, primary factors are assumed to substitute for one another according to the constant elasticity of substitution, while composite value added and intermediates are used in fixed proportions (Table 5 reports the elasticities of substitution in the GTAP model). Separability in production also means that the elasticity of substitution between any individual primary factor, on the one hand, and intermediate inputs on the other, is equal. The production technology in GTAP is represented by a set of nested CES and Leontief (fixed) functions. As shown in Figure .2, at the first level of the production tree, producers use a composite unit of intermediate inputs and primary factors in fixed proportions according to a Leontief function. At the second level, firms purchase composites of primary factors and composites of intermediate inputs that are obtained as combinations of domestic goods and imported bundles of the same commodity category. Domestic and imported intermediate inputs can be substituted according to a CES form. At the third level, a CES form is also assumed to capture the degree of substitutability between imports of different origin. Employing the Armington assumption, the GTAP model assumes that goods from different sources are imperfect substitutes. Thus the imported commodities are separable from domestically produced goods. Similarly, imported intermediates are also assumed to be separable from domestically produced intermediates. Accordingly, there are two sets of Armington or source substitution elasticities in the GTAP database. One of these relates to the substitution between domestic and imported composites (domestic-import substitution elasticity) - *ESUBD*. The other one relates to the substitution among imports from different sources (import-import substitution elasticity) - *ESUBM*. In GTAP, these elasticities are defined separately for each of the representative agents within each region rather than referring to single economy-wide demand behavior. For cross-regional behavior, the model assumes that for each commodity all agents in all regions display the same substitution elasticity. In GTAP, international trade is included by the addition of a region, namely, the Rest of the World (*ROW*). The *ROW* is the source of imports into the regional economy, as well as the destination for its exports. Figure-1 indicates that firms on one side get additional revenues for selling commodities to the *ROW* (*VXMD*). On the other side, the producers spend their revenues not only on primary factors and domestically produced intermediate inputs, but also on intermediate imports (*VIFA*), and

an additional consumption tax on imports to the regional household, denoted as *TAXES*. Furthermore, both the government and private household have to pay additional commodity *TAXES* on imports. Thus, the ROW gets payments for selling its goods to the private household, the government, and the firms. These revenues will be spent on commodities exported from the single region to the rest of the world (*VXMD*), and on import taxes, (*MTAX*), and export taxes (*XTAX*) paid to the regional household. As can be seen from Figure 7.2, imports are traced to specific agents in the domestic economy, resulting in distinct import payments to ROW from private households (*VIPA*), government households (*VIGA*), and firms (*VIFA*). In the GTAP model, the additional value flows denoted as taxes (*TAXES*) arise due to various policy interventions. The *TAXES* flow from private household, firms and government to the *regional* household (Figure .1). Due to the policy intervention, the government pays consumption taxes on commodities it purchases, and commodity taxes on imports. In contrast to that, taxes paid by the private household cover consumption taxes, commodity taxes on imports and income tax net of subsidies. In GTAP, producers also pay taxes to the regional household. These value flows represent taxes on intermediate inputs, consumption tax on imported inputs, and production taxes net of subsidies.

### THE GTAP DATA BASE

The GTAP database is the database for the GTAP model of the world economy, which is publicly available. The main data source for this model is “The GTAP 4 Data Base” (McDougall et. al., 1998), which refers to the year 1995 and therefore, all of the analysis in this study was taken from this base year. The benchmark equilibrium data set serves as a description of the economy in the initial equilibrium before any policy changes have been made. The database covers the 50 sectors within each of the 45 regions. The centerpiece of the GTAP database consists of input-output (I/O) data for each region, which account for inter-sectoral linkages within regions, detailed bilateral trade, transport, and protection data that link 45 country/regional economic databases. Thus, the GTAP database is easy to adapt to appropriate sectoral and regional aggregations that allow one to focus on specific policy questions. The regional databases in the model are derived from individual country input-output (I/O) tables that provide information about the individual regional economies in the model. The bilateral trade data was primarily derived from the United Nations *COMTRADE* (Commodity Trade) database. The Economic Research Service (*ERS*) of the United States Department of Agriculture (*USDA*) supplied the missing information in the UN trade data

### THE REGIONAL AND COMMODITY AGGREGATION IN THE MODEL

Since the full GTAP database contains 45 regions and 50 commodities, it is generally necessary to aggregate regions and commodities to a higher level for reason of computational efficiency. Therefore, the database is aggregated to 10 regions and 10 commodities, which emphasizes sectors and countries of interest for this study. Accordingly, the 10 regions of the model constitute Pakistan (LKA), India (IND), Rest of South Asia (RAS), Association of South East Asian Nations (ASEAN-5), Rest of Asia (ROA), Japan (JPN), and countries in the European Union (EU), countries in the North American Free Trade Area (NAFTA), Middle East (MIE) and Rest of the World (ROW).

The regional aggregation scheme is presented in Table 6. The country aggregation is chosen to reflect Pakistan's major trading partners. Thus India and Japan separated from the rest of the world because of the growing importance of these countries as sources of imports to Pakistan. The database disaggregates data at a country level but not for all countries. Thus, country level data exist for India and Pakistan but not for the rest of the SAARC countries. These countries (Bangladesh, Bhutan, Maldives, Nepal and Pakistan) have data as a group under "Rest of South Asia." Therefore, these countries are included as the Rest of South Asia (RAS). The East and Southeast Asian countries are aggregated into two groups as ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand) and Rest of Asia (China, Hong Kong, Korea and Taiwan) because these two regions are also major sources for Pakistan's imports. While the member countries of the European Union (United Kingdom, Germany, Denmark, Sweden, Finland and the Rest of European Union) are aggregated as the EU, the United States, Canada and Mexico are aggregated as NAFTA. Moreover, all the countries in the Middle East included as Middle East. The EU, NAFTA and the Middle East countries are major destinations for Pakistan's exports. Similarly, the ten commodity categories in this model are intended to represent the commodities that are of major interest to the Pakistan economy. The commodity categories in the model are: Agriculture, Forestry and Fishing (AGRI); Mining and Quarrying (MINQ); Processed Food (PROF); Textiles (TEXT); Wearing Apparels (WEAP); Petroleum and Coal Products (PECP); Machinery and Equipment (MAEQ); Transport Equipment (TREQ); Other Manufactures 17 (OTHM) and Services (SERC). The commodity aggregation chosen and detailed in each of the above commodity categories are shown in Table 7.

### SECTION III: EXPERIMENTAL DESIGNS

All experiments were conducted with the standard general equilibrium closure 25 of the GTAP model. According to the standard closure of the model, prices, quantities of all non-endowment commodities and regional incomes are endogenous variables. Conversely, exogenous variables in this closure include population, the nominal price of savings, all technological change variables, and all slack variables except the Woleaian slack variable, all policy variables, and all endowments. If the value of the *walraslack* is zero, then global savings equals global investment and the solution is consistent in a general equilibrium sense. Finally, the global bank's allocation of investment across region is flexible ( $RORDELTA=1$ ). Thus the rate of return to investment is allowed to equalize across countries, so that savings demand can be met by investment in other countries, as well as by the country's own investment. The elasticity of the expected rate of return to investment with respect to end-of-period capital stocks ( $RORFLEX$ ) is set at 10 (the default setting for this parameter), making the supply of new capital goods quite insensitive to the expected rate of return. As shown in Table 8, trade liberalization policy analysis for Pakistan proceeds with six scenarios of alternative trade policy options. The first scenario (*Experiment-1*) was undertaken in the context of Pakistan's unilateral trade liberalization. Since the Government of Pakistan is committed to continue trade reforms with the aim of introducing a uniform tariff rate (15 percent) over the medium term (Government of Pakistan, 1995), this experiment is based on the assumption that Pakistan unilaterally reduces its import tariffs to 15 percent, to maintain a uniform tariff structure on a global basis. In this case, we assume that the rest of the world does not

reciprocate. The second trade reform scenario (*Experiment-2*) was conducted under the regional trade liberalization policy option to examine the impact of South Asian Free Trade Agreement- SAFTA in different contexts from the perspective of Pakistan. As a member of the SAPTA, Pakistan is committed to continue major trade liberalization measures, to establish and promote free trade arrangements for strengthening inter-regional economic co-operation and the development of national economies. In this experiment, it was assumed that Pakistan and each of the SAARC member countries in the model (India and the Rest of South Asia comprising Bangladesh, Bhutan, Maldives, Nepal and Pakistan) remove their tariffs against each other, while maintaining their tariffs against the rest of the world. The third scenario (*Experiment-3*) was conducted to combine the unilateral trade liberalization policy option (15 per cent uniform tariff for the rest of the world) with the regional trade liberalization policy option (SAFTA with SAARC countries). The rationale for this scenario is that the Pakistan government envisages introducing a uniform external tariff of 15 per cent while having free trade agreement with SAARC countries under the SAFTA. In this experiment, we assume that Pakistan and each of the SAARC countries remove their tariffs against each other, but Pakistan maintains a 15 per cent uniform import tariff for the rest of the world.

**Table 1**  
**Key Economic Indicators data for SAARC countries-2005-06**

Country	Mid Year Population	Population in Growth rate	GDP US\$ Mn	GNP Per capita US\$	Literacy rate	Life expectancy	Crude birth rate per (000)	Crude death rate exports	Exports US\$ Mn	Imports US\$
<b>Pakistan</b>	148.8	1.92	93,908	600	48.7	63	36	36	13,375	17,954
<b>Bhutan</b>	0.8	2.5	657	760	47.0	63	35	9	n.a	n.a
<b>Bangladesh</b>	135.2	1.3	585,68	440	41.1	63	29	8	6,608	11,276
<b>India</b>	1,086.0	1.6	686,08	620	61.0	63	24	8	71,763	94051
<b>Maldev</b>	0.3	1.5	719	24,10	97.2	67	36	6	122	
<b>Nepal</b>	24.7	2.2	6,685	250	48.6	62	33	10	756	1,869
<b>Sri lanaka</b>	19.5	1.1	19,224	1,010	92.1	74	16	7	5,757	8000

**Note: ADB key economic indicators -2005-06**

**Table 2**  
**Gross National Product of Pakistan**

		<b>Rs. Million</b>							
<b>S#</b>	<b>Sectors/ Sub-sectors</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>	<b>2004-05</b>	<b>2005-06</b>	<b>2006-07</b>
<b>A.</b>	<b>Agricultural sector</b>	<b>923609</b>	<b>945301</b>	<b>968291</b>	<b>1059316</b>	<b>1164751</b>	<b>1314234</b>	<b>1382660</b>	<b>1608522</b>
	1. Crops	467879	456258	449993	500370117	538208	651774	666727	1608522
	1.1. Major crops	342200	325579	316857	370117	411836	497556	496841	579996
	1.2. Minor crops	125679	130679	133136	130450	126372	154218	169886	191835
	2. Livestock	417120	446058	476310	512976	578218	621170	678033	794987
	3. Fisheries	15163	16546	16377	16625	16728	17490	22230	243559
	4. Forestry	23447	26439	25611	29148	31597	23800	15670	17345
<b>B.</b>	<b>Industrial Sector</b>	<b>830865</b>	<b>942263</b>	<b>989349</b>	<b>1083914</b>	<b>1416986</b>	<b>1659285</b>	<b>1939160</b>	<b>2203490</b>
<b>A+B</b>	<b>Commodity producing Sectors</b>	<b>1754474</b>	<b>1887564</b>	<b>1957640</b>	<b>2143230</b>	<b>2581737</b>	<b>2973519</b>	<b>3321820</b>	<b>3812012</b>
<b>C</b>	<b>Services Sector</b>	<b>1807546</b>	<b>2035680</b>	<b>2188527</b>	<b>2390988</b>	<b>2668790</b>	<b>3149049</b>	<b>3807356</b>	<b>4414507</b>
<b>D</b>	<b>Gross Domestic Product (GDP)</b>	<b>3562020</b>	<b>3923244</b>	<b>4146167</b>	<b>4534218</b>	<b>5250527</b>	<b>6122568</b>	<b>7129176</b>	<b>8226519</b>
<b>E.</b>	<b>Net Factor Income from Abroad</b>	<b>- 47956</b>	<b>-54482</b>	<b>23665</b>	<b>151812</b>	<b>124478</b>	<b>134461</b>	<b>149901</b>	<b>160738</b>
<b>F.</b>	<b>Gross National Product(GNP)</b>	<b>3514064</b>	<b>3868762</b>	<b>4169832</b>	<b>4686030</b>	<b>5375005</b>	<b>6257029</b>	<b>7279077</b>	<b>8387257</b>
<b>G.</b>	<b>Population in Million</b>	<b>137.53</b>	<b>140.36</b>	<b>143.17</b>	<b>146.75</b>	<b>149.65</b>	<b>152.53</b>	<b>155.37</b>	<b>158.17</b>
<b>H.</b>	<b>Per capita Income (Rs.)</b>	<b>25551</b>	<b>27563</b>	<b>29125</b>	<b>31933</b>	<b>35917</b>	<b>41022</b>	<b>46850</b>	<b>53027</b>

Source: [http://www.statpak.gov.pk/depts/fbs/statistics/national\\_accounts/table12.pdf](http://www.statpak.gov.pk/depts/fbs/statistics/national_accounts/table12.pdf)

**Table 3**  
**Regional Aggregation 10 Regions of the Model**

<b>Aggregated Regions</b>	<b>GTAP Region</b>
1. Pakistan	Pakistan
2. India (IND)	India
3. Rest of South Asia	Bangladesh Bhutan Maldives Nepal Sri Lanka
4. Association of South East Asian Nations ASEAN-5	Indonesia Malaysia Philippines Singapore Thailand
5. Rest of Asia	Hong Kong Korea Taiwan China
6. Japan (JPN)	Japan
7. European Union	United Kingdom Germany Denmark Sweden Finland Rest of European Union
8. North American Free Trade Area NAFTA	USA Canada Mexico







**Table 9**  
**Sensitivity Analysis Estimated Percentage Change in**  
**Pakistan's Output & in Agriculture Trade Liberalization**

Tariff	15% Uniform Import Tariff			SAFTA			SAFTA cum 15% Uniform		
	Central	50%	100%	Central	50%	100%	Central	50%	100%
	Scenario	Increase In ESUBM	Increase In ESUBM	Scenario	Increase In ESUBM	Increase In ESUBM	Scenario	Increase In ESUBM	Increase In ESUBM
<b>(a) Industry Output</b>									
<b>AGRI</b>	-0.98	-1.33	-1.89	-3.1	<b>3.88</b>	5.66	2.45	3.39	<b>5.66</b>
<b>MINQ</b>	-8.56	-8.89	-13.01	-8.98	<b>-12.40</b>	-18.88	-16.93	-23.04	<b>-34.90</b>
<b>PROF</b>	0-8.56	-7.78	-8.67	-2.56	<b>-3.44</b>	-14.36	-18.88	-9.45	<b>-8.56</b>
<b>TEXT</b>	-6.76	-6.67	-7.78	-2.56	<b>-3.62</b>	-7.90	-10.0	-12.4	<b>-14.8</b>
<b>PECP</b>	1.78	1.78	2.56	1.08	<b>-21.94</b>	-39.0	4.5	-2.59	<b>-15.80</b>
<b>MAEQ</b>	-16.97	-23.66	-28.6	4.45	<b>-2.56</b>	4.7	4.7	-2.33	<b>-13.5</b>
<b>TREQ</b>	-17.08	-19.75	-21.0	81.6	<b>131.6</b>	207.6	50.7	81.3	<b>120.4</b>
<b>(b) Aggregate Exports</b>									
<b>AGRI</b>	-7.9	-11.23	-12.41	33.12	-54.12	67.89	22.5	54.0	50.89
<b>MINQ</b>	-8.53	-12.34	-14.45	-9.89	-17.03	-23.54	-18.45	-26.56	-45.78
<b>PROF</b>	-17.45	-23.56	-28.97	8.89	25.27	71.4	-5.78	2.56	29.63
<b>TEXT</b>	-6.79	-10.78	-14.67	-14.78	23.44	27.05	6.4	12.43	16.67
<b>PECP</b>	23.56	43.56	56.6	-0.76	-1.65	-2.3	22.4	41.90	68.90
<b>MAEQ</b>	-17.09	-27.78	-34.6	-26.78	70.1	12.50	56.9	67.2	43.8
<b>TREQ</b>	-18.9	-27.8	-34.7	65.6	67.9	78.6	52.6	71.0	65.0
<b>(c) Aggregate Imports</b>									
<b>AGRI</b>	-7.89	-9.8	-6.78	32.7	-49.0	-71.0	20.9	37.9	58.7
<b>MINQ</b>	-1.56	-3.78	-3.54	2.34	6.54	8.76	-0.67	2.89	6.43
<b>PROF</b>	23.6	27.90	34.5	41.0	31.0	19.11	31.8	40.8	50.89
<b>TEXT</b>	30.8	23.6	30.1	-3.03	-12.5	-14.98	12.6	2.6	4.12
<b>PECP</b>	-5.18	-7.56	-8.67	0.78	0.88	0.65	-4.78	8.8	11.3
<b>MAEQ</b>	3.04	4.64	5.78	7.90	8.89	7.14	7.98	8.66	11.3
<b>TREQ</b>	4.69	5.45	6.00	12.66	17.10	23.90	22.0	16.8	18.04

### SENSITIVITY ANALYSIS

Sensitivity analysis for AGE models is critical for establishing the robustness and obtaining the acceptance of model results. Although AGE models have become important tools of analysis in the quantitative evaluation of trade policy, the solutions obtained from these models are conditional on many assumptions. Among many assumptions, one set of assumptions—the values of model parameters such as elasticities—are amenable to “sensitivity analysis.” Evaluation of the robustness of the model results can also help to increase the credibility of the conclusions of the study. In the GTAP model, the substitutability among imported commodities from different sources is determined by the Armington elasticity of substitution parameter called ESUBM. According to the Armington assumption, each country has some degree of market power over its products and can influence its terms of trade because that goods from different sources are treated

as imperfect 19 substitutes. Hence, to reduce Pakistan's market power, it is necessary to increase the substitutability among imports from different origins because the terms trade effects largely depend on the import-import substitution elasticities (McDougall et al., 1998). This kind of experiment could also be interpreted as a form of conditional systematic sensitivity analysis (CSSA). Under the CSSA; each parameter is separately perturbed from its central value conditional on all the other parameters remaining at their central values. The robustness of the model results is then revealed by comparison of the simulation results with the central case. Thus, three additional experiments are undertaken under the sensitivity analysis to reduced Pakistan's market power by increasing the values of ESUBM to capture the effect of possibly different adjustment capacities as a small country. Though this will affect all countries/regions' market power in the model, it will have most effect on the small countries like Pakistan. The first experiment under the sensitivity analysis (Experiment 4) deals with the unilateral trade liberalization scenario. (15 percent uniform import tariff). The second experiment (Experiment 5) related to the regional trade liberalization (SAFTA by itself) and the third one (Experiment 6) conducted under the unilateral trade liberalization with combination of regional trade liberalization (SAFTA cum 15 percent uniform import tariff). To make these experiments manageable, two separate experiments are conducted under the Experiments 4, 5 and 6 respectively. Thus, under the first experiment, the parameter ESUBM was perturbed from its central value and then increased its value by 50 per cent in the first three scenarios-*Experiments 4-1, 5-1 and 6-1* respectively. Under the second experiment, the value of ESUBM was doubled (100 percent increase) for the other three scenarios-*Experiments 4-2, 5-2, and 6-2* respectively. With these six scenarios, it was assumed that all other parameters (except ESUBM) in the model remain at their central values.

## SIMULATION RESULTS

### **Experiment-1: Reduction of Import Tariffs to 15 percent**

The first experiment considered the Pakistan's reduction of import tariffs to 15 percent under the unilateral trade liberalization. The impact of this scenario on regional welfare and the resulting percentage changes in sectoral output and trade are reported in Table 9 and 10 respectively. Accordingly, if Pakistan (LKA) reduces its import tariffs to 15 percent unilaterally on a global basis to maintain a uniform external tariff rate, Pakistan experiences a welfare gain around US\$ 20 201 million (1.53 percent of the GDP). Under this scenario, Pakistan's volume of imports rises by 3.3 percent while its volume of exports falls slightly by 0.3 percent reflecting the fact that the pressure to increase imports is stronger than the increase in demand for Pakistan's exports by unilateral liberalization. However, as a result of the composite export price increase by 1.1 percent, Pakistan experiences a small improvement in the terms-of-trade of 1.5 percent and the real GDP by 0.8 percent. The welfare gains or losses for other regions are quite varied under this simulation. However, since Pakistan is a small country, the impact of Pakistan's unilateral reduction of import tariffs to 15 percent will not affect other region's real GDP or terms-of-trade significantly. As shown in Table 9, the 15 percent uniform tariff will adversely affect most of the sectoral output in Pakistan because of the increased competition for import competing industries. As shown in panel (a) of Table 9, the most affected industry is the transport equipment (TREQ) sector (18 percent),

followed by machinery and equipment (MAEQ) sector (16 percent). It is noteworthy that these sectors expand significantly under the regional liberalization scenarios, particularly under the SAFTA scenario. The textiles (TEXT) sector (8 percent), processed food (PROF) sector (8 percent), mining and quarrying (MINQ) sector (8 percent), other manufactures (OTHM) sector (5 percent), and agriculture (AGRI) sector (1 percent) also report a decrease in output. However, there is a considerable increase in the wearing apparel (WEAP) sector (21 percent) and marginal increases in both the petroleum and coal products (PECP) sectors (2 percent), and the services (SERC) sector (1 percent). Similarly, as can be seen from panel (b) of Table 9, export sales also decline considerably in almost all the sectors except petroleum products (25 percent) and wearing apparel (21 percent). The largest decline in export sales occurs in machinery and equipment (22 percent) followed by transport equipment (19 percent), processed food (16 percent) and services (15 percent). As shown in panel (c) of Table 9, Pakistan's sectoral imports expand mainly in processed food (26 21 percent), wearing apparel (20 percent), and textiles (19 percent) while imports contract mainly in agriculture (9 percent), services (7 percent) and petroleum products (5 percent) under this policy reform. Accordingly, the results suggest that a reduction of import tariffs to 15 percent will increase Sri Lanka's welfare and terms-of-trade as well. Although one might expect that the reduction of import tariffs would increase the domestic output and therefore increase export sales, this policy reform would adversely affect Pakistan's domestic output in most of the sectors because of foreign competition. A similar impact can be seen in export sales too.

### **Experiment-2: South Asian Free Trade Agreement-SAFTA**

As shown in Table-10, the welfare effects of the SAFTA scenario will be quite varied across the members, although removing barriers to trade will significantly expand the volume of trade within the region. The welfare gains from regional trade liberalization are the sum of trade creation benefits (generated new trade within the area from free trade); minus the trade diversion losses (caused by replacing more efficient nonmember suppliers with less efficient preferred member countries); plus the terms-of-trade gains associated with increased market access. It appears from Table -10, that the SAFTA will generate significant benefits for both Pakistan and India, but a loss for the countries in the RAS. Pakistan's welfare gain from the SAFTA is around US\$254 million (1.92 percent of the GDP) reflecting the fact that consumers will enjoy a shift of consumption from domestically produced goods to cheaper imports, and producers from cheaper imported inputs as well. Pakistan's composite export price increases by 5 percent, and in turn this leads to the terms of trade improvement by 4 percent. However, there is only a small increase in Pakistan's volume of exports (0.9 percent), but the volume of imports will increase considerably by 7.5 percent, and this will lead to only a marginal improvement of the real GDP by 0.1 percent. In this experiment, India stands to gain most from the improved market access that SAFTA promises to deliver. As shown in Table 10, the welfare gain for India is around US\$ 4445 million (1.35 percent of the GDP). This will be accompanied by an improvement of the terms-of-trade by 3.6 percent. Thus, the impact of the SAFTA on India's welfare is larger given its smaller share of imports from the members of the SAFTA (Schiff, 1996). In contrast, the SAFTA will have an adverse impact on the RAS, as representatives of the other SAARC member countries because of trade diversion. The estimated welfare loss for the RAS is around US\$1575 million (1.72 percent of the GDP). This situation is further aggravated by the deterioration in the terms-

of-trade by 3.9 percent. Thus, the trade-diverting effects of the formation of a FTA are likely to outweigh trade creating effects for these countries, so, there may be efficiency loss which may lead to reduced welfare. Although the simulation results capture only a comparative static analysis of trade liberalization, it may suggest that this type of FTAs would promote welfare in some regions, but this could be at the expense of other regions. For example, as shown in Table 10, Japan, the largest single importing country of Pakistani goods would no doubt lose from the SAFTA by around US\$799 million because of the loss of not only Pakistan's market for her exports, but also the South Asian market as well. Table 11 presents the percentage changes in sectoral output, and trade by region under the SAFTA liberalization. The percentage changes in industry output in Pakistan, as shown in panel (a) of Table 11, the performance of the transport equipment sector is remarkable, reporting about 85 percent increase, due mainly to the advantages by the cheaper imported intermediate inputs from the SAARC region. The industry output of other manufacture (5 percent), manufacturing equipment (4 percent), and agriculture (2 percent) also increase but to a lesser extent. However, Pakistan's industry output in wearing apparels (11 percent), mining and quarrying (9 percent), textiles (93 percent) and processed food (2 percent) decline as the domestic market is opened up to more efficient overseas producers. The removal of import tariffs under the SAFTA will adversely affect India's domestic output of apparels (12 percent), mining and quarrying (2 percent), processed food (2 percent) and agriculture (0.4 percent). Only the transport equipment sector increases by 16 percent under this policy reform which is an indication of the availability of cheaper imports that are used by the sector itself as intermediate inputs following trade liberalization. In contrast, the RAS reports the increase of industry output in wearing apparel (16 percent), machinery and equipment (6 percent), petroleum product (4 percent), textiles (4 percent) and processed food (2 percent). It also experiences a significant decrease in industry output in transport equipment by 50 percent followed by a small reduction in mining and quarrying (3 percent) and agriculture (0.4 percent) due to increased competition. As can be seen from panel (b) of Table 11, there is a substantial increase in transport equipment exports by Pakistan of around 801 percent, indicating that Pakistan will benefit immensely, by exporting these items under the SAFTA, although these items are not currently important in its export basket. The export sales of agriculture (33 percent) other manufactures (16 percent), textiles (13 percent), processed food (9 percent) and manufacturing equipment (8 percent) also increase their sales as a result of induced competition, while the services sector (17 percent), wearing apparel (12 percent) and mining and quarrying (11 percent) decline under this trade liberalization. In contrast, there is a substantial increase in India's export sales in transport equipment (228 percent) followed by machinery and equipment (44 percent). The other manufactures (9 percent) and textiles (9 percent) also increase considerably while all the other sectors report decreases in export sales. The sectors that report the highest decreases are wearing apparel (27 percent), services (15 percent) and processed food (15 percent). However, the RAS reports a substantial increase in export sales in almost all the sectors because of the preferential access to the vast SAFTA market. The largest increase occurs in the transport equipment sector (448 percent) followed by machinery and equipment (103 percent), petroleum products (102 percent), mining and quarrying (72 percent), agriculture (71 percent), and other manufacture (44 percent). As shown in Table 11 (panel c), Pakistan's aggregate imports increase considerably in

agriculture (32 percent), processed food (18 percent) and transport equipment (14 percent), while both the textile and apparels imports decrease slightly by 2 percent. All the other sectors report a small increase in imports under the scenario. Not surprisingly, India's aggregate imports will increase in all the sectors with the largest increase recorded for wearing apparel (75 percent), transport equipment (27 percent), agriculture (23 percent), and textiles (21 percent) and processed food (16 percent). Thus, the simulation results seem to suggest that having a FTA with SAARC countries is a wise Strategy for Pakistan, because it provides access to the vast market of the SAARC countries. Competitive suppliers in Pakistan will enjoy a greater market share and consumers will have access to variety of cheaper and better quality goods. Trade liberalization permits Pakistan to expand its export sectors at the same time that all sectors compete more closely with a larger number of competing varieties from SAFTA countries. Productive resources would then get allocated more efficiently as compared to the pre-liberalization situation as Pakistan would specialize in the sectors where it has comparative advantage. Therefore, Pakistan will enjoy immediate benefits from the SAFTA. Although India gains the most from the SAFTA scenario, it would not be beneficial for the RAS. However, the SAFTA will generate more production and trade opportunities for the region as a whole.

### **Experiment-3: SAFTA cum 15 percent Uniform External Tariff**

This experiment considered the impact of combined trade policy of unilateral cum regional trade liberalization on Pakistan's welfare and trade. As shown in Table 12, the simulation results indicate a considerable increase in welfare for Pakistan, around US\$442 million (3.35 percent of the GDP) under this scenario, reflecting that both consumers and producers are able to benefit from the removal of trade barriers. Indeed, this simulation represents the highest welfare gain for Pakistan among the three trade liberalization experiments presented. Apparently, there are two trade-creation effects from this scenario. First, trade creation that results from Pakistan's own trade liberalization, and second, that which results from the regional liberalization under the SAFTA. Pakistan also experiences the highest terms-of-trade improvement of 5.2 percent under this policy reform, as the economy would be expected to gain from the increased composite exports price of 5.4 percent, relative to a small increase in the price of imports of 0.3 percent. As might be expected, Pakistan's volume of imports increases significantly by 9.0 percent, but the volume of exports decreases slightly by 0.3 percent. As a result, there is only a marginal improvement in the real GDP by 0.98 percent. Not surprisingly, India, as Pakistan's major import source, would also gain considerably under this policy reform by around US\$4398 million (1.34 percent of the GDP). The reported terms-off trade improvement for India is 3.6 percent. However, this policy reform also leads to a considerable welfare loss for the RAS of approximately US\$1592 million (1.74 percent of the GDP). The RAS also experiences a deterioration of the terms-of-trade by 3.9 percent. Table 13 highlights the estimated percentage changes in regional output and distribution of sales under this policy reform. Accordingly, Pakistan's domestic output in the transport equipment sector rises considerably, by 53 percent and 625 percent respectively, as a result of the easy access to cheaper raw materials from the world, and preferential access to the SAFTA market. Both agriculture and petroleum product exports also rise considerably, by 23 percent. However, there is a notable decrease in domestic output and export sales in mining and quarrying (16 percent and 18 percent respectively)

machinery and equipment (12 percent and 13 percent respectively), and processed food (9 percent and 6 percent respectively). Pakistan's domestic output in textiles decreases by 11 percent while the exports of textiles increase by 6 percent. The export sales in services also decrease by 27 percent As shown in panel (c) of Table 13. Pakistan's aggregate imports increase in almost all sectors under trade liberalization, with the exception in petroleum products (4 percent) and services (3 percent). The largest increase occurs in the processed food sector (41 percent), followed by agriculture (20 percent), transport equipment (13 percent), textiles (12 percent), machinery and equipment (7 percent) and wearing apparel (7 percent). Thus, the results suggest that if Pakistan implements the SAFTA with SAARC countries, while having a 15 percent uniform external tariff for the rest of the world that will improve Pakistan's welfare and the terms-of-trade more than any other trade policy reform that we considered. Thus, Pakistan gains from both unilateral and regional trade liberalization simultaneously under this scenario. Although this policy reform provides incentives to some domestic industries to increase their output and export sales, there are some industries that will reduce production and export sales because of the increased competition.

The GTAP model assumes constant returns to scale and perfect competition in all sectors. Instead, if we allow for increasing returns to scale and imperfect competition in some sectors of our model, we can raise significantly the estimated welfare gains of trade liberalization. As far as liberalization stimulates investment and technology provided by the enlargement of the market, the welfare effects reported in this study are underestimates of potential gains. Moreover, we have not incorporated the effects of non tariff barriers (NTBs) in our trade liberalization simulations; instead we assumed that all other distortions remain constant except tariffs. Therefore, the omission of NTBs surely leads to an underassessment of the impacts of trade reforms on efficiency and trade.

#### **Experiments 4, 5 & 6: Sensitivity of the Results**

As described previously, to quantify the impact of trade policy reforms on Pakistan, three additional experiments were undertaken with an increased elasticity value for the import-import substitution parameter (Armington parameter)-ESUBM, to consider Pakistan as a small country Accordingly, under these three experiments, first, the size of the ESUBM increased by 50 percent, and then doubled the value (100 percent increase) to reduce Pakistan's market power in the world market. This would provide an opportunity to examine the sensitivity or robustness of the model predictions with respect to the change in the underlying parameters.

The welfare increases for the country as the elasticities increase. However, under these two scenarios, we see a slight decline in Pakistan's terms-of-trade as elasticities increases. Moreover, under these scenarios, the impact on terms-of-trade is not much different from the central scenario case similarly, experiment 5 (E-5) deals with the SAFTA scenario. As shown in Table 15, with the increase of the value of ESUBM, both the welfare and the terms-of-trade will increase linearly from the central scenario case. Thus, the welfare gain for Pakistan under the 50 percent increase in ESUBM (E-5.1) is approximately US\$340 million (2.58 percent of the GDP), whereas under the 100 percent increase scenario (E-5.2), it is around US\$422 million (3.19 percent of the GDP). Thus in the former case, Pakistan's welfare will increase by 42 percent from its central value scenario, and in the latter case it will increase by 76 percent. Thus, welfare increases as

elasticities increase. Thus, the gains are rather linear with both the cases reflecting the robustness of the model results. Experiment 6 (E-6) considered the combined policy of SAFTA cum 15% uniform import tariffs scenario. Thus, 50% increase of the value of ESUBM (E-6.1), would increase welfare gain around US\$592 million (from US\$443 million at the central scenario) or 4.4 percent of the GDP. Here, the increase in welfare from the central value is 33 percent. Similarly, doubling the value of ESUBM (E-6.2) would increase Pakistan's welfare by around US\$743 million or 5.6 percent of the GDP. In this case, the increase in welfare from the central value is 67 percent. Moreover, under these two scenarios, the increase in terms-of-trade is 5.9 and 8.8 respectively. Thus the improvements in the terms of trade from the central value are 1.7 and 3.6 percent respectively. Although these welfare and terms-of-trade gains are not almost linearly related to the changes in the Armington elasticity ESUBM, the result would suggest that unilateral trade liberalization in combination with regional trade liberalization permits Pakistan to expand its export sectors at the same time that all sectors compete more closely with a larger number of competing varieties from abroad.

