

FORMAN

# JOURNAL OF ECONOMIC STUDIES

Volume: 6 2010 January-December

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**Subscription Rate**

***Inland***

Students Rs.150

General Rs.300

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**ISSN:** 1990-391X

**Abbreviated Key Title:** Forman j. econ. stud.

**Recognized by:** HEC (Ref. Letter No. DD/SS&H/JOUR/2011/78)

**Internationally Indexed by:** IBSS & Ulrich's

**Journal Website:** [www.fccollege.edu.pk/academics/departments/academic-departments/department-of-economics/research](http://www.fccollege.edu.pk/academics/departments/academic-departments/department-of-economics/research)

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<b>Volume: 6</b>	<b>2010</b>	<b>January-December</b>
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Household Consumption Patterns in Pakistan: A Rural-Urban Analysis	1
<i>Babar Aziz and Shahnawaz Malik</i>	
Private Return on Higher Education in Pakistan	27
<i>Malik Fahim Bashir and Muhammad Mazhar Iqbal</i>	
Changing Demographic Trends and Housing Market in Pakistan	49
<i>Pervez Azim and Rizwan Ahmad</i>	
Growth, FDI and Exports in Pakistan: A Co-integration Analysis	65
<i>Ghulam Shabbir and Amjad Naveed</i>	
Dynamics of Poverty in Rural Punjab: A Case Study of Rural Area of Tehsil Samundri	85
<i>Irum Naz, Sadia Ali and Babar Aziz</i>	
Trade, Poverty and Employment: Empirical Evidence from Pakistan	103
<i>Muhammad Tariq Majeed</i>	
Book Review	119
<i>Muhammad Aslam Chaudhary</i>	

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**DEPARTMENT OF ECONOMICS  
FORMAN CHRISTIAN COLLEGE (A CHARTERED UNIVERSITY)  
FEROZEPUR ROAD, LAHORE, PAKISTAN**

## Household Consumption Patterns in Pakistan: A Rural-Urban Analysis

Babar Aziz and Shahnawaz Malik<sup>1</sup>

### Abstract

*This paper attempts to analyze various elasticities; expenditure (income), own-price and household size in relation to a variety of Aggregate Food Commodity (AFC) groups. The outcome of this research reflects that most of the estimated elasticities are significant and reasonable in magnitude. It is observed that cereal's group has a fixed position in the menu of the Pakistani consumers; in both rural and an urban region. The expenditures on vegetables and meats increase with higher income in rural areas weigh against the urban areas. However, the expenditures on fruits, and milk and milk products are more likely to increase with higher income both in urban areas than in rural areas. Besides, household size has a significant impact on household food expenditures. The expenditures on most food groups increase at a decreasing rate as household size increases.*

### I. Introduction

Food is a basic need and it has an enormous economic impact on Pakistani households. For this reason, it is imperative to gain thorough knowledge of the determinants of food demand in order to design comprehensive agricultural, food and social policy options that improve access to food. Expenditure (income) and price elasticities of food demand are exemplified as the key information for this purpose, and econometric analyses are needed to estimate them empirically. In addition to the described elasticities, some other features like the possible effects of income changes on patterns of per capita expenditure in both rural and urban areas; the existence and the effects of economies of scale on household food expenditure among several scales of household sizes; and no doubt, the simultaneous effect of total expenditure, location, and household size on food expenditure patterns of

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a country are also mandatory in order to design wide-ranging agricultural, food and social policy options that build up the strength of the households towards the healthier food access. Therefore, this study illuminates the partial food demand systems as a basis for future choice of Pakistani food policies.

For the sake of analysis, a double-log specification of the Engel curve is estimated. The use of Engel functions is appropriate as the data used is cross-sectional and price effects are absent. Expenditure elasticities are calculated using the slope of the Engel curve. Some of the popular functions used are linear, quadratic, semi-log, double-log, log-inverse, and inverse. Each functional form possesses some desirable characteristics, thus no single form has found general acceptance<sup>2</sup> but studies by Prais and Houthakker (1955) indicate that the semi-log and double-log specifications are the most appropriate forms. However, for all practical purposes and when elasticities are estimated at the sample means, estimates obtained using a double-log specification are generally sufficient<sup>3</sup>. So, on the basis of Mergers (1991) views, here a double-log specification of the Engel curve is opted for the static demand analysis. Expenditure on food products was aggregated into various sub groups: e.g. cereals (CR), pulses (PL), fruits (FR), edible oils and fats (EOF), sugar and gur (SG), meats (MT), vegetables (VG), tea, coffee and soft drinks (TCS), and milk and milk products (MMP). The decision to break down the commodities into these groups is based on the pattern of the Pakistani diet and the available data.

In static framework this study focuses: (i) to estimate the expenditure elasticities for Aggregate Food Commodity (AFC) groups across rural-urban regions; (ii) to explore household size economies by estimating expenditure elasticities with respect to the household size in rural and urban regions; and finally, (iii) to analyze the simultaneous effects between the total expenditure, location and household size.

Expenditure elasticity is one of the key determinants of future food demand, and it is important to have an accurate estimate of expenditure elasticity in order to forecast the medium to long-term demand for food stuffs. Keeping aligned with the international research about the fact several empirical studies have been conducted on consumption patterns in Pakistan. These include Rehman (1963), Bussink (1970), Khan (1970), Ali (1981, 1985), Siddiqui (1982), Malik (1982), Cheema and Malik (1984, 1985), Malik

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<sup>2</sup> See, Salathe (1979) for further details.

<sup>3</sup> See, for instance Mergers (1991).

and Ahmad (1985), Malik *et al.* (1987), Burney and Khan (1990, 1991), Malik (1992), Burki (1997), Aziz (1997, 2004), Chaudhary *et al.* (1999), Malik and Siddique (2002), Ahmad (2004), and Malik and Babar (2005, 2006).

The studies mentioned here are almost meticulous in the area of consumption analysis. These studies have addressed different issues relating to household consumption patterns in rural and urban households. Most of the studies used HIES data to highlight the rural urban differences in consumption patterns in Pakistan. In addition to it the researchers have also explored the expenditure elasticities while making use of Engel curve methodology in its various functional forms (*i.e.* linear, semi-log, log-log, log-log inverse and semi-log inverse). Siddiqui (1982) and Cheema and Malik (1985) also explored the household size effect on the consumption patterns of the inhabitants. The present study is a step ahead in the sense that in addition to expenditure elasticities, the effects of household size, location and simultaneous effects on the consumption patterns of the people are also explored. Rest of the paper is organized as; part-II consists of data sources and model specification, part-III deals with the food expenditure elasticities by region, part-IV discusses on food expenditure elasticities by household size, part-V provides the simultaneous effect of total expenditure, location and household size and last part is specified for summery and conclusions.

## II. Data Sources and Model Specification

The data used is based on micro level data set of Pakistan Integrated Household Survey data (PIHS) 2004-05 conducted by Federal Bureau Statistics, Government of Pakistan.<sup>4</sup> Total per capita expenditure and per capita expenditure on nine major food groups<sup>5</sup> are calculated and used separately for both rural and urban areas and for each household size (one person, 2-4 persons, 5-7 persons, and 8 or more persons). It is hypothesized that the relative importance of economies of scale increases with household size.

This provides a basis for estimating Engel curves that are based on the relationships between expenditure on an individual good and the income level as measured by total expenditures. In cross-sectional budget studies, provided

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<sup>4</sup> See, appendix B (table B1 to B3), for further details about the households (*i.e.* number of households in sample, household size, sex, etc.).

<sup>5</sup> The food groups are cereals (CR), pulses (PL), fruits (FR), edible oils and fats (EOF), sugar and gur (SG), meats (MT), vegetables (VG), tea, coffee and soft drinks (TCS), and milk and milk products (MMP).

the surveys are completed in a short time-span, prices faced by all households can be regarded as constant, apart from minor variations due to social and regional factors. This allows focusing on responses of household demand to variation in income or total expenditure<sup>6</sup>. After statistically estimating the Engel curves, the nature of these responses can be summarized by computing expenditure elasticities.