Table 16 highlights Pakistan's sectoral output, exports and imports under the sensitivity analysis scenarios. Accordingly, Pakistan's industry output falls significantly in all most all the sectors except for significant increases in transport equipments and wearing apparels. Pakistan's export sales also decrease considerably under all the experiments as shown in panel (b) of Table 16, except the transport equipments petroleum products and apparel sectors under E-4, transport equipments, machinery and equipment, other manufacture and textiles sectors under E-5 and transport equipments, petroleum products, other manufacture and textiles sectors under E-6. Pakistan's aggregate imports (panel(c) in Table 16)) increase considerably in all sectors except agriculture, services, petroleum products, mining and quarrying under E-4, wearing apparels, and textiles under E-5, and petroleum products and services under E-6.

#### **SAFTA**

A free trade area is an agreement among countries where by tariffs and non-tariff barriers for instance quotas, licensing requirements and products safety regulation are abolished among members. Compared to customs unions and common market, a free trade area is the least institutionalized form of economic integration, where each member of the FTA keeps its own external tariffs and other regulations for trade with non-member countries. An FTA may offer advantages to all member countries. An FTA is likely to increase interregional trade and enhances competitiveness, productivity and efficiency. Trade creation, trade diversion, and terms of trade are the components of static effects. When the removal of trade barriers promotes trade among the members (trade creation effect), it sometimes does so at the expense of imports from non-members (trade diversion effect). If an FTA leads to a reduction in imports from non-members, FTA members are likely to experience improvement in their terms of trade vis-à-vis non-members (terms of trade effect). The trade creation effect and terms of trade effect lead to an increase in economic welfare of the members, while the trade diversion effect is likely to reduce economic welfare of the members because imports from most efficient suppliers in non-members are replace by imports from less-efficient member producers. It is important to note that for non-economic welfare. The free trade scenario analysis assumes that there will not only be normal trading relations with India but SAFTA will

also be operative and there will be no tariff or custom duty on imports from India. However, the domestic taxes at the border level would continue to prevail. Besides, duty drawback and other tariff neutralization measures for inputs as well as export incentives would be available. It will be useful to mention that the trade diversion means that a free trade area diverts trade, away from a more efficient supplier for example from rest of the world (ROW), towards a less efficient supplier within the FTA for example India. The trade 3 diversion may reduce a country's national welfare but in some cases national welfare could improve despite the trade diversion, depending upon the particular situation. In contrast, trade creation implies that a free trade area creates trade that would not have existed otherwise. As a result, supply occurs from a more efficient producer of the product.

#### **NON ECONOMIC BENEFITS**

Besides the welfare and terms of trade gains suggested by the simulations, regional trade liberalization under SAFTA may have many non-economic benefits to a small country like Pakistan, particularly social and political benefits; those are difficult to account for in a quantitative way. For example, SAFTA can help its members to speak with one voice in global negotiations and develop a common understanding on several global trade-related issues. It could also reduce the political disputes among members and make the region a more attractive location for foreign direct investments. This is critical for a developing country like Pakistan as it is typically unable to fully finance its growth in investment with domestic savings. Since absorptive capacity in Pakistan is crucial for obtaining significant benefits from FDI, liberalization of trade and FDI policies needs to be complemented by appropriate policy measures with respect to education, R&D, and human capital accumulation if Pakistan is to take full advantage of increased trade and foreign investment. Since the proximity, history and cultural familiarity associated with trade are important determinants of foreign trade, the expansion of the neighboring market following trade liberalization could be more important for Pakistan to exploit economies of scale and able to avoid transport and other costs of trade to more distant markets. It is widely believed that the outcome of an RTA depends mainly on the membership, the policies intended to pursue and the effectiveness of the proposed institutional mechanism. Therefore, member countries of SAFTA should set their own agenda and priorities as a bloc, in order to face the impact of future trade issues under the global framework without jeopardizing their growth prospects and interests. Moreover, political willingness and commitments are equally important for the success of any trade agreement. Lastly, to be consistent with the multilateral process RTAs should be outward looking and that they are more likely to facilitate liberal multilateral trade. The outward orientation of any RTA is judged on the basis of its consistency with Article XXIV of the GATT. As results suggest; that the increase in volume of imports under all the trade liberalization scenarios will have an adverse impact on the competitiveness of some domestic industries, and hence export sales. Since Pakistan's industries are still developing, policy makers should ensure that domestic production is not severely affected from foreign competition, and that exports remain competitive on the world market. Therefore, governments should adopt selective trade policy instruments to protect domestic industries and expand production, while yielding the benefits of trade liberalization in the presence of economies of scale. A policy maker might want to consider the other socio-economic objectives of trade policy such as the development of



labour intensive and high value added industries. The reduction of the overall dependence on imported inputs cannot be over-emphasized. As with any other policy, trade policy must necessarily be pro-people to reduce inequalities and enhance economic development. The challenge for policy makers in Pakistan is thus to design trade policy to improve the welfare of citizens and take advantage of new opportunities that would be created by trade liberalization, while protecting most vulnerable groups in the economy from possible adjustment costs and insecurities. Thus, the provision of a basic safety net would be needed to ensure that individuals and families do not fall below minimum standard of living which is an important ingredient in ensuring equity and political acceptability of the trade reforms.

### CONCLUSIONS

The simulation results presented and analyzed here demonstrate the importance of experimental designs, and the usefulness of the global CGE modeling framework for examining the impacts of the different types of trade policy reforms for Pakistan. Although, the GTAP model cannot capture the dynamic effects of trade liberalization, it is a useful tool for generating comparative static results for a variety of trade reform scenarios. It also identifies the industries that will expand, and those that will contract, and the size of these changes as a result of various trade liberalization scenarios. The results suggest that Pakistan would experience the highest welfare gain under the combined policy reform of the SAFTA cum 15 percent uniform external tariffs while the SAFTA on its own gives the second highest welfare gains. SAFTA allows the participating countries to achieve larger economies of scale in production, attain specialization, increase competitiveness and diversify their export basket, thus assisting domestic economic reform. Therefore, harmonizing economic policies among neighboring countries must receive higher priority in the policy making process. Although, simulation results are highly sensitive to the underlying data and assumptions regarding the reference scenarios, the results clearly provide an assessment of the implications of SAFTA.

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**ON THE ROLE OF DATA POWERS IN DECISION MANAGEMENT  
CAPACITY BUILDING IN THE ORGANIZATIONS  
IN DEVELOPING COUNTRIES**

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**ABSTRACT**

Every Manager in an establishment / organization (Public, Private or Corporate) has to make certain decisions for developing the business activity in the sphere under his control. Such decisions are pivotal for promoting a business, whatever the activity field may be say, production, agriculture, population, banking, crimes, healthcare, industry and environment, etc. even in the development and management of HR in the organization irrespective of size of the establishment (small, medium or large). The types of decisions could be short, medium or large term and the decision making strategy may be adhoc, or planned.

The decisions are taken by the Managers both under certainty or uncertainty conditions. Whatever may be the form, type or nature of a decision, it has far reaching impact on the organization(s) both in the internal as well as external environment and resultant on the overall economy and development of a country. This implies that these are the decisions of the Managers that make or mar a business. So while taking such decisions (managerial or technical), the Managers must base their decisions on valid information provided to them. This paper seeks to quantify the role of valid data powers in decision management capacity building in the organizations in a developing country that leads to overall good governance.

**KEY WORDS**

Capacity building; certain and uncertain conditions; data power; human resource management; governance.

**1. INTRODUCTION**

- 1.1 Decisions are pivotal for promoting a business, whatever the activity field may be say, production, agriculture, population, banking, crimes, healthcare, industry and even in the human resource management in the organizations irrespective of size of the establishment. Decisions could be short, medium or long term with decision making strategy as adhoc, or planned.
- 1.2 Managers have to take decisions for setting targets, achieving the set targets in the organizations (public / private). The decisions are taken by the Managers both under certainty or uncertainty conditions [5]. Whatever may be the form, type or nature of a decision, it has far reaching impact on the organizations both in the internal as well as

external environment and resultantly on the overall economy and development of a country. It is therefore imperative that decisions are based on correct and reliable information.

## 2. ANALYTICAL DISCUSSION

- 2.1 Data is the basis for logical decision making in all spheres of life from “**policy planning**” to “**monitoring and control**”, giving rise to official statistics like personnel performance appraisal systems or technical issues like revenue recoveries in the Utilities. Take the case of HR Career Management which is based on performance indicators of the potential personnel e.g. for promotions to higher rank, succession planning of officers for key positions with high profile personnel, all this requires valid information. The Selection Boards recommend personnel on the basis of evaluation reports / assessments and other personality traits against specific benchmark threshold scores.
- 2.2 Various official statistics are prepared in all organizations for planning, operating and monitoring the results versus targets in the organizations and resultantly, overall development in the State.
- 2.3 If reported statistics are not error free, the succession planning execution of HR may go wrong.
- 2.4 National Statistical Organizations (NSOs) prepare official statistics in almost all developing countries, as per individual country requirements covering a variety of data on social, economic, industrial and demographic aspects in the developing countries, but without proper programmed responsibility and not as per one standardized format for use in external environment. So, quality of official statistics (managerial or technical fields) in public or private sector organizations in the developing countries is questionable. The official statistics thus based on such data (with reporting errors) may not be transparent and lead to biased decision making.
- 2.5 The following observations on official statistics are generally made:
  - Identification data input formats not customized. e.g., Performance Evaluation Reports (PERs) are same for all cadre employees. These PERs are not written as per given time schedule but with years time lag, which may involve human memory error at the time of writing such PERs. The integrity of the reporting officers is sometimes itself challengeable.
  - Data collection systems are not error free.
  - Likewise, awareness in the masses i.e. respondents for correct communication of information required, is not developed properly.
  - Analysis and interpretation of available data by the managers is another aspect to be looked into. All this necessitates capacity building of decision makers.

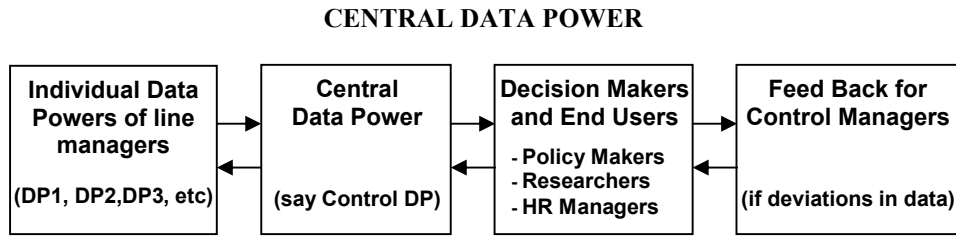
### 3. DECISION MANAGEMENT CAPACITY BUILDING SCENARIO

- 3.1 Capacity building of an activity, generally refers to the sum total of various management differentials applied in a business scenario for achieving the targets in that activity like resources (HR, Financial, Physical), Infrastructure for system development and Information. If all other resources (physical, financial, infrastructure) are at equilibrium position, it is the HR and information that blend the decision management capacity building.
- 3.2 Apart from day to day judgmental decision making for general operations in an establishment, the Managers have to take critical decisions and make future predictions / forecasts for development of the business.
- 3.3 If a Manager does not know the difference between say ratio-type and regression-type estimates. In which environment, such estimates apply and what would be the impact if one estimate in place of the other is used. All this has impact on situational analysis.
- 3.4 Management and quality go side by side. Decision management in any activity correlates positively with quality data and managing roles. Everyone should know what to do, what are his responsibilities, and how much he is accountable for the wrong done.
- 3.5 The major management differential in decision making is HR role itself. Responsibilities of various roles of HR involved in data collection, its analysis and interpretation must be well defined, they should be enriched with proper communication style, statistics knowledge and skills required through training / retraining and refresher courses and seminars. This will develop effective role playing and enhance capacity building of HR. If something goes wrong at any managerial stage, the specific role player will be held accountable which will lead to merit culture in the organization.

### 4. DATA POWERS FOR DATA QUALITY IMPROVEMENT

- 4.1 Decision making based on valid data develops transparency and meritocracy in the organization. Official statistics reporting systems will result in unbiased decision making and just culture will spread in an organization. This end can be achieved, if data quality is improved.
- 4.2 The quality of data for performance indicators and official statistics could be improved provided if:-
  - Data benchmarks in respective activity are well defined, data is collected as complete, correct and compatible. Data is filtered through use of statistical techniques (both in case of primary as well as secondary data). Data input formats are customized and standardized.
  - Proper data bases/data profiles called **Data Power (DP)** with valid capacity building be developed in the organizations for technical and managerial decisions.
  - Capacity building with respect to valid data collection, compilation, dissemination and data updation for individual data powers by different “line managers” reporting to Central Data Power is backed IT support [3].

A **valid data power** can be viewed as depicted below:-



## 5. RECOMMENDATIONS

- 5.1 Data reporting formats be customized and standardized as per requirement of the Organizations and overall governance. These should be simple and apprehensible by the respondents. This will lead to correct and complete data collection, which is an essential input for decision management capacity building.
- 5.2 Valid Data Powers (individual & central) be developed in the Public and Private Sector organizations, fully backed by IT support for taking compatible decisions by the managers.
- 5.3 Training of the decision makers (HR technical / non-technical) and performance appraisers be ensured for better analysis and interpretation of data profiles.
- 5.4 Research and development formations be developed in individual organizations for furthering, standardization and customization of data collection / dissemination thereof for better capacity building of decision management.

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## **OIL PRICE SHOCKS: A COMPARATIVE STUDY ON THE IMPACTS IN PURCHASING POWER IN PAKISTAN**

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### **ABSTRACT**

The study investigates the relationship between changes in crude oil prices and Pakistan and the macro-economy. A multivariate VAR analysis is carried out among five key macroeconomic variables: real gross domestic product, short term interest rate, real effective exchange rates, long term interest rate and money supply. From the VAR model, the impulse response functions reveal that oil price movements cause significant reduction in aggregate output and increase real exchange rate. The variance decomposition shows that crude oil prices significantly contribute to the variability of real exchange rate long term interest rate in the Pakistan economy while oil price shocks are found to have significant effects on money supply and short term interest rate in the economy. Despite these macro econometric results, caution must be exercised in formulating energy policies since future effects of upcoming oil shocks will not be the same as what happened in the past. Explorations and development of practicable alternatives to imported fuel energy will cushion the economy from the repercussions of oil shocks.

### **KEYWORDS**

Oil price fluctuations; Macroeconomic performance, Pakistan.

### **1. INTRODUCTION**

The global economy is now facing its worst prospects in more than half a century, with increasing financial losses, falling asset prices, and a deep downturn in real economic activity. Several developed economies including the US, UK, Japan and Germany are already in recession. Overall global GDP growth is projected to decline by the World Bank, from 2.5 per cent in 2008 to 0.9 per cent in 2009, the weakest since records became available in 1970. International trade would decelerate sharply, with global export volumes declining for the first time since 1982. As labor market conditions have deteriorated, consumer spending, business investment, and industrial production have also declined, the Federal Reserve lowered the target for its benchmark interest rate and established a target range for the federal funds rate of 0 per cent and 0.25 per cent. The European Commission in November unveiled an economic recovery plan worth €200 bln. with aims to save further job losses, stimulate spending and boost consumer confidence. The ECB has reduced its key policy rate from 4.25 per cent in September to 2 per cent by mid-January. The British central bank has reduced interest rates four times

since April from 5.0 per cent to 1.5 per cent. The latest half-percentage point cut in January 2009, that brings the rate to its lowest level in the central bank's 315-year history, was necessitated by weakening consumer spending, a tightening credit market for households and businesses, and a deteriorating business and residential investment outlook. Bank of Japan has cut interest rates from 0.5 per cent to 0.3 and then to 0.1 per cent by mid-December, and has adopted several liquidity enhancing measures. The Bank of Korea lowered its Base Rate from 5.00 per cent in early October to 2.50 per cent by January 2009. China has cut lending rates considerably since mid-September and unveiled a 4 trillion-yuan fiscal stimulus package in early November to rejuvenate the weakening economy. The Bank of Thailand cut the benchmark interest rate by 75 basis points to 2 per cent in January, the decision, which follows a 1-percentage point reduction in December, is more aggressive than expected.

A permanent oil price shock would clearly have a major impact on the world economy. This should send a message to policymakers around the world to consider ways to tackle demand and improve energy efficiency, in order to reduce the vulnerability of their economies to an oil price shock. Oil price shocks would normally affect macroeconomic performance through a number of channels. First, higher oil prices transfer income from oil-importing countries to oil-exporting countries through a shift in the terms of trade. This results in a loss of real income for oil-importing countries. Second, higher oil prices reduce industry output through higher costs of production. Third, they directly increase inflation via higher prices of imported goods and petroleum products. If higher inflation leads to an upward spiral in wages, central banks would be forced to raise interest rates.

#### **Pakistan as a Net Importer of Oil**

Over the last two decades, Pakistan has been a net importer of natural gas and crude petroleum among the non-OPEC countries. Pakistan becomes important to world energy markets because of its huge oil and natural gas resources. The country has the world's 13th largest natural gas reserves and 24th largest crude oil reserves. In total, Pakistan has six oil refineries, with a total capacity of 514,500 barrels per day. As evident from Figure 2, domestic production consistently exceeds the local consumption of oil in Pakistan since 1971 to 2004. The excess of oil produce in Pakistan was exported to neighboring countries such as Singapore, South Korea, Thailand and Japan.

The recent rise in the oil price (of both crude oil and products) is one of series of large shifts in price that have occurred during the last 30 years. From a relative "low" price of RM 1.10 in 1999 for fuel price RON 97, it escalated to RM 1.92 per liter in 2006 (refer to Figure 3). Although Pakistan is a country produces and exports oil, it is not a member of OPEC, or a major oil producing country. Thus, Pakistan has no influence on how the price of oil is determined in the international market. If there is a large increase in oil prices on the world market, it affects the price of petroleum products such as diesel, petrol and cooking gas (LPG) in our country.

Higher oil price causes different impacts to both net oil importers and net oil exporters in this world (combining both crude and products). The effect of the oil shock is expected to lower world GDP because of the reduced purchasing power by the oil importers to balance higher oil import costs will not fully offset by increased demand for



imports from oil exporters. Therefore, GDP of most oil importing countries fall as their exports of other goods will fall as well. As a net exporter of oil, oil price shocks will impede the growth of trade between Pakistan and other countries, especially for oil importing countries like U.S., China, Japan and Europe. Economic slowdown in these countries will limit their demand of consumers' and thus affect Pakistan exports of goods and services.

The W has been a net exporter of crude oil since 1981. According to the British Department of Trade and Industry (DTI), the largest destinations of crude oil exports in 2004 were the United States (28 percent), the Netherlands (21 percent), Germany (17 percent), and France (14 percent). According to Oil and Gas Journal (OGJ), the W had 4.0 billion barrels of proven crude oil reserves in 2006, the most of any EU member country. Since Britain established itself as an oil exporter in 1981, revenues from the North Sea have helped strengthen the country's current account. At their peak, oil-export revenues accounted for more than 20 per cent of total trade goods exports in the early 1980s, according to research from ING Financial Markets. However, the importance of oil to the W economy has declined slightly over the past two decades, with oil's contribution to total energy consumption falling from 37 percent in 1983 to 35 percent in 2003. In June 2006, Britain officially became a net importer of oil for the first time in 11 years when local production was not sufficient to meet local demand for oil (refer to Figure 4). Data published by the W Department for Trade and Industry (DTI) showed that the imported oil during every month in 2006 except for June. DTI forecasts that the will export oil for a few months during 2007 and see a decline in domestic oil production. Although oil demand marginally exceeded indigenous production in 2006, the W is expected to return to self-sufficiency in 2007-2008 and still provide 90 % of its need in 2010. According to the 6 Office for National Statistics, the surge in oil imports has widened's trade deficit to £6.7 billion in 2006. The increase in trade deficit was made worse as fuel price in the skyrocketed in the last 5-year period. In 2007, the current price of fuel in the is 88 pence per liter compared to just 77 pence per liter in 2000 (refer to Figure 5).

## 2. STATEMENT OF TOPIC

Today, oil prices remain an important macroeconomic variable: higher prices can still inflict substantial damage on the economies of oil-importing countries and on the global economy as a whole. A clear negative correlation between oil prices and aggregate measures of output or employment has been reported by Hamilton (1983), Burbidge and Harrison (1984), Rotemberg and Woodford (1996), (Abeyasinghe, 2001), among others. Analyses of microeconomic data sets at the level of individual industries, firms, or workers also demonstrate significant correlations between oil price shocks and output, employment, or real wages (Steven J. Davis & Haltiwanger, 2001; Steven J Davis, Prakash, & Ramamohan, 1996; Keane & Prasad, 1996; Lee & Ni, 2002). However, the magnitude to which the volatility of oil prices affects the open economies depends on whether the economy is a net importer or exporter of oil (Abeyasinghe 2001).

The and Pakistan are net oil exporters among the non-OPEC countries. Over the last several years, the governments of and Pakistan have reaped substantial profit brought about by the high world crude oil prices. However, studies have shown that the economy

of these countries were not all that resilient to higher oil prices than in the past. The W revealed a surprising behavior: while it is expected that an oil price shock has positive effects on the GDP growth for a net oil exporting country, an oil price increase of 100% actually leads to a loss of British GDP growth rate of more than 1% after the first year in all specifications (Jiménez-Rodríguez & Sánchez, 2004). An 8extensive literature has highlighted that this unexpected result has to do with the fact that oil price hikes led to a large real exchange rate appreciation of the pound (Dutch disease). Similarly, (Abeysinghe, 2001) concluded that although the direct impact of high oil prices on Pakistan is positive, it cannot escape the contractionary effect on growth coming through the trading partners. In the long run, Pakistan would also lose out.

### **3. OBJECTIVES OF THE STUDY**

Generally, this research investigates the impacts of oil price changes and its impact on the consumer using decision and economies of Pakistan. This study aims to find out if the volatility of macroeconomics are due to the fluctuations in oil prices. Also it will employ simulation techniques (impulse response functions) to see what will be the results of an oil price shock to the variables in the model, how long will such effects last and when can we expect the maximum repercussions.

### **4. SIGNIFICANCE OF THE STUDY**

There are several reasons that justify the interest in the oil price and macroeconomic relationship in Pakistan and the First, most of the papers on the effect of oil prices are applied to the US case or OECD countries and only a few papers study the Asian economies (Abeysinghe, 2001; Mehrara & Oskoui, 2007). Second, this study will include only the net oil importer (Pakistan), which could help us to examine whether the oil price–macroeconomy relationship in net oil importing countries are different than that of the oil importing countries. Third the results of this study will add to the dearth of existing economic literature on this subject, as this paper tries to employ updated economic specifications on oil price-macroeconomy linkage.

### **5. REVIEW OF RELATED LITERATURE**

Since the first oil shock in 1973/74, much research has been undertaken into the oil price–macroeconomy nexus. These studies have reached different conclusions over time. Earlier works (Hamilton, 1983; Burbidge and Harrison, 1984) have achieved statistically significant empirical relationships between oil prices and aggregate economic performance, principally GDP/ GNP growth. Hamilton (1983) propounded three hypotheses for oil-shock and output correlation: (1) historical coincidence, (2) endogeneity of crude oil prices, and (3) causal influence of an exogenous increase in the price of crude petroleum. Econometric results showed that there was insignificant evidence that the correlation was neither a consequence of coincidence nor a set of influences that triggered oil shocks and recessions. The causal interpretation leads to the conclusion that the characteristics of the pre-1973 recessions would have been different if such energy shocks and disruptions did not come about (Hamilton 1983).

Meanwhile Burbidge and Harrison (1984) tested the effects of increases in oil 9 prices using a seven-variable vector autoregression (VAR) model for five countries (United

States, Japan, Germany, United Kingdom and Canada) in the Organization for Economic Cooperation and Development (OECD) using monthly data from January 1961 to June 1982. They found out that substantial effects of oil-price shocks on price level were evident on the U.S. and Canadian economies and with great pressure on industrial production on U.S. and U.K. They also pointed out that the oil shock in 1973 only worsened the incoming recession of that period. Following the collapse of oil prices in 1986, it was argued that the oil price–macroeconomy relationship has weakened. In addition, an asymmetric oil price–macroeconomy relationship was established (Mork, 1989). Mork (1989) extended Hamilton's study by using a longer data sample and taking into account oil price controls existed during the 1970s. Furthermore, he looked into the possibility of an asymmetric response to oil price increases as well as decreases. The results showed that GNP growth was correlated with the circumstances of the oil market and that oil price declines were not statistically significant as oil price increases.

Mork, Olsen and Mysen (1994) applied essentially the same model as Mork (1989) to the experience of seven OECD countries over the period 1967:3-1992:4. Their model also included the contemporaneous oil price and five quarterly lags for price increases and decreases separately. For the United States, the contemporaneous price increase and the first and second lags were significant, and of negative sign. Five of the other six countries; Japan, West Germany, France, Canada, and the United Kingdom had roughly similar patterns of coefficients, while Norway had positive, statistically significant elasticities for both price increases and decreases.

Later studies from 1995 onwards devoted much attention to investigate the weakening of the oil price–macroeconomy relationship. Particularly, (Lee & Ni, 1995) and Hooker (1996, 1999) argued strongly that the fundamental oil price–macroeconomic relationship identified in earlier studies had eroded. It is noted that much of the research on oil price–macroeconomy relationship have been done concentrating on either the United States (US) or Organization for Economic Cooperation and Development economies. However, a recent study by (Hui & Kliesen, 2005) proved the opposite. They found that a volatility measure constructed using daily crude oil futures prices had a negative and significant effect on future gross domestic product (GDP) growth of the US over the period 1984-2004. This finding, which is consistent with the nonlinear effect documented by Hamilton (2002), means that an increase in the price of crude oil from, say, \$40 to \$50 per barrel generally matters less than increased uncertainty about the future direction of prices (increased volatility). This finding implies that crude oil price volatility is mainly driven by exogenous (random) events such as significant terrorist attacks and military conflicts in the Middle East.

When almost all researches dealt with the effects of oil prices, as measured in 10 levels or in logarithmic form, on key macroeconomic variables, (Ferderer, 1996) used oil price volatility (monthly standard deviations of daily oil prices) to assess movements in U.S. aggregate output. He also took note of the monetary channel through which oil prices affect the economy by including federal funds rate and non-borrowed reserves to capture the monetary policy stance during oil shocks. Results showed that contractionary monetary policy in reaction to oil price increases partly explains the correlation between oil and output. However, sectoral shocks and uncertainty channels, but not monetary policy channel, provide partial explanation to the asymmetric relationship between oil price changes and output growth (Ferderer, 1996).

To date, most of the empirical studies carried out were focused on the oil importing economies, particularly the developed economies. Few studies exist yet on the effect of oil price shock on key macroeconomic variables for oil exporting countries. Generally, studies conducted on oil exporting countries found that the effects of oil price shocks exerts positive impacts on GDP in the short run although the adverse consequences are more likely to be felt in the long run ((Abeyasinghe, 2001; Mehrara & Oskoui, 2007; Olomola & Adejumo, 2006). In fact, some countries like Kuwait, Indonesia and Nigeria were less prone to macroeconomic instability brought about by the oil price disturbances. The results could be attributed to the relatively successful experience of in the use of stabilization and savings fund and the right structural reforms (Mehrara & Oskoui, 2007).

## 6. THEORETICAL FRAMEWORK

Volatility of oil prices has negative repercussions on the aggregate economy as abundantly shown by economic literature. An oil price shock, as a classic example of an adverse supply shock, i.e. an increase in oil prices shifts the aggregate supply upward, results to a rise in price level and a reduction in output and employment (Dornbusch, Fisher and Startz 2001). On the other hand, aggregate demand decreases as higher commodity prices translate to lower demand for goods and services, resulting to contraction in aggregate output and employment level. The macroeconomic effects of oil shocks are transmitted via supply and demand side channels and are potentially minimized by economic policy reactions.

### Supply Side Channel

Since oil is a factor of production in most sectors and industries, a rise in oil prices increases the companies' production costs and thus, stimulates contraction in output (Jimenez-Rodriguez and Sanchez 2004). Given a firm's resource constraints, the increase in the prices of oil as an input of production reduces the quantity it can produce. Hunt, Isard and Laxton (2001) add that an increase in input costs can drive down non-oil potential output supplied in the short run given existing capital stock and sticky wages. Moreover, workers and producers will counter the declines in their real wages and profit margins, putting upward pressure on unit labor costs and prices of finished goods and services.

In addition, oil price volatility shrinks investment activities in production of oil and gas (Verleger 1994 as cited from Raguindin & Reyes, 2005). Verleger (1994) as cited from Raguindin & Reyes (2005) adds that a "permanent increase in volatility might lead to a situation where future capacity will always be a little lower than in a world of zero price volatility and prices a little higher". Hamilton (1996) shares the same point and stresses that concerns on oil prices variability and oil supply disruptions could cause postponement of investment decisions in the economy.

### **Demand Side Channel**

As presented earlier, oil price increases translate to higher production costs, leading to commodity price increases at which firms sell their products in the market. Higher commodity prices then translate to lower demand for goods and services, therefore shrinking aggregate output and employment level. Furthermore, higher oil prices affect aggregate demand and consumption in the economy. The transfer of income and resources from an oil-importing to oil-exporting economies is projected to reduce worldwide demand as demand in the former is likely to decline more than it will rise in the latter (Hunt, Isard and Laxton 2001). The resulting lower purchasing power of the oil-importing economy translates to a lower demand. Also, oil price shocks pose economic uncertainty on future performance of the macroeconomy. People may postpone consumption and investment decisions until they see an improvement in the economic situation. In sum, an increase in oil prices causes a leftward shift in both the demand and supply curve, resulting to higher prices and lower output.

### **Economic Policy Reactions**

The effects of oil price increases on headline and core inflation may stimulate the tightening of monetary policy (Hunt, Isard and Laxton 2001). Authorities have the policy tools to minimize, if not totally eliminate, the adverse effects of such shock. The Central Bank (CB) has its key policy interest rates that can influence demand and inflation directions in the economy. However, pursuing 12one policy can be counterproductive; when CB cuts its interest rate, demand rises, but at the expense of higher inflation, and vice versa.

The credibility of the monetary authorities in responding to oil shocks is at stake when monetary policy reactions appeared inconsistent with the announced policy objectives. As a result, inflation expectation and process are disrupted (Hunt, Isard and Laxton 2001). Money supply plays a role on the negative correlation between oil prices and economic activity. By means of the real money balances channel, increases in oil prices cause inflation which, in turn, reduces the quantity of real balances in the economy (Ferderer 1996). Ferderer (1996) further noted that “counter inflationary monetary policy responses to oil price shocks are responsible for the real output losses associated with these shocks”.

## **7. EMPIRICAL METHOD**

This section presents the empirical method used in this paper to assess the oil price-macroeconomy relationship of the Pakistan and the W economies. First, data definition and limitation are discussed. Second, a vector auto regression (VAR) model was constructed using historical data to capture the behavior of the macroeconomy given oil price fluctuations. Impulse response functions were examined to trace out the response of the dependent variable in the VAR model to shocks in the error terms. Variance decomposition technique was done to evaluate the relative importance of oil price fluctuations on the volatility of the other variables in the model.

### **The Data**

This paper used quarterly data for the period 1992:2 to 2006:4 of five macroeconomic variables and oil price variables to capture economic behavior. The model includes output and exchange rate variables (real gross domestic product (RGDP) and real effective

exchange rate (REER), three monetary variables namely money supply (M1), long term interest rate (GBONDS) and short term interest rate (TBILLS3) and the oil price variable (ROIL). RGDP, ROIL and REER were expressed in logarithmic form while M1, GBONDS5 and TBILLS3 were expressed in levels. The data sets were obtained from the International Finance Statistics (IFS), Economic Planning Unit (EPU), Statistics Department of Pakistan and the Economic and Social Research Council (ESRC) of the W.

### **Definition of Terms**

Five of the most commonly used terms in this research are defined as follows:

1. Gross Domestic Product (RGDP) is a measure of total output within the geographic limits of the country, regardless of the nationality of the producers of output.
2. Real Effective Exchange Rate (REER) index of the Ringgit Pakistan 13(RM) and the British Pound Sterling are the Nominal Effective Exchange Rate Index (NEERI) of the RM and Pound adjusted for inflation rate differentials with the countries whose currencies comprise the NEERI basket.
3. Short Term Interest Rate (TBILLS) interest rates on loan contracts-or debt
4. Long Term Interest Rate (GBONDS) is the interest rate earned by a note or bond that matures in 10 or more years.
5. Money supply (M1) is currency plus demand deposits.

### **Oil Price Variable**

A number of studies used different oil price variables to account for the effects of these shocks on economic activity. Hamilton (1983) used the quarterly changes in nominal Producer's Price Index (PPI) for crude petroleum. Burbidge and Harrison (1984) employed a relative price of oil computed as the ratio of Saudi Arabian crude cost (US\$) to the CPI of the country under studied. Mork (1989) used the refiner acquisition cost (RAC) for crude oil and PPI. Ferderer (1996) used the monthly means and standard deviations of prices for refined petroleum products (deflated by CPI) as the real oil price and oil price volatility, respectively. Abeyasinghe (2001) proposed different definitions of oil price variables 4 and finally modeled the oil price in first-log-difference of oil price (in US\$) multiplied by the country's exchange rate. He pointed out that the other real oil price definition appears to be a poor proxy for the relative oil price because of the direct dependence of CPI to oil price. Hooker (1996a) and Jimenez-Rodriguez and Sanchez (2004) both used oil prices in real terms but the former also included nominal PPI for crude petroleum in his regression model.

Most of the international cross-country analysis used the US\$ world oil price in real terms (PPI for crude oil divided by PPI for all commodities) or the world oil price transformed into each country's currency through the exchange rate. However, only the latter recognizes the different effects of oil prices on each country due to exchange rate volatility or level of inflation. Furthermore, as noted by Cunado and de Gracia (2004), oil prices converted into each country's currency produced more significant impacts on variables under study.

### **The Vector Auto regression (VAR) Model**

A number of the studies cited made use of vector auto regression models. This technique treats all variables in the system as endogenous and regresses each current (non-lagged) variable in the model on all the variables in the model lagged a certain number of times.

The study employs the following VAR model of order p (VAR (p)):

$$Y_t = c + \sum A_i Y_{t-1} + \varepsilon_t,$$

where  $Y_t$  is a  $(n \times 1)$  vector of endogenous variables,  $c$  is the intercept vector of the VAR,  $A_i$  is the  $i$ th matrix of autoregressive coefficients and  $\varepsilon_t$  is the generalization of a white noise process. The study estimated two sets of VAR models which incorporated the linear and nonlinear specifications of oil price response to economic activity. The first VAR model used the oil price variable measured as the log - first-difference of crude oil.

### **VAR Applications**

A six-variable vector autoregression model is presented to examine the sources of variations and fluctuations in the Pakistan and British economies triggered by oil prices. The first step of our analysis is to test for stationarity – to investigate the existence of unit roots in our statistical series by calculating the Augmented Dickey-Fuller Test (ADF Test). This test is based on autoregressive models that always include an intercept and generally a trend component. A large negative test statistic rejects the null hypothesis and implies that the time series is stationary.

The Akaike information criterion (AIC) will be used to compare the performance of the VAR with various lag length specifications. Both variance decomposition and impulse responses will be utilized to assess the relationship between oil price shocks and aggregate economic activity. A variance decomposition provide the variance of forecast errors in a given variable to its own shocks and those of the other variables in the VAR. It allows us to assess the relative importance of oil price shocks to the volatility of the other variables. Impulse response functions allow us to examine the dynamic effects of oil price shocks on Pakistan and the British macroeconomies. It traces over time the expected responses of current and future values of each of the variables to a shock in one of the VAR equations.

## **8. RESULTS AND DISCUSSION**

In this section, the preliminary tests and data transformations are presented. Moreover, the empirical results obtained from the estimated VAR models using linear oil price specifications are discussed. The impulse response functions and variance decompositions obtained from the estimated VAR models are also expounded.

### **Presentation of Results**

**Tests of Stationarity** Econometric analysis using time-series data necessitates stationarity. To have stationary representations of the VAR models, each variable was tested for unit roots specification using the augmented Dickey-Fuller (ADF) test. Table 1 and 2 provide the unit root regression results in levels and first-differences of the

variables entered in the model and the corresponding critical value of 10%, 5% or 1% to reject the null hypothesis of the presence of a unit root.

### Integration Test for Pakistan

The ADF statistics in Table 1 suggest that all six variables are integrated of order one, whereas the first-differenced are integrated of order zero. These non-stationary variables were transformed by taking their first differences in order to exhibit stationarity, indicating that the mean, variance and covariance of the time series are independent of time.

**Table 1: Unit Root tests for Pakistan**  
Level First Difference

	Level	First Difference		
REER(log)	3	-3.189	1	-6.567***
RGDP(log)	8	-2.778	4	-4.7687**
ROIL(log)	5	-1.877	5	-5.899***
BOND5	1	-2.67	6	-5.878**
TBILLS3	4	-3.56	4	-4.787**
MI	6	-3.776	3	-4.56**

Notes: We denote with one/two/three asterisks the rejection of the null hypothesis of the presence of unit root at 10% / 5% / 1% critical levels. The calculated statistics are those computed in MacKinnon (1991).

### Integration Test for the

Table 2 provides the unit root regression results for the W. Only TBILLS was stationary in levels. The remaining variables, namely REER, RGDP, ROIL, GBONDS and MI are observed to be non-stationary at all significance levels but exhibit stationarity after the variables were transformed by taking their first difference, indicating that the mean, variance and covariance of the time series are independent time 16

**Table 2: Unit Root tests for Consumers preferences in Purchase decision**  
Level First Difference

	Level	First Difference		
REER(log)	1	-3.189	1	-6.567***
RGDP(log)	3	-2.778	4	-4.7687**
ROIL(log)	4	-1.877	5	-5.899***
BOND5	3	-2.67	6	-5.878**
TBILLS3	4	-3.56	4	-4.787**
MI	4	-3.776	3	-4.56**

Notes: We denote with one/two/three asterisks the rejection of the null hypothesis of the presence of unit root at a 10% / 5% / 1% critical levels. The calculated statistics are those computed in MacKinnon (1991).

### Optimal Lag Length

Next, the Akaike Information Criterion (AIC) was used to assess the performance of the VAR model with varying lag length specifications. The optimal lag length is the one that minimizes the AIC. The AIC showed that the optimal lag length is six (6) for VAR models of Pakistan and the (refer to Table 3 and Table 4)



**Table 3**  
**Identifying the Optimal Lag Length using the**  
**Akaike Information Criterion (AIC) for Pakistan**

VAR order p (VAR(p))	AIC Using Linear Oil Price Specification
1	58.90
2	60
3	66
4	84
5	83
6	66

\* optimal lag length

### 9. IMPULSE RESPONSE FUNCTION

An impulse response function (IRF) was computed from the coefficients of vector regression using orthogonalized set of residuals. IRF traces the effect of one standard deviation shock to one of the innovations on current and future values of each of the endogenous variables in the system.

#### **IRF: Pakistan**

Generally, most of the variables show an increase during the first few quarters, with the exception of real GDP, GBONDS and ROIL. Chart 1 presents the IRFs generated from the VAR model using the linear specification of crude oil prices and show that a positive oil price shock leads to a decline in real GDP, long term interest rate and real oil price, persisting for three (3) quarters after which, the three variables recover. Money supply and short term interest rate increase a quarter (with the exception of real exchange rate which increases for three consecutive periods) after an oil price shock. However, such increase do not last long (i.e., M1 and TBILLS3 go back to its pre-shock level between the third and fourth quarters) while REER goes back to pre-shock level between four and fifth quarter.

#### **VCOM: Pakistan**

Table 5 shows the variance decomposition of the VAR model specification for Pakistan. It suggests that oil price shocks contribute a relatively large share on the long-term interest rate and reel effective exchange rate. In most cases, if not at all times, the variable itself are the largest source of its own variation in succeeding periods.

The largest effect of an oil shock to a variable's variation is on long-term interest rate (GBONDS5), accounting for approximately 18 percent in the third, fourth and the fifth period. Likewise, crude oil prices account for 11 percent of real exchange rate volatility.

Meanwhile, crude oil prices are marginal sources of variation of short-term interest rate (TBILLS3). Volatility of money supply (M1) due to oil price fluctuations is accounted for 8 percent. Changes in real GDP and TBILLS3 are nominal, accounting for only 5 percent and 4 percent respectively.

**Table 5: Variance Decomposition of Pakistan  
Variance Decomposition of DGBONDS5**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.67678	0.655444	0.776756	0.000000	0.7655444	0.7654	0.776656
2	0.352598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.751273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.876996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.495348						
6	0.313694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.621995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.835914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.70875	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DLOGREER:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.452598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DLOGRGDP:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.8765	0.7666656	0.98765	0.9876	0.4566	0.34565	0.87655
2	0.32211	0.7766	0.89765	0.7654	0.9765	0.8754	0.8765
3	0.76654	0.666678	0.886767	0.78767	0.75444	0.765544	0.67665
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.876686	0.86767	0.7867658	0.765544	0.87655	0.787756	0.76565
6	0.86756	0.7866656	0.7665464	0.86654	0.876544	0.86767	0.8867576
7	0.721995	35.41632	0.76756	0.7867565	0.8868767	0.65433	0.6765644
8	0.735914	0.678788	0.7654454	0.7767657	0.867676	0.777575	0.767677
9	0.6778768	0.7867656	0.655442	0.7655544	0.5644332	0.765544	0.9876654
10	0.7655433	0.9786778	0.7766556	0.8765554	0.7877656	0.877676	0.88676765

**Variance Decomposition of DLOGROIL:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.43345	0.676766	0.787878	0.89786	0.676656	0.455676	0.76767
2	0.452598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348	0.7868768	0.676868	0.776756	0.786767	0.786876	0.886767
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.9242	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DM1:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.89787	0.78797	0.786775	0.897868	0.897868	0.786755	0.786755
2	0.7867765	0.787675	0.786755	0.78786	0.798786	0.798789	0.7878
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.7876765	0.6768678	0.677687	0.78676	0.785554	0.768676	0.687665
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.9242	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DTBILLS3:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.452598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

The largest effect of an oil shock to a variable's variation is on money supply, accounting for about 28 percent. Variation in M1 occurs in the third period due to innovation in ROIL but converge to about 26 percent after seven years. Meanwhile, the ROIL innovation has dominant effect on TBILLS3 and REER, accounting for 19 percent variation and 10 percent in the fifth period respectively. Crude oil prices are marginal sources of variation of RGDP and GBONDS5. Volatility of RGDP and GBONDS5 due to oil price fluctuations is accounted for 7 percent and 6 percent respectively.

**Table 6: Variance Decomposition of the W****Variance Decomposition of DGBONDS5:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.78788	0.9899	0.565767	0.68787	0.7879	0.56565	0.87878
2	0.67687	0.676889	0.78686	0.67676	0.676565	0.878666	0.56578
3	0.78787	0.57686	0.68787	0.8798977	0.687879	0.68798	0.688686
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348	5.7879	0.7879	0.78898	0.6779	0.897768	0.79898
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DLOGREER:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DLOGRGDP:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DLOGROIL:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of DM1:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**Variance Decomposition of TBILLS3:**

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

**11. CONCLUSION**

The study estimated the relationship between crude oil price movements and key macroeconomic variables in the Pakistan and the W economies using linear vector auto regression model. Impulse Response functions and variance decomposition are obtained for both countries to assess how oil price shocks move through major channels of the Pakistan and W economies and how much shocks contribute to the variability of the

variables in the system. Five macroeconomics variables were taken into consideration: Real Effective Exchange Rate (REER), Real Gross Domestic Product (RGDP), Short Term Interest rate (TBILLS3), long term interest rate (GBONDS5) and money supply (M1), together with world crude oil prices.

The accumulated impulse responses obtained from the linear oil price specification indicate that oil price movements lead to decline in real GDP, long term interest rate for both countries. However, only marginal impacts are seen in short-term interest rate, money supply and REER for Pakistan and the W.

The variance decomposition estimated from the VAR model of the W shows that oil price fluctuations significantly contribute to the variability of money supply, short-term interest rate and REER. In the case of Pakistan oil price movements played a greater role in variability of long-term interest rate and REER. However crude oil prices are only marginal sources of the variation of RGDP for both Pakistan and the W.

Nevertheless, given these results obtained from the study, energy policies to be formulated must not assume that future effects of upcoming oil shocks will be the same as what happened from the past. Therefore the manner by which oil price fluctuations passed through the major economic channels in the past will not essentially provide how Pakistan economy will be affected by future oil price shocks. Nevertheless, analyzing how economic policy reactions that were previously done amidst these shocks will show how effective a certain monetary or fiscal policy in minimizing their adverse effects.

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## CHALLENGES AND OPPORTUNITIES FOR ISLAMIC BANKING SYSTEM IN PAKISTAN

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### Abstract

The current research investigate opportunities and challenges faced by the Islamic banking system in Pakistan. Data were collected from various secondary sources and Annual reports of Islamic banks operated in Pakistan. It examines the major products/services offered by various Islamic banking institutions (IB) as well as analyzing such institutions' financial performance based on the latest data available. Results indicates that Islamic Banks has stable growth besides that there are lot of challenges faced by Islamic banking in terms of regulatory and sanctioned by the state bank of Pakistan. It was revealed that performance of Islamic banking the recession period is better than conventional banking in Pakistan. It was further revealed that Islamic banking has more growth in the recession period in Pakistan. It was revealed that Islamic banking is less profitable, less risky and less efficient compare with the conventional banking in Pakistan during the study period 2007- to march 2009.

### KEY WORDS

Performance; Islamic Banking; Global Economic; Recession.

### INTRODUCTION

Both risk managers and regulators are working to address the above challenges. To overcome the shortcomings of the Islamic money market, many investment banks are currently designing new complex products, compliant with Shariah law. It remains to be seen whether these new solutions will obtain widespread Shariah-compliant status in the Islamic finance community, and generate enough demand for a functional Islamic money market to develop.

The rapid developments are likely to continue. Financial institutions in countries such as Bahrain, the UAE and Malaysia have been gearing up for more Shariah-compliant financial instruments and structured finance – on both the asset and liability sides. At the same time, the leading financial centers, such as London, New York and Singapore, are making significant progress in establishing the legal and prudential foundations to accommodate Islamic finance side-by-side with the conventional financial system. Many of the largest western banks, through their Islamic windows, have become active and sometimes leading players in financial innovation, through new Shariah-compliant financial instruments that attempt to alleviate many of the current constraints such as a weak systemic liquidity infra-structure. More conventional banks are expected to offer

Islamic products, enticed by enormous profit opportunities and also ample liquidity, especially across the Middle East.

New product innovation is also driven by domestic banks' interest in risk diversification. With a large number of new Islamic banks across the Middle East and Asia especially, diversification of products enables banks to offer the right product mix to more sophisticated clients. A few banks are already active across different jurisdictions, and this trend is certainly going to continue in the near future, possibly with some consolidation. On the regulatory front, the Islamic Financial Services Board (IFSB), an international standard-setting organization based in Malaysia, has moved ahead with its efforts aimed at fostering of the soundness and stability of the Islamic financial services industry through more standardized regulation. Globally accepted prudential standards have been adopted by the IFSB that smoothly integrate Islamic finance with the conventional financial system. For instance, the adoption of the IFSB standards (somewhat akin to Basel II), which take into account the specificities of Islamic finance, ensures a level playing field between Islamic and conventional banks.

Many challenges still lie ahead, as is clear from the discussion above. However, the ongoing improvements in banks' risk management techniques and prudential frameworks for Shariah-compliant banking give reasonable hope that the Islamic financial industry's growth will contribute positively to broader financial and economic stability.

We begin with basic principles. The one is interest-based money lending while the other operates like a trading house. Where does this difference originate? Two core principles lie at the centre – elimination of Riba and gharar. Any Islamic transaction needs to assess these two things first and foremost. Bearing in mind the definition given in Hadith, as mentioned above, we can discuss the time value of money and the workings of present day Islamic banks. For this, we have to look at the differences between the ways in which modern capitalist theory (the basis of interest-based banking) views 'money' and 'commodity' and the principles defined by Islam.

According to capitalist theory, there is no difference between money and commodity in so far as commercial transactions are concerned. Accordingly, both are treated at par and can be sold at whatever price parties agree upon. With this theory, selling Rs100 for Rs110 or renting Rs100 for a monthly rental of Rs10 is the same as selling a bag of rice costing Rs100 for Rs110 or renting a fixed asset costing Rs100 for a monthly rental of Rs10.

Islamic principles differ from this concept because money and commodity have different characteristics. For instance, money has no intrinsic value but is rather a measure of value or a medium of exchange. It cannot fulfil human needs by itself, but needs to be converted into a commodity. On the other hand, a commodity can fulfil human needs directly. Furthermore, commodities can differ in quality while money has no differential quality, in the sense that a new note of Rs1000 is exactly equal in value and quality to an old note of Rs1000. Similarly, commodities are transacted or sold by pinpointing the item in question or at least by giving certain specifications. Money, however, cannot be pinpointed in a transaction of exchange. Even if it could be, it would be of no use to do this since the different denominations of money making up an equal amount have the same ultimate value.

With these differences in mind, to exchange Rs1000 for Rs1100 in a spot transaction would make no sense since the money in itself has no intrinsic utility or specified quality. So, the excess amount on either side is without consideration and hence not allowed under Shariah. The same would hold true if we were to exchange these Rs1000 for Rs1100, to be delivered after a period of one month, since the excess of Rs100 would be without consideration of either utility or quality but would only be related to time.

The false sense of immunity from losses that all these factors together provide, has introduced a fault line in the financial system. Banks have not, therefore, undertaken a careful evaluation of the loan applications. This has led to an unhealthy expansion in the overall volume of credit, to excessive leverage, and to an unsustainable rise in asset prices, living beyond means, and speculative investment. Unwinding later on gives rise to a steep decline in asset prices, and to financial fragility and debt crises, particularly if there is over-indulgence in short sales. Jean Claude Trichet, president of the European Central Bank, has rightly pointed out that 'a bubble is more likely to develop when investors can leverage their positions by investing borrowed funds'.

### **THE SUB PRIME MORTGAGE CRISIS**

The sub prime mortgage crisis, in the grip of which the US finds itself at present, is a classical example of excessive and imprudent lending. Securitisation or the 'originate-to-distribute' model of financing has played a crucial role in this. The creation of collateralised debt obligations (CDOs) by mixing prime and sub prime debt made it possible for mortgage originators to pass the entire risk of default of even sub prime debt to the ultimate purchasers who would have normally been reluctant to bear such a risk. Mortgage originators had, therefore, less incentive to undertake careful underwriting.

Consequently, loan volume gained greater priority over loan quality and the amount of lending to sub prime borrowers and speculators increased steeply. According to Ben Bernanke, chairman of the board of governors of the US Federal Reserve System, 'far too much of the lending in recent years was neither responsible nor prudent... In addition, abusive, unfair, or deceptive lending practices led some borrowers into mortgages that they would not have chosen knowingly.' The check that market discipline could have exercised on the serving of self-interest did not come into play. Even the supervisors failed to perform their task effectively by not taking serious notice of the unfair practices at an early stage and nipping them in the bud.

The result is that a number of banks have either failed or have had to be bailed out or nationalised by the governments in the US, the UK, Europe and a number of other places. This has created uncertainty in the market and prolonged the credit crunch, which made it hard for even healthy banks to find financing. There is a lurking fear that this might be only the tip of the iceberg and a lot more may follow if the crisis causes a prolonged recession and leads to defaults on the part of credit card institutions, corporations and derivatives dealers.

When there is excessive and imprudent lending and lenders are not confident of repayment, there is an excessive resort to derivatives like CDSs to seek protection against default. The buyer of the swap (creditor) pays a premium to the seller (a hedge fund) for the compensation he will receive in case the debtor defaults. If this protection had been

confined to the actual creditor, there may not have been any problem. What happened, however, was that hedge funds sold the swaps not to just the actual lending bank but also to a large number of others who were willing to bet on the default of the debtor. These swap holders, in turn, resold the swaps to others. The whole process continued several times. While a genuine insurance contract indemnifies only the actually insured party, in the case of CDSs there were several swap holders who had to be compensated. This accentuated the risk and made it difficult for the hedge funds and banks to honour their commitments. The notional amount of all outstanding derivatives (including CDSs of \$54.6 trillion) is currently estimated by the BIS to be over \$600 trillion, more than ten times the size of the world economy. No wonder George Soros described derivatives as 'hydrogen bombs', and Warren Buffett called them 'financial weapons of mass destruction'.

### THE ISLAMIC FINANCIAL SYSTEM

One of the most important objectives of Islam is to realise greater justice in human society. According to the Quran, a society where there is no justice will ultimately head towards decline and destruction (Quran, 57:25). Justice requires a set of rules or moral values, which everyone accepts and faithfully complies with. The financial system may be able to promote justice if, in addition to being strong and stable, it satisfies at least two conditions based on moral values. One of these is that the financier should also share in the risk so as not to shift the entire burden of losses to the entrepreneur, and the other is that an equitable share of financial resources mobilised by financial institutions should become available to the poor to help eliminate poverty, expand employment and self-employment opportunities and, thus, help reduce inequalities of income and wealth.

To fulfil the first condition of justice, Islam requires both the financier and the entrepreneur to equitably share the profit as well as the loss. For this purpose, one of the basic principles of Islamic finance is 'no risk, no gain'. This should help introduce greater discipline into the financial system by motivating financial institutions to assess the risks more carefully and to effectively monitor the use of funds by the borrowers. The double assessment of risks by both the financier and the entrepreneur should help inject greater discipline into the system, and go a long way in reducing excessive lending.

Islamic finance should, in its ideal form, help raise substantially the share of equity and PLS in businesses. Greater reliance on equity financing has supporters even in mainstream economics. Professor Kenneth Rogoff of Harvard University states that in an ideal world equity lending and direct investment would play a much bigger role. Greater reliance on equity does not necessarily mean that debt financing is ruled out. This is because all the financial needs of individuals, firms, or governments cannot be made amenable to equity and PLS. Debt is, therefore, indispensable, but should not be promoted for nonessential and wasteful consumption and unproductive speculation. For this purpose, the Islamic financial system does not allow the creation of debt through direct lending and borrowing. It rather requires the creation of debt through the sale or lease of real assets by means of its sales- and lease-based modes of financing (Murabaha, ijara, salam, istisna and sukuk). The purpose is to enable an individual or firm to buy now the urgently needed real goods and services in conformity with his/her ability to make the payment later. It has, however, laid down a number of conditions, some of which are:

- The asset which is being sold or leased must be real, and not imaginary or notional.
- The seller or lesser must own and possess the goods being sold or leased.
- The transaction must be a genuine trade transaction with full intention of giving and taking delivery.
- The debt cannot be sold and thus the risk associated with it must be borne by the lender himself.

The first condition will help eliminate a large number of derivatives transactions which involve nothing more than gambling by third parties who aspire to claim compensation for losses which have been actually suffered only by the principal party and not by them. The second condition will help ensure that the seller (or lesser) also shares a part of the risk to be able to get a share in the return. Once the seller (financier) acquires ownership and possession of the goods for sale or lease, he/she bears the risk. This condition also puts a constraint on short sales, thereby removing the possibility of a steep decline in asset prices during a downturn. The Shari'ah has, however, made an exception to this rule in the case of salam and istisna where the goods are not already available in the market and need to be produced or manufactured before delivery. Financing extended through the Islamic modes can thus expand only in step with the rise of the real economy and thereby help curb excessive credit expansion. The third and the fourth conditions will not only motivate the creditor to be more cautious in evaluating the credit risk but also prevent an unnecessary explosion in the volume and value of transactions. This will prevent the debt from rising far above the size of the real economy and also release a substantial volume of financial resources for the real sector, thereby helping expand employment and self-employment opportunities and the production of need-fulfilling goods and services. The discipline that Islam wishes to introduce in the financial system may not, however, materialise unless governments reduce their borrowing from the central bank to a level that is in harmony with the goal of price and financial stability.

One may raise an objection here that all these conditions will perhaps end up shrinking the size of the economy by reducing the number and volume of transactions. This is not likely to happen because a number of the speculative and derivatives transactions are generally known to be zero-sum games and have rarely contributed positively to total real output. Hence a decline in them is also not likely to hurt the real economy. While a restriction on such transactions will cut the commissions earned by the speculators during an artificially generated boom, it will help them avert losses and bankruptcy that become unavoidable during the decline and lead to a financial crisis.

The injection of a greater discipline into the financial system may tend to deprive the sub prime borrowers from access to credit. Therefore, justice demands that some suitable innovation be introduced in the system to ensure that even small borrowers are also able to get adequate credit. Such borrowers are generally considered to be sub prime and their inability to get credit will deprive them from realising their dream of owning their own homes and establishing their own micro enterprises. There is no doubt that a number of countries have established special institutions to grant credit to the poor and lower middle class entrepreneurs. Even though these have been extremely useful, there are two major problems that need to be resolved. One of these is the high cost of finance, ranging from

30 to 84 per cent in the interest-oriented microfinance system. This causes serious hardship to the borrowers in servicing their debt. No wonder the minister of finance for Bangladesh described micro credit interest rates in that country as extortionate in an address he delivered at a micro credit summit in Dhaka in 2004. It is, therefore, important that micro credit is provided to the very poor on a humane, interest-free basis (Qard Hasan). This may be possible if the microfinance system is integrated with zakat and waqf institutions. For those who can afford to bear the cost of microfinance, it would be better to popularise the Islamic modes of PLS and sales- and lease-based modes of finance, not only to avoid interest but also to prevent the misuse of credit for personal consumption.

Another problem faced by microfinance is that the resources at the disposal of microfinance institutions are inadequate. This problem may be difficult to solve unless the microfinance sector is scaled up by integrating it with the commercial banks. Commercial banks do not generally lend to small borrowers because of the higher risk and expense involved in such financing. It is, therefore, important to reduce their risk and expense. This may be done partly by a subsidy from zakat and waqf funds for those borrowers who are eligible for zakat. Thus we can see that the Islamic financial system is capable of minimising the severity and frequency of financial crises by getting rid of the major weaknesses of the conventional system. It introduces greater discipline into the financial system by requiring the financier to share in the risk. It links credit expansion to the growth of the real economy by allowing credit primarily for the purchase of real goods and services which the seller owns and possesses, and the buyer wishes to take delivery. It also requires the creditor to bear the risk of default by prohibiting the sale of debt, thereby ensuring that he evaluates the risk more carefully. In addition, Islamic finance can also reduce the problem of sub prime borrowers by providing credit to them at affordable terms. This will save the billions that are spent after the crisis to bail out the rich bankers. These do not, however, help the poor because their home may have already become subject to foreclosure and auctioned at a give-away price. The problem is that the Islamic finance is still in its infancy and shares a very small proportion of international finance. In addition, it does not genuinely reflect the ethos of Islamic teachings. The use of equity and PLS is still very small while that of debt-creating modes is preponderant. Moreover, even in the case of debt-creating modes, all the conditions laid down by the Shari'ah are not being faithfully observed by the use of legal stratagems (hiyal). This is partly due to a lack of proper understanding of the ultimate objectives of Islamic finance, the non-availability of trained personnel, and the absence of a number of shared or support institutions that are needed to minimise the risks associated with anonymity, moral hazard, principal/agent conflict of interest, and late settlement of financial obligations. The system is, thus, not fully prepared at present to play a significant role in ensuring the health and stability of the international financial system. It is, however, expected that the system will gradually gain momentum with the passage of time and complement the efforts now being made internationally for promoting the health and stability of the global financial system. Since the current architecture of the conventional financial system has existed for a long time, it may perhaps be too much to expect the international community to undertake a radical structural reform of the kind that the Islamic financial system envisages. However, the adoption of some of the elements of the

Islamic system, which are also a part of the western heritage, is indispensable for ensuring the health and stability of the global financial system. These are:

- The proportion of equity in total financing needs to be increased and that of debt reduced.
- Credit needs to be confined primarily to transactions that are related to the real sector so as to ensure that credit expansion moves more or less in step with the growth of the real economy and does not promote destabilizing speculation and gambling.
- Leverage needs to be controlled to ensure that credit does not exceed beyond the ability of the borrower to repay.
- If the debt instruments, and in particular CDOs, are to be sold, then there should be full transparency about their quality so that the purchaser knows exactly what he is getting into. It would also be desirable to have the right of recourse for the ultimate purchaser of the CDOs so as to ensure that the lender has incentive to underwrite the debt carefully.
- While there may be no harm in the use of CDSs to provide protection to the lender against default, it needs to be ensured that the swaps do not become instruments for wagering. Their protective role should be confined to the original lender only and should not cover the other purchasers of swaps who wish to wager on the debtor's default. For this purpose the derivatives market needs to be properly regulated to remove the element of gambling in it.
- All financial institutions, and not just the commercial banks, need to be properly regulated and supervised so that they remain healthy and do not become a source of systemic risk.
- Some arrangement needs to be made to make credit available to sub prime borrowers at affordable terms to enable them to buy a home and to establish their own micro enterprises. This will help save the financial system from crises resulting from widespread defaults by such borrowers

#### **WHY ISLAMIC COUNTRIES ARE LESS AFFECTED BY THE FINANCIAL CRISIS?**

In the beginning of March at the World Islamic Economic Forum in Jakarta political and business leaders accentuated the strength of Islamic principles of banking and investing. Islamic banks are generally doing better in today's uncertain economic times than their Western colleagues. So our financial institutions have a lot to adopt from Islamic economic system.

The Koran states detailed regulations and prohibitions concerning the economic system. First of all, Muslims don't deal with "Riba" – a word interpreted as interest on loans, credit cards or savings accounts.

This prohibition concerns all interest-bearing transactions, whether you are giving a loan or applying for it. The Prophet Muhammad cursed people who pay interest, those who collect it, those who write an agreement based on it, and those who witness such an agreement.

Muslims believe that interest-based transactions are not fair because they give a guaranteed return to the creditor without any guarantees for the borrower. One of the main principles of Islamic banking is the sharing of financial risk and sharing responsibility for profit and loss.

Following this prohibition, Islam banks don't deal with interest-bearing mortgages. As a result, the U.S. sub-prime mortgage crisis and the following recession haven't hit Islamic banks as badly as their Western colleagues. If you want to buy a house and you don't have enough money, Islamic banks offer two types of financing:

**Murabaha:**

this type of financing, the bank agrees to buy the property and then re-sell it to the buyer for a higher price. All costs are fixed at the time of the agreement, so there are no late payment fees. The balance is paid through instalments within a set period of time.

The buyer gains 100% ownership of the property from the beginning. However, transactions must be backed by real assets (gold, land, equipment) or a high down payment in order to protect lender against default.

- Ijarah: This type of financing is similar to rent-to-own contracts or real estate leasing. The bank buys the property for you, but it remains the owner as long as the buyer makes instalment payments. Once the balance is paid off in full, the property is registered in the buyer's name. There is other aspect of Islamic economic system that has helped Islamic financial institutions to avoid serious financial difficulties. The Koran prohibits investing in businesses that involve gambling, selling alcohol or pork.

Many Muslims have made a conclusion that investing in stock markets or stock trading (buying shares with the intention to sell them and earn profit) is a form of gambling, so it is prohibited by the Koran. When the stock market crashed, they were immune to its ripple effect.

Financial experts also state that Islamic banks tend to rely on deposit accounts because taking credit from international financial organizations is prohibited (it will make them pay interest). That means that Islamic banks have to ensure their clients that their deposits will not be invested in companies that run "un-Islamic" business. However, in spite of these facts, following Islamic principles is not enough for banks to get the total protection from the financial crisis. Islamic finance is so intertwined with the global financial system that they also can't avoid problems.

Many Islamic banks have invested their funds in equity. When the prices for real estate go down, their portfolios also go down. Countries involved in computer and electronics manufacturing (such as Malaysia) have been hit by competitive devaluation and reduce of export.

Data Collection Methodology: . Data were collected from various secondary sources and Annual reports of Islamic banks operated in Pakistan, Journals, Magzines and News papers . Data were analysed by SPSS statistical software's.



## RESULTS AND DISCUSSIONS

Islamic banks have been less affected than many conventional banks in the current global recession as they are prohibited from activities that have contributed to the credit crunch such as investment in toxic assets and dependence on wholesale funds. The International Financial Services London report notes that the industry has felt the influence of the credit crunch and downturn in the global economy with Sukuk issuance being more than halved and the fall in the value of equity funds. In 2007, the global market for Islamic financial services rose by 37% to US \$ 729 billion but by 2008 the industry began to feel the impact of the credit crunch as it enveloped the globe.

Nevertheless, London has been consolidating its position as the key western centre for Islamic finance in 2008. Two Islamic banks, Gatehouse Bank and European Finance House, have been granted licenses bringing to five the number of fully Sharia compliant banks in the UK. Principal Insurance became the first Shariah compliant independent company authorized to offer Takaful to UK residents. In capital markets, four new exchange traded funds and two new equity funds were launched.

IFSL's report indicates that the UK's offering includes a total of 22 banks, far more than in any other Western country. Professional services are provided by 18 law firms and the Big Four accounting firms. A cumulative total of 18 Sukuk issues raising \$10bn have been listed on the London Stock Exchange, second only to Dubai. With 55 institutions offering educational and training products in Islamic finance, the UK has more providers than any other country worldwide.

Duncan McKenzie, IFSL's Director of Economics said: The UK has benefited considerably from supportive government policies intended to put Islamic services on the same footing as conventional services. Evidence of London's growing role in Islamic finance is shown in the UK being the only western country to feature prominently, 8th with assets of \$18bn, in a global ranking of Sharia compliant assets by country. Added Sir Andrew Cahn, UK Trade & Investment's Chief Executive Officer: Despite its origins overseas, Islamic finance has found a natural home in the UK. Though no sector is immune to the global financial crisis, Islamic finance has shown great resilience. It is important we continue to work with our Islamic finance partners to maintain our position as the leading western centre for Islamic finance service providers.