### 2.1. The Model

A double-log specification of the Engel function has been chosen in order to estimate expenditure elasticities for rural and urban areas and for each household size. A double-log specification has proven the most appropriate way of estimating the expenditure elasticity of demand; it generates more realistic expenditure elasticities (Malik, 1992). The general model can be written as follow:

$$\ln w_j = \alpha_j + \beta_j \ln y + \eta_j \quad (1)$$

Where  $w_j$  is the average per capita expenditure share for food group  $j$ ,  $\alpha_j$  and  $\beta_j$  are the estimated coefficients,  $y$  is the average total per capita income calculated as the average total per capita expenditure, and  $(\eta_j)$  is the disturbance term. As pointed out before, the derivation of the Engel function assumes constant prices.

Equation (1) is estimated for each of the nine Aggregate Food Commodity (AFC) groups for rural and urban areas, and for each household size in both rural and urban Pakistan. Three hypotheses are to be tested:

- First, it is unstipulated that the income (or expenditure) variable is an imperative determinant of food expenditures.
- Second, there exists dissimilarity in the expenditure elasticity for each food group between rural and urban areas. More specifically this hypothesis refers to the existence of location effect among the inhabitants of different localities.

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<sup>6</sup> In the literature, there is a tendency to use total expenditure instead of income as explanatory variable. The central theme behind this adoption is that people declare total expenditures more truly than income. Therefore, in this study the total expenditure elasticities are estimated instead of income elasticities.

- The third hypothesis suggests that there is a demarcation in the elasticity for each food group among several scales of household size<sup>7</sup>.

Dummy variables are included for the verification and confirmation of second and third hypotheses. There are four categories of household size as described in the data set. Therefore, three dummies are introduced, in order to testify the second and third hypothesis after following the methodology as described by Gujarati (1995). Assuming that the four types household size have a common slope but different intercepts in the regression of per capita expenditure share for a food group on average total expenditures<sup>8</sup>. The equation estimated for this is of the form:

$$\ln w_j = \alpha_j + \beta_j \ln y + \gamma_0 D_{0j} + \gamma_1 D_{1j} + \gamma_2 D_{2j} + \gamma_3 D_{3j} + \eta_j \quad (2)$$

Where:

$$\begin{aligned} D_0 &= 1, \text{ if rural} \\ &0 \text{ otherwise} \\ D_1 &= 1, \text{ if household size 2-4 persons} \\ &0 \text{ otherwise} \\ D_2 &= 1, \text{ if household size 5-7 persons} \\ &0 \text{ otherwise} \\ D_3 &= 1, \text{ if household size 8 and more persons} \\ &0 \text{ otherwise} \end{aligned}$$

All other variables have been as defined above. The two equations (1) and (2) are estimated using (OLS) regression. Expenditure elasticities are calculated as ( $\varepsilon_j = \beta_j$ ), where  $\beta_j$  is the coefficient of regression. The coming section illustrate the results of expenditure elasticities for rural as well as urban areas of Pakistan.

### III. Food Expenditure Elasticities by Region

There are variations in elasticities for chosen AFC groups that tend to indicate a difference in household's attitudes toward these groups as their

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<sup>7</sup> Debate about household size economies of scale are well documented in Deaton and Paxon (1998); Gibson (2002); and Abdulai (2003).

<sup>8</sup> The first household type (one person) is treated as the base category and the intercept  $\alpha_j$  reflects the intercept of this category.

income augmented. The corresponding expenditure elasticities are reported for both rural and urban regions of Pakistan.

### **3.1. Rural Pakistan**

On an economic basis, the estimated elasticities in table 1 (see appendix A) seem to be plausible. All expenditure elasticities have positive signs and for all of the AFC groups is less than one. This means that all selected food groups are necessities for Pakistani households in rural regions, *i.e.*, as income increases their expenditure will increase at a lower rate.

Table 1 reveals that expenditure elasticities of demand for all food groups are significant at one percent level of significance. The elasticities of cereals and pulses are relatively similar at low numbers, which means that the consumption of these commodities is relatively little affected by income changes. The smaller elasticities, the less the consumption is affected by a change in income. The cereals group has an expenditure elasticity of 0.43, which means that as total expenditure rises by one percent the expenditure on cereals would tend to rise by only 0.43 %.

The elasticity of pulses is 0.40, the lowest, indicating that as total expenditure raises by one percent the quantity consumed from pulses group would tend to rise by 0.40 %. This result is consistent with the fact that consumption of pulses is important for the poor and is likely to decrease with higher income.

The vegetables group has a fixed position in the Pakistani menu. It has an expenditure elasticity of 0.53 compared to fruits group, which has a relatively high expenditure elasticity of 0.92. An increase in total expenditure by one percent would tend to generate a 0.92 % increase in fruits expenditure in rural Pakistan. Fruits such as citrus, banana, and grapes are consumed extensively during religious fasting, especially in rural areas. The meats group has a relatively high expenditure elasticity of 0.98, indicating that an increase in total expenditure by one percent would tend to cause a 0.98 % increase in meat expenditure.

Milk and milk products are used for breakfast and dinner in Pakistan. Not only are they protein sources, but also their prices, compared to prices of other animal products, were for a long time relatively low. Increased total expenditure has a clear impact on the expenditure on milk and milk products; its expenditure elasticity is 0.84. This means that a one percent increase in total expenditure would tend to cause an increase in expenditure on milk and

milk products by 0.84 %. For sugar and gur, the expenditure elasticity is 0.75, which means that an increase in total expenditure by one percent would tend to generate 0.75 % increase in sugar and gur expenditure in rural Pakistan.

The estimated expenditure elasticity for the edible oils and fats group is 0.63, which means that a one percent increase in total expenditure would tend to cause an increase in the expenditure on the edible oils and fats group by 0.63 %. With higher income perhaps the quantity of edible oils and fats consumed will not increase but the quality of edible oils and fats group consumed will improve.

### **3.2. Urban Pakistan**

It is found that all AFC groups have positive expenditure elasticities in urban regions and all are less than one (table 2, see appendix A). This means that all selected food groups are necessities for urban Pakistan. It is found that the change in the consumption of food groups will be significant at one percent probability level as income increases.

The estimated expenditure elasticity for cereals group is 0.44, which might be a symptom of that a one percent increase in total expenditure is associated with an increase of about 0.44 % in cereals expenditure. The cereals group has a momentous place in the menu of the Pakistani consumer. The elasticity of cereal's group for urban regions is very close to that of rural regions and low in magnitude. The low expenditure elasticity thus reveals the constant behaviors of the consumers towards the cereal consumption and the consumption of cereals is effected minutely as income of consumers' changes.

For the pulses group, the expenditure elasticity is only 0.26, the lowest, compared to the elasticities for other food commodities. Like cereals the low magnitude of expenditure elasticity for pulses illustrates that the consumption of pulses increases at decreasing rate as income of the consumer increases. The expenditure elasticity for the vegetables group is 0.50, where an increase in total expenditure by one percent would tend to cause 0.50 % increase in vegetables expenditure in urban Pakistan.

Increased total expenditure has a clear stimulus for the consumption of fruits in urban Pakistan. Its consumption is likely to escalate more with higher income than any other commodity. The expenditure elasticity of fruits is 0.95, which means that a one percent increase in total expenditure is associated with an addition of about 0.95 % in expenditure on fruits.

The expenditure elasticity for the meats group is 0.71, which indicates that an increase in total expenditure by one percent would tend to cause a 0.71% increase in meats group expenditure in urban Pakistan. The expenditure elasticity of milk and milk products group is somewhat high, 0.90, indicating a one percent increase in total expenditure is associated with an increase of about 0.90 % in expenditure milk and milk products group.

The estimated expenditure elasticity of the sugar and gur group is 0.72, which means that an increase in total expenditure by one percent would tend to cause a 0.72 % increase in expenditure on the sugar and gur and its products group. The high expenditure elasticity of sugar and gur is also an indicator of increasing sweets consumption with higher income. The expenditure elasticity for edible oils and fats is 0.56, indicating a one percent increase in total expenditure would tend to generate an increase in the share of edible oils and fats group by 0.56 %, as improvement of the quality of edible oils and fats consumed.