## CONCLUSIONS

A variety of Islamic banking instruments and transactions are available in different markets. These may be classified as equity, debt or fee based services/ products. The first includes Musharakah and Mudarabha; the second consists of Salam, istisna, istijrar, qard, murabaha, ijara, bai-bithaman-ajil, bai-al-einah, bai-al-dayn, and tawarruq; the third comprises services based on wakala and kafala. On the validity of some of these transactions and instruments, there is a difference of opinion among Muslim scholars. There are scholars who oppose certain practices because they find hidden elements of riba and gharar in them. They claim that some products appear Islamic only in form, not substance. Tawarruq, bai-al-dayn, and bai-al-einah are among transactions either disallowed or, at best, deemed controversial by some of the prominent scholars.

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## ROLE OF NGO's AND PUBLIC SECTOR TO IMPROVEMENT OF RURAL LIVELIHOODS IN SINDH

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### ABSTRACT

Rural livelihoods in Sindh recorded an improvement despite financial constraints, expenditure doubled between 2001 and 2006 growing at an average rate of 23% per annum. Public sector contributed significantly through various interventions on poverty alleviation but the most worrying situation was the expenditure on food subsidies, food support programs and low cost housing has been stagnant even in nominal terms with negative repercussions for the poor and the needy. Sindh Agricultural and forestry workers coordinating organization has made social mobilization as core activity and entry point followed by different development interventions. The Agha Khan rural support program provides a one-time grant to complement village organizations to the infrastructure projects. The national rural support program has lowered the levels of poverty in member households. The Pakistan poverty alleviation fund educational program provides quality learning at primary level in district Sanghar. Similarly PPAF has also improved health care through the provision of quality basic health services. The young Sheedi welfare organization has establish emergency centre for disaster preparedness and provided 600 goats to 200 beneficiaries. Badin rural development society through their effort 1500 women and 2800 men in 60 villages are engaged in development process. The major strength of NGOs was that they have special ability to reach the poor and other segments of society while their major weakness is small size and budget and lack technical capacity to confront difficult situation. It is recommended that NGOs should ensure that new technologies are introduced to help farmers improve and increase crop production. NGOs should create a condition in which the poor are either given or enabled to acquire their assets and a peaceful environment to benefit from those assets. Government should provide facilities for institutional building to the local NGOs this will encourage them to work sincerely towards poverty alleviation. NGOs should not rely on government for future projects instead they can raise funds through savings and donation from rich individuals.

### INTRODUCTION

Poverty has become a major issue in Sindh whereas 50 percent of the population lives below the poverty line and suffer from low calorie intake, low per capita income, unemployment, inadequate access to education, sanitation, health facilities and unhygienic environment. (Anka *et al.* 2008).

More importantly these people are more vulnerable to shocks. According to studies conducted by Sindh coastal development authority in 2005 concluded that the important factor in predicting poverty is the proximity and availability of water. A high incidence of poverty is found among non-farm households compared to farm households. The average annual income of farm households is 1.7 times higher than those of non households (Agricultural Census of Pak 2000).

According to some survey conducted by SDPC poverty is concentrated in those areas growing the major commodity crops (wheat, cotton and rice). The cotton and wheat growing area of Sindh have the highest farm based poverty indicators suggesting that low commodity prices and the structure of agricultural marketing for the major crop have a serious impact on poverty (Gazdar, 2007).

The distribution of key private assets is highly unequal and this is the fundamental cause of poverty in Sindh. Despite, some promising changes in rural areas, it seems clear that several factors have combined to increase deprivation of some of the poorest in Sindh over the last 55 years or so. (Sindh poverty reduction strategy paper 2003).

The only safety net that is generally known to local people in Sindh is Zakat, unless it is given to deserving people and equitably poverty will remain with vulnerable groups. A critical factor affecting the ability to cope with shock is that poor and very poor families tend to have limited assets available. This increases their vulnerability and results in a decline in well being that is difficult to recover from (Anka *et al.* 2009).

In view of the above this paper shall discussed the contribution of public sector and NGOs towards improvement of rural livelihoods in Sindh.

### **OBJECTIVES**

1. To review various public sector programmes aimed at rural livelihoods in Pakistan.
2. To discuss the contributions of NGOs towards improvement of rural livelihoods in Sindh.
3. To identify the strength and weakness of NGOs in delivery of poverty alleviation programmes.
4. To develop recommendations for public and private sector regarding poverty reduction programmes in Sindh.

### **METHODOLOGY**

The present paper is a descriptive study which will analyse various programmes undertaken by public and private sector organizations for improvement of rural livelihoods in Sindh. Data used in this paper are mostly from secondary sources. Besides identifying the strength and weaknesses of these NGOs the author also explores what will be the likely impact of these programmes to the rural communities in Sindh.

## RESULTS AND DISCUSSION

### 1. Public Sector Contribution to Rural Livelihoods in Pakistan

#### 1.1 Zakat Programmes

The principal form of cash transfers to the poor and disadvantaged in Pakistan is through the publicly administered system of zakat. The two main types of support programmes, the Guzara Allowance and the permanent rehabilitation grant, absorb in excess of 70 percent of zakat related disbursements. The programmes run under zakat are classified as regular and other programmes. Funds for the permanent rehabilitation scheme and for regular programmes are disbursed through provinces, while those for other programmes are distributed directly by the central zakat council. Guzara allowance (or subsistence allowance), one of the major zakat programmes, is a typical cash transfer, paid at the rate of Rs.500 per month to eligibles and is one of the main instruments of support given by the local zakat committee. Those eligible are;

- i) Adult living below poverty line (Rs.670 per month for 2002) with preference to widows and disabled
- ii) Unemployed and
- iii) Not habitual beggars.

The local zakat committee establishes the eligibility of the person and the list of recipients has to be pasted outside the local mosque. Three different categories of educational assistance are also provided under zakat. The payment is made directly to institutions, where eligible students are enrolled. Stipend are given to students enrolled in the mainstream public or private sector schools (Table-1)

**Table-1: Disbursement and beneficiaries of zakat in Pakistan 2003-04**

	Total amount disbursed (Rs. Million)	Total number of beneficiaries
<b>(A) Regular Zakat Programmes</b>		
Guzara allowance	1923.3	813,642
Educational stipends	408.9	289,181
Stipend to student in deeni madras	174.3	69,851
Health care	152.3	186,750
Social welfare / rehabilitation	121.1	25,544
Marriage assistance to unmarried women	122.4	11,876
<b>Sub-Total (A)</b>	<b>2902.2</b>	<b>1396,844</b>
<b>(B) Other Regular Head</b>		
Eid grants	209.2	0
Leprosy patients	0.5	56
Permanent rehabilitation scheme of zakat phase III	2319.5	175,664
Educational stipend (Technical)	429.2	22,310
<b>Sub-Total (B)</b>	<b>2958.4</b>	<b>198,030</b>
<b>Grand Total (A + B)</b>	<b>5860.6</b>	<b>1594,874</b>

Source: Govt. of Pakistan 2006 B, Zakat Disbursements, Mahbulul Haq Centre for Human Development, 2006 Report.

Zakat is being used to finance health care under the national level health programmes managed by the provincial and central zakat councils. The zakat council determines the eligibility of an unmarried woman unable to bear expenses related to her marriage. Almost one third of the total disbursement under zakat was devoted to PRS (permanent rehabilitation scheme) benefiting around 10,000 people with the average value of the grant being Rs.17,000 (Human Development South Asia, 2006).

### 1.2 Pakistan Baitul Maal (PBM) Scheme

The Pakistan Baitul Maal (PBM), which operates under the administrative control of the Ministry of Women Development, Social Welfare and Special Education, was established as an autonomous corporate body under a special act of 1991. The PBM was set up to help the destitute, needy widows and orphans, invalids and other such people who are in dire need of assistance. The two main benefits that it provides are the food support programme and individual financial assistance. As shown in (Table-2), majority of the beneficiaries (52 percent) belongs to Punjab, while less than 5 percent of the recipients are from Baluchistan, signaling with the population share of the provinces.

**Table-2: Percentage Province-wise Distribution of Pakistan Baitul Maal (PBM) Beneficiary Households in Pakistan 2003-04**

Project	Punjab	Sindh	NWFP	Baluchistan	AJK
Food support program	52	21	18	4	5
Individual financial assistance	44	26	10	11	10
National centre for rehabilitation of child centres	36	25	20	12	6
Instructional rehabilitation	53	0.50	27	0.49	19

Source: Mahbul Haq Centre for Human Development, 2006 Report.

### 1.3 The Food Support Programme (FSP)

A redesigned food subsidy scheme was initiated in 1994, which was renamed as the Atta Subsidy Scheme in July 1997, aimed at providing a cash grant of Rs.200 per month per family to 520,000 poor households across Pakistan. The aim of the food support programme was to provide a food safety net for the poorest households to those with income below Rs.2000 per month. FSP is a cash transfer of Rs.2,400 per annum in two installments of Rs.1,200 each to 1.25 million households.

### 1.4 Individual Financial Assistance (IFA)

The primary purpose of individual financial assistance (IFA) is to support the poor, widow, destitute women, orphans and disabled persons through medical treatment, education stipends, rehabilitation and general assistance. Financial assistance can only be given once a year. Assistance for medical treatment is provided through government hospital up to the maximum of Rs.300,000. Bright, deserving students are also give stipend to cover tuition fees up to Rs.40,000, can be paid to the poor to make them self-reliant.

### **1.5 The Khushhal Pakistan Programme (KPP)**

The Khushhal Pakistan Programme (KPP) is an important public sector programme to create employment opportunities for unemployed poor. Under this programme, members of the national assembly (MNAs) are authorized to identify and finance development schemes upto Rs.5.00 million in their constituencies. The programme provides essential infrastructure in rural and low income urban areas by building farm to market roads, water supply schemes, repairing existing schools, small rural roads, streets, drains and storm channels. The sectoral and provincial distribution of RPP shows that more than half of the disbursements were made for Punjab, 22 percent for Sindh, 14 percent for NWFP and less than 10 percent for other areas of Pakistan.

### **1.6 Pakistan Poverty Alleviation Fund (PPAF)**

The PPAF was established in 2000 it provides soft loans to 65 different partner organizations, which, in turn lend to individuals and groups within their target communities. It also provides grants on a cost sharing basis for development of small scale community infrastructure and strengthens micro-finance institutions (MFIs) by supporting their capacity building activities. To date, the PPAF has managed cumulative disbursements of nearly Rs.14 billion. A study conducted by Gallup Pakistan, found adequate evidence to suggest that on the average low income households, who borrow from the PPAF, are better off than what they would have been if they had not borrowed (Human Development in South Asia, 2006).

### **1.7 Khushhali Bank**

Khushhali Bank launched its operation as a micro-credit financial institution in the year 2000, with the prime objective to establishing a pro-poor sustainable financial services delivery network in the country. With a predominantly rural portfolio, the bank now has service outlets in all provinces. The bank provides short-tenure micro loans ranging up to US \$ 500 dollars for working capital and asset purchase. Nearly one-third of its 50,000 clients are women. The processing of loans is strengthened through the involvement of community based organizations (CBOs) in lieu of the traditional collateral requirements defined as those, living below the level of the microfinance lending programmes of the Khushhali bank, have enjoyed considerable improvement in economic / social welfare indicators and have also benefited from accelerated income generating activities in the agricultural sector. However, in general there has not been a significant impact on caloric intake of the borrowers or their consumption expenditure on non-food items. Similarly, the bank clients have not displayed better performance in terms of school enrolment of their children.

For Khushhali Bank to realize its potential impact, it is essential to bypass the information problems while conducting micro-credit operations on a truly massive scale. For long term sustainability, it is therefore, imperative to achieve high repayment rates while charging interest rates that cover the cost of lending (Microfinance in Pakistan, 2005).

### **1.8 Small and Medium Enterprises for Empowerment of the Poor**

The small and medium enterprises development authority (SMEDA) in Pakistan was established in October, 1998 as an autonomous corporate body headed by the Prime

Minister. The terms of reference of (SMEDA) are that it will be an apex policy making body for small and medium enterprises (SMEs) and provide and facilitate support services, generate massive employment opportunities, give industrial growth, revitalize small business and back start the economy through aggressive launch of SME support programme. The SME sector has great potential for generating employment, especially for the low income groups thus creating a business environment that is supportive of SMEs. This is an important part of the government's poverty reduction strategy. This sector contributes 30 percent of the GDP with value addition to the manufacturing sector of around 35 percent and generating 25 percent of manufacturing sector export earning (US \$ 2.5 billion). It also provides 99 percent of non-agricultural jobs. The micro enterprises development initiatives such as provision of credit through banks are expected to spur economic activity mainly in the self employed segment of the population (SMEDA, 2008).

The government recognizes that SME led private sector development needs further strengthening of the regulatory environment, adjustment in potential policies and provision of support services for enterprise establishment, development of quality improvement and export marketing in the short to medium term. SME led economic growth is expected to reduce poverty through

- (1) Income generating activities in rural and urban areas.
- (2) Creating employment opportunities
- (3) Providing forward linkages to the micro-enterprises benefiting from the availability of micro credit.

## **2. CONTRIBUTION OF NGO'S TO RURAL LIVELIHOODS IMPROVEMENT IN SINDH**

The desire to help those in need is as old as civilization itself. Volunteerism is not new in Pakistan. It has a long history dedicated and selfless workers who have devoted their lives to respond to the needs of people. Volunteerism in Pakistan has come to be identified by the organizations to which they belong not too long ago, mostly the non formal organizations were simply known as voluntary social organizations / agencies. Presently, the voluntary organization are in more organized form and are widely known as NGOs.

Realizing the importance of NGOs as a helping hand to state in socio-economic development by the present government, citizen community board (CCBs) has become a part of the local development agenda.

Most NGOs are welfare oriented. They are usually operative at the level of neighborhoods and are involved in the provision civic amenities such as basic health, education, library facilities, vocational training, youth programmes, credit, income generating activities etc. (Shireen, 1998).

### **2.1 Participatory Development Approach**

Participatory development is a process which involves the participation of the poor at the village level to build their human natural and economic resource base for breaking out of the poverty nexus. It specifically aims at achieving a localized capital formation



process based on the progressive development of group identity skill development and local resources generation. The beginning of the process is therefore, the emergence of a nascent form of community consciousness.

### **Contributions to Rural Livelihood Improvement**

The total coverage of NGOs at present is relatively insignificant, compared to the magnitude of the poor population. According to survey conducted by NHDR/PIDE 2001, the total received by all categories of the sample population, the percentage of loans received from NGOs was only 0.8 percent in rural areas and 1 percent in urban areas.

Similarly the national rural support programme (NRSP) which is by far the largest NGO in the country, operating in twenty seven districts, has a total coverage of only 293,000 beneficiaries. The NHDR/AI survey shows that there was considerable variation with respect to the effectiveness of targeting of the poor between various NGOs and the impact of intervention on income, nutrition and health of the poor.

NGOs, that enabled the formation of autonomous organizations of the poor could play an important role in creating a systemic relationship between local governance and poor communities. Such a relationship would enable the poor to participate in identification and implementation of development projects as well as decisions related with access over markets and local power structures. Equally important the emphasis perhaps may need to shift from building centralized NGOs in a large number of districts with low intensity of coverage and high overheads in each towards district specific NGOs, which achieve full coverage of the poor population in the villages, union councils and tehsils of that district.

### **2.2 Sindh Agricultural and Forestry Workers Coordinating Organization SAFWCO**

Since inception in 1986, SAFWCO has worked to improve the quality of life especially the poor. SAFWCO approach is based on five steps such as mobilization, organization, strategic planning, partnership building through small projects and facilitation towards sustainability.

SAFWCO's work is spread across Sanghar District as a demonstration of how to empower people. Significant work has been done in the field of social organization and services delivery, agriculture and economic development, natural resource development and human institutional development. The work in social organization and service delivery builds the social and physical infrastructure enabling the rural poor to address systemic process of poverty. The process of organization and infrastructure building helps them to participate and take control over resources. The human and institutional development process mainly targets awareness and consciousness raising, combined with skills and tools development. The natural resources management and agriculture and economic development programmes are aimed at consolidating the social organization process that gives people a sense of accomplishment and confidence in the process. SAFWCO Micro Finance Programme is a part of agriculture and economic development sector (SAFWCO Annual Report, 2005).

### **2.3 Sindh Rural Development Project (SRDP)**

In view of the denial by the provincial government of Sindh about the existence of the bonded labour in agricultural sector and the presence of private jails in the province,

Asian Development Bank initiated a process for launching a loan project in Sindh for the abolition of the bonded labour in Agricultural Sector in 1998 with the name of Sindh Rural Development Project (SRDP). According to the project documents, the overall goal of the project was to reduce poverty in four districts of southern Sindh, through increasing empowerment and improving governance, improving access of the rural poor to public services, transferring technology for improved livelihoods and providing essential infrastructure. In addition to the above, the project aimed at improving the social status and economic well-being of the poorest groups in the project area with a focus on the following target groups; (i) haris and agricultural labourers, (ii) marginal owners-cum tenants (with less than 2 ha) and (iii) small village based artisans. There was a particular focus on women as the most disadvantaged among the target groups (Sindh Rural Development Project, 2007).

#### **2.4 Aga Khan Rural Support Programme (AKRSP)**

Since it began, 13 years ago the Aga Khan Rural Support Programme (AKRSP) has transformed the remote Northern areas and Chitral in Pakistan into rural development success stories. Its distinctive approach has provided the inspiration for other programmes in Pakistan and elsewhere.

The key element of the programme is institutional development at village level, which provides the framework for community members to take advantage of outside assistance as well as to use their own resources more productively. AKRSP started the process by providing an agent to help villagers form a village organization and undertake a significant investment in productive infrastructure of their choice, such as irrigation facilities or a local road that will benefit their community. The programme provides a one time grant to complement villagers contributions to the infrastructure projects. The grant process helps village organizations to mobilize savings and acquire agricultural technology and production inputs. As benefits accrue, AKRSP facilitates links with other entities providing health and education services.

##### **a. Strategy**

With rapid population growth, limitations on usable land and improved accessibility, the economic environment in the programme area is changing. Though, farming is important, most households earn between 30-50 percent of their income of the farm often in non agricultural jobs. AKRSP is responding to expanding into the promotion of non-agricultural investment.

People in the project areas are increasingly demanding social services and investments in health and education. In response, AKRSP is facilitating links between village organizations and other providers. In future most of the basic infrastructure and social service investment in the region is likely to come from the government.

##### **b. Conditions for Replication**

In Pakistan AKRSP has been successfully spread over three districts under separate day to day management and its replication has begun in two adjacent districts with support from Asian Development Bank and government of Pakistan. The prospects of replicating the AKRSP model on a broad scale depends partly on the macro and sectoral policy environment including the regulatory system for finance,

natural resource and commerce as well as state support services. Experience over the past 50 years, for example in Brazil, Kenya, Korea, Malawi, Malaysia, Taiwan and China suggests that most successful governments sponsored rural development programmes have been run by autonomous and accountable parastatal bodies with carefully crafted institutional development strategies (AKRSP, 2007).

### 2.5 National Rural Support Programme in Sindh (NRSP)

In 1991, the Government of Pakistan (GOP) supported the country wide replication of the rural support programme model which culminated in the creation of the NRSP. In 1992, Government of Pakistan provided NRSP with a grant of Rs.500 million to start operations. As other resources became available, particularly from donors and also from provincial governments, RSP expanded beyond initial eight districts. Cost recovery from NRSP's micro-credit programme, which credit organization in Pakistan with 160,893 active loans totaling, Rs.1,779 million (US \$29.6 million), now provides a significant proportion of NRSPs operating funds (NRSP, 2000).

#### a. Experience in the Project Districts

NRSP is established in the project districts with 12 years of operation in Badin and 6 years in Thatta. It engaged in community mobilization, savings and the implementation of small scale civil works in these areas. The details of current NRSP activities in Thatta and Badin districts are shown in (Table-3).

**Table-3: Current NRSP areas in Thatta and Badin.**

District	Tehsil / Taluka	Field Unit
Badin	* Badin	Badin
	* Golarchi	Golarchi
	Tando bago	Tando Bago
	Talhar	Talhar
Thatta	Matli	Matli
	Thatta	Thatta
	Sajawal	Sajawal
	Mirpur Bathro	Mirpur Bathro
	*Mirpur Satro	Mirpur Satro

Source: NRSP records

\* Project areas

#### b. Social Mobilization and Small Scale Interventions

NRSP community organizations have proven successful in facilitating needs identification by villages and in arranging for demand to be effectively met in participatory ways. Community organizations (CO) members and their households can avail themselves of a number of services from NRSP including training, micro-credit and support for small-scale civil works interventions. NRSP has also put in place important sustainability measures and is helping (COs), register a community citizens board and access funding from district governments.

**Table-4: NRSP Community Physical infrastructure in Thatta and Badin as of 31 August 2006**

	<b>Badin</b>	<b>Thatta</b>	<b>Total</b>
Completed projects	322	111	433
Total cost in (Rs. Million)	84,337	14.29	98.647
Donor share	60.936	11.326	72.26
Community share	23.421	2.964	26.36

Source: NRSP records

### c. Achievements Recorded

NRSP performance was evaluated as part of a case study for 2004 Shanghai Conference on scaling up poverty reduction. It was estimated that membership in the NRSP community organizations (CO) resulted in about 7.5 percent higher household incomes annually. Similarly, NRSP estimates show that poverty levels were lower in member households. The UNDP supported Pakistan National Human Development Programme Report (2003) states that 68 percent, of the NRSP respondents ate daily 68 percent ate better than before, 50 percent felt improvements in health and 82 percent experienced a sustainable increase in income after disbursement of credit (NRSP, 2000).

## 2.6 Badin Rural Development Society BRDS

Badin Rural Development Society (BRDS) has been working for the upliftment and community participation in development initiatives at district level since last one decade. It aims at strengthening the standard of health, food security, water and sanitation better participation of women, creating equal opportunities for vulnerable groups and poverty alleviation in the targeted areas of District Badin especially the coastal belt. These communities face devastation and catastrophies like earthquake, droughts, drenchers and other fatal calamities. Badin Rural Development Society has adopted its integrated social mobilization strategy for the development of area, ensuring women participation or giving preference to women in all its activities.

## 2.7 Contribution of BRDS to Rural Livelihoods in Sindh

### a. Education

Giving right to education is one of the strategic objective of BRDS; the organization has vision to advocate the right of child education for both girl or boy to avail their education with appropriate facilities. In the year 2007, BRDS has provided bags and other educational materials. Over 4000 children have benefited from their activities. In 2008, BRDS planned to give these materials to only newly enrolled schools except girls schools initiated by the community and BRDS.

### b. Achievements

1. Overall children enrollment increased in sponsored villages.
2. Communities have learnt strategies of how they can advocate the right to education.
3. People are sensitized over right of education and now equally respond to daughter and son for studying.

4. Communities are requesting British Petroleum (BP) for social investment in infrastructure.
5. Children are well organized and attached with BRDS educational facilities.

**c. Social Mobilization**

In district Badin, the programme intervention was based on report building, mobilization and organization for sustainable positive changes in physical and behavioural attitudes within the target communities. During the year 2007, BRDS team mobilized thousands of coastal communities to mainstream them in the people's oriented development. There are 60 villages in union councils Seerani, Bhugra Memon and Ahmed Rajo, where community groups are formed; there are 1500 women and 2800 men who are active members in these groups. BRDS team is regularly interacting with these groups to identify innovative ideas and approaches which can lead to a progressive society (Badin Rural Development Society, 2007).

**d. Achievements**

1. 1500 women and 2800 men in 60 villages are engaged in development process
2. 10 villages are registered for being part of development in district government initiatives.
3. All women council seats are filled by competitive process in recent local bodies election.
4. 35 mother committees are formed for girls enrolment and school management.
5. Female group members are sending their children in schools and accepted equal right of education for both girls and boys.
6. 10 youth groups are functioning properly at community level.

**2.8 Young Sheedi Welfare Organization YSWO Badin**

YSWO came into being in the year 1987 with determination, commitment and dedication of the poor Sheedi people under the distinguished leadership of Faiz Mohammad Bilali. This organization has become the silver lining for the poor and marginalized communities of Badin District, particularly those living along the coastal belt. In 1989, it was registered with social welfare department government of Sindh, under social voluntary organization act, 1961.

**a. Achievements**

- 1) 58 Villages in 5 union councils of Ahmad Rajo, Bhugra Memon, Abdullah Shah, Lunwari Sharif and Kadhan have been selected for disaster preparedness and management project.
- 2) 116 Community organizations have been formed.
- 3) 9 clusters of the target villages have been formed.
- 4) 01 Emergency centre has been established and equipped with necessary emergency items.
- 5) 04 Trainings have been given to the officials of community organizations.

- 6) Site has been selected for construction of 2 demoraised platforms in 2 cluster locations in Tehsil Badin.
- 7) 12 TBA Training participants have been selected, while contents have been discussed with lady doctor.
- 8) 3 Radio Programmes have been broadcasted out of 10 programmes.
- 9) In poverty Alleviation and income generation activities, 431 goat / sheep have been distributed to 143 beneficiaries in Badin.
- 10) 600 goats have been given to 200 beneficiaries in tehsil Johi, district Dadu through local partner village Shadabad Welfare Organization.
- 11) 200 beneficiaries have been finalized in Tehsil Diplo, District Tharparkar through local NGO (Young Sheedi Welfare Organization Annual Report, 2007).

### **2.9 Land Distribution to the Poor for Self Reliance in Sindh**

The Government of Sindh has announced grant of state land to the poor in all districts, where state land is available with primary objective of reaching out to the most marginalized segment of Sindh population. Grant of the state land to the poor Haris is one of the central poverty reduction strategy of the new government. The policies of land grant followed by different governments have however been more or less a routine affair and there has been no attempt to target the landless in transparent manner. Similarly also there was no attempt to facilitate institutional support to the poor beneficiaries in terms of connecting them to rural credit markets etc for enabling them to move to sustainable livelihoods. The broad policy framework has been evolved on the basis of past lessons and major weaknesses of the past policies. What has basically surfaced, is the fact that in the past land grant were primarily implemented through a mechanism provided under the land revenue act. In view of the above, the government has drawn out the framework of a policy that builds upon past mistakes and oversights for ensuring sustainability of reforms.

### **2.10 Sindh Microfinance Network SMN**

Sindh Agriculture and Forestry Workers Coordinating Organization (SAFWCO) being a practitioner in the fields, felt the need of a platform for small scale NGO/CBO who are practitioners and providing microfinance services in their respective areas of Sindh.

Sindh Microfinance Network (SMN) is a Network for organizations engaged in microfinance and dedicated in improving the outreach and sustainability of microfinance in Sindh. Microfinance sector in Sindh is in the initial stages of development. Estimates suggest 2 million households need the microfinance services.

SMN is established to provide a forum for microfinance practitioners to exchange views and experiences on issues of common interest for the majority of the population, this changing scenario has meant decreasing individual control over livelihoods. The objectives of SMN were as follows:

1. Enhance the capacity and support of technical assistance.
2. Build a microfinance database of microfinance institutes.
3. Conduct research on microfinance related issues and provide development services.
4. Facilitate effective networking at provincial, national and institutional level
5. Disseminate information and share experiences and lesson learnt.

### **2.11 Participatory Village Development Programme Sindh PVDP**

Participatory village development programme PVDP was established in 1997 in response to communities of District Tharparkar's needs for poverty alleviation safe health quality education, permanent source of livelihood community capacity for management of their natural and human resources and awareness of their civil and political rights. The wide spread child labour particularly in carpet factories and other work places also created the need to work for child protection and improving the lives of children. PVDP showed utmost concern for the marginalised women who are subjected to maltreatment by males and have restricted access to health services education opportunities, skills and awareness in a society which allows limited social mobility to the women and girls who are also unaware of their basic rights.

So far about 60,000 people have benefited directly or indirectly from water security projects, environmental rehabilitation and other projects including food security, livestock, health, education and income generation and poverty alleviation projects. There are about 1500 male and female community activists who are trained and now serving their own communities. More than 63 staff members have been trained in various subject related with community development.

#### **a. Rural Livelihood Improvement and Food Security Issues in Thar**

Like many other Asian countries Pakistan is poverty trapped country and poverty roots have emerged in many areas of Pakistan especially in Thar Desert. In Thar there is lack of income opportunities, regular drought occurring, lack of assets, health and education opportunities. More than 80% households live in constant debt and below the poverty line. As a result of drought like situation in this area people are compelled to leave their homes and migrate to canal irrigated areas outside of Thar in search of food, fodder and work. This has been the coping mechanisms for survival of the people during drought times for many years. Participatory village development programme emerged in Thar as a ray of hope for Thari people. PVDP believes in giving people choices and opportunities for improving the quality of their lives. The six step poverty model is designed to give people various choices and opportunities to improve their livelihood, skills and natural environment and empower women. The poverty reduction model also aims to reduce vulnerability of the poor households through development of assets, skills income opportunities and capabilities for self reliance. The food security issue is important to reduce drought related miseries of the poor. PVDP works with community to support preservation of wild food plus storage of locally produced eatables for drought times when access to foods becomes difficult for the poor masses.

The poverty reduction and food security programme has significantly contributed towards PVDP vision of making the poor households socio economically self reliant. This is done through building physical assets such as goat, trees, water tank, economy stoves and developing women skills for income generation through embroidery trainings and support.

**b. Achievements and Impacts**

**Table-5: Achievements recorded**

S.No.	Activities	Achievement to date
1	Small flocks of goats	4180
2	Fuel efficient stores	4187
3	Bair fruit trees	119,040
4	Fodder trees	132,550
5	Rainwater tanks	3496
6	Embroidery	1356

Source: Participatory Village Development Programme Sindh. Annual Report 2007 Page 8.

**c. Impact of Poverty Alleviation Programmes to Rural Livelihoods**

- 1) Women Empowerment through assets development in terms of livestock, trees water tanks and fuel store and marketable handicraft skill of women.
- 2) Reduction in shocks and vulnerability particularly during the emergencies droughts earthquake, flooding.
- 3) Reduction in poverty through income generation from sale of goats and embroidery work and saving on health cost use of clean drinking water.
- 4) Improvement in environment through trees planting use of fuel efficient stove and water conservation.
- 5) Recognition of PRM by other organizations and considering its replication.
- 6) Improved nutrition in food for growing children and pregnant women.

**d. Skill Enhancement For Self Reliance Of Women Through Vocational Centres**

PVDP encourages women to improve their handicraft skills in order to generate income for meeting their basic needs. In this regard vocational centres were established in which the women are taught to make different types of handicraft items for sale. The efforts are made to produce innovative handicraft goods for the market. PVDP has so far supported the women in making different types of purses, bags, embroidery work on clothes, wall hanging, artificial jewelry and greeting cards. It can be said with confidence that PVDP can help many women with income generation contributing to poverty reduction and improving their living conditions.



**Table-6: Achievements**

S.No.	Activities	Achievement to date
1	Skill enhancement training	31
2	Handicraft marketing skills	13
3	Embroidery support to women	1356
4	No of sewing machines provided	73

Source: Participatory Village Development Programme Sindh.  
Annual Report 2007 Page 20.

**e. Impact of Skill Enhancement for self Reliance**

- 1) Women improved handicraft skills according to market need.
- 2) The livelihood of a family increased by involving women in the skill development.
- 3) Confidence of women enhanced.
- 4) Women dignity in family and society enhanced.

### 3. STRENGTHS AND WEAKNESSES OF NGO'S

Like other sectors, the NGO are not exceptional in having strengths and weaknesses. Some strengths and weaknesses are as follows:

**a. Strengths:** NGO have special ability to reach the poor and other segments of society overlooked by public and commercial sectors. NGO facilitate local resource mobilization and have programmes of local participation in development. Service delivery at low cost and innovative solutions to novel problems are their strengths. The biggest strength of these organizations is the openness in thought. They are said to be learning organizations their capacity grows from small size with administrative flexibility and have relatively more freedom from political constraints.

Perhaps the single most important factor to the success of NGOs is the quality of leadership. Specifically it is the ability to relate with humility and love with the poor. The successful NGO leader creates the team synergy to develop innovative responses to each new problem on the ground. The second factor in the success of small NGOs, which engaged in social mobilization is the identification, training and fostering of village level activists who gradually begin to manage existing community organization (COs) enabling NGO staff to give more time to develop new COs. The third factor in the success of small NGOs is the ability of level leadership to devolve responsibilities acknowledge their achievements and to learn from them just as much as it is necessary for leadership to learn from the poor.

The fourth factor in the success of small NGOs in reaching significant scale is the development of credible accounting procedures and a regular monitoring and evaluation exercise on the basis of which donor funding can be sought when it is required. In each case successful NGO apart from devising some modes of reflection and action with the village communities also develops formalized recording and reporting system.

**b. Weaknesses:** Due to the small size and budget, NGO lack in technical capacity because the highly trained technical and professional people do not find much attraction for career jobs in this sector. NGO have limited ability to scale up successful projects to achieving regional or national impact. This is due to their small size and resources, that there are unscientific administrative system, intensive focus on a few committees, the difficulties in maintaining their essential value consensus; soon as the staff expands interaction to developing real efficiency and expertise in a well defined technological environment and even living with their own commitments to their beneficiary populations (Shireen, 2002).

#### 4. SUMMARY CONCLUSION AND RECOMMENDATIONS

The paper examine various public sector programmes aimed at rural livelihood in Pakistan and Sindh. Contributions of NGOs towards improvement of quality of life in rural areas of Sindh has been discussed. The paper identified the major strength and weaknesses of NGOs in implementing poverty alleviation programmes. Finally recommendations were developed for rural livelihood improvement in Sindh.

The major conclusion drawn from this paper were the underprivileged settlements in rural Sindh experience health problems due to lack of basic amenities and bad hygiene practices. Similarly the lack emergency obstetric services is another issue of greater concern. The most worrying situation was the expenditure on food subsidies, food support programmes and low cost housing has been stagnant even with negative repercussions for the poor and the needy. Individual financial assistance given to poor widow, destitute women, opens and disable people is very migre. NGOs lack in technical capacity confront existing challenges this is due to their small in size and resources. Microcredit loans do not reach the poorest of the poor in Sindh.

In order to address the above issues the following recommendations are made.

##### 4.1 Recommendations

1. There is need to start different public welfare schemes at grass root level for improving livelihoods of the poor.
2. Rural women NGOs already working in Sindh be strengthen, they should include in their charters training of women for income generating jobs.
3. NGOs should ensure that new agricultural technologies are introduced to help farmers to improve and increase crop production so as to improve their living standard.
4. Government should provide facilities for institutional building to the local NGOs. This will encourage them to work sincerely towards poverty alleviations.
5. There is a need for a very strong monitoring and evaluation of NGOs so as to make sure that their services reach the poorest of the poor in Sindh. The monitoring and evaluation should be carried by independent research organization.

6. Rural poor in Sindh should involve themselves in other socioeconomic activities such as monitoring input market and agro processing in order to diversify their means of livelihood so as to generate more income.
7. NGOs should not rely on government to provide funds for future projects. Instead they can raise funds through savings and donations from rich individuals.
8. NGOs should create a condition in which the poor are either given or enabled to acquire their assets and a peaceful environment to benefit from those assets.

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## A COMPARATIVE STUDY OF PERFORMANCE OF ISLAMIC BANKING AND CONVENTIONAL BANKING IN PAKISTAN

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### ABSTRACT

The aim of this study is to examine and to evaluate the performance of the four Islamic banks in Pakistan i.e. Meezan Bank Limited, AlBaraka Islamic Bank Pakistan, BankIslami Pakistan Limited and Dubai Islamic Bank Pakistan Limited, in comparison with that of a group of 5 Pakistani conventional banks i.e. MCB Commercial bank Limited, Habib Bank limited, Bank Alfalah, Allied Bank Limited and Bank Alhabib. The study evaluates performance of the Islamic banks in profitability, liquidity, risk, and efficiency for the period of 2005-2009. Financial ratios (12 in total) such as Return on Asset (ROA), Return on Equity (ROE), Loan to Deposit ratio (LDR), Loan to Assets ratio (LAR), Debt to Equity ratio (DER), Asset Utilization (AU), and Income to Expense ratio (IER) are used to assess banking performances. T-test and F-test are used in determining the significance of the differential performance of the two groups of banks. The study found that Islamic Banks are less profitable, more solvent (less risky), and also less efficient comparing to the average of the 5 conventional banks. However, there was no significant difference in liquidity between the two sets of banks. The reasons are due to the facts that conventional banks in Pakistan have longer history and experience in doing banking business and hold dominating position in the financial sector with its large share in the overall financial assets of Pakistan, as compared to Islamic banks, which in true sense, started only a few years back with all letter and spirit.

The study found that Islamic Banks are less profitable, more solvent (less risky), and less efficient during 2005-2009, however, these are improving considerably over time indicating convergence with the performance of the conventional banks.

### INTRODUCTION

The study is aimed at comparative financial performance of Islamic banking with conventional banking in Pakistan. Specifically, study makes comparison of 4 Islamic banks and a group of 5 conventional banks performances each year in 2005-2009. Data for each year have been compiled from the income statements and balance sheets of these two sets of banks. In the bank performance study, this type of inter-bank analysis is pretty common. In today's competitive financial market, one can better understand the performance of a bank by an analysis of inter-bank comparison.

## RESEARCH METHODOLOGY

In order to see how Islamic banks have performed in competition with the conventional banks over 5 years, the study uses 12 financial ratios for the bank's performance. These ratios are broadly categorized into four groups: (a) profitability ratios; (b) liquidity ratios; (c) risk and solvency ratios; and (d) efficiency ratios. Since there are five conventional banks in a group to compare with one conventional bank, so we first calculated ratio of each bank in that group and then calculated average of those five ratios to compare that average ratio with that of Islamic banks each year. T-test and F-test are used in determining the significance of the differential performance of the two groups of banks.

## EMPIRICAL RESULTS

### 1. PROFITABILITY RATIOS

#### 1.1. Return on Assets (ROA)

The result indicates several important points of comparison of ROA between Islamic banks and conventional banks. First, ROA of conventional banks has been greater than Islamic over time except year 2009 in which Islamic banks ROA (1.43%) slightly surpassed conventional banks ROA (1.38%). Second, ROA decreased drastically to 1.14% from 1.93% (40% decreases) and from 2.18% to 1.35% (38% decrease) during 2005-2006 for Islamic banks and conventional banks respectively. Third, after having drastic decrease in 2005-2006, conventional banks recovered their ROA in 2006-2007. But this recovery was not only small but also temporarily. Since 2007, ROA of conventional banks is consistently on decreasing trend. Islamic banks has similar story as of conventional banks but with one difference i.e. ROA of Islamic banks seem to be more fluctuating in that it increased in 2006-2007 from 1.14% to 1.37%, but again decreased to 1.30% in 2008 and ended up at 1.43% in 2009 with an increase of 0.13%. Finally, on average, ROA of conventional banks (1.59%) is higher than average ROA of Islamic banks (1.49%); however, statistically there is no difference between the two means at 5% significance level (see Table-1.13).

Financial results of 2010 of Islamic banks and conventional banks will reveal whether this declining trend of conventional banks ROA would continue and ROA of Islamic banks would increase or decrease. Nevertheless, banking sector in Pakistan is growing significantly but considering the last 4 years trend in ROA, both types of banks are experiencing difficulties in profitability.

**Table 1.1: Return on Assets**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	1.93%	1.14%	1.37%	1.30%	1.43%	1.49%	0.00296
Conventional Banks	2.18%	1.35%	1.59%	1.47%	1.38%	1.59%	0.0034

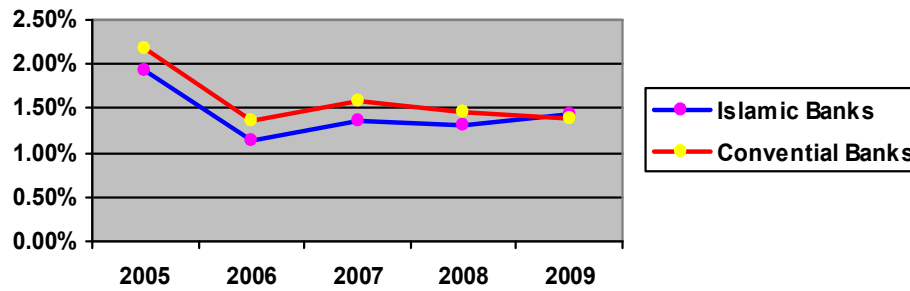


Figure 1.1

### 1.2 Return on Equity (ROE)

Similar to ROA, from the study of ROE of both conventional banks and Islamic banks, we emphasize some important points to consider. The result shows that conventional banks ROE is consistently higher than Islamic banks ROE during 2005-2009. In year 2005, the difference was huge which decreased considerably during 2006-2009. The difference is 17.6% in 2005, which has plummeted to 2.5% in 2009. This momentous decrease in difference of two ROEs is essentially due to overall increasing trend in ROE of Islamic banks and decreasing trend in ROE of conventional banks. This gives us an important insight. ROE of Islamic banks followed conventional banks ROE in terms of increase and decrease during 2005-2009, however, in the years when ROE of the two banks increased, increase in ROE of Islamic banks has been more than increase in ROE of conventional banks (30% increase for Islamic banks as compared to 12% increase for conventional banks in 2005-2007), and decrease in ROE of Islamic banks has been less than decrease in ROE conventional banks (8.5% decrease for Islamic banks as compared to 15% decrease for conventional banks in 2007-2008). ROE of Islamic banks increased from 12.23% in 2005 to 16.88% in 2009, whereas, ROE of conventional banks decreased from 29.83% to 19.38% in 2009. Analysis of the last five years financial statements further highlighted that overall profits base has increased more than equity base in Islamic banks resulted into an increase in ROE over time. On the contrary, for some of the conventional in a group of 5 conventional banks, equity base increased and profits base decreased which stood the main cause of overall reduction in ROE during 2005-2009. Nevertheless, ROE of Islamic banks has improved; ROE of Islamic banks is lagging behind the conventional banks as yet. An average ROE of the Islamic banks is 13.27%, whereas the average ROE of conventional banks for the same periods is 22.76%. The difference of the two means is strongly significant (see Table-1.13).

Table 1.2: Return on Equity (ROE)

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	12.23%	10.69%	13.87%	12.69%	16.88%	13.27%	0.02317
Conventional Banks	29.83%	21.04%	23.60%	19.95%	19.38%	22.76%	0.04271

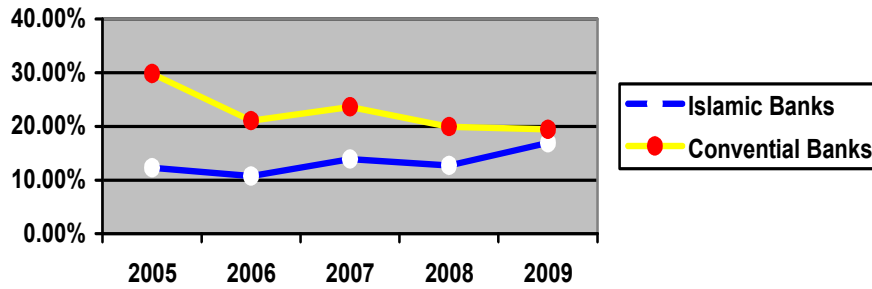


Figure 1.2

### 1.3 Profit Expense Ratio (PER)

Another measure of profitability, PER, is supporting the conventional banks to be more profitable in terms of expenses as compared to the Islamic banks over the time period of 2005-2009. The analysis of PER of Islamic banks and conventional banks indicates that conventional banks have generated consistently higher profits for every one rupee of expense spent during 2005-2009 but with decreasing trend as compared to Islamic banks during the same time period. After the decrease in 2005-2006, PER of conventional increased in 2007, but again it decreased afterwards with no sign to rise again. PER of conventional banks was 1.91 in 2005 which decreased by 57% from 1.91 in 2005 to 0.82 in 2009. This decrease in PER of conventional banks is far greater than decrease in PER of Islamic banks during the same time period. PER of Islamic banks decreased to 0.72 in 2009 from 0.94 in 2005 accounting for only 23% decrease. Further analysis of financial statements of the 5 conventional banks included in the study revealed the fact that expenses of these conventional banks have increased during 2007-2009, however, for some banks profits did not increase much and for others even decreased during the same time period, which resulted into decrease in PER of the group of conventional banks. Mean PER of the Islamic banks is 0.77 which is less than conventional banks mean PER of 1.34. This difference in the two means is statically different at 5% significance level (see Table-1.13).

**Table 1.3: Profit to Expenses Ratio (PER)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	0.94	0.54	0.88	0.76	0.72	0.77	0.15530
Conventional Banks	1.91	1.3	1.48	1.2	0.82	1.34	0.39877

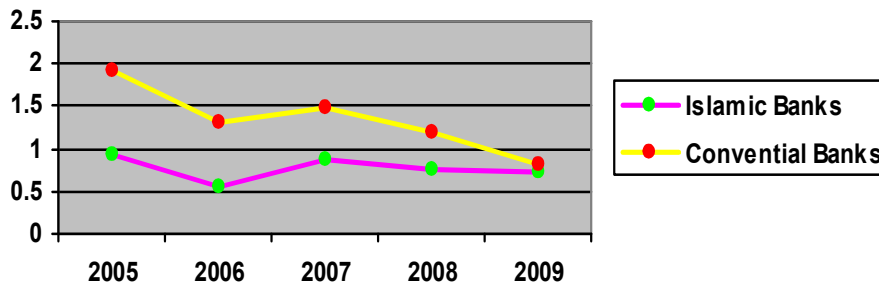


Figure 1.3



Nonetheless, overall all results of profitability measures go in favor of conventional banks. The results indicate that conventional banks are *more profitable* compared with Islamic banks, however, Islamic banks are consistently improving and performing better in making good returns on investment (assets), satisfying their shareholders in offering competitive or even better returns, and also managing their operating expenses.

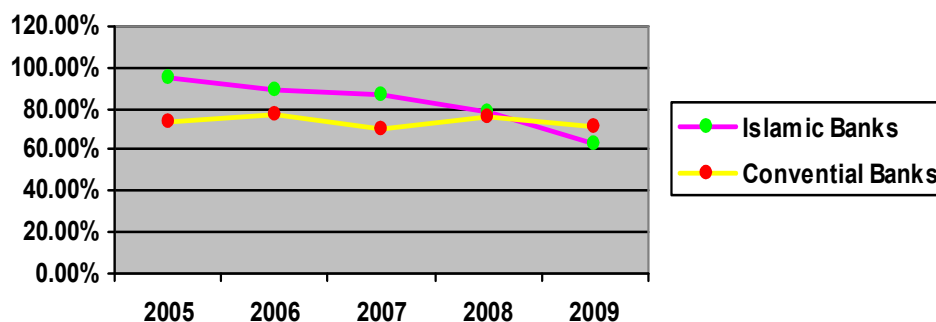
## 2. LIQUIDITY RATIOS

### 2.1 Loan to deposit Ratio (LDR)

High loan to deposit ratio for Islamic banks compared with conventional banks during 2005-2008 indicates that Islamic banks has been comparatively less liquid. However, in 2009, Islamic banks LDR (63.35%) decreased below conventional banks (70.89%) turning Islamic banks into comparatively better liquidity position. LDR of Islamic banks decreased from 95.36% in 2005 to 63.35% in 2009. This overall declining trend in LDR of Islamic banks indicate the tendency of comparatively more increase in deposits than loans (financings) and further emphasizes improved liquidity position of Islamic banks. Compared with Islamic banks, LDR of conventional banks has been reasonably lower and floating between approximately 70% and 77%. Conventional bank LDR was 73.85% in 2005 which decreased to 70.89% in 2009. Although Mean LDR of Islamic banks 82.70% is higher than Mean LDR of conventional banks 73.55% but statistically there is no difference between the two means at 5% level of significance (see Table-1.13).

**Table 1.4: Loan to Deposit Ratio (LDR)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	95.36%	89.61%	86.70%	78.47%	63.35%	82.70%	0.12413
Conventional Banks	73.85%	76.66%	69.90%	76.44%	70.89%	73.55%	0.03103



**Figure 1.4**

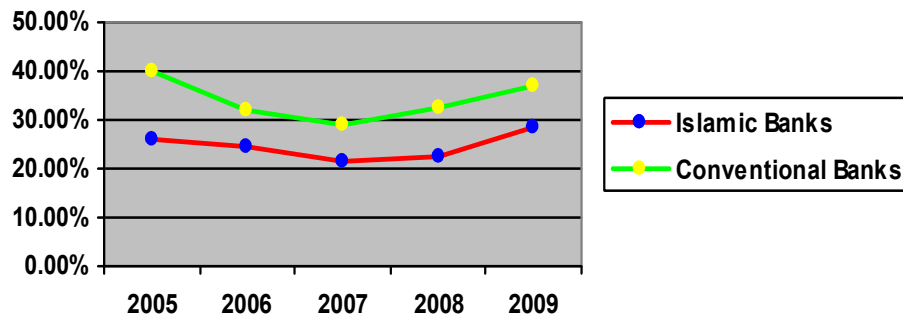
### 2.2. Cash & Portfolio Investments to Deposits & Borrowings Ratio (CPIDBR)

After decrease in ratio of cash & portfolio investment to deposits & borrowings of both Islamic banks and conventional bank during 2005 and 2007 from 25.77% to 21.60% and 39.88% to 29.12% respectively, CPIDBR increased to 28.39% for Islamic banks and 36.90% for conventional banks in 2009. However, decrease in CPIDBR was more than

increase for both sets of banks. Since 2007, an increasing trend in CPIDBR indicates that liquidity position of both Islamic banks and conventional banks is improving over time. Higher CPIDBR of conventional banks supports that conventional banks are more liquid as compared to Islamic banks. Table-1.5 shows that mean CPIDBR of Islamic banks (24.56%) is lesser and statistically different from mean CPIDBR of conventional banks (34.11%) at 5% significance level (see Table-1.13).

**Table: 1.5 Cash & Portfolio Investment to Deposit Ratio (CPIDR)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	25.77%	24.37%	21.60%	22.65%	28.39%	24.56%	0.02673
Conventional Banks	39.88%	32.12%	29.12%	32.52%	36.90%	34.11%	0.04256



**Figure 1.5**

### 2.3 Loan to Asset Ratio (LAR)

Whereas loan to deposit ratio shows that liquidity position of Islamic banks is getting better, loan to asset ratio shows somewhat different results. Figure 1.6 shows that LAR of Islamic banks is on increasing trend whereas LAR of conventional banks is swinging between 59% and 64%. This increasing trend of Islamic banks LAR is palpable evidence of more financial stress which Islamic banks is taking by making excessive loans and holding less liquid assets. However, this is an indication of potential betterment in profitability and also conforms to our results drawn from profitability ratios of Islamic banks. LAR of Islamic banks increased to 66.63% in 2009 from 51.47% in 2005 while LAR of conventional banks increased from 59.57% in 2005 to 59.78% in 2009. Further analysis of LAR indicated that Murabaha has been the most famous and mostly used mode of financing followed by Ijara, export refinance under Islamic scheme, and Musharaka are standing second, third, and fourth respectively in a row. Overall result indicates that Islamic banks are as liquid as the conventional banks are. Table-1.6 shows that the average LAR of conventional banks is slightly higher than that of Islamic banks; however, the difference is not statistically significant at 5% significance level (see Table-1.13).

**Table 1.6: Loan to Asset Ratio (LAR)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	51.47%	58.21%	64.35%	62.65%	66.63%	60.66%	0.05993
Conventional Banks	59.57%	62.44%	60.63%	63.99%	59.78%	61.28%	0.01890

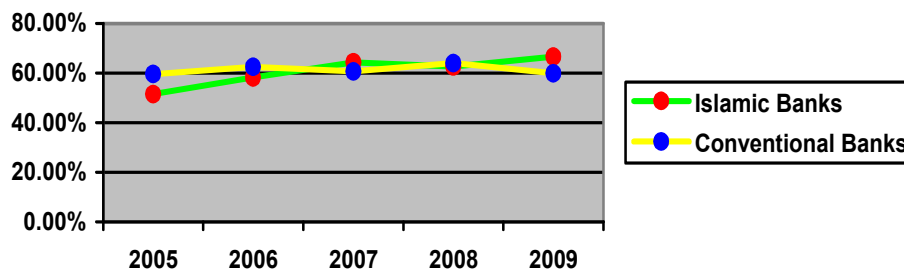


Figure 1.6 Loan to Asset Ratio (LAR)

Overall results of all liquidity measures show that Islamic banks and conventional banks are similar to each other except in terms of CPIDBR in which conventional banks are found to be more liquid than Islamic banks. Moreover, the study found that Murabaha, Ijara, export refinance under Islamic scheme, and Musharaka have been the most famous and mostly used mode of financing.

### 3. RISK AND SOLVENCY RATIOS

#### 3.1 Debt to Equity Ratio (DER)

Debt to equity ratio of Islamic banks increased to 10.77 times in 2009 from 5.35 times in 2005 showing an overall increasing trend as compared to conventional banks DER which increased from 14.76 times in 2005 to 17.29 times in 2006 but followed a downward trend afterwards and ended at 13.49 times in 2009. Noticeably, decrease in DER of conventional banks is more than increase in DER of Islamic banks. These results demonstrate that conventional banks are more *risky* as compared to Islamic banks. “Deposits” constitute major liability for any type of banks whether Islamic or conventional. Borrowed money stands second among total liabilities for almost all conventional banks except all Islamic banks which are prohibited by Islamic Shari’ah from taking or giving interest-based debts. Increasing trend in DER for Islamic banks indicate that deposits base of Islamic banks is increasing more than its equity base. We observed from our further analysis of the financial statements of the group of five conventional banks that for conventional banks DER to follow decreasing trend is partly due to more reliance on equity financing as compared to debt and less deposits base. Higher DER during 2005-2009 in figure 7 points out the conventional banks to be more risky than Islamic banks. Average DER of Islamic banks is 8.48 times as compared to 15.37 of the conventional banks. This difference in means is statistically different at 5% level of significance (see Table-1.13).

Table 1.7: Debt-Equity Ratio (DER)

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	5.35	8.39	9.14	8.75	10.77	8.48	1.97216
Conventional Banks	14.76	17.29	17.06	14.23	13.49	15.37	1.71381

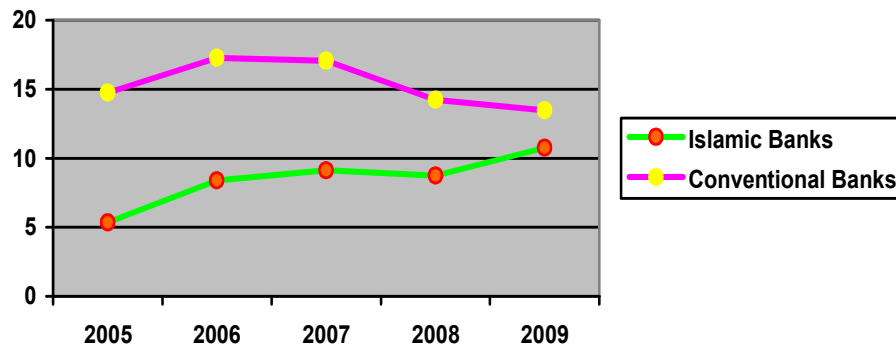


Figure 1.7

### 3.2 Debt to Total Assets Ratio (DTAR)

The results of debt to total assets ratio conform to our results of DER. The results show that DTAR of the conventional banks is consistently higher than Islamic banks making once again conventional banks to be more *risky* and less solvent than Islamic banks. However, Islamic banks' DTAR has increased considerably during 2005-2009. It was 84.25% in 2005 which climbed to 91.51% in 2009 getting quite closer to conventional banks DTAR of 91.51%. Though, DTAR of conventional banks was high but it stayed pretty stable and fell in range of 92% to 94% over five years. The comparison of means of DTAR for risk measure for both Islamic banks and conventional banks in Table-1.8 reveals that the average DTAR of Islamic banks is 89% whereas the average DTAR of conventional banks is 92.78%. The difference of the two means is statistically different as 5% significance level (see Table 1.13)

**Table 1.8: Debt to Total Assets Ratio (DTAR)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	84.25%	89.35%	90.14%	89.74%	91.51%	89.00%	0.02776
Conventional Banks	92.22%	93.39%	93.12%	92.67%	92.48%	92.78%	0.00475

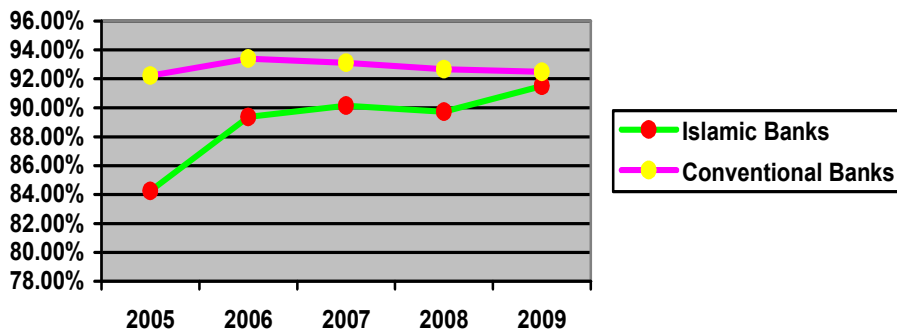


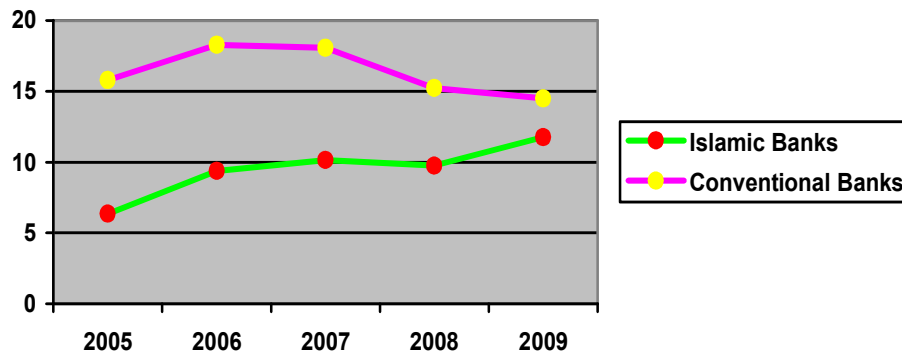
Figure 1.8

### 3.3 Equity Multiplier (EM)

The analysis of another measure of risk, equity multiplier, further proves conventional banks to be more *risky* and less solvent as compared to Islamic banks. The results are consistent with our results found in DER and DTAR for both sorts of banks. EM of Islamic banks increased to 11.77times in 2009 from 6.35times in 2005. Not surprisingly, conventional banks EM is exhibiting similar behavior as of DER which further verifies that relative to debt, equity base is increasing more in conventional banks. Increasing from 15.79times in 2005 to 18.29times and 18.07 times in 2006 and 2007 respectively, EM of conventional banks decreased to 14.49time in 2009. Table-1.9 shows mean values for two sets of banks. The difference between the two means is statistically significant at 5% significance level (see Table-1.13).

**Table 1.9: Equity Multiplier (EM)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	6.35	9.39	10.14	9.75	11.77	9.48	1.97216
Conventional Banks	15.79	18.29	18.07	15.23	14.49	16.37	1.71367



**Figure 1.9**

Overall, analysis of the results of all risk and solvency measures, DER, DTAR, and EM, indicate conventional banks to be more risky and less solvent than Islamic banks. As we observed in LDR that deposits base of Islamic banks is increasing rapidly over time and deposits make the largest component of total liabilities of the bank, that is why, we observe DER, DTAR, and EM of Islamic banks on the rising trend.

## 4. EFFICIENCY RATIOS

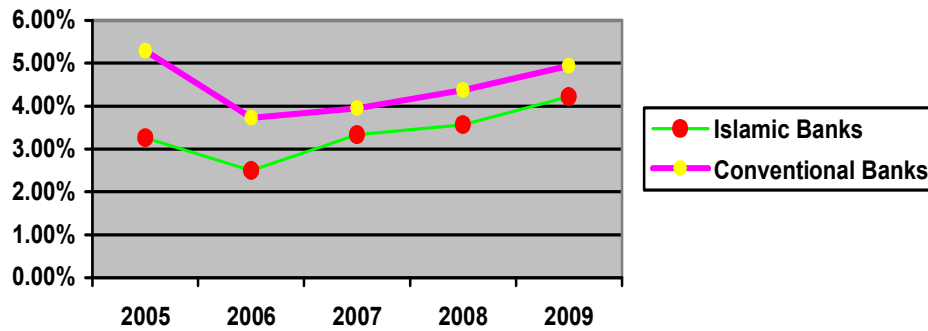
### 4.1 Asset Utilization (AU)

The behavior of the two lines in figure-1.10 reveals some useful information about AU of both banks. Having drastic decrease in 2005, AU of conventional banks showed an upward trend and increased from 2.50% in 2005 to 4.94% in 2009 but remained below 5.29% that was in 2005. On the contrary, AU ratio of Islamic banks not only mapped the trend in the same direction and increased from 2.5% in 2005 to 4.22% in 2009 but also surpassed AU ratio of 3.26% that was in 2005. Apparently, this result indicates that Islamic banks are doing relatively better in terms of trend than conventional banks.

However, AU ratio of conventional banks is consistently higher during 2005-2009 than Islamic banks and an average of AU ratio of conventional banks (4.46%) is higher and, at 5% significance level, statistically different from average AU ratio of Islamic banks (3.38%). This proves that conventional banks are comparatively more efficient in utilization of the assets in generating total income (revenue) than that of Islamic banks. (see Table-1.13)

**Table 1.10: Asset Utilization (AU)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	3.26%	2.50%	3.33%	3.57%	4.22%	3.38%	0.00619
Conventional Banks	5.29%	3.73%	3.95%	4.37%	4.94%	4.46%	0.00656



**Figure 1.10**

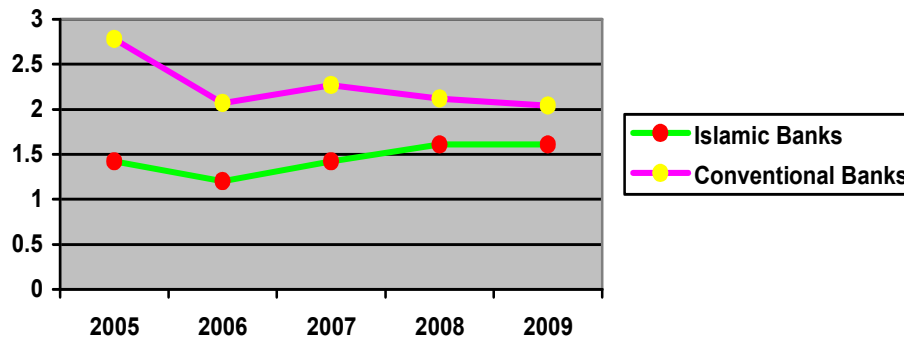
#### 4.2 Income to expense Ratio (IER)

Figure-1.11 exhibits the behavior of income to expense ratio for both conventional banks and Islamic banks. The results show that IER of conventional banks is higher than that of Islamic banks during the 5-year period, which proves once more that conventional banks are more efficient in managing their expenses. Compared with Islamic banks, conventional banks are generating more income for every 1 rupee of expense spent. However, the results also show that since 2007 this ratio is decreasing for conventional banks while it is on the increasing trend for Islamic banks. Further analysis of financial statement reveals that the decreasing trend is due to increase in expenses and decrease in income of some banks in the group of 5 conventional banks, and for Islamic banks IER to increase since 2007 is due to increase in income which is more than increase in expenses, causing the IER to rise.

IER of Islamic banks decreased from 1.42 times in 2005 to 1.2 times in 2006 but increased afterwards and stayed at 1.61 times in 2008 and 2009. IER of conventional banks decreased to 2.07 times in 2006 from 2.78 times in 2005 and having increased again to 2.27 times in 2007 it decreased thereafter. IER in 2009 is 2.04 times. Mean IER of Islamic banks is 1.45 times which is less than mean IER of 2.26 times for conventional banks shows that both means are strongly different from each other at 1% significance level (see Table 1.13)

**Table 1.11: Income Expense Ratio (IER)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	1.42	1.2	1.42	1.61	1.61	1.45	0.16991
Conventional Banks	2.78	2.07	2.27	2.12	2.04	2.26	0.30599

**Figure 1.11**

#### 4.3 Operating Efficiency (OE)

As another measure of efficiency, OE ratio, measured by dividing operating expenses by operating revenues, further strengthens our previous two results that conventional banks are also more efficient than Islamic banks in managing their operating expenses and generating more operating revenues. Difference in performance was huge in 2005 which, however, reduced drastically resulting into convergence of OER for both banks in 2009. In 2005 the difference in ratios of two sets of banks was 48.50%, which reduced to 3.51% in 2009. Learning by doing has drastically decreased this difference over 5 years which evidently supports our results of previous two efficiency measures and our argument that Islamic banks are improving considerably in managing its operations. OER of Islamic banks was 103.39% in 2005 which followed a decreasing trend thereafter and resulted into decrease in ratio to 62.23% in 2009. Ratio of OE for conventional banks increased to 58.72% in 2009 from 54.95% in 2005 showing an upward trend and increasing inefficiency on the part of conventional banks. Average of OER of 78.78% is higher and statistically different at 5% significance level than average OER 53.51% of conventional banks (see Table-1.13).

**Table 1.12: Operating Efficiency (OE)**

	2005	2006	2007	2008	2009	Mean	S.D
Islamic banks	103.4%	95.94%	70.37%	61.99%	62.23%	78.78%	0.19536
Conventional Banks	54.95%	53.51%	47.43%	52.95%	58.72%	53.51%	0.04076

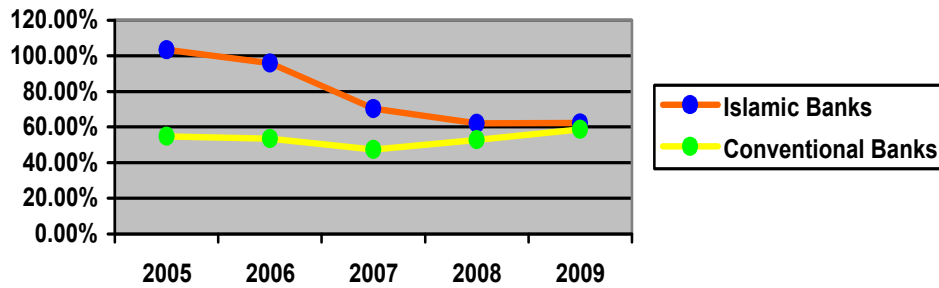


Figure 1.12

An overall analysis of all efficiency measures reveals that Islamic banks are less efficient in asset utilization, income generation and managing their expenses. However, the results also show the Islamic banks are improving overtime considerably in these efficiency measures.