As it is clear from the aforementioned results that the cereals group has a fixed position in the menu of the Pakistani consumer in both rural and urban areas, so that's why, its consumption is relatively affected diminutively by income changes. The expenditures on vegetables and meats increase with higher income in rural areas weigh against the urban areas. However, the expenditures on fruits, and milk and milk products are more likely to increase with higher income in urban areas than in rural areas.

#### **IV. Food Expenditure Elasticities by Household Size**

This section examines the existence of economies of scale in household food expenditure in Pakistan. Engel relationship is estimated for nine AFC groups using the same survey data set as mentioned before. The survey includes data on food expenditure by household size. This data were divided into four brackets as follows: one person, 2-4 persons, 5-7 persons, and 8 and more persons<sup>9</sup>.

Economies of scale in consumption are present if expenditures increase at a decreasing rate as household membership increases. Some studies examine the interactions between household size, economies of scale,

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<sup>9</sup> The details about household size are presented in appendix B: tables B1 to B3.

and the consumption of private goods such as food<sup>10</sup>. Economies of scale in consumption may occur for mainly three reasons:

- First, the public goods within the household can be shared and serve their function without needing to be replicated in relation to the number of individuals within the household.
- Second, larger households may process food more efficiently and with less waste than smaller households (for example, food portions and leftovers that may be discarded by smaller households may be used by larger ones).
- Third, larger households may receive quantity discounts because they buy larger quantities.

It is found that household size has a significant influence on household food expenditures. The expenditures on most food groups increase at a decreasing rate as household size increases (table 3 to 6 for rural Pakistan and table 7 to 10 for urban Pakistan, see appendix A). There are differences in elasticity estimates for selected food groups that tend to indicate a difference in economies of scale in consumption of these foods.

Table 3 to 6 (see appendix A) present the expenditure elasticities for selected AFC groups for the four household sizes at rural level. All of the coefficients appear to be significant at the one percent significance level and expenditure elasticities have the expected positive signs.

Expenditure elasticity for cereals group is 0.35 for the smallest household size (one person). It increased to reach 0.43 for the biggest household size (8 persons and more), but it is the lowest, 0.31, for the household size 5-7 persons. It is observed that the expenditure elasticities for most food groups decrease for the household size 2-4 persons and 5-7 persons, and then increase for the largest household size (8 persons and more), as shown in table 3 to 6 (see appendix A).

The expenditure elasticity for vegetables and fruits has each achieved the lowest for the household size 2-4 persons, indicating high economies of scales in consumption of these food groups for this household size as compared to other household sizes. For other food groups, the expenditure elasticities are the lowest for the household size of 5-7 persons.

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<sup>10</sup> Some studies offer a detailed discussion about the economies of scale in consumption, see: e.g. Deaton and Paxon (1998); Gibson (2002); and Abdulai (2003).

For urban Pakistan, the corresponding expenditure elasticities are reported in table 7 to 10 (see appendix A) for each household size for nine AFC groups. The expenditure elasticity for the cereals group increases at a decreasing rate as household membership increases. It is 0.36, 0.41, 0.43, and 0.48 for the household sizes: one person, 2-4 persons, 5-7 persons and 8 and more persons, respectively. The same pattern of elasticity estimates is observed for fruits, meats, tea, coffee and soft drinks, and milk and milk products with differences in economies of scale in consumption of these food groups as household size increases.

#### **V. Simultaneous Effect of Total Expenditure, Location and Household Size**

Important determinants of food expenditure patterns are income (or expenditure) level of the household, the household size, and the local food habits. These determinants are analyzed simultaneously by using dummy variables for each food group, as mentioned in equation (2). The major results are shown in table 11 to 19 (see appendix A).

As can be expected, total expenditure (income) variable is an important determinant of food expenditure. There is a marked difference between rural and urban areas in the expenditure on most food groups. Most of the coefficients appear to be significant at the one significance level and expenditure elasticities have the expected positive signs. For most food groups, the household sizes; 5-7 persons and 8 and more persons, have significant influences on household food expenditures.

#### **VI. Summery and Conclusions**

A double log Engel curve specification is used in a static framework in order to estimate the expenditure elasticities and to explore the household size economies of scale in consumption. All the estimated expenditure elasticities are as expressed in magnitude (less than one) with positive signs. This means that all selected food groups are necessities, *i.e.*, as income increases their expenditure will increase at a lower rate. There are differences in elasticity estimates for selected food groups that tend to indicate a difference in economies of scale in consumption of these foods. It is further explored that household size has a significant influence on household food expenditures. The expenditures on most food groups increase at a decreasing rate as household size increases. For most food groups, the household sizes; 5-7 persons and 8 and more persons, have significant influences on household

food expenditures. The main findings of the Engel curve's analysis are as under.

- The analysis reveals that expenditure elasticities in urban regions are low in magnitude as compared to the same for rural regions.
- The consumption towards cereals' group is relatively affected diminutively by income changes because it has a fixed position in the menu of the Pakistani consumers in both rural and urban areas. The expenditures on vegetables and meats increase with higher income in rural areas weigh against the urban areas. However, the expenditures on fruits, and milk and milk products are more likely to increase with higher income in urban areas than in rural areas. Moreover, fruits; meats; and milk's group reflect high magnitudes of expenditure elasticities as compared to the other included groups.
- Regarding household specific elasticity estimates, households residing in urban and rural areas, and households of different sizes show that the expenditures on vegetables and meats increase with higher income in urban areas compared to rural areas. However, the expenditures on fruits, fish, and milk and its products are more likely to increase with higher income in rural areas than in urban areas. Also, the expenditure of most food groups has increased at decreasing rates as household size increased.
- It is explored that household size has a significant influence on household food expenditures. The expenditures on most food groups increase at a decreasing rate as household size increases. There are differences in elasticity estimates for selected food groups that tend to indicate a difference in economies of scale in consumption of these foods. In this context it is also observed that for most food groups, the household sizes; 5-7 persons and 8 and more persons, have significant influences on household food expenditures.

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**Appendix A: Tables of Empirical Results****Table: 1. Expenditure Elasticities for Selected AFC Groups in Rural Pakistan**

Food Groups <sup>11</sup>	$\alpha_j$	$\beta_j$	Std. error	$R^2$	T-Statistics
CR	1.90	0.43	0.05	0.75	7.94***
PL	0.08	0.40	0.06	0.64	6.14***
VG	0.55	0.53	0.06	0.75	8.02***
FR	-3.08	0.92	0.07	0.87	11.77***
MT	-0.60	0.98	0.05	0.91	15.09***
TCS	-1.93	0.67	0.05	0.87	12.11***
MMP	-2.35	0.84	0.04	0.94	17.95***
EOF	-0.49	0.63	0.06	0.84	10.37***
SG	-1.89	0.75	0.03	0.96	24.94***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 2. Expenditure Elasticities for Selected AFC Groups in Urban Pakistan**

Food Groups	$\alpha_j$	$\beta_j$	Std. error	$R^2$	T-Statistics
CR	1.57	0.44	0.01	0.99	79.87***
PL	0.69	0.26	0.01	0.93	15.58***
VG	0.57	0.50	0.02	0.95	20.00***
FR	-3.26	0.95	0.03	0.97	25.01***
MT	-0.07	0.71	0.02	0.97	24.87***
TCS	-0.86	0.49	0.04	0.86	10.20***
MMP	-2.55	0.90	0.05	0.93	15.71***
EOF	-0.18	0.56	0.02	0.96	22.12***
SG	-1.80	0.72	0.01	0.99	69.49***

Note: \*\*\* Indicates significant at one percent level of significance.

<sup>11</sup> Cereals (CR), pulses (PL), vegetables (VG), fruits (FR), meats (MT), tea, coffee and soft drinks (TCS), milk and milk products (MMP), edible oils and fats (EOF), and sugar and gur (SG).

**Table: 3. Expenditure Elasticities for Selected AFC Groups in Rural Pakistan if Household Size is One Person**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	2.53	0.35	0.52	4.28***
PL	0.74	0.36	0.62	4.06***
VG	2.03	0.37	0.43	2.73***
FR	-3.52	0.96	0.86	7.81***
MT	0.17	0.72	0.88	8.69***
TCS	-0.27	0.52	0.86	7.73***
MMP	-2.27	0.85	0.88	8.71***
EOF	0.37	0.56	0.44	2.78***
SG	-2.09	0.82	0.83	8.97***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 4. Expenditure Elasticities for Selected AFC Groups in Rural Pakistan if Household Size is 2-4 Persons**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	2.01	0.41	0.96	18.51***
PL	1.43	0.23	0.48	3.58***
VG	2.69	0.28	0.45	3.36***
FR	-1.28	0.71	0.75	6.44***
MT	1.17	0.58	0.94	14.38***
TCS	0.03	0.44	0.94	15.04***
MMP	-1.52	0.75	0.95	15.73***
EOF	1.41	0.41	0.74	6.37***
SG	-0.32	0.57	0.95	16.65***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 5. Expenditure Elasticities for Selected AFC Groups in Rural Pakistan if Household Size is 5-7 Persons**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	2.66	0.31	0.81	8.41***
PL	1.38	0.21	0.52	4.14***
VG	1.60	0.38	0.82	8.64***
FR	-2.56	0.84	0.86	10.06***
MT	1.61	0.49	0.70	6.16***
TCS	-0.21	0.42	0.56	4.55***
MMP	-1.02	0.64	0.72	6.41***
EOF	0.99	0.41	0.74	6.83***
SG	0.86	0.38	0.70	6.09***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 6. Expenditure Elasticities for Selected AFC Groups in Rural Pakistan if Household Size is 8 and more Persons**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	1.76	0.43	0.95	19.04***
PL	0.03	0.37	0.32	2.77***
VG	0.29	0.53	0.91	13.01***
FR	-3.81	0.99	0.84	9.20***
MT	-1.10	0.87	0.94	16.29***
TCS	-1.77	0.62	0.89	11.23***
MMP	-2.27	0.81	0.91	12.45***
EOF	-1.38	0.73	0.92	13.95***
SG	-1.45	0.68	0.96	12.04***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 7. Expenditure Elasticities for Selected AFC Groups in Urban Pakistan if Household Size is one Person**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	2.38	0.36	0.72	6.62***
PL	0.18	0.37	0.49	30.40***
VG	2.02	0.39	0.84	9.26***
FR	-1.27	0.76	0.74	6.94***
MT	2.31	0.48	0.68	6.06***
TCS	2.30	0.20	0.41	3.44***
MMP	0.79	0.55	0.73	6.71***
EOF	1.90	0.37	0.88	11.06***
SG	-0.11	0.57	0.72	6.57***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 8. Expenditure Elasticities for Selected AFC Groups in Urban Pakistan if Household Size is 2-4 Persons**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	1.82	0.41	0.97	28.16***
PL	1.60	0.17	0.63	5.41***
VG	1.84	0.37	0.91	13.59***
FR	-1.70	0.78	0.96	20.76***
MT	1.41	0.55	0.87	10.99***
TCS	1.44	0.23	0.58	4.85***
MMP	0.09	0.62	0.91	13.01***
EOF	0.90	0.45	0.93	15.50***
SG	-0.93	0.62	0.94	15.93***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 9. Expenditure Elasticities for Selected AFC Groups in Urban Pakistan if Household Size is 5-7 Persons**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	1.57	0.43	0.99	72.29***
PL	1.35	0.17	0.85	9.47***
VG	1.49	0.38	0.95	17.31***
FR	-2.39	0.85	0.95	18.20***
MT	0.46	0.64	0.94	16.67***
TCS	0.15	0.36	0.74	6.82***
MMP	-1.48	0.76	0.91	13.17***
EOF	0.93	0.41	0.94	15.78***
SG	-1.28	0.65	0.98	34.67***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 10. Expenditure Elasticities for Selected AFC Groups in Urban Pakistan if Household Size is 8 and more Persons**

Food Group	$\alpha_j$	$\beta_j$	$R^2$	T
CR	1.20	0.48	0.94	15.59***
PL	-0.15	0.38	0.67	5.67***
VG	0.94	0.44	0.90	11.93***
FR	-3.02	0.91	0.95	17.46***
MT	-0.34	0.74	0.97	22.39***
TCS	-1.51	0.57	0.84	9.34***
MMP	-2.55	0.89	0.92	13.29***
EOF	0.20	0.48	0.80	8.02***
SG	-1.29	0.63	0.97	25.30***

Note: \*\*\* Indicates significant at one percent level of significance.

**Table: 11. Double-Logarithmic Curves: Estimated Results for Cereals**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	1.99	15.39***	0.90
Ln total expenditure	0.40	28.74***	
Location	0.15	5.06***	
Household size (2 – 4 persons)	-0.10	-2.48***	
5 – 7 persons	-0.20	-4.64***	
8 and more persons	-0.17	-3.73***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 12. Double-Logarithmic Curves: Estimated Results for Pulses**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	1.63	4.46***	0.41
Ln total expenditure	0.20	5.06***	
Location	0.29	3.57***	
Household size (2 – 4 persons)	-0.24	-2.05**	
5 – 7 persons	-0.48	-4.01***	
8 and more persons	-0.54	-4.27***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 13. Double-Logarithmic Curves: Estimated Results for Vegetables**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	1.96	11.64***	0.89
Ln total expenditure	0.39	21.81***	
Location	0.04	0.96	
Household size (2 – 4 persons)	-0.30	-5.65***	
5 – 7 persons	-0.53	-9.58***	
8 and more persons	-0.69	-11.85***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 14. Double-Logarithmic Curves: Estimated Results for Fruits**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	-1.99	-5.96***	0.88
Ln total expenditure	0.86	23.86***	
Location	-0.06	-0.75	
Household size (2 – 4 persons)	-0.38	-3.54***	
5 – 7 persons	-0.55	-4.96***	
8 and more persons	-0.69	-5.98***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 15. Double-Logarithmic Curves: Estimated Results for Meats**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	1.06	4.91***	0.89
Ln total expenditure	0.62	26.49***	
Location	0.02	0.32	
Household size (2 – 4 persons)	-0.21	-3.08***	
5 – 7 persons	-0.42	-5.94***	
8 and more persons	-0.36	-4.80***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 16. Double-Logarithmic Curves: Estimated Results for TCS Group**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	0.55	2.41**	0.82
Ln total expenditure	0.39	15.78***	
Location	0.20	4.01***	
Household size (2 – 4 persons)	-0.37	-5.12***	
5 – 7 persons	-0.64	-8.42***	
8 and more persons	-0.76	-9.56***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 17. Double-Logarithmic Curves: Estimated Results for Milk Group**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	-0.72	-2.93***	0.91
Ln total expenditure	0.72	26.91***	
Location	-0.40	-7.33***	
Household size (2 – 4 persons)	-0.15	-1.93	
5 – 7 persons	-0.39	-4.75***	
8 and more persons	-0.48	-5.61***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 18. Double-Logarithmic Curves: Estimated Results for Oils and Fats**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	1.04	4.92***	0.86
Ln total expenditure	0.46	20.30***	
Location	0.17	3.54***	
Household size (2 – 4 persons)	-0.27	-3.96***	
5 – 7 persons	-0.55	-7.88***	
8 and more persons	-0.63	-8.49***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Table: 19. Double-Logarithmic Curves: Estimated Results for Sugar and Gur**

Explanatory variables	Parameter	T- Statistics	$R^2$
(Constant)	-0.40	-2.02***	0.92
Ln total expenditure	0.60	28.30***	
Location	0.12	2.69***	
Household size 2 – 4 persons	-0.32	-5.05***	
5 – 7 persons	-0.54	-8.27***	
8 and more persons	-0.64	-9.27***	

Note: \*\*\* & \*\* Indicate significant at one & five percent level of significance, respectively.