**Table 1.13**  
**Comparison of Islamic Banks with Conventional Banks' Financial Ratios**

Performance Measures	Islamic Banks		Conventional Banks		T-test	F-test
	Mean	S.D	Mean	S.D		
<b>Profitability</b>						
ROA	1.43%	0.00296	1.49%	0.0034	0.45192	0.79644
ROE	13.27%	0.02317	22.76%	0.04271	0.0024****	0.263059
PER	0.77	0.155306	1.34	0.398773	0.017198***	0.098444*
<b>Liquidity</b>						
LDR	82.70%	0.12413	73.55%	0.03103	0.14852	0.01986***
CPIDBR	24.56%	0.2673	34.11%	0.4256	0.0028****	0.38803
LAR	60.66%	0.05993	61.28%	0.0189	0.83068	0.04605**
<b>Risk &amp; Solvency</b>						
DER	8.48	1.97216	15.37	1.71381	0.00036****	0.79022
DTAR	89%	0.02776	92.78%	0.00475	0.01705***	0.00474****
EM	9.48%	1.97216	16.37%	1.71367	0.00036****	0.78926
<b>Efficiency</b>						
AU	3.38%	0.00619	4.46%	0.00656	0.02782**	0.90979
IER	1.45	0.016991	2.26	0.30599	0.00084****	0.27904
OE	78.78%	0.19536	53.51%	0.04076	0.0221***	0.01015***

\*\*\*\* Difference in means: Significant at 1%

\*\*\* Difference in means: Significant at 2.5%

\*\* Difference in means: Significant at 5%

\* Difference in means: Significant at 10%



## FINANCIAL REFORMS AND HOUSEHOLD SAVINGS IN PAKISTAN

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### ABSTRACT

This study empirically examines the relationship between the household saving and financial reforms in Pakistan. For econometrics evidence this study uses the robust Cointegration technique, ARDL. Empirical findings indicate that long run relationship exists and financial liberalization index negatively (statistically significant) impact on household saving in the long and short run that suggests liberalization lead to increased consumption rather than savings. The other variable per capita income, agriculture sector GDP and remittance positively, and real interest rate negatively determine household savings in the long run. Dependency ratio is negatively determining household savings in the short run.

### KEYWORDS

Financial reforms; household savings; Pakistan.

JEL Classification: G<sub>10</sub>, D<sub>13</sub>

### INTRODUCTION

Pakistan was started the process of financial liberalization in the late 1980s on the advice of the International Monetary Fund (IMF) and World Bank (World Bank). The main aim of these reforms was to increase economic growth through increase in capital productivity, lowering the cost of intermediation through competition, increase in efficiency and the saving rate. In this way the financial system was expected to assist in enhancing economic growth of the country. For achievement of above objectives Pakistan began financial liberalization in the late 1980s, the International Monetary Fund (IMF) and the World Bank (WB) provided technical and financial assistance<sup>1</sup>. The financial liberalization literature was developed in 1970s. When McKinnon and Shaw (1973) brought the problem of financial repression in developing countries into focused. They found that financial liberalization policies would increase savings and this is going to spur investments and economic growth because negative real interest rate causes a

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<sup>1</sup> The World Bank provided a loan to the tune of \$350 million during the period of 1989-1997 under financial sector adjustment loan. In 1995 Pakistan received \$216 million for financial development and intermediation project, another loan for \$300 million was received in 2001 for financial sector restructuring and privatization project. Asian Development Bank also assisted in the capital market development programme in 1997.

decline in the savings level resulting in low investment levels and growth rates. These findings were proved foundation by the endogenous growth literature, which emphasized the role of develop financial market as a source of higher economic growth by increasing the productivity of capital or enhancing saving rate. Since saving is viewed as one of the basic channels through which financial sector liberalization spur economic growth<sup>2</sup>.

The new growth theories of Romer, 1986; Lucas 1988; Japelli and Pagano 1994 were explained that the steady state growth path in terms achieve three dimension i.e. the level of technology, the proportion of savings channeled into investment and the saving rate. Financial sector reforms can cause growth from these three channels. So to study the impact of financial sector reforms on long run economic growth, it is crucial to examine the links between financial sector reforms and savings. Thus the objective of this paper is to empirically investigate the impact of financial reforms on the household saving by using the auto-regressive distributed lag (ARDL) model. Remaining part of the paper organized as follows. Section B review of literature, section C Methodology, section D describes the empirical results and final section (E) give conclusion.

### LITERATURE REVIEW

Numbers of studies empirically investigate the relationship between the financial reforms, real interest rate and savings, but this study review some revealing studies. Schmidt- Hebbel et al. (1992) showed statistically insignificant effect of real interest rate on saving. Bayoumi (1993) examined financial liberalization and household savings association in the life cycle framework by using an overlapping generation model and conclude that saving of a young consumer becomes sensitive to wealth, real income and other demographic and macroeconomic factors. Fry (1988) empirically concluded that real interest rates positively and significantly determine national saving in the sample of fourteen Asian developing countries. Bayoumi and Samiei (1998) proved real interest rate positively and significant effect on private savings in industrial countries and a negative insignificant coefficient for developing countries.

Bandiera et al. (2000) construct an index of financial liberalization for Chile, Ghana, Indonesia, Korea, Malaysia, Mexico, Turkey and Zimbabwe by the period of 1970-94. They reject the positive effect of the real interest rate on saving in most of the countries, moreover the relationship between financial liberalization index and saving are mixed: negative and significant in Korea and Mexico, positive and significant in Turkey and Ghana. Jappelli and Pagano (1994) using a panel data approach examine the role of capital market imperfections on aggregate saving and growth in OECD countries. They conclude that financial deregulation has decline national saving and growth rates in the OECD countries. Nair et al. (2004) concludes that financial liberalization index negatively associated with the household saving and financial reforms leads consumption rather than savings in India. Ahmed (2007) finds real deposit rate positively associate with private saving and financial liberation index positively related with saving rate, per capita income and investment rate in the Botswana.

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<sup>2</sup> Structuralists and the neo- Keynesians were of the view that financial liberalization slows economic growth and increases the rate of inflation. According to this perspective, financial liberalization cause increase in interest rates and manufacturing costs, causing prices to increase.

Faruqee and Husain (1995) found demographic factors important in determination of saving rate in the Asian countries. Held and Uthoff (1995) empirically estimated the saving function in the Latin nations by including the per capita income, inflation, growth, dependency ratio, terms of trade and foreign savings in the saving model. They found domestic and foreign saving are the substitute and demographic factors play an important role in illumination of the saving behavior. Loayza et al. (2000) demonstrated that dependency ratio and financial liberalization have negatively and, income, inflation and fiscal policy have a positively associated with the saving rate. Baharumshah et al. (2007) show positive correlation between FDI and privative savings.

### METHODOLOGY

The impact of financial liberalization on domestic savings is estimated by drawing model form life cycle theory.

$$HS_t = \varphi_0 + \varphi_1 FLI_t + \varphi_2 RIR_t + \varphi_3 Ln(PC)_t + \varphi_4 Ln(DPR)_t + \varphi_5 Ln(AGPD)_t + \varphi_6 Ln(RM)_t + v_{1t} \quad (1)$$

where  $HS_t$ ,  $FLI_t$ ,  $RIR_t$ ,  $PC_t$ ,  $DPR_t$ ,  $AGPD_t$  and  $RM_t$  are respectively the household savings, financial liberalization index, real interest rate, per capita income, dependency ratio, agriculture sector GDP and remittance. There are two important determinants of saving in the life cycle model, income and age structure. Saving is positively related to income and inversely to age dependency (Modigliani and Brumberg, 1954). As in our model dependent variable is household saving, the income variable considers the per capita income (PC). To capture the impact of financial reforms on household savings this study is included two financial side variables: real interest rate and financial liberalization index as a determinant of household savings. This study also included Remittance in order to capture the effect of foreign income and agriculture sector GDP (AGP) in household saving model in order to cover structure changes into the economy<sup>3</sup>. Annual time series data from the period of 1980 to 2008 is used in this empirical work. The data used in the study are taken from the State bank of Pakistan. Domestic saving, per capita income, agriculture sector GDP, remittances are measured in million of rupees. The real interest rate ( $RIR_t$ ) is defined as nominal deposit rate ( $r_t$ ) minus the inflation rate ( $\pi_t$ ) [ $RIR_t = r_t - \pi_t$ ]. Inflation represents the growth rate of consumer price index. Financial liberalization index is used in this study that is developed by Hye and Wizarat (2009).

### METHODOLOGY

Robustness of the variables is also tested by using bounds testing approach to cointegration, proposed by Pesaran et al. (2001). The following unrestricted error correction regression is estimated:

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<sup>3</sup> (see Muhleisen, 1997; Loayza and Shankar, 2000)

$$\begin{aligned}
\Delta \text{Ln}(HS)_t = & \psi_0 + \sum_{i=1}^n \psi_i \Delta \text{Ln}(HS)_{t-i} + \sum_{i=0}^n \psi_i \Delta \text{Ln}(FLI)_{t-i} + \sum_{i=0}^n \psi_i \Delta \text{Ln}(RIR)_{t-i} \\
& + \sum_{i=0}^n \psi_i \Delta \text{Ln}(PC)_{t-i} + \sum_{i=0}^n \psi_i \Delta \text{Ln}(AGDP)_{t-i} + \sum_{i=0}^n \psi_i \Delta \text{Ln}(DPR)_{t-i} \\
& + \sum_{i=0}^n \psi_i \Delta \text{Ln}(RM)_{t-i} + \alpha_1 \text{Ln}(HS)_{t-1} + \alpha_2 \text{Ln}(FLI)_{t-1} \\
& + \alpha_3 \text{Ln}(RIR)_{t-1} + \alpha_4 \text{Ln}(PC)_{t-1} + \alpha_5 \text{Ln}(AGDP)_{t-1} \\
& + \alpha_6 \text{Ln}(DPR)_{t-1} + \alpha_7 \text{Ln}(RM)_{t-1} + \zeta_{1t}
\end{aligned} \tag{2}$$

The long run relationship among the variables is determined by using the F-deletion test. The null hypothesis for no cointegration amongst the variables in equation (2) is  $(H_0 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = 0)$  against the alternative hypothesis  $(H_1 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 \neq 0)$ . The null hypothesis of no cointegration is rejected if the calculated F-statistic is greater than the upper bound critical value<sup>4</sup>.

### EMPIRICAL RESULTS

The Dickey Fuller Generalized Least Square (DF-GLS) unit root test is utilized for the determination of integration level. The unit roots test results in levels and first differences are presented in table 1. The results confirm that the null hypothesis is rejected for all the variables at the first difference. This implies that the series is integrated of the first order.

**Table 1:**  
**Dickey Fuller Generalized Least Square (DF-GLS) unit root test result**

<i>Variable</i>	<i>Level</i>	<i>1<sup>st</sup> Difference</i>
<b>FLI</b>	-1.03	-2.99*
<b>RIR</b>	-2.24	-4.56***
<b>Ln (RM)</b>	-1.61	3.98***
<b>Ln(AGDP)</b>	-1.84	-5.12***
<b>Ln (DPR)</b>	-2.71	-2.95*
<b>Ln(PC)</b>	-1.09	3.15**
<b>Ln(HS)</b>	-2.22	-5.76***

Note \*:\*\*:\*\*\* represent the 10%, 5% and 1% level of significance.

This study is determined robustness among the variables by using ARDL approach. A two step procedure employs in order to determine the long run relationship. In the first step, existence of long run relationship is investigated by using the F- deletion test. The short and long run coefficients are estimated in the second step if the long-run relationship is established in the first step.

<sup>4</sup> In cases where the F-statistic falls inside the upper and lower bounds, a conclusive inference cannot be made. Small sample Critical values of upper and lower bound is used i.e. determine by Narayan (2005).

The estimated F-statistic is found to be 25.36, which is higher than the upper bound value at 1 percent level<sup>5</sup>. So long run relationship exists and null hypothesis is rejected. The optimum lag order of ARDL selected on the basis of Schwarz Bayesian Criterion. The long run coefficients are presented in table 2.

The table 2 shows that financial liberalization index and real interest rate negatively associated to the household saving. Per capita income, agriculture sector GDP and remittances positive expedite household savings. No significant relation between household savings and dependency ratio in the long run.

Table 3 represents the result of short run coefficients. The error correction term is significant with expected sign. It indicates the high speed of adjustment from short run fluctuation to long run equilibrium (201% discrepancy is corrected in each year). In the short run the financial liberalization index and dependency ratio depressing household savings. Agriculture sector GDP and remittances positively determine household saving in the short run. Real interest rate and per capita income insignificantly determine household saving the short span of time.

Table 2:

<b>Long Run Coefficients of Household Savings Model</b>		
<b>Dependent Variable: Household Saving (HS)</b>		
<i>Variables</i>	<i>Coefficients</i>	<i>T-Ratio[Prob]</i>
<i>FLI</i>	-0.21	-2.39[0.04]
<i>RIR</i>	-0.02	-2.42[0.04]
<i>LnRM</i>	0.23	2.83[0.02]
<i>LnAGDP</i>	25.91	5.48[0.00]
<i>LnDPR</i>	-0.14	-0.19[0.85]
<i>Ln PC</i>	0.24	2.80[0.02]
<i>Constant</i>	5.27	0.52[0.61]
<i>R-Squared</i>	0.99	
<i>R-Bar-Squared</i>	0.99	
<i>F-stat</i>	243.65[0.00]	
<i>DW-statistic</i>	2.96	

Table 3: Short run Coefficients

<b>Dependent Variable: Household Saving (HS)</b>		
<i>Variables</i>	<i>Coefficients</i>	<i>T-Ratio[Prob]</i>
<i>ECM(-1)</i>	-2.01	-10.47[0.00]
$\Delta$ ( <i>FLI</i> )	-0.41	-2.25[0.04]
$\Delta$ ( <i>RIR</i> )	-0.02	-1.39[0.18]
$\Delta$ ( <i>LnRM</i> )	0.15	1.29[0.21]
$\Delta$ ( <i>LnAGDP</i> )	23.39	2.31[0.03]
$\Delta$ ( <i>LnDPR</i> )	-75.17	-2.34[0.03]
$\Delta$ ( <i>Ln PC</i> )	0.86	0.17[0.85]
<i>Constant</i>	10.5622	.52553[.608]
<i>R-Squared</i>	0.95	
<i>R-Bar-Squared</i>	0.84	
<i>F-stat</i>	11.37[0.00]	
<i>DW-statistic</i>	2.97	

## CONCLUSION

The objective of this paper is to develop a model in order to capture the impact of financial reforms on household savings in Pakistan. For empirical evidence this paper uses the robust cointegration technique ARDL is proposed by Pesaran et al. The ARDL approach confirms the long run relationship and long run results indicate that financial liberalization index and real interest rate negatively cause household savings. On the other

<sup>5</sup> 1% critical value 4.270 and 6.211 respectively lower and upper bound value, See Narayan (2005).

hand per capita income, agriculture sector GDP & remittances (positively & significantly) and dependency ratio (insignificantly) determine household saving in the long run. In the short run financial liberalization index and dependency ratio are negatively and agriculture sector GDP is positively determine household saving in the short run.

On the basis of long run empirical results, this study rejects the McKinnon and Shaw hypothesis in the case of Pakistan. Policy makers of Pakistan expected that financial reforms will increase credit availability and financial intermediation that will be enhanced saving level. But negative impact of financial liberalization index on household savings suggests that financial liberalization lead consumption rather than household savings.

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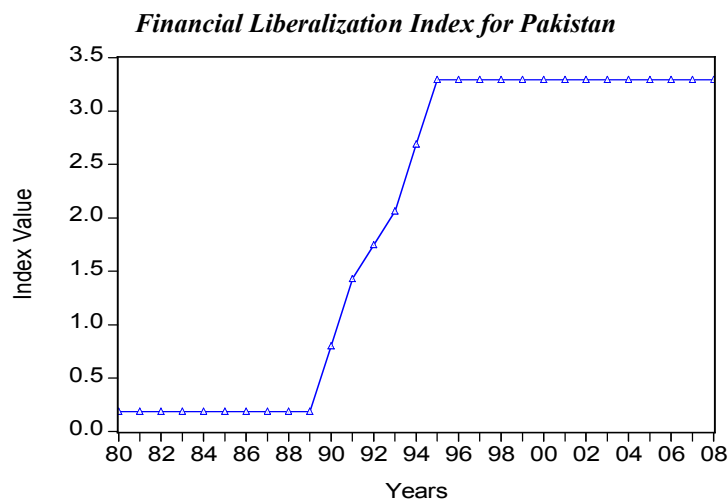
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## APPENDIX

### A. Financial Liberalization Index

This study uses financial liberalization index that construct by Hye and Wizarat (2009)<sup>6</sup>. They construct financial liberalization index by using the eleven financial liberalization policy components that are used by policy makers of Pakistan in the financial reforms process [(1) Islamization (2) interest rate deregulation (3) credit controls (4) stock market reforms; (5) Prudential Regulations (6) privatization of financial institutions (7) removal of entry barriers (8) Non performing loans (9) external account liberalization; (10) Debt management reforms and (11) Open market operations].



This figure shows that in the period of 1990 to 1996 most liberalization measures were taken by the policy makers of Pakistan.

<sup>6</sup> They generate series of Financial Liberalization Index by using the methodology followed by Bandiera et.al (2000).

**B. Unit root Test**

In order to test for the stationarity of the variables, this study is employed Dickey Fuller Generalized Least Square (DF-GLS)<sup>7</sup> unit root test in order to determine the integration level. Elliot et al. (1996) enhance the power of ADF test by de trending criteria and DF-GLS test is based on null hypothesis  $H_0: \delta=0$  in the regression (of variable  $X_t$ ) as follows,

$$\Delta X_t^d = \delta^* X_{t-1}^d + \delta_1^* \Delta X_{t-1}^d + \dots + \delta_{p-1}^* \Delta X_{t-p+1}^d + \eta_t \tag{1}$$

$$X_t^d = X_t - \hat{\phi}_0 - \hat{\phi}_1 t \tag{2}$$

Where  $X_t^d$  is the de trended series and null hypotheses of this test is that  $X_t$  has a random walk trend, possibly with drift as follows.

Actually, two hypotheses are proposed. (i)  $X_t$  is stationary about a linear time trend. (ii) It is stationary with a non zero mean, but with no linear time trend. Considering the alternative hypotheses, the DF-GLS test is performed by first estimating the intercept and trend utilizing the generalized least square technique. This estimation is investigated by generating the following variables. Subject,

$$\bar{X} = [X_t, (1-\bar{\beta}L)X_2, \dots, (1-\bar{\beta}L)X_t] \tag{3}$$

$$\bar{Y} = [X_t, (1-\bar{\beta}L)Y_2, \dots, (1-\bar{\beta}L)Y_t] \tag{4}$$

$$Y_t = (1, t)\bar{\beta} = 1 + \frac{\alpha}{T} \tag{5}$$

where “T” stands for number of observation of X variable and  $\alpha$  is fixed<sup>8</sup>. While OLS estimation is followed by this equation:

$$\bar{X} = \phi_0 \bar{Y} + \phi_1 Y_t + \varepsilon_t \tag{6}$$

and OLS estimator’s  $\phi_0$  and  $\phi_1$  are utilized for the removal of trend from as  $X_t$  above. ADF test is employed on the transformed variables by fitting the OLS regression<sup>9</sup>.

$$\Delta X_t^d = \lambda_0 + \rho X_{t-1}^d + \sum_{j=1}^k \gamma_j \Delta X_{t-j}^d + u_t \tag{7}$$

In alternative hypothesis,  $\hat{\alpha} = -7$  in the required equation of  $\beta$ , above, then they calculate  $X_{td} = X_t - \hat{\phi}_0$ , fit the ADF regression on new transformed variable and employ the test of the null hypothesis that is  $\rho=0$ .

<sup>7</sup> Less consistency of ADF for small size data, so DF-GLS test of unit root also used.

<sup>8</sup> The power of envelop curve is one half at  $\hat{\alpha} = -13.7$  when the model has constant and trend term, and at  $\hat{\alpha} = -7$  when it has only constant term (see Elliot et al. 1996 for comprehensive study)

<sup>9</sup> For the critical values (see Elliot et al., 1996) of null hypothesis which is  $\rho=0$ .



## CAUSES OF STRESS IN ORGANIZATION

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### ABSTRACT

The aim of this study is to investigate the root causes of stress for employees working at Sukkur city. For this purpose stress is taken as dependent variable whereas independent variables are categorized into extra-organizational and intra-organizational stressors. Data was gathered from different sectors such service, manufacturing and distribution including banks, insurance companies, manufacturing (LU Continental Biscuit Factory Sukkur and Engro Foods) and distribution (Medicine distribution firms). Data was collected through self-administrative questionnaire consisting of 20 questions. Respondents were only the employees working at operational level. From the results it was quite clear that employees working in different areas feel great stress, there were different causes due to which employee experience stress. Findings have been classified into extra-organizational and intra-organizational stressors. Extra-organizational stressors include variables such as climate, economic conditions and employee family, whereas intra-organizational stressors include variables such as company policies, working conditions, leadership, workload and office timings.

According to results 33% of overall stress is caused by factors outside organization whereas 67% stress is due to internal factors. It was also found that major cause of stress is workload (25%) because employees are been utilized more than their capabilities, second major cause for stress is timings (16%) as employees work for long hours, next cause for stress is climate (11%) as employees especially from distribution side have to go outside offices to meet their clients and customers so hot weather, traveling distances and transportation system really give them tough time which result in stress. Next stressor is leadership as leader-employee relationship is needed to be very good but according to some employees their bosses do not behave well due to which they feel stressed. Other causes include economic, family, company policies and working conditions with percentage of 11%, 8%, 7% and 7% respectively.

### FINDINGS

According to our results there are so many causes of stress which are categorized into:

#### 1. Extra Organizational Stressors

- Climate
- Economic
- Family

#### 2. Intra-Organizational Stressors

- Leadership
- Company Policies

- Working Conditions
- Workload
- Office Timings

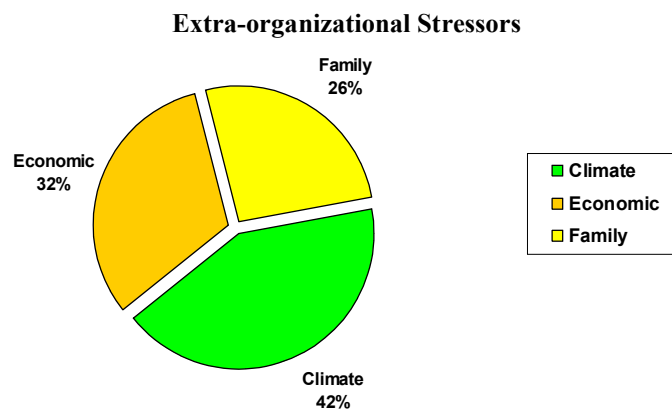
As our study covers the all areas of business so results are presented according to respective business area including service, manufacturing and trading organizations. Findings are categorized into overall causes of stress in all business, causes of stress in each sector and finally effect of each variable in different sectors. Following table represents the overall result in percentage form.

<b>Causes of Stress</b>			
<b>Variables</b>	<b>Service</b>	<b>Manufacturing</b>	<b>Trading</b>
<b>Extra-organizational</b>			
Climate	11%	6%	25%
Economic	8%	15%	9%
Family	14%	4%	7%
<b>Intra-organizational</b>			
Company Policies	10%	11%	1%
Leadership	11%	19%	6%
Workload	19%	27%	28%
Working Conditions	4%	10%	8%
Timings	23%	8%	16%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

## 1. CLASSIFICATION OF STRESSORS

### 1.1 Extra-organizational Stressors

It is believed that stress is only caused by the factors inside the organization but this study proves that there are certain outside factors which cause stress for employees and as a result of those employees' performance is affected. According to results 33% of overall stress is caused by factors outside organization. Following chart shows percentage wise distribution of extra-organizational stressors.



This chart shows that 42% extra-organizational stress is caused by climate factor, as in Sukkur there are warm conditions so employees feel a lot of stress during traveling specially marketing personnel who have to do outdoor job. Second major extra-organizational stressor is economic which 32%, as economic conditions of Pakistan are not too good and due to inflation purchasing power is reducing so people find it really difficult to fulfill their needs this ultimately results into stress. Last extra-organizational stressor is family, as employees have to spend a lot of time in their jobs especially people who are working in service organizations such as banks they hardly give any time to their families and as a result of it they are mentally upset and feel stress.

### 1.2 Intra-organizational Stressors

These stressors are present within the organization. In our study 67% of overall stress is caused by internal factors. Following chart shows the percentage wise distribution of factors present within the organization.



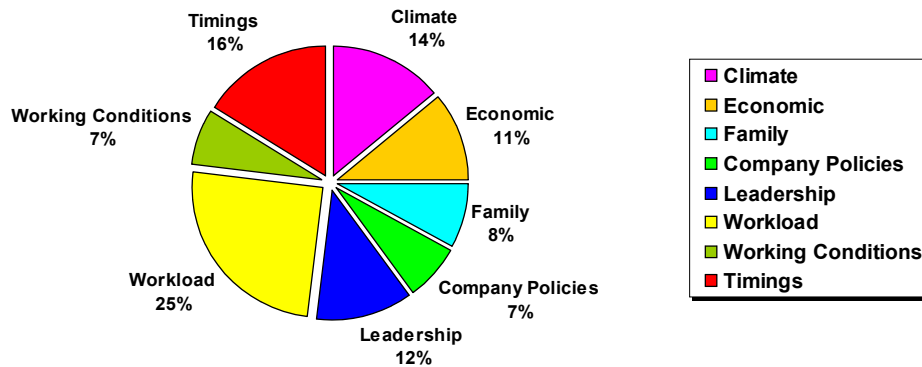
It is obvious from the chart that major cause of stress is workload, as employees are provided with really tough tasks and some believes they are asked to work more than their capabilities, and then the next stressor is timings with 23% as it was said by most of employee especially working at banks that there is timing of coming to bank but there is no specific time to return their homes, therefore due to long hours of work they experience stress. The next cause for stress is leadership (18%) as most of bosses do not have good behavior with subordinates so employees are not comfortable at all. Working conditions also cause stress these includes work environment, physical facilities and co-workers. Company policies stand last in terms of causing stress these policies include all rules and regulations concerning jobs such as salaries, vacations, bonuses, recognition, promotion policies etc.

## 2. OVERALL CAUSES OF STRESS IN ALL BUSINESSES

Earlier percentages were assigned to causes according to their category i.e. within the organization and outside the organization. Now have a look at overall distribution of percentage to each variable in all businesses.

Variables	Percentage
<b>Intra-organizational</b>	
Climate	14%
Economic	11%
Family	8%
<b>Extra-organizational</b>	
Company Policies	7%
Leadership	12%
Workload	25%
Working Conditions	7%
Timings	16%
<b>Total</b>	<b>100%</b>

**Causes of Stress in All Businesses**

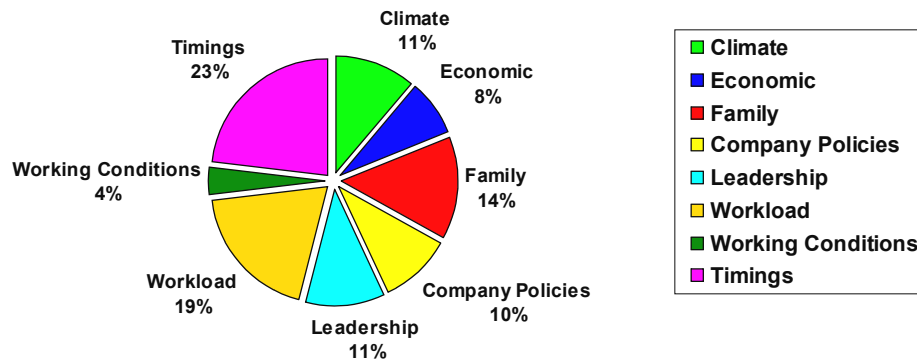


It is clear from the chart that major cause of stress is workload (25%) because employees are been utilized more than their capabilities, second major cause for stress is timings (16%) as employees work for long hours, next cause for stress is climate (11%) as employees especially from distribution side have to go outside offices to meet their clients and customers so hot weather, traveling distances and transportation system really give them tough time which result in stress. Next stressor is leadership as leader-employee relationship is needed to be very good but according to some employees their bosses do not behave well due to which they feel stressed. Other causes include economic, family, company policies and working conditions with percentage of 11%, 8%, 7% and 7% respectively.

### 3. SECTOR WISE CAUSES OF STRESS

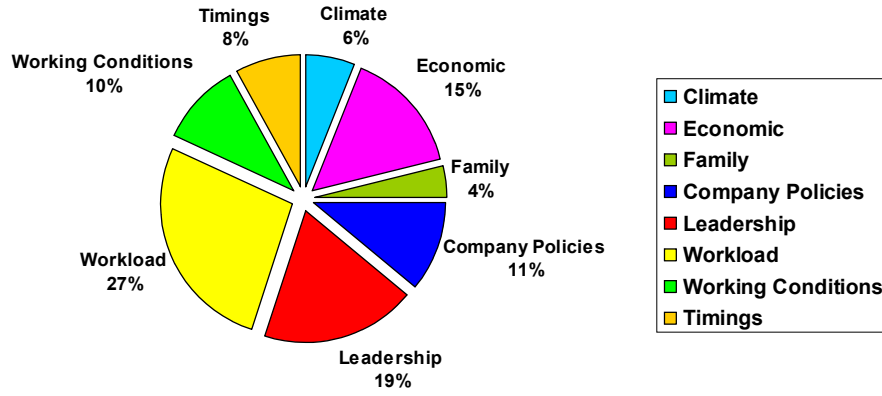
#### 3.1 Causes of Stress in Service Organizations

Variables	Percentage
<b>Intra-organizational</b>	
Climate	11%
Economic	8%
Family	14%
<b>Extra-organizational</b>	
Company Policies	10%
Leadership	11%
Workload	19%
Working Conditions	4%
Timings	23%
<b>Total</b>	<b>100%</b>



#### 3.2 Causes of Stress in Manufacturing Organizations

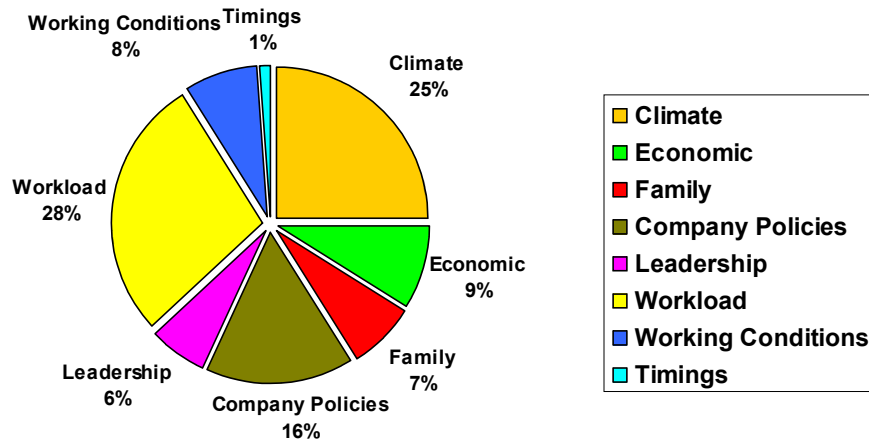
Variables	Percentage
<b>Intra-organizational</b>	
Climate	6%
Economic	15%
Family	4%
<b>Extra-organizational</b>	
Company Policies	11%
Leadership	19%
Workload	27%
Working Conditions	10%
Timings	8%
<b>Total</b>	<b>100%</b>



**3.3 Causes of Stress in Distribution Organizations**

Variables	Percentage
<b>Intra-organizational</b>	
Climate	25%
Economic	9%
Family	7%
<b>Extra-organizational</b>	
Company Policies	11%
Leadership	6%
Workload	28%
Working Conditions	8%
Timings	8%
<b>Total</b>	<b>100%</b>

**Causes of Stress in Distribution Organizations**

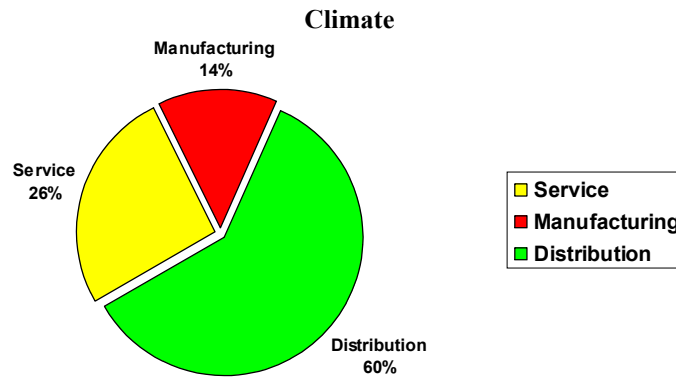


**4. EFFECT OF EACH VARIABLE ON INDIVIDUAL AREA OF BUSINESS**

This is very important analysis because this suggests how different variable differ in each area of business. Results show the percentage effect of each variable in three different areas of business i.e. service, manufacturing and distribution.