**Appendix B****Table: B1. Size of an Average HH and its Composition by Sex and Quintiles (Pakistan)**

Average HH Size	Quintiles					
	Total	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
No. of sample Households	14708	2277	2598	2832	3156	3845
Percentage of Households	100.00	16.16	17.19	18.71	21.25	26.68
Average number of: Members per HH	6.75	8.66	7.62	6.98	6.31	5.20
Male	3.44	4.33	3.89	3.55	3.25	2.67
Female	3.31	4.33	3.73	3.43	3.06	2.54
Average number of adults Male (age 18 & above)	1.71	1.77	1.68	1.72	1.74	1.66
Female (age 16 & above)	1.84	2.00	1.87	1.86	1.84	1.72
Children	3.19	4.89	4.07	3.40	2.73	1.83
Percentage of HH by number of members:	100.00	100.00	100.00	100.00	100.00	100.00
Total						
One	0.85	0.09	0.00	0.16	0.33	2.74
Two	4.35	0.33	0.74	1.34	4.35	11.22
Three	6.95	1.27	2.53	5.76	7.78	13.41
Four	10.57	3.07	6.02	9.44	12.94	16.96
Five	13.68	7.04	12.15	13.49	16.77	16.34
Six	14.93	11.41	15.57	16.56	16.89	13.93
Seven	13.88	15.42	16.39	16.75	13.16	9.90
Eight	11.90	17.79	15.99	12.98	10.84	5.77
Nine	8.04	12.80	11.74	9.03	5.98	3.71
Ten & over	14.86	30.79	18.86	14.47	10.95	6.02

Source: HIES 2004-05 electronic data copy.

**Table: B2. Size of an Average HH and its Composition by Sex and Quintiles (Urban Pakistan)**

Average HH Size	Quintiles					
	Total	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
No. of sample Households	5809	540	726	959	1267	2317
Percentage of Households	100.00	7.99	10.68	15.42	21.58	44.33
Average number of: Members per HH	6.63	9.30	7.91	7.46	6.90	5.43
Male	3.39	4.61	4.00	3.80	3.57	2.79
Female	3.24	4.69	3.92	3.65	3.33	2.64
Average number of adults						
Male (age 18 & above)	1.83	1.89	1.82	1.86	1.96	1.75
Female (age 16 & above)	1.93	2.21	1.99	2.02	2.04	1.79
Children	2.87	5.21	4.10	3.58	2.90	1.89
Percentage of HH by number of members:	100.00	100.00	100.00	100.00	100.00	100.00
Total						
One	1.20	0.00	0.00	0.00	0.31	2.56
Two	3.65	0.44	0.58	0.71	2.10	6.74
Three	6.94	1.49	2.50	3.10	4.86	11.33
Four	11.18	0.90	4.03	6.27	9.03	17.51
Five	15.69	4.04	8.84	13.47	17.50	19.34
Six	14.80	8.69	13.05	15.94	15.90	15.38
Seven	13.59	15.69	17.94	17.72	14.78	10.14
Eight	11.51	19.94	17.99	15.89	12.15	6.59
Nine	7.70	16.06	14.22	7.90	8.27	4.28
Ten & over	13.74	32.75	20.84	18.99	15.08	6.12

Source: HIES 2004-05 electronic data copy.

**Table: B3. Size of an Average HH and its Composition by Sex and Quintiles (Rural Pakistan)**

Average HH Size	Quintiles					
	Total	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
No. of sample Households	8899	1737	1872	1873	1889	1528
Percentage of Households	100.00	20.05	20.30	20.28	21.10	18.28
Average number of: Members per HH	6.80	8.53	7.55	6.81	6.03	4.94
Male	3.46	4.27	3.87	3.46	3.10	2.52
Female	3.34	4.26	3.68	3.35	2.93	2.42
Average number of adults Male (age 18 & above)	1.65	1.75	1.65	1.68	1.64	1.55
Female(age 16 & above)	1.80	1.96	1.84	1.80	1.74	1.63
Children	3.35	4.83	4.06	3.34	2.64	1.76
Percentage of HH by number of members:	100.00	100.00	100.00	100.00	100.00	100.00
Total						
One	0.68	0.10	0.00	0.22	0.34	2.95
Two	4.68	0.31	0.78	1.57	5.45	16.38
Three	6.96	1.22	2.53	6.72	9.21	15.81
Four	10.28	3.48	6.52	10.59	14.85	16.31
Five	12.72	7.61	12.98	13.50	16.42	12.88
Six	14.99	11.92	16.21	16.78	17.37	12.26
Seven	14.02	15.37	16.01	16.41	12.36	9.61
Eight	12.08	17.38	15.49	11.93	10.20	4.83
Nine	8.20	12.19	11.12	9.44	4.87	3.05
Ten & over	15.39	30.41	18.37	12.83	8.94	5.91

Source: HIES 2004-05 electronic data copy.

## Private Return on Higher Education in Pakistan

Malik Fahim Bashir and  
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### Abstract

*Since the development of human capital theory, education has been established, by various empirical researches, a key element in raising the economic well-being of an individual and a nation alike. However, demand for education in general and demand for higher education in particular has not picked up, so far, in many developing countries including Pakistan. A probable reason for this paradox could be the discrepancy in social and private rates of return on higher education. Therefore, this research estimates private rate of return for four successive degrees of higher education. This study considers education by degree and estimates private rate of return for each degree rather than social one. Private return on higher education has been estimated by two criteria; NPV and IRR, considering explicit as well as implicit costs and life long earnings. Results show that private rate of return is lowest for PhD degree by IRR criterion and for professional bachelor degree by NPV criterion, so, to boost demand for the highest degree of education, private rate of return must increase that can be achieved effectively either by raising pay scale or by increasing retirement age for PhD degree holders or by giving interest-free scholarships to PhD scholars.*

### I. Introduction

Until 1960s, accumulation of physical capital had been considered as the main factor of economic growth. Since capital accumulation, in turn, depends on savings of individuals and institutions, therefore primary focus in that period was on saving. This view has however changed after the development of endogenous growth theory in general and human capital

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theory in particular. Currently development of human capital is attached top priority to achieve sustainable economic growth. An individual or a nation that continuously strengthens its human capital can enjoy a higher standard of living for an extended period. Whereas a nation that ignores development of its human capital fails to achieve technical progress.

Human capital refers to enrichment of any latent ability of a person that adds to his/her productive efficiency. It simply means that human capital is not exogenously given; rather it can be generated by conscious effort of individuals and by a well-planned policy of government. Human capital is developed by improved nutrition, better healthcare, extra schooling, higher education, on-the-job training, involvement in productive research and other similar activities. To quantify the importance of each factor contributing towards human capital is a gigantic task. Therefore, to keep it manageable, this research will focus only on higher education

Higher education promotes economic growth in three different ways. First, to establish institutions of higher education, funds are activated to build, equip and furnish these institutions; to remunerate services of their staff and professors; and to pay for expenses of their students. Such activated funds are not turned over just once; rather they add to economic activity in the economy many fold through multiplier effect.

Second, higher education leads to additional earnings of successful graduates throughout their remaining life. Moreover, an increase in educated populace of a country enhances its welfare in many different ways. For example; decrease in the crime rate, improvement in the social, political and ecological environment of the society, development of communication skills, and strengthening of cultural and commercial relations with other nations.

Third, institutions of higher education incubate further research and experimentation which are necessary for technological progress. Off and on inventions and innovations may be conceivable in a country with low levels of education but a sustained growth in technology cannot be managed absence of institutions of higher learning. A qualified worker not only handles existing equipment and machines with more care but also thinks of improvement in their functioning and design.

In spite of long-standing evidence in support of higher education, so far, many developing countries have paid little attention towards higher education. Consequently, these countries lack in basic infrastructure for

growth and development and show poor indicators of human development. Unfortunately, Pakistan also falls in the category of those countries which have lowest human development index (HDI). Pakistan's HDI is 0.539 that is lower than that of India, Sri Lanka and many other developing countries. Pakistan stands at 135<sup>th</sup> position in the ranking of HDI compiled by United Nations Organization<sup>2</sup>.

To promote higher education in the country, Government of Pakistan government established Higher Education Commission (HEC) in 2000. HEC started, on one hand, awarding scholarships to seekers of higher degrees of education and on the other hand, increased funding to degree-awarding universities. Such efforts of HEC are though extremely laudable, yet they may not bring desirable results unless clubbed with a befitting reward system for those who successfully complete their degrees. The reason is that in hope of getting more funding from HEC, many universities might- admit all those who apply for admission without really testing their caliber and commitment to complete their degrees. Similarly, many bachelor degree holders, in charm of getting scholarships and stipends, might proceed for higher studies without showing real urge to complete their degrees. It means that current policy will definitely increase enrollment in higher studies but will not guarantee any increase in pass out ratio.

As in case of any other service like tailoring, hair-cutting and welding, it is the private rate of return to that service that truly represents its demand. As a principle, the higher is private rate of return to a service, the more willing should be a common person to learn it to its highest possible level. The same must be true in case of higher education. It can therefore be hypothesized that low demand for higher education in the country may be due to unattractive salary structure for graduates of higher education.

It is true that some people obtain higher education simply for the sake of social prestige that it confers. For example, in Pakistan, a bachelor degree is obligatory to become a member of legislative body or to head a national-level institution. However, in this research it is assumed that financial reward for a degree of higher education remains the main driving force for its pursuit. It means that a young man looks at relative rates of return of consecutive degrees of higher education to decide where to stop his/her education and enter the labor market.

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<sup>2</sup> Human Development Index (HDI) 2007, UN, Washington D.C.

In many previous studies, though the return on education has been estimated, yet their focus has been either too broad or too narrow. Some studies have compared rate of return on primary, secondary and higher education while others have estimated rate of return for a single year of schooling. Furthermore, some studies have estimated only social rate of return on education that duly highlights the importance of education in a society but does not reflect its demand. Therefore, the main objective of this study is to estimate private rate of return of four degrees of higher education; professional bachelor, master, M Phil and PhD. Particularly this research has the objectives to; estimate private NPV and IRR for professional bachelor, master, M Phil and PhD degrees, at first, on the basis of simplified assumptions, repeat the same exercise on the basis of relaxed assumptions and recommend various policies to boost the higher education.

The remaining portion of the study is organized as follows. Section II reviews the existing literature and empirical findings on the subject. Section III explains methodology, mentions data sources and discusses estimation methods. Section IV contains numerical results of this research and offers a thorough discussion of these results. Section V provides a summary of the study and lists few policy implications.

## **II. Literature Review**

For a long time, economic growth had been considered a fruit of capital accumulation and of exogenous technological progress. Later on, development of endogenous growth theory cast doubts about this view. One of the proponents of endogenous growth theory, Romer (1987) argued that differences in exogenous factors cannot fully explain different rates of economic growth experienced in various countries of the world. Indeed, there are certain endogenous factors which are useful to explain observed differences in growth rate of various countries. Among these factors, investment in human capital is the most important one. Improvement of knowledge and skills of individual workers enhances their productivity that results in sustained economic growth in the country.

Becker (1964) takes expenditures on education as an investment. It means that while deciding for admission in a higher degree of education, a person looks at the rate of return for that degree. If it is attractive, he/she gets admission in the degree program; otherwise he/she enters the labor market. That is why Becker (1974) interprets private return on educational investment as the demand for education.

Psacharopoulos (1985) analyzing the data of 60 countries explains that productivity benefits are attributed to education for two reasons. One is that productivity of the same physical capital when operated by a higher degree holder increases because he/she operates it more skillfully. The other is that he/she thinks of new ideas and innovative methods of operating it.

Education is widely accepted as the most important form of investment in human capital. For example, Luis and Romer (1991) noted that the success of South Korea and Taiwan and failure of Thailand in developing their economies in 1960s and 1970s may be attributed to differences in their levels of education. Realizing this lacuna, later on Thailand has been paying due attention towards its educational development. As a result, by the end of 1990s educational achievement of Thailand were comparable with those of other nations. Thus, Thailand emerged as the fifth largest economy in the cadre of newly industrialized countries of the region.

Psacharopoulos and Patrinos (2002 and 2004) reviewed studies of 98 countries conducted from 1960 to 1997 and concluded that higher education gives less return than that on primary and secondary schooling. All these studies focus only on financial benefits that accrue to individuals and tax revenues that go to government exchequer. In their analysis, they did not consider social benefits of education and positive impacts of research and development on technological innovations and inventions.

Lin (2004) is of the view that higher education plays a strong role in the economic growth of a country. According to his estimates, a one percent rise in higher education stock leads to a 0.35 percent rise in industrial output, and a one percent increase in the number of engineering or natural sciences graduates leads to a 0.15 percent increase in agricultural output. The author also concluded that graduates of natural and engineering sciences had the largest positive contribution in national output.

By using labor force survey data for Germany, Mark *et al.* (2004) calculated rates of return for higher education by subject and by gender. Their analysis shows that Medicine, Law, Economic and Social Studies yield highest private return followed by Mathematics, Engineering and Natural Sciences. They discovered that Language and Cultural Studies are quite unattractive among youth of the society because their rate of return is the lowest that is even less than that on government bonds.

In case of Pakistan, Guisinger et al. (1984) has studied return on education using Mincerian function and data for males only. They found a low rate of return for primary and lower secondary schooling and a high rate of return for higher levels of education in Pakistan. Haque (1977), Hamdani (1977), Khan and Iran (1985), Shabbir (1991), Nasir (1998) and Asadullah (2005) all have similar findings that return on education in Pakistan increases with the level of education and, on the average, return on education in Pakistan is less than that in other developing countries.

Monazza (2007) has found large differences in labor market earnings between males and females in Pakistan. She has concluded that return on an additional year of schooling ranges between 7 to 11 percent for men and between 13 to 18 percent for women. She has also discovered that in the labor market overall reward for men is much higher than that for woman. However, the increase in rate of return on higher levels of education is much higher for women.

As can be seen from all these studies whether conducted in context of a foreign country or in context of Pakistan, they have categorized education either too broadly like primary, secondary and higher or too narrowly like a year of schooling or education without mentioning any degree as pioneered by Mincer (1974). Whereas the right categorization, in our view, is education by degree like primary, middle or lower secondary, secondary, intermediate or higher secondary and bachelor degree at the lower level of education and professional bachelor, master, MPhil and PhD at the higher level of education. This study aims to fill up this gap as it concentrates on private rate of return for various degrees of higher education.

### **III. Methodology and Data Sources**

Computation of educational costs and benefits involves many assumptions and proxies. There are two types of costs; public cost incurred by the government and personal cost incurred by the individual who obtains education. Though both are relevant, yet it is the latter one that affects an individual's demand for higher education. Therefore, in this study, only private cost is taken into account. Personal costs can be further divided into two types; direct, explicit or out of pocket cost and indirect, implicit or opportunity cost of education. The former denotes the tuition fee and expenditures on stationary, books and boarding and lodging while the latter denotes the income forgone during the period of study. Both of these costs are taken into account in this research.

Benefits of education are also of two types, personal and social. Here, we take up only personal benefits because they determine the demand for education. Personal benefits of higher education can further be decomposed into financial benefits like salary and non-financial benefits like prestige in society. Since quantification of non-financial benefits requires many restrictive assumptions therefore they are ignored.

Financial benefits of education can be either regular like monthly salary or irregular like bonus pay. We take into account only regular benefits because data on irregular monetary benefits is scanty and unreliable and also because irregular benefits vary for employees of the same institution, not speak of employees of different institutions or ministries. Educated people find jobs either in public or in private sector. Since the pay of an employee in private sector depends more on his/her efficiency and managerial abilities than on his/her academic qualifications, therefore one can hardly find any standard pay scale in private sector. Each firm and industry has its own pay structure. Instead of taking the average pay in private sector, this study assumes that a potential candidate for higher education keeps in mind mainly basic pay scales (BPS) that are applicable to all employees of the government of Pakistan and autonomous bodies like universities. Therefore, opportunity cost and earnings of education are estimated on the basis of BPSs only.