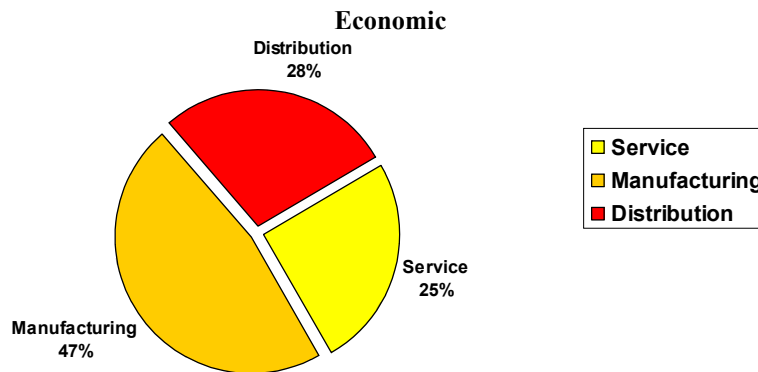
**4.1 Climate**

Sector	Percentage
Service	26%
Manufacturing	14%
Distribution	60%
<b>Total</b>	<b>100%</b>



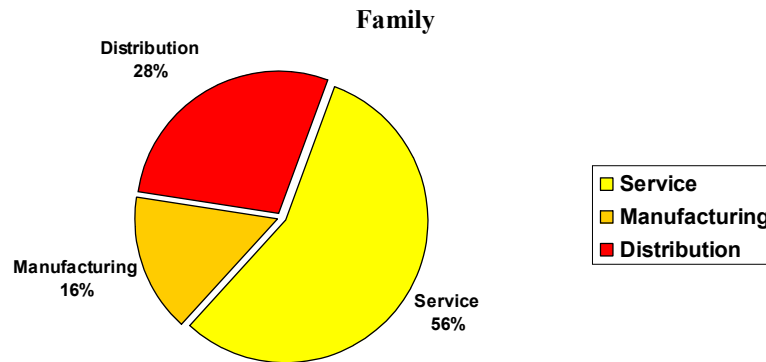
**4.2 Economic**

Sector	Percentage
Service	25%
Manufacturing	47%
Distribution	28%
<b>Total</b>	<b>100%</b>



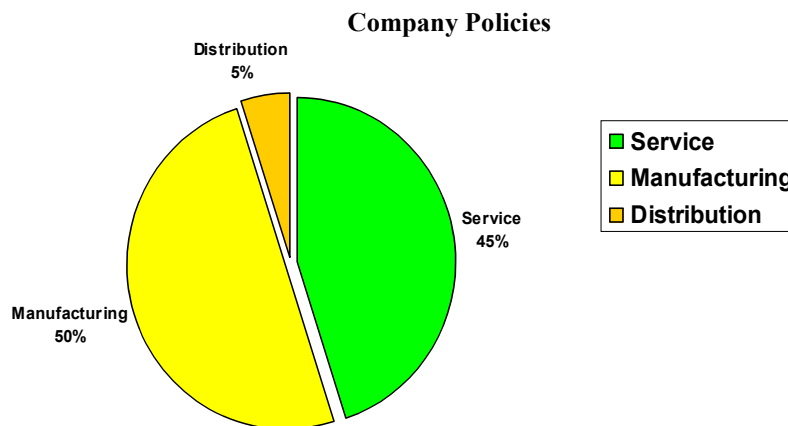
### 4.3 Family

Sector	Percentage
Service	56%
Manufacturing	16%
Distribution	28%
<b>Total</b>	<b>100%</b>



### 4.4 Company Policies

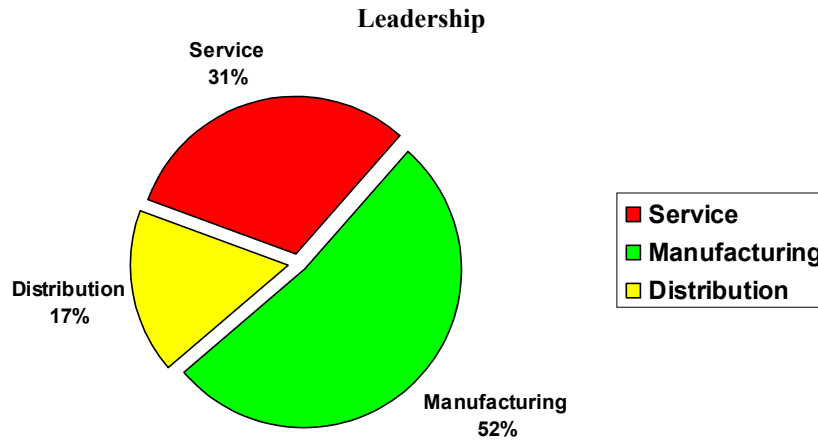
Sector	Percentage
Service	45%
Manufacturing	50%
Distribution	5%
<b>Total</b>	<b>100%</b>





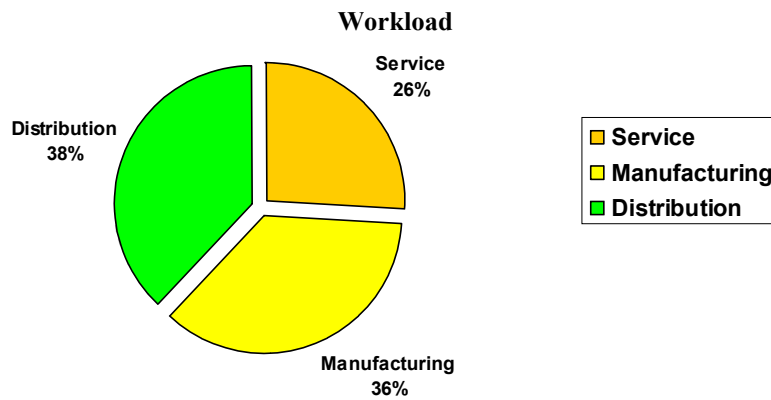
**4.5 Leadership**

Sector	Percentage
Service	31%
Manufacturing	52%
Distribution	17%
<b>Total</b>	<b>100%</b>



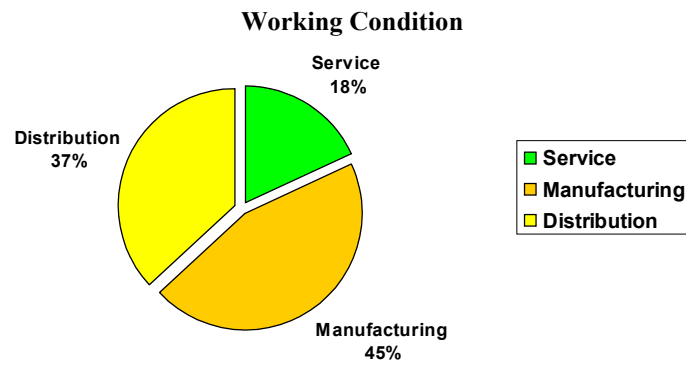
**4.6 Workload**

Sector	Percentage
Service	26%
Manufacturing	36%
Distribution	38%
<b>Total</b>	<b>100%</b>



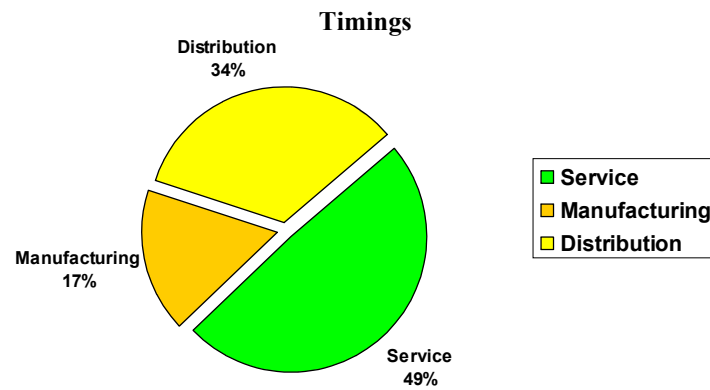
#### 4.7 Working Conditions

Sector	Percentage
Service	18%
Manufacturing	45%
Distribution	37%
<b>Total</b>	<b>100%</b>



#### 4.8 Timings

Sector	Percentage
Service	49%
Manufacturing	17%
Distribution	34%
<b>Total</b>	<b>100%</b>



**THE IMPACT OF ECONOMIC FREEDOM ON ECONOMIC GROWTH:  
A CASE OF SOME SELECTED SAARC MEMBER COUNTRIES**

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**ABSTRACT**

This research paper in general focuses on the significance of economic freedom for growth in South Asian countries using the panel data of five SAARC member countries. Study pinpoints the above given issue by adopting econometric techniques, using time period from 1995 to 2007. Econometric techniques which we use here are Auto Regressive Distributive Lag (ARDL) Model to investigate the long run relationship between concerned variables and the OLS for estimation. The analysis shows that the level of economic freedom robustly, positively and significantly affects the GDP per capita of five SAARC member countries; the impact of two control variables openness and foreign direct investment on growth of five SAARC member countries are also positive and statistically significant. Empirical evidences suggest that existence of free private markets where individuals make decision on their own behalf is very conducive to growth in five SAARC countries.

**KEY WORDS**

Economic Growth; Economic Freedom; SAARC.

**INTRODUCTION**

A sizeable theoretical and empirical evidences are available on growth. But there is not any remarkable study which pursued to investigate the nature of relationship between above said economic freedom–growth issue in South Asian Countries. Most studies show that those nations which have restriction on private agents and transactions have a lower level of economic growth. In other words it is less clear whether economic freedom causes economic growth or not in SAARC. This study investigates empirically nature of relationship between economic freedom and growth in five South Asian countries. We used reliable economic freedom index measured by The Heritage Foundation (USA) in cooperation with the Wall Street Journal. We selected Bangla Desh, India, Nepal, Pakistan and Sri Lanka for the present study purpose while Bhutan and Maldives are not included due to unavailability of economic freedom data by above said institution.

In Asia, where 70% of the developing world's people live, there is a distressing and lengthening agenda of economic development. More than 750 million people live in absolute poverty, more than 600 million people cannot read and write, two-third of them are women, about half the people have no access to safe drinking water and per capita income is also in lower levels. More disturbing are the wide disparities within Asia. In South Asia, more than one billion people are facing economic instability, while East Asians are enjoying the economic prosperity. During third quarter of 20<sup>th</sup> century per

capita incomes growth of East Asia was 5.2% per annum compared to 1.4% in South Asia. During 1975 to 2005 average of GDP growth of East Asian countries was between 7 to 9% per annum while average GDP growth of South Asian countries moved between 4.5 to 5.5% per annum. In spite of approximately similar social and economic condition of East and South regions, South Asia is producing 8% of the world output while East Asia is contributing 18% at the spot in world output<sup>1</sup>.

What are the reasons that East Asia's economic progress is too better than South Asia? Consistent increase in income distribution disparities, poverty, unemployment and inflation rate, no doubt, are economic threats to South Asian economic progress but an important reason is difference in level of economic freedom in South and in East Asia. Both regions have their own markets, but there is difference in market structure of East and South Asia. In East Asian countries, people are enjoying free private markets where individuals making deals on their own behalf or as agents for identifiable individuals to pursue their own ends for their economic objectives rather than as agent of government. On the other hand all these characteristics are deteriorated in South Asian markets due to undue intervention in markets of goods and services by central and local governing authorities. It is true that there are so many other factors which could be responsible for such deteriorated economic progress in South Asia but fact of worsen markets freedom has its unique importance.

A core purpose of this study is to investigate that if we have theoretical reasons to expect relationships between economic freedom and economic growth, then either growth–economic freedom relationships exist empirically in SAARC countries or not, and to inject few quantitative facts into the ongoing debate about the advantages of the free market economic system versus controlled and interventionist economic system. We know that attainment of better level of economic freedom is a time consuming phenomenon, May it has little positive impact on economic prosperity in short run, but whether this growth will be sustained in long run or not in focused region, is other objective of this study.

This paper is organized as follow, section 1 based on review of literature, section 2 presents the data, model and methodology, section 3 based on empirical estimation of growth–economic freedom relationships, and section 4 provides conclusions and policy suggestions.

## 1. REVIEW OF LITERATURE<sup>2</sup>

Gwartney, Lawson, and Holcombe (1999), de Haan and Strum (2000, 2001) find that economic freedom has positive impact on economic growth in long run but in short period it does not contribute significantly toward economic growth because economic freedom is a time taking phenomenon. Carlsson and Lundstrom (2002); Weede and Kampf (2002); Ali and Crain (2001, 2002) found that economic freedoms at its initial stages did not have stronger and significant positive effect on economic prosperity, but in

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<sup>1</sup> All the data and other information's are available at IFS May 2007.

<sup>2</sup> "Having discovered that the wealth of nations was everywhere being Limited and diminished by policies restrictive of human freedom, he (Adam Smith) preached the liberation of man and the abolition of restrictive policies."

*William Rappard, in his opening address to the first meeting of the Mont Pelerin Society, 1-10 April 1947.*

some cases during short run analysis economic freedom level affects economic growth significantly if difference in economic freedom is also included as an independent variable. Berggren N. (2003) summarized the existing studies about economic freedom – growth relationships and concludes the instead of lot of work that has been done but research on economic freedom is still at an early stage. He surveyed and concludes that mostly studies find the existence of positive relationships between economic freedom and economic growth, but some areas of freedom index also have inverse correlation between above said variables. Hanke and Walters (1997) study the relationship between economic freedom and GDP per capita and find the positive correlation. De Haan and Siermann (1998) conclude that the economic freedom index established by Scully and Slottje is linked with growth but only in some out of the nine developed schemes. Wu and Davis (1999) probe the correlation between economic freedom, political freedom and growth and find that economic freedom has its unique importance especially for the purpose of economic growth.

It is also important that whether all components or areas of economic freedom index are equally important for economic prosperity or not? Researchers find that some areas of index of economic freedom have better positive correlation with growth than others. Carlsson and Lundstrom (2002) investigate those four out of seven areas of index of economic freedom (economic structure and use of markets, freedom to use alternative currencies, legal structure and security of ownership, and freedom of exchange in capital markets) are positively and significantly associated with growth. Two areas/components (size of government and international exchange, and freedom to trade with foreigners) are negatively and statistically significantly related to economic growth. And remaining one component (monetary policy and price stability) of economic freedom has statistically insignificant relationship with economic growth.

## **2. DATA, MODEL AND ECONOMETRIC METHODOLOGY**

### **2.1 Data:**

This study uses the panel data from 1995 to 2007 of 5 SAARC countries (Bangladesh, India, Nepal, Pakistan and Sri Lanka). Member countries economic freedom measurements are taken from The Heritage Foundation USA economic freedom index report of 2008. And all other statistics are taken from International Financial Statistics May, 2007 published by the International Monetary Fund and from world development indicators (WDI) 2007. Exports (X), Imports (M), foreign direct investment (FDI) and Gross domestic product (GDP) measures in million of rupees. Per capita Gross domestic product is used as a proxy variable for economic growth. The ratio of Exports plus imports divided by GDP use for capture the impact of openness. All variables used in this study in logarithm transformation for econometrics estimation.

**Table 1**  
**Descriptive Statistics**

	<b>Ln(EF)</b>	<b>Ln(FDI)</b>	<b>Ln(OP)</b>	<b>Ln(Y)</b>
<b>Mean</b>	3.98	-0.45	3.70	6.26
<b>Median</b>	3.97	-0.18	3.50	6.24
<b>Maximum</b>	4.18	1.05	4.49	6.94
<b>Minimum</b>	3.65	-5.30	3.14	5.74
<b>Std. Dev.</b>	0.10	1.00	0.43	0.31
<b>Skewness</b>	-0.16	-2.59	0.67	0.57
<b>Kurtosis</b>	3.46	11.82	1.94	2.47
<b>Correlation Matrix</b>				
	<b>Ln(EF)</b>	<b>Ln(FDI)</b>	<b>Ln(OP)</b>	<b>Ln(Y)</b>
<b>Ln(EF)</b>	1.00			
<b>Ln(FDI)</b>	0.55	1.00		
<b>Ln(OP)</b>	0.68	0.18	1.00	
<b>Ln(Y)</b>	0.83	0.56	0.70	1.00

According to correlation matrix our core explanatory variable (economic freedom) is strongly correlated with GDP per capita (proxy of growth). Statistics shows that growth of SAARC countries is positively correlated with level of economic freedom. And the intensity of this correlation is eighty three percent.

### 2.2 Model:

To examine the economic growth-economic freedom long run relationships for five South Asian countries following model is applied,

$$(Y)_t = \beta_0 + \beta_1(EF)_t + \beta_2(FDI)_t + \beta_3(OP)_t + \varepsilon_t \quad (1)$$

Here Y is per capita GDP; EF stands for level of economic freedom at certain period of time t; FDI is foreign direct investment and OP is representative of openness;  $\beta_0$  is the constant; and  $\varepsilon_t$  is the disturbance term. The economic growth-economic freedom correlation is determined by the size of beta. FDI and OP are supporting variables. To examine relationships study employs the modified autoregressive distributed lag (MARDL) suggested by Pesaran et al. (2001), for co-integration (panel data) analysis, and OLS econometric technique for estimation. We used above mentioned variables in natural logarithm form to assess the significance of economic freedom for growth purpose. So the log transformation of model is as follow;

$$\ln(Y)_t = \beta_0 + \beta_1 \ln(EF)_t + \beta_2 \ln(FDI)_t + \beta_3 \ln(OP)_t + \varepsilon_t \quad (2)$$

In case of more than unity value of concerned beta or slop coefficient (elasticity) growth will be more elastic with change in that explanatory variable.

### 2.3 Econometric Methodology:

To examine the long run relationships between economic growth and economic freedom, this study uses recent co-integration analysis approach, known as modified autoregressive-distributed lag (MARDL) model {Pesaran *et al.* (2001)}. Pesaran *et al.* co-integration approach, also known as Bounds testing approach. This approach is

applicable only for more than 80 observation estimation, but lately Paresh Kumar Narayan in 2005 generate only the bounds values for an estimation which is based on less than 80 observations. So technique is MARDL and bounds values are taken from Paresh Kumar Narayan tables. To begins with; we test for the null hypothesis of no co-integration against the existence of a long run relationship. Unlike other co-integration techniques (e.g., Johansen's approach) which require certain pre-testing for unit roots and that the focused variables to be integrated are of order one, the ARDL model provides an substitute test for examining a long run relationship regardless of whether the underlying variables are  $I(0)$ ,  $I(1)$ , or fractionally integrated.

This approach has the following econometric advantages in comparison to other Co-integration procedures.

- 1) The long and short-run parameters of the model in question are estimated simultaneously;
- 2) The ARDL approach to testing for the existence of a long-run relationship between the variables in levels is applicable irrespective of whether the underlying regressors are purely  $I(0)$ , purely  $I(1)$ , or fractionally integrated;
- 3) The small sample properties of the bounds testing approach are far superior to that of multivariate co-integration. The bounds testing approach of Pesaran *et al.* (2001) is employed to test the existence of a co-integration relationship among the variables.
- 4) Modified ARDL method is free from any problem faced by traditional techniques in the literature.

The Pesaran *et al.* procedure involves investigating the existence of a long-run relationship in the form of the unrestricted error correction model for each variable as follow

$$\begin{aligned} \Delta \ln(Y)_t = & \lambda_0 + \sum_{i=1}^n \lambda_i \Delta \ln(Y)_{t-i} + \sum_{i=0}^n \lambda_i \Delta \ln(EF)_{t-i} + \sum_{i=0}^n \lambda_i \Delta \ln(OP)_{t-i} \\ & + \sum_{i=0}^n \lambda_i \Delta \ln(FDI)_{t-i} \alpha_1 \ln(Y)_{t-1} + \alpha_2 \ln(EF)_{t-1} + \alpha_3 \ln(OP)_{t-1} \\ & + \alpha_4 \ln(FDI)_{t-1} + v_{1t} \end{aligned} \quad (3)$$

where  $\ln(Y)$  is the natural logarithms of per capita Gross domestic product ,  $\ln(EF)$  is the natural logarithms of economic freedom level ,  $\ln(OP)$  is the natural logarithms of trade openness, and  $\ln(FDI)$  is the natural logarithms of foreign direct investment,  $\Delta$  is the difference operator. The modified ARDL approach estimate '(n+1)' number of regression in order to obtain optimal lag length for each variable, where 'n' is the number of lags to be used in the equation 3.

The F-tests are used for testing the existence of long-run relationships. Thus; the Pesaran *et al.* approach compute two sets of critical values for a given significance level. One set assumes that all variables are  $I(0)$  and the other set assumes they are all  $I(1)$ . If the computed F-statistic exceeds the upper critical bounds value, then the  $H_0$  (null hypothesis) is rejected. If the F-statistic falls into the bounds, then the test becomes inconclusive. Lastly, if the F-statistic is below the lower critical bounds value, it implies no co-integration. When

long-run relationship exists, the F-test indicates which variable should be normalized. The null hypothesis of equation (1) is  $\langle H_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0 \rangle$ .

Moreover, when the order of integration of the variables is known and if all the variables are

$I(1)$ , the decision is made based on the upper bound. Similarly, if all the variables are  $I(0)$ , then the decision is made based on the lower bound. Then the long run relationship is estimated using the selected ARDL model.<sup>3</sup>

### 3. RESULTS INTERPRETING STYLE

#### 3.1 Unit Root Problem:

Process of investigating the order of integration reveals that except openness our all variables are stationary at level. We relied on the **Levin Lin & Chu t Common Unit Root Test Statistics** and **IPS (Im Pesran, Shin) Individual Unit Root Test Statistics** for panel data stationary evidence. These considered power full and suggestive than any other test for panel data stationary detection. The statistics are given in table 2 & 3 as under,

**Table 2**  
**Panel Data “Levin Lin & Chu t” Common Unit Root Test**

Variables	Statistics	Probability	Specification
EF*	-1.66	0.0483	Level (individual trend and Intercept )
FDI*	-5.60	0.0000	Level ( Intercept )
GDPPC*	-2.54	0.0056	Level (individual trend and Intercept )
OP*	-6.30	0.0000	1 <sup>st</sup> difference( Intercept )

\*Stands for natural log.

**Table 3**  
**Panel Data “IPS (Im Pesran Shin W statistics) Individual Unit Root Test**

Variables	Statistics	Probability	Specification
EF	-1.74	0.0410	Level ( Intercept )
FDI*	-4.25	0.0000	Level ( Intercept )
GDPPC*	-1.81	0.0348	Level (individual trend and Intercept )
OP*	-3.96	0.0000	1 <sup>st</sup> difference( Intercept)

\*Stands for natural log.

According to both unit root test process of investigating the order of integration reveals that only OP having a unit root problem at level while all other three variables are stationary at level but openness is stationary at 1<sup>st</sup> difference.

<sup>3</sup> See Shahbaz et al. (2008) “Rural Urban Inequality under Finance and Trade Nexus: An Econometric Evidence” paper in PSDE 23<sup>rd</sup> Annual General Meeting and Conference.



### 3.2 Co-Integration analysis:

**Table 4**  
**ARDL Co-integration Bound Testing (Restricted intercept and no trend)**

Dependent variable	F Statistics (lag order 3)	Paresh Kumar Narayan (2005) Critical values		
		Level of significance	Lower Bound value i.e. $I(0)$	Upper Bound value i.e. $I(1)$
GDPPC	4.59			
OP	4.20	1%	4.05	5.15
EF	3.95	5%	2.97	3.86
FDI	4.95	10%	2.49	3.35

Turning to the results of ARDL co-integration test shown in table 4. The results of the bounds testing approach for co-integration show that there all four are co-integrated vector. It is found that our concerned variables are cointegrated for 5 South Asian countries and the long run relationships exists between the variable because F-statistic exceed the Narayan Paresh Kumar (2005) upper bound at the 5 and 10% level of significance. So we conclude that the null hypothesis of no cointegration cannot be accepted and that there is indeed an existence of Co-integration relationship among the variables in the model.

### 3.3 Long Run Elasticity:

After detection of long run relationship between the variables, our goal in this section is to estimate the long run elasticity. We achieve this thorough using the ordinary least square procedure.

Table 5 shows the results of long run coefficient. This table describes the long run elasticities because all variables in logarithm form. Estimation shows that Economic Freedom (EF) has positive and significant affect on economic growth of 5-SARAC countries in long span of time. The other variables openness and foreign direct investment also positively and significantly effect in the SAARC growth.

Economic freedom, openness and foreign direct investment have their unique importance for determining growth in the long run of the 5-SAARC countries. In which the elasticity of the economic freedom coefficient is greater than one, it means that change in level of economic freedom in focused region has more elastic impacts on growth in long span of time.

**Table 5: Long Run OLS (Ordinary Least Squares) Results**

Dependent Variable: Ln(Y)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Ln(OP)	0.19	0.06	2.81	0.00
Ln(EF)	1.28	0.43	2.94	0.00
Ln(EF(-1))	0.49	0.40	1.21	0.22
Ln(FDI)	0.11	0.03	3.58	0.00
Constant	-1.52	1.24	-1.22	0.22
R-squared	0.82	Mean dependent var		6.28
Adjus. R-squared	0.80	S.D. dependent var		0.315
S.E. of regression	0.13	Akaike info criterion		-1.02
Sum squared resid	0.92	Schwarz criterion		-0.83
Log likelihood	32.11	F-statistic		55.25

**Table 6: Short Run OLS (Ordinary Least Squares) Results**

<b>Dependent Variable: <math>\Delta \ln(Y)</math></b>				
<b><math>\Delta</math> Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b><math>\Delta \ln(OP)</math></b>	0.350	0.052	6.73	0.00
<b><math>\Delta \ln(EF)</math></b>	0.024	0.087	.027	0.77
<b><math>\Delta \ln(EF(-1))</math></b>	0.051	0.072	0.70	0.42
<b><math>\Delta \ln(FDI)</math></b>	0.055	0.006	9.16	0.00
<b>Constant</b>	0.029	0.003	8.60	0.00
<b>ECM(-1)</b>	-.126	0.023	-5.47	0.00
<b>R-squared</b>	0.42	<b>F-statistic</b>		3.86
<b>Adjusted R-squared</b>	0.40	<b>Probability</b>		0.10
<b>Durbin Watson Stat.</b>	1.81			

### 3.4 Short Run Dynamics Behavior:

Finally we employed the ECM version of modified ARDL to investigate the short run dynamic relationships. After investigation the long run impacts of concerned variables in the basic model, we turned to short run dynamic model as following

$$\Delta \ln(Y)_t = \lambda_0 + \sum_{i=1}^n \lambda_i \Delta \ln(Y)_{t-i} + \sum_{i=0}^n \lambda_i \Delta \ln(EF)_{t-i} + \sum_{i=0}^n \lambda_i \Delta \ln(OP)_{t-i} + \sum_{i=0}^n \lambda_i \Delta \ln(FDI)_{t-i} + (ECM)_{t-1} \quad (1)$$

Table 6 reports the results of ECM formulation of above given equation. According to Engle Granger (1987), co-integrated must have in ECM representation. The ECM strategy provides an answer to problem of spurious correlation in the short run dynamic relationship between economic growth and economic freedom along with supporting variables, more technically, ECM measures the speed of adjustment back to co-integrated relationships. ECM posited to be a force affecting the integrated variables to return their long run relation when they deviate from it. The signs of the short run dynamic impacts are maintained to the long span of time. The equilibrium correction coefficients estimated value is -0.126, which is significant at 10% level of significance has the correct sign and imply a fairly 12.6 % per annum speed of adjustment. In other words 12.6 % disequilibrium from the previous year shock converges back to the long run equilibrium in the current year.

## 4. CONCLUSION AND POLICY RECOMMENDATIONS

Research on economic freedom is still at its embryonic stages and a lot of remains to be done. However we used the most applicable technique to judge the long run economic freedom-growth relationships in five South Asian countries. The study shows that freedom to private sectors (financial freedom, investment freedom, fiscal freedom, monetary freedom, business freedom, trade freedom, freedom from corruption and property rights) leads toward economic prosperity. In our study, we observed that size of government has negative correlation with growth while financial freedom trade freedom, investment freedom, property rights, business freedom, and freedom from corruption are positively linked with economic growth.

Keeping in view the above discussion, we offer some policy recommendations to enhance the economic growth in under discussion five South Asian countries through increase in economic freedom.

- i) One indicator of the Heritage Foundation Economic Freedom index is government size. The study shows that government size is negatively correlated with growth. Because increase in government size negatively affects the better allocation of resources. South Asian countries can enhance the growth process through reduction in government size. These countries should plan policies that influence the incentive to private individual, to work, to save and to invest.
- ii) Protection of property rights is another key ingredient of economic freedom index. But property rights are protected through strong and unbiased judicial system. Establishment of impartial and strong judicial system may increase the process of growth through sufficient provision of protection to property rights.
- iii) Financial and monetary markets should be free, because freedom and development of financial sector enhance the pace of investment but keep in mind that in this respect central bank of economy will play central role to avoid the problem of inflation.
- iv) There should be a freedom of business and investment through reduction in business starting complication of documentation, availability of infrastructure. Investor should be entertained through reduction in taxes, increase in financial assistance and through introduction of tax free zone.

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#### APPENDIX-1

##### Economic Freedom Scores of 5 SAARC Countries

YEAR	BANGLADESH	INDIA	NEPAL	PAKISTAN	SRI LANKA
1995	38.7	45.1	-	57.6	60.6
1996	51.1	47.4	50.3	58.4	62.5
1997	49.9	49.7	53.6	56.0	65.5
1998	52.0	49.7	53.5	53.2	64.6
1999	50.0	50.2	53.1	53.0	64.0
2000	48.9	47.4	51.3	56.4	63.2
2001	51.2	49.0	51.6	56.0	66.0
2002	51.9	51.2	52.3	55.8	64.0
2003	49.3	51.2	51.5	55.0	62.5
2004	50.0	51.5	51.2	54.9	61.6
2005	48.8	54.3	52.2	54.7	60.7
2006	54.2	52.4	54.5	59.3	58.6
2007	48.0	54.1	55.1	58.5	59.3
2008	44.9	54.2	54.7	56.8	58.3

Source: The Heritage Foundation report 2008

## APPENDIX-2

## Component/Area wise Economic Freedom Scores of 5 SAARC Countries

	Year	Business Freedom	Trade Freedom	Fiscal Freedom	Govt. Size	Monetary Freedom	Investment Freedom	Financial Freedom	Property Rights	Freedom from Corruption	Labor Freedom
BANGLADESH	1995	40	-20.0	44.0	91.5	72.9	50	30	30	10	-
	1996	40	38.0	79.2	92.0	70.7	50	50	30	10	-
	1997	40	38.0	70.6	94.2	66.1	50	50	30	10	-
	1998	40	38.0	73.0	93.5	71.1	50	50	30	23	-
	1999	40	34.0	77.2	94.5	71.0	50	30	30	23	-
	2000	40	32.0	77.2	90.3	68.1	50	30	30	23	-
	2001	40	48.8	77.3	93.3	68.6	50	30	30	23	-
	2002	40	50.6	77.3	93.3	72.7	50	30	30	23.0	-
	2003	40	38.0	77.2	94.0	80.8	50	30	30	4.0	-
	2004	40	38.0	77.2	94.1	78.9	50	30	30	12.0	-
	2005	40	34.0	84.1	93.4	76.3	30	10	30	13.0	77.4
	2006	58.2	48.2	84.1	94.4	74.9	30	30	30	15	77.4
	2007	59.1	0.0	84.1	94.0	68.7	30	20	30	17	77.3
INDIA	1995	55	0.0	46.8	92.4	71.7	50	30	50	10	-
	1996	55	14.0	63.5	88.7	65.6	50	30	50	10	-
	1997	55	13.2	67.1	88.7	65.1	50	30	50	28	-
	1998	55	13.2	67.1	89.7	65.6	50	30	50	26	-
	1999	55	24.0	77.8	90.6	67.2	30	30	50	28	-
	2000	55	19.6	76.6	73.0	63.7	30	30	50	29	-
	2001	55	25.6	77.0	76.5	68.2	30	30	50	29	-
	2002	55	21.8	76.7	78.1	70.8	50	30	50	28.0	-
	2003	55	23.0	76.6	71.9	77.6	50	30	50	27.0	-
	2004	55	23.6	74.2	77.1	77.0	50	30	50	27.0	-
	2005	55	38.0	75.6	76.3	77.4	50	30	50	28.0	63.1
	2006	49.6	24.0	76.1	74.6	77.6	50	30	50	28	63.8
	2007	50.8	51.2	76.0	71.4	77.2	40	30	50	29	65.3
NEPAL	1995	-	-	-	-	-	-	-	-	-	-
	1996	55	53.2	86.4	91.3	67.0	30	30	30	10	-
	1997	55	63.0	82.9	93.5	67.7	30	30	50	10	-
	1998	55	66.6	83.0	89.6	67.3	30	30	50	10	-
	1999	55	65.0	83.0	88.4	66.9	30	30	50	10	-
	2000	55	47.8	86.3	88.0	64.6	30	30	50	10	-
	2001	55	67.8	84.0	88.0	69.8	30	30	30	10	-
	2002	55	64.2	84.0	89.2	78.2	30	30	30	10.0	-
	2003	55	49.6	88.8	90.9	79.4	30	30	30	10.0	-
	2004	55	51.4	88.9	88.6	77.3	30	30	30	10.0	-
	2005	55	56.4	86.6	91.3	77.2	30	30	30	10.0	55.1
	2006	62.4	53.8	86.6	92.3	77.2	30	30	30	28	54.5
	2007	60.7	61.4	86.6	92.8	81.8	30	30	30	25	52.9

	Year	Business Freedom	Trade Freedom	Fiscal Freedom	Govt. Size	Monetary Freedom	Investment Freedom	Financial Freedom	Property Rights	Freedom from Corruption	Labor Freedom
PAKISTAN	1995	55	32.4	59.1	82.1	69.9	70	70	70	10	-
	1996	55	31.0	65.0	66.3	68.5	70	70	70	30	-
	1997	55	30.0	67.5	71.2	68.0	70	50	70	23	-
	1998	55	35.0	67.4	72.6	69.0	70	50	50	10	-
	1999	55	29.0	78.5	70.6	68.8	70	50	30	25	-
	2000	55	43.0	82.1	78.1	72.3	70	50	30	27	-
	2001	55	49.4	82.0	90.3	75.5	50	50	30	22	-
	2002	55	59.0	73.8	85.5	76.6	50	50	30	22.0	-
	2003	70	44.2	65.8	83.9	78.1	50	50	30	23.0	-
	2004	70	55.6	68.2	86.3	78.4	50	30	30	26.0	-
	2005	70	54.6	69.7	89.7	74.0	30	30	30	25.0	74.2
	2006	72.2	59.0	71.4	89.5	77.2	50	50	30	21	72.7
2007	71.6	63.6	73.0	92.3	72.6	50	40	30	21	71.3	
SRI LANKA	1995	70	54.2	64.3	78.3	78.4	50	70	50	30	-
	1996	70	61.0	72.5	78.1	80.5	50	70	50	30	-
	1997	85	61.0	72.5	69.1	81.8	50	70	50	50	-
	1998	85	61.0	72.3	66.3	77.0	50	70	50	50	-
	1999	70	68.0	72.6	71.7	74.0	50	70	50	50	-
	2000	70	71.0	72.9	79.7	74.9	50	50	50	50	-
	2001	70	70.2	73.4	81.3	79.1	50	50	70	50	-
	2002	70	72.0	73.3	81.3	79.3	50	50	50	50.0	-
	2003	70	70.2	73.4	80.3	68.6	50	50	50	50.0	-
	2004	70	70.6	79.9	77.3	69.6	50	50	50	37.0	-
	2005	70	76.6	78.5	80.6	72.3	50	30	50	34.0	64.8
	2006	68.2	71.4	78.5	83.1	72.5	30	30	50	35	67.4
2007	69.2	71.6	78.5	83.4	70.4	30	40	50	32	67.9	

Source: The Heritage Foundation report 2008

## SECONDARY DATA ANALYSIS USING NEURAL NETWORK MODEL

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### ABSTRACT

There are four province of Pakistan; Punjab, Sindh, NWFP and Baluchistan. All these provinces are not much homogenous with respect to the different characteristics of all aspects of life. We feel that there is a requirement to investigate the classification of these provinces with respect to different characteristics of the people they are living in these areas. By keeping this investigation in view we want to classify with respect to household characteristics (Education, Wealth status, Language, Electricity, Television, Refrigerator, Telephone, Source of drinking water, Type of cooking fuel, Main floor material, Main wall material, Main roof material, Bicycle, Motorcycle/Scooter and Truck) and stretch of Tuberculosis factors (Tuberculosis spread by: air when coughing or sneezing, Tuberculosis spread by: sharing utensils and Tuberculosis spread through food). By using advance statistical techniques like Neural Network Model one can also predict the chance of any respondent that can belong to any of them four area on the basis of Household characteristics and stretch of Tuberculosis factors. For this purpose we use the secondary data from Demographic and Health Survey (DHS) Pakistan 2006/07. We use Neural Network Multilayer Perceptron for data analysis purpose. We conclude that household characteristics have great importance in all areas of Pakistan (Punjab, Sindh, NWFP and Baluchistan) for classification purpose. According to our result Punjab is more facilitated area of Pakistan than other provinces and in reality it is. Second facilitated area is Sindh, thirdly NWFP and than Baluchistan.