Moreover, to obtain a degree, the timings of costs and benefits are not same because costs are incurred heavily at the beginning of a degree program while earnings accrue over an extended period of working life. Therefore, comparison of absolute costs and earnings is not meaningful. To get around this problem, net present value (NPV) and internal rate of return (IRR) that duly inculcate time value of money are used. Both methods give same results if initial investment for all investment projects or educational degrees under consideration is same. In case of different initial investment outlays, NPV is more pertinent than IRR.

For illustration, let us consider two projects, A and B, with initial investment of 100 and 1000 and one-period return of 110 and 1050 respectively. It means that IRR on project A is 10 percent and on project B is 5 percent. Therefore, according to IRR criterion, project A is definitely preferable over project B. On the other hand, NPV criterion requires a given interest rate to work with. In this example, if it is in the range of zero to 4.4 percent, then project B becomes preferable because the amount of its NPV comes out greater than that for project A even though IRR for project A

remains twice of that for project B. On the other hand, if interest rate is more than 4.5 percent, then NPV for project A is greater. In fact, a rational individual maximizes amount of NPV rather than IRR. However, IRR is more useful for general comparison of two projects. Therefore, in this research, both NPV and IRR have been measured.

NPV is the difference between present value of benefits of higher education and present value of its cost at a given interest rate. The greater is margin by which benefits exceed costs of a degree program, the more rewarding and attractive is that degree to potential candidates. On the other hand, IRR represents the discount rate that equates the present value of income stream accruing to a degree holder to the cost of degree. If this discount rate is higher than the market interest rate, then education is a worthwhile investment on pure economic grounds, otherwise not.

### 3.1. Calculation of Net Present Value (NPV)

Following formula has been used to calculate NPV for different degree programs.

$$NPV = \sum_{i=e+m+1}^n \frac{E_i}{(1+r)^i} - \sum_{i=e+1}^m \frac{(C_{Di} + C_{Oi})}{(1+r)^i}$$

- $E_i$  is the annual earning after obtaining a degree.
- $C_{Di}$  is the annual direct cost and  $C_{Oi}$  is the annual opportunity cost of a degree.
- $r$  denotes the given interest rate to discount future costs and future earnings.
- Subscript  $e$  denotes the age at the time of admission in a degree,  $m$  denotes the period for completion of a degree and  $n$  denotes the retirement age that is 60 for all degree holders.

### 3.2 Calculation of Internal Rate of Return (IRR)

IRR is defined as that rate of discount which equates the present value of future stream of net receipts with initial investment outlays. It is denoted as follows.

$$\sum_{i=e+m+1}^n \frac{E_i}{(1+d)^i} = \sum_{i=e+1}^m \frac{(C_{Di} + C_{Oi})}{(1+d)^i}$$

Explanation of all variables and super/subscripts is same as above except  $d$ , which denotes that discount rate or IRR which equates the present value of future benefits to the present value of costs.

### **3.3. Data Sources**

#### **3.3.1. Explicit Cost**

The explicit (direct) cost includes university fees, expenditures on books, stationary and transportation. Out of them, tuition is paid generally at the beginning of each semester and is same for all students whereas other expenses are incurred periodically over the whole period of study and may be different for each student. However, for simplicity, total explicit expenses in this research are treated as same for all students in a specific degree program. They are paid, by assumption, at the beginning of each academic year in lump sum.

Pakistan Social and Living Standard Measurement Survey (PSLM) 2004-05 reports education expenditures of 14000 households whose children were studying at any level. Out of them, 96 households had their children studying only in professional bachelor degree, 100 in master degree and 4 in MPhil and PhD programs. Other households had their children at different degrees of education. Therefore, we have picked up only these 200 households to estimate explicit cost of concerned higher degree programs. As the number of observations for M. Phil and PhD is very small, therefore it may not be advisable to make an analysis on the basis of PSLM only.

To take care off this data problem, we conducted a survey of 103 students of four universities in Islamabad; International Islamic University (IIU), Quaid-i-Azam University (QAU), National University of Modern Languages (NUML) and Allama Iqbal Open University (AIOU) in Summer 2008. The breakup of students who were interviewed is given in the appendix table 1. We asked them to disclose their expenditures on tuition fee, transport, stationary, books, and lodging and boarding. The figures obtained in this survey are compared with those ones deduced from PSLM 2004-05 data in table 3.1. Since cost figures from both data sets are quite close, therefore in calculations of NPV and IRR, we have used only those figures derived from PSLM data. Total cost of a degree is then evenly distributed over all years required for its completion.

**Table: 1. Explicit Cost of Different Degree Programs**

	<b>Professional Bachelor</b>	<b>Master</b>	<b>M. Phil</b>	<b>PhD</b>
PSLM	49742	26054	20490	4980
Survey	50968	27852	23692	51610

Source: Calculated by the author on the basis of PSLM 2004-05 and primary survey data.

### 3.3.2. Implicit Cost (Opportunity Cost)

Implicit cost is the income forgone during the period of a degree program. It is calculated on the basis of BPS to which an admission seeker for that degree is eligible to apply for job. For example, an admission seeker in a master degree must have a bachelor degree and having a bachelor degree, he/she is eligible to work in BPS 16. Therefore, indirect cost of a master degree is two-year salary in BPS-16; the first year salary without any increment and the second year salary with one increment. In addition to the specified pay of BPS as given in appendix table 2, 45 percent of the initial pay is added as house rent and a lump sum amount of Rs.2480 as conveyance allowance that is same for BPS 14 to 22 as per regulations of Government of Pakistan.<sup>3</sup> Similarly indirect cost of M Phil and PhD degrees is 2-year and 4-year salary in BPS-17 respectively. However, the first year salary for M Phil degree starts from initial pay without any advance increment while the first year salary for PhD degree starts with four advance increments. For each subsequent year, a single increment is added. Indirect cost for professional degree is not in one pay scale; rather it is assumed as 2-year salary in BPS-9 to which a higher secondary school graduate is eligible to apply and 2-year salary in BPS-16 to which a bachelor degree holder is eligible to apply. Conveyance allowance for BPS 1 to 13 is Rs.1380. The data used on BPS has been issued by Regulation Wing, Finance Division Government of Pakistan in June 2008.

Medical allowance is not included because its payment is usually not in cash. Dearness, special and other similar allowances, which are the part of salary of existing employees, are not included because a new entrant is not

<sup>3</sup> Some officers in BPS 20 to 22 who hold some executive posts are provided chauffer –driven cars. However, their percentage is small and moreover due to difficulty in estimating the cash-value of chauffer –driven cars, in this study the amount officially specified as conveyance allowance (that is Rs.2480) for these officers is taken for all.

entitled to them. Earnings other than regular pay of an individual such as traveling allowance are not considered due to lack of data and uniformity.

### **3.3.3. Degree Completion Time, Induction in Labor Market and Working Years**

The minimum prescribed time for completion of a professional, master, M Phil and PhD degree is 4, 2, 2 and 4 years respectively as collected from prospectuses of various universities and educational institutions. The age at time of admission and the age at time of completion of various degrees are estimated on the presumption that a child gets admission in first grade, on the average, at the age of 6 years. Then he/she passes his/her primary education at the age of 11 years, higher secondary or intermediate education at the age of 18 years and graduate degree at the age of 20 years. It is also supposed that degree holders enter the job market just after completing their degree and get jobs immediately. This information is summarized in appendix table 3<sup>4</sup>.