### 1. INTRODUCTION

Facility means something designed, built, installed, etc., to serve a specific function affording a convenience or service: transportation facilities; educational facilities; a new research facility. Something that permits the easier performance of an action, course of conduct, etc., to provide someone with every facility for accomplishing a task; to lack facilities for handling bulk mail. Synonyms are readiness or ease due to skill, aptitude readiness or ease due to skill, aptitude, freedom from difficulty.

The household is the basic unit of analysis in many social, microeconomic and government models. The term refers to all individuals who live in the same dwelling.

In economics, a household is a person or a group of people living in the same residence. Most economic models do not address whether the members of a household are a family in the traditional sense. There is no vast literature on household characteristic using Neural Network.

A number of analysts have developed methods to estimate household wealth or permanent income using responses in health surveys on the ownership of selected assets or on the use of certain services correlated with permanent income such as electricity. Such indices have been used extensively in the analysis of household surveys such as the Demographic and Health Surveys (DHS). Household permanent income estimated in such a manner can neither be compared across populations nor over a period of time in the same population. Even when the same survey instrument is used, the tendency to acquire an asset such as a boat or air conditioning unit is certain to differ among households of different cultural backgrounds living in different environments. Similarly, supply and demand for assets such as electronic devices can change rapidly in the same setting over even a few years time [Ferguson, et al. (2002)]. The objective of this study is to predict the area on the basis of facilities using Neural Network Models.

## 2. LITERATURE REVIEW

Since the pioneering work of Altman (1968), Linear Discriminant Analysis (LDA) had been the most commonly used statistical model in the prediction of corporate failure. However, its application is hampered by a series of restrictive assumptions and it suffers from a limited discriminatory power. Neural Networks had been proposed to complement or substitute for traditional statistical models. White (1989), Cheng and Titterington (1994) and Sarle (1994) provide much insight into the statistical components of Neural Networks.

Gallinari, et al. (1991) had demonstrated the relationship between LDA and MLP. Bell, Ribar and Verchio (1990), Hart (1992), Yoon, et al. (1993), Curram and Mingers (1994), Wilson and Sharda (1994) and Altman, et al. (1994) had compared the classifying power of different statistical tools and of MLP. Feldman and Kingdon (1995) had surveyed some of the research issues used in applying Neural Networks to real-world problems and reviewed a number of Neural Network financial applications.

Jonathan and Shruthi (2005) explained that Artificial Intelligence had always lent a helping hand to the practitioners of medicine for improving medical diagnosis and treatment. They proposed the design of a two tier Neural Inter-network based Medical Diagnosis System (NIMD) that used k-Nearest Neighbor Classification for Diagnosis pruning. The disease detection modules comprise different classifiers like Neural Networks, Decision Trees, and Bayesian Networks etc. depending on the size of the input vector and the characteristics of the training set. An analysis of the performance of their hybrid system revealed superior performance and utility compared to other existing approaches.

Derya and Ibey (2009) illustrated that the use of combined neural networks (CNNs) model to guide model selection for diagnosis of the erythematous-squamous diseases. They also tested multilayer Perceptron neural networks (MLPNNs) and benchmarked for their performance on the diagnosis of the erythematous-squamous diseases. They described that CNN model achieved accuracy rates which were higher than that of the stand-alone Neural Network Model (MLPNN).



### 3. MATERIAL AND METHODS

#### 3.1 Data and Data Source:

We have data from secondary source that is data of Pakistan 2006/2007 based on household characteristics. We get the data from Demographic and Health survey (DHS) of Pakistan 2006/2007. The sample size is 39049.

#### 3.2 Data Analysis Technique:

##### 3.2.1 Neural Network

It is extensively expected that biological neurons process data in parallel, partitioning large tasks for brisk achievement. It is evident that this technique is effective, based on the brain's capability to operate on complex data systems, and to apply knowledge/experience to new situations (Ward Systems Group Inc., 1996).

An artificial neural network can:

1. learn by adaptation, changing synaptic weights to account for changes in the surrounding environment
2. examine vague, noisy, and probabilistic information
3. Extrapolate from known examples to unknown ones

Naturally, in an Artificial Neural Network (ANN) neurons are arranged in three layers, with each layer connected to the neurons in the next layer. A weight is associated with each connection, and input values in the first layer are weighted and conceded on to the second layer, called the hidden layer. By using an activation function Neurons in the hidden layer produce transitional outputs to sum the weighted input values. The results of these transitional outputs are then weighted by the connections between the hidden layer and the output layer. Initially, training data is fed into the network in order to teach it. The network learns by continually rearranging the weights until the neuron's outputs are similar to the correct outputs in the training data (Ward Systems Group, Inc., 1996).

##### 3.2.2 The Multilayer Perceptron Neural Network Model

A multilayer Perceptron is a feed forward artificial neural network model that maps sets of input data onto a set of appropriate output. It is a modification of the standard linear perceptron in that it uses three or more layers of neurons (nodes) with nonlinear activation functions, and is more powerful than the Perceptron in that it can distinguish data that is not linearly separable, or separable by a hyper plane.

If a multilayer Perceptron consists of a linear activation function in all neurons, that is, a simple on-off mechanism to determine whether or not a neuron fires, then it is easily proved with linear algebra that any number of layers can be reduced to the standard two-layer input-output model. What makes a multilayer Perceptron different is that each neuron uses a nonlinear activation function which was developed to model the frequency of action potentials, or firing, of biological neurons in the brain. This function is modeled in several ways, but must always be normalizable and differentiable.

The multilayer Perceptron consists of an input and an output layer with one or more hidden layers of nonlinearly-activating nodes.

### 3.2.3 Input Layer:

A vector of predictor variable values ( $x_1 \dots x_p$ ) is presented to the input layer. The input layer (or processing before the input layer) standardizes these values so that the range of each variable is -1 to 1. The input layer distributes the values to each of the neurons in the hidden layer. In addition to the predictor variables, there is a constant input of 1.0, called the *bias* that is fed to each of the hidden layers; the bias is multiplied by a weight and added to the sum going into the neuron.

### 3.2.4 Hidden Layer:

Arriving at a neuron in the hidden layer, the value from each input neuron is multiplied by a weight ( $w_{ji}$ ), and the resulting weighted values are added together producing a combined value  $u_j$ . The weighted sum ( $u_j$ ) is fed into a transfer function,  $\sigma$ , which outputs a value  $h_j$ . The outputs from the hidden layer are distributed to the output layer.

- a) **Activation Function.** The activation function "links" the weighted sums of units in a layer to the values of units in the succeeding layer.
- b) **Hyperbolic tangent.** This function has the form:  $\gamma(c) = \tanh(c) = (e^c - e^{-c}) / (e^c + e^{-c})$ . It takes real-valued arguments and transforms them to the range (-1, 1). When automatic architecture selection is used, this is the activation function for all units in the hidden layers.
- c) **Sigmoid.** This function has the form:  $\gamma(c) = 1 / (1 + e^{-c})$ . It takes real-valued arguments and transforms them to the range (0, 1).
- d) **Number of Units.** The number of units in each hidden layer can be specified explicitly or determined automatically by the estimation algorithm.

### 3.2.5 Output Layer:

Arriving at a neuron in the output layer, the value from each hidden layer neuron is multiplied by a weight ( $w_{kj}$ ), and the resulting weighted values are added together producing a combined value  $v_j$ . The weighted sum ( $v_j$ ) is fed into a transfer function,  $\sigma$ , which outputs a value  $y_k$ . The  $y$  values are the outputs of the network. If a regression analysis is being performed with a continuous target variable, then there is a single neuron in the output layer, and it generates a single  $y$  value. For classification problems with categorical target variables, there are  $N$  neurons in the output layer producing  $N$  values, one for each of the  $N$  categories of the target variable.

### 3.2.6 Applications of Multilayer Perceptron:

Multilayer perceptrons using a back propagation algorithm are the standard algorithm for any supervised-learning pattern recognition process and the subject of ongoing research in computational neuroscience and parallel distributed processing. They are useful in research in terms of their ability to solve problems stochastically, which often allows one to get approximate solutions for extremely complex problems.

Currently, they are most commonly seen in speech recognition, image recognition, and machine translation software, but they have also seen applications in other fields such as cyber security. In general, their most important use has been in the growing field of artificial intelligence, where the multilayer perceptron's power comes from its similarity to certain biological neural networks in the human brain.

#### 4. RESULTS AND DISCUSSION

We apply Multilayer perceptron Method in which the dependent variable is Region and independent variables are Education level, Language and Wealth status. We want to classify the effect of Language, Education and Wealth status on Region. The model partition the data into two samples Training and Household. 27245 cases randomly selected in the training sample and 11803 in the Household sample. Total cases are 39049 and only one case exclude from the analysis.

Figure 1 shows the structure of Multilayer Perceptron Neural Network. The input layer contains the predictors (Education level, Language and wealth status).The hidden layer contains unobservable nodes, or units. The output layer contains 4 units because our dependent variable has four categories (Punjab, Sindh, Baluchistan, and NWFP). This figure is the aggregation of the input layers, output layers and hidden layers. Some mathematical activation functions. The Hidden layer activation function is hyperbolic tangent and output activation function is soft max. In Figure 1 Grey lines show positive weights and blue lines shoe negative weights.

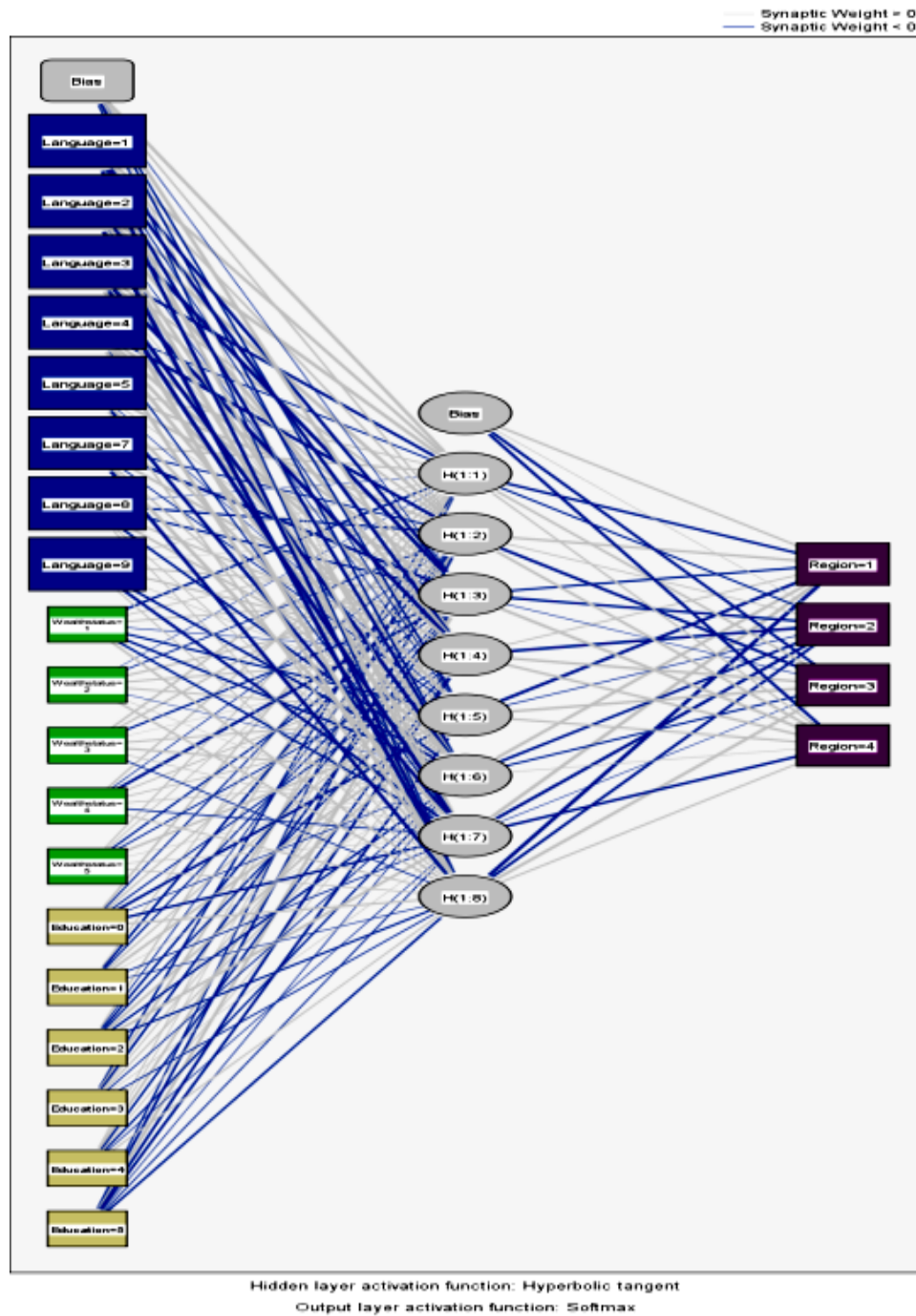
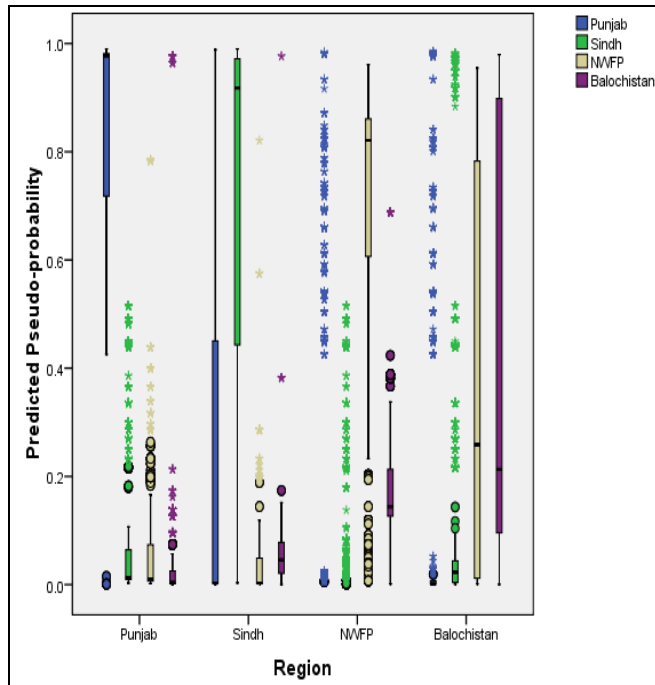


Figure 1: Figure for MLPNN

**Table 1: Classification Results for MLPNN**

Sample	Observed	Predicted				Percent Correct
		Punjab	Sindh	NWFP	Baluchistan	
Training	Punjab	10780	616	8	20	94.4%
	Sindh	1725	5639	8	2	76.5%
	NWFP	723	50	4439	74	84.0%
	Baluchistan	388	393	1373	1007	31.9%
	<b>Overall Percent</b>		<b>50.0%</b>	<b>24.6%</b>	<b>21.4%</b>	<b>4.0%</b>
Holdout	Punjab	4588	273	6	11	94.1%
	Sindh	790	2427	4	2	75.3%
	NWFP	301	18	1979	32	84.9%
	Baluchistan	199	161	583	429	31.3%
	<b>Overall Percent</b>		<b>49.8%</b>	<b>24.4%</b>	<b>21.8%</b>	<b>4.0%</b>

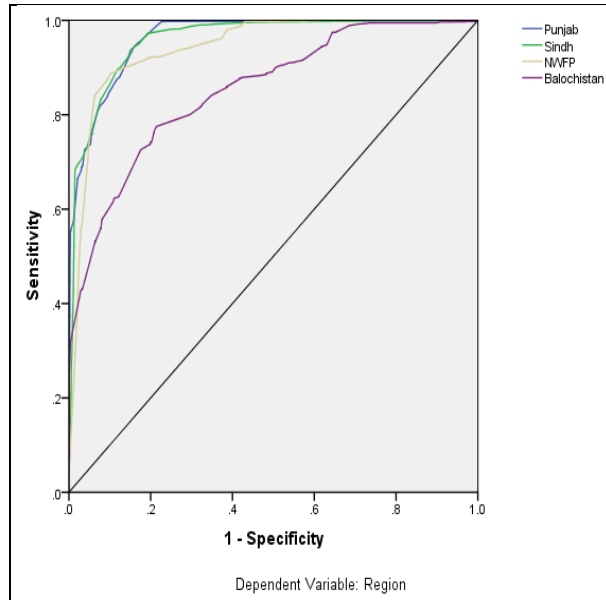
Table 1 shows the classification results for MLP. Cells on the diagonal of the cross-classification of cases are correct classification. Cells off the diagonal of the cross-classification of cases are incorrect classification. Similarly 5639 of the 7374 cases in the Sindh are correctly classified, 4439 of the 5286 cases in the NWFP are correctly classified and 1007 of the 3161 cases in the Baluchistan are correctly classified. From the above discussion we can also interpret the misclassified cases of Sindh, NWFP and Baluchistan. Overall, 80.3% of the training cases are classified correctly and 79.8% holdout cases are correctly classified. A better model should correctly identify a higher percentage of the correct cases.



**Fig. 2: Predicted by observed chart**

Figure 2 shows the predicted-by-observed chart for the combined training and household samples. It displays clustered box plots of predicted pseudo-probabilities. The x-axis corresponds to the observed response categories, and the legend corresponds to

predicted categories. This figure provides information similar as classification table. The leftmost box plot shows for cases that have observed category Punjab, the predicted pseudo-probability of category Punjab. The portion of the box plot above the 0.5 mark on the *y*-axis represents correct classifications shown. The portion below the 0.5 mark represents incorrect classifications. The first box plot of predicted-by-observed chart provides the same information as the first diagonal of the classification table. The second box plot shows for cases that have observed category Punjab the predicted pseudo-probability of category Sindh. It is representing incorrect classification because box plot is low the 0.5 mark and the case above the box plot are misclassified. The 3<sup>rd</sup> box plot show for cases that have observed category Punjab, the predicted pseudo-probability of category NWFP. The 4<sup>th</sup> box plot shows, for cases that have observed category Punjab, the predicted pseudo-probability of category Baluchistan. These are also representing incorrect classification. Similarly the other box plots can be interpreted.



**Fig. 3: Receiver Operator Curve**

Figure 3 shows the Receiver Operating Characteristic curve (ROC curve) for four categories Punjab, Sindh, NWFP and Baluchistan. ROC Curve provides a visual display of the sensitivity and specificity or all possible cut offs in a single plot which is much cleaner and more powerful than a series of tables. ROC curve shows the tradeoff between the true positive rate or sensitivity (portion of positive cases that are correctly identified as positive) and the false negative rate or specificity (portion of negative cases that are incorrectly identified) for a given model.

**Table 2: Area for ROC curve**

		Area under the Curve
<b>Region</b>	Punjab	.962
	Sindh	.959
	NWFP	.943
	Baluchistan	.852

We can also interpret the ROC curve from Table 24. If the area is 1.0, we have an ideal test, because it achieves both 100% sensitivity and 100% specificity. In this case all the categories have above 85% area so we can say we have an ideal model for classification.

*From Figure 4 the cumulative gains chart shows the percentage of the overall number of cases in a given category “gained” by targeting a percentage of the total*

number of cases. Cumulative gains are use to predict the model performance. The first point on the curve for the Punjab category is at (10%, 25%), meaning that if we score a dataset with the network and sort all of the cases by predicted pseudo-probability of Punjab, we should expect the top 10% to contain approximately 25% of all of the cases that actually take the category Punjab. Likewise, the top 20% would contain approximately 48% of the category Punjab; the top 30% of cases would contain 70% of category Punjab and so on. If the first point covers more percentage of randomly selected cases then we can get the more percentage of correct classification. Figure 4 depicts that in first 10% cases Punjab, Baluchistan, NWFP and Sindh 20%, 52%, 45% and 35% respectively cases are correctly classified. In 20% cases NWFP, Baluchistan, Sindh and Punjab 80%,72%, 67% and 47% respectively cases are correctly classified. In 30% cases NWFP, Sindh, Baluchistan and Punjab 90%, 85%,80% and 68% respectively cases are correctly classified. In 40% cases Sindh, Punjab, NWFP and Baluchistan 97%, 95%, 93% and 82% respectively cases are correct classified. Figure also demonstrate that in first (10-30)% Baluchistan move sharply upwards but

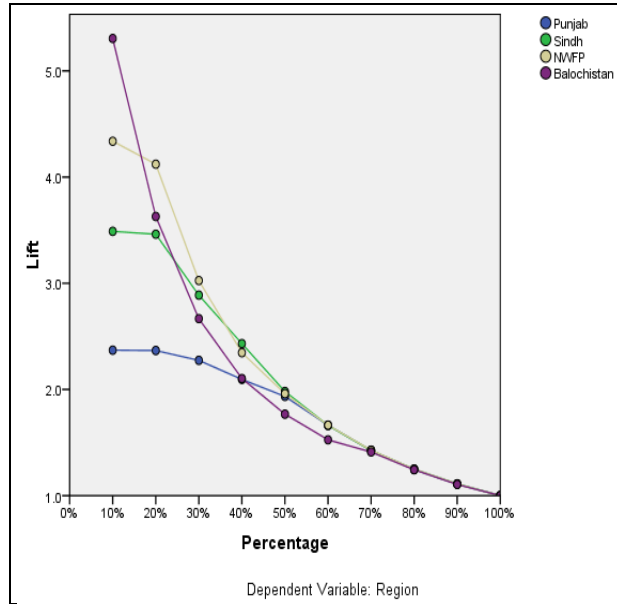


Fig. 4: Cumulative Gain Chart

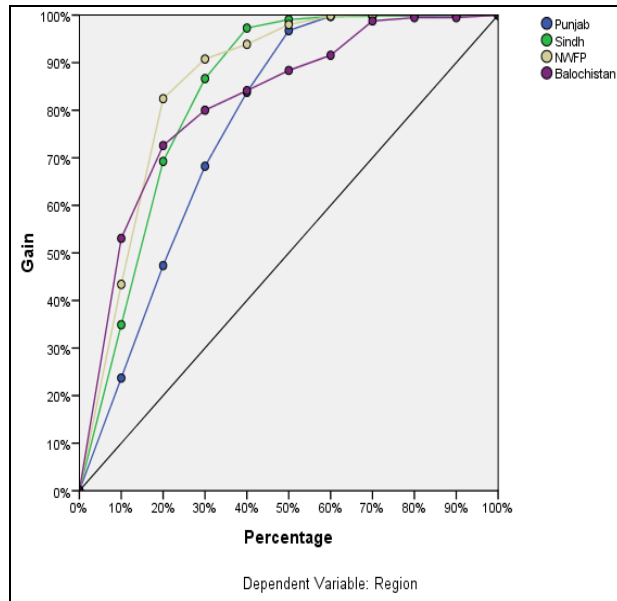


Figure 5: Lift Chart

later on its sharpness reduce and steadily increasing. In (10-20)% NWFP increasing with high rate but later on its also reduce. Punjab move upwards with almost with same rate on all the percentage levels. In (10-20) % Sindh move sharply as compared to other percentage levels.

Figure 5 shows Lift chart for four categories; Punjab, Sindh, NWFP and Baluchistan. Lift is a measure of the effectiveness of a predictive model calculated as the ratio between the results obtained with and without the predictive model.

The lift chart is derived from the cumulative gains chart; the values on the y-axis correspond to the ratio of the cumulative gain for each curve to the baseline. Thus, the lift at 10% for the category Punjab is  $25\%/10\% = 2.5$ . Similarly, the lift at 20% for the category Punjab is 2.4, the lift at 30% for the category Punjab is 2.3 and so on. Similarly we can interpret lift for other categories.

## 5. CONCLUSION

The conclusion of the paper is that the household characteristics have great importance in all the areas (punjab, sindh, NWFP and Baluchistan) . All the respondents of punjab have high wealth status as compared to other provinces. So Punjab is highly facilitate than others and low faciitate area is Baluchistan. Also punjab is well off and more Educated area than the others. Baluchistan is more illetrate and poorest area. Sindh and NWFP are also poorest and illetrate but not like the Baluchistan. Similarly the spread of tuberculosis factors are highly discriminate in Punjab and low discriminatio of these factors in Sindh and NWFP.

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APPENDIX

**Table 3: Parameter Estimate for Multilayer Perceptron Model**

Predictors		Predicted									
		Hidden Layer 1						Output Layer			
		H(1:1)	H(1:2)	H(1:3)	H(1:4)	H(1:5)	H(1:6)	Region=1	Region=2	Region=3	Region=4
Input Layer	(Bias)	-.332	-.024	.046	-.032	.354	-.044				
	[Language=1]	-.656	-.668	.388	.765	-.572	-.016				
	[Language=2]	.349	-2.183	.118	-.522	.657	.492				
	[Language=3]	-.941	1.642	1.026	.905	-1.858	1.003				
	[Language=4]	.542	1.935	-.486	-.360	1.135	-.912				
	[Language=5]	-.219	.844	-.441	-.751	-.393	.522				
	[Language=7]	.123	-1.135	.412	.324	.647	-.028				
	[Language=9]	.157	.485	-.256	-.452	.354	-.601				
	[Wealth status=1]	-.520	.272	-.277	-.235	.385	.359				
	[Wealth status=2]	.122	.432	-.281	-.092	.276	.084				
	[Wealth status=3]	-.211	.130	-.007	-.249	.111	.014				
	[Wealth status=4]	.393	.080	.517	-.009	-.177	.210				
	[Wealth status=5]	-.391	.443	.538	-.041	-.574	-.434				
	[Education=0]	-.367	.380	.101	-.120	.186	.204				
	[Education=1]	-.099	.083	-.311	.272	-.358	-.332				
	[Education=2]	-.367	.286	.095	.686	.224	-.224				
	[Education=3]	.452	.237	-.279	-.079	-.043	-.312				
	[Education=4]	-.040	.150	.000	-.274	.036	-.007				
[Education=5]	-.015	-.014	-.192	-.043	-.283	-.259					
Hidden Layer 1	(Bias)							-.042	.901	-.045	-.373
	H(1:1)							.250	-2.932	1.071	2.106
	H(1:2)							-.759	.750	.257	-.561
	H(1:3)							.582	-.377	-.069	-.384
	H(1:4)							1.212	.346	.023	-.749
	H(1:5)							-1.664	.973	1.728	.300
	H(1:6)							1.101	-.262	-1.418	.425

**Table 4: MLP-Predicted Pseudo Probabilities**

MLP-Predicted pseudo probability-1	MLP-Predicted pseudo probability-2	MLP-Predicted pseudo probability-3	MLP-Predicted pseudo probability-4
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.893	0.102	0.064	0.049
0.706	0.275	0.010	0.009
0.706	0.275	0.010	0.009

### Manual Calculations for Neural Network Model

We use the response of first respondent from our data file to show the calculation on Neural Network Model manually as:

The responses are

Language: 1(Urdu), Wealth Status: 5 (Complete Primary) Education: 2(Richest)

#### Input Layers:

Using the function

$$y_i = a_i + \sum w_{ij}x_k$$

Here “ $i$ ” shows the number of Hidden Layers and  $i = 1, 2, \dots, 6$

“ $j$ ” shows the number of Input Layers and  $j = 1, 2, \dots, m$ , In this case  $m = 18$

“ $k$ ” shows the responses of the respondent and  $k = 1, 2, 3$

“ $a$ ” shows the bias, “ $w$ ” for weights and “ $x$ ” is the number of responses

Input Layer Function =  $\tanh(y)$

$$\begin{aligned} y_1 &= -0.332 -0.656(1) -0.391(5) -0.367(2) \\ &= -3.677 \end{aligned}$$

$$\tanh(y_1) = -1 = c_1 \text{ (say)}$$

$$\begin{aligned} y_2 &= -0.024 -0.668(1) +0.434(5) +0.286(2) \\ &= 2.095 \end{aligned}$$

$$\tanh(y_2) = 1 = c_2$$

$$\begin{aligned} y_3 &= 0.046 +0.388(1) +0.538(5) +0.095(2) \\ &= 3.314 \end{aligned}$$

$$\tanh(y_3) = 1 = c_3$$

$$\begin{aligned} y_4 &= -0.032 +0.765(1) -0.041(5) +0.686(2) \\ &= 1.9 \end{aligned}$$

$$\tanh(y_4) = 1 = c_4$$

$$\begin{aligned} y_5 &= 0.354 -0.572(1) -0.574(5) +0.224(2) \\ &= -2.64 \end{aligned}$$

$$\tanh(y_5) = -1 = c_5$$

$$\begin{aligned} y_6 &= -0.044 -0.16(1) -0.434(5) -0.224(2) \\ &= -2.678 \end{aligned}$$

$$\tanh(y_6) = -1 = c_6$$

**Hidden Layers:**

$$z_i = a_i + \sum w_{ij}c_j$$

Here  $i=1, 2, 3, 4$  and “ $i$ ” shows the number of Output Layers

$j=1, \dots, 6$  and “ $j$ ” shows the number of Hidden layer

After putting the values

$$\begin{aligned} z_1 &= -0.42 + 0.250(1) - 0.759(-1) + 0.582(1) + 1.212(1) - 1.664(-1) + 1.101(-1) \\ &= 3.304 \end{aligned}$$

$$\exp(z_1) = 27.22 = r_1 \text{ (say)}$$

$$\begin{aligned} z_2 &= 0.901 - 2.939(1) + 0.750(-1) - 0.377(1) + 0.346(1) + 0.973(-1) - 0.262(-1) \\ &= -3.523 \end{aligned}$$

$$\exp(z_2) = 0.37 = r_2$$

$$\begin{aligned} z_3 &= -0.45 + 1.071(1) + 0.257(-1) + 0.069(1) + 0.023(1) + 1.728(-1) - 1.418(-1) \\ &= 0.62 \end{aligned}$$

$$\exp(z_3) = 1.86 = r_3$$

$$\begin{aligned} z_4 &= -0.373 + 2.106(1) - 0.561(-1) - 0.384(1) - 0.749(1) + 0.3(-1) + 0.425(-1) \\ &= 0.436 \end{aligned}$$

$$\exp(z_4) = 1.55 = r_4$$

Hidden Layer function is Soft Max, that is

$$f_i = \frac{\exp(r_i)}{\sum_{i=1}^n \exp(r_i)} \text{ where } i = 1, \dots, n \quad n = 4 \quad \sum_{i=1}^n \exp(r_i) = 31$$

After simplification we finally get

$$f_1 = 27.22/31 = 0.89, f_2 = 0.37/31 = 0.1, f_3 = 1.86/31 = 0.06 \text{ and } f_4 = 1.55/31 = 0.05$$