### **3.3.4. Lifelong Earnings**

Like opportunity cost of a degree, lifelong earnings are estimated on the basis of BPSs. It is assumed that after completing his/her degree, a degree holder immediately starts job in the BPS to which he is eligible to apply. More specifically it is assumed that a master and a professional bachelor degree holder joins BPS 17 without any increment, an M Phil degree holder joins BPS 17 plus four advance increments and a PhD degree holder joins BPS 18 without any increment plus five thousand PhD allowance. Then every degree holder keeps on getting an annual increment in the same BPS until he/she crosses all stages of relevant BPS. After getting the last stage, he/she is promoted to the next BPS in which his/her salary is fixed as per rules<sup>5</sup>. These assumptions are made for convenience and uniformity<sup>6</sup>. House rent and

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<sup>4</sup> Some individuals complete higher degrees of education while doing some part-time job. Accordingly their opportunity cost of education must be less. Similarly some degree-holders do not get job just after completing their degrees. Accordingly their lifelong earnings must be less. However, due to lack of data on part-time jobs and length of period for job-seeking, it is assumed that all degree seekers complete their degrees without doing any part-time job and get job just after completing their degree.

<sup>5</sup> In order to protect the existing pay, the difference in highest salary in the existing BPS and initial salary in the next PBS is filled with the increments of next BPS such that the salary becomes at least as much as in the existing BPS but not greater by the full amount of an increment in the next BPS.

<sup>6</sup> In fact, many employees are promoted to next higher scales before reaching the maximum limit of their existing scales. However, due to having little knowledge about possibility and

conveyance allowance are added to the salary mentioned in concerned BPS as explained above in context of indirect cost of a degree. Dearness, special and other similar allowances are granted to current employees only and not to fresh ones, therefore they are not included. Irregular financial benefits like bonuses and traveling allowance are ignored because of their non-uniformity and lack of data.

It means that a master as well as a professional bachelor degree holder who joins BPS 17 in the age of 23 years is promoted to BPS 18 in the age of 44 and is placed in the 14<sup>th</sup> stage of BPS 18. He/she is then promoted to BPS 19 in the age of 51 and is again placed in its 14<sup>th</sup> stage. He/she gets the final promotion in BPS 20 in the age of 58 years and is placed in its 12<sup>th</sup> stage. Finally he/she retires while getting the highest stage of BPS 20. Similarly an M Phil degree holder who starts job in the age of 25 years is promoted to BPS 18, 19, 20 and 21 in the age of 42, 49, 56 and 59 years respectively. He/she retires in 13<sup>th</sup> stage of BPS 21. Accordingly, a PhD degree holder joins BPS 18 in the age of 29 and then gets promotion to every next BPS a year latter than does M Phil degree holder.

### **3.3.5. Net Present Value (NPV)**

To calculate NPV, an interest rate must be given that represents the time value of money or opportunity cost of a degree. Mostly the risk-free interest rate that is given on Treasury Bills (T-Bills) is taken as the time value of money. In this research, the average interest rate on fortnightly offered 3 month T-Bills from July 2005 to June 2008 that comes out 8.67 percent is used as discount factor. The data on interest rates on T-Bills is taken from various issues of *Statistical Bulletins* published by State Bank of Pakistan.

### **3.4. Relaxation of Assumptions**

In sensitivity analysis in the subsequent section, the base case assumptions described above are changed in the following three ways.

- Retirement age is changed from 60 to 55 and 65 years.
- Completion time for each degree has been increased from the minimum prescribed period by one year because many students take longer than the minimum prescribed time to complete their degrees.

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actuality of such promotions at the time when an individual plans to take admission in a degree program, it is assumed that degree-seeker keep in mind this most probable scenario, which is known to them at the planning stage as well.

- The average of last 3 years' interest rate on 3-month T-Bills to calculate NPV for various degrees has been replaced with 5, 10 and 15 percent interest rates.

## VI. Results and their Description

Following table 2 shows costs and earnings of various degree programs for the base case. The figures are based on a detailed worksheet (not shown) that includes yearly costs and yearly earnings of each degree program under alternative assumptions. The base case adopts 60 years as retirement age, 8.67 percent as the discount rate which is the average of last 3 years' interest rates on 3-month T-Bills and assumes that a degree seeker completes his/her degree in minimum prescribed time for the degree. First three rows of the table report direct, indirect and total costs at zero rate of discounting for each degree program respectively. Fourth row shows total lifelong earnings. Fifth line gives NPV of total cost and earnings discounted at 8.67%. The last line of the table shows IRR for each degree program.

**Table: 2. Total Costs, Earnings, NPV and IRR for Different Degrees**

Education Level	Professional Bachelor	Master	M Phil	PhD
Direct Cost (in Rs.)	49,742	26,054	20,490	40,980
Opportunity Cost (in Rs.)	464,202	276,288	411,420	1,000,440
Total Cost (in Rs.)	510,944	302,342	431,910	1,041,420
Life Long Earnings (in Rs.)	15,181,461	15,181,461	15,815,085	16,275,819
NPV at r =8.67% (in Rs.)	1,938,944	2,507,645	2,734,545	2,405,757
IRR	30.42%	56.24%	47.88%	24.41%

Source: Author's calculations; based on PSLM 2004-05 and on BPSs 2008.

The total cost of education is the highest for PhD degree, second highest for a professional bachelor degree and is the lowest for a master degree. The main reason for visible differences in costs for these degrees is opportunity cost of education; otherwise yearly direct cost is the highest for master degree and lowest for M Phil and PhD degrees. The opportunity cost for professional bachelor degree is spread over 4 years including 2-year opportunity cost of simple bachelor degree. Here one might argue that opportunity cost of a simple bachelor degree should also be included in

indirect costs of other degrees. This argument is valid if the emphasis is on professional bachelor degree versus other three degrees. Since the focus of this research is to compare return on master, M. Phil and PhD degrees, therefore opportunity cost of simple bachelor degree is ignored for these degrees.

Total earnings of a professional bachelor and a master degree holder are same as both of them join BPS 17 in the age of 23 years and get promoted to next BPSs in same years. The absolute amount of lifelong earnings for PhD degree holders is the highest, Rs.16.276 million, and is the lowest for professional bachelor and master degree holders, Rs.15.181, as one would expect, yet the difference is not much. That is why NPV at  $r=8.67$  percent is the lowest, Rs.2.406 million, for PhD degree holders and highest, Rs.2.735 million for M. Phil degree holders. The reason for this discrepancy is clear that higher earnings to PhD degree holders start accruing in far future, in the age of 29 years.

IRR for all degrees is positive. It is the highest for master degree, 56.24 percent, followed by that for M Phil degree, 47.88 percent, then for professional degree, 30.42 percent and least for PhD degree, 24.41 percent. Hence, according to IRR criterion, obtaining of a master degree is most profitable while obtaining of a PhD degree is least profitable. Another anomaly that has been noted above is that an M Phil degree holder moves to next higher BPSs one year ahead of a PhD degree holder.

#### **4.1. Sensitivity Analysis**

Sensitivity analysis indicates one by one relaxation of three assumptions of the base case. First, two alternative retirement ages, 55 and 65 years, are considered in lieu of 60 years. Second, degree completion time is increased by one year from the minimum prescribed time for completion of each degree. Third, to calculate NPV, instead of using the average of actual interest rates on 3-month T-Bills during July 2006-June 2008 that is 8.67 percent, three arbitrarily chosen interest rates; 5, 10 and 15 percent are used.

The change in retirement age does not affect the cost for any degree but only the earnings of all degree holders. Absolute amount of earnings though decreases significantly in case of 55 years of age for retirement as shown in table 3, yet the order of earnings for various degrees remains unchanged. That is the highest lifelong earnings are for a PhD degree holder (Rs.12.691 million) and the lowest ones for a professional bachelor and a

master degree holder (Rs.11.969 million). Life long earnings for an M. Phil degree holder remain in the middle (Rs.12.330 million).

**Table: 3. Total Costs, Earnings, NPV and IRR for Different Degrees at Alternative Retirement Ages**

Education Level	Professional Bachelor		Master		M. Phil		PhD	
	55 year	65 year	55 year	65 year	55 year	65 year	55 year	65 year
Retirement Age	55 year	65 year	55 year	65 year	55 year	65 year	55 year	65 year
Total Cost	238,301	238,301	149,036	149,036	221,784	221,784	597,872	597,872
Life Long Earnings	11,968,548	19,083,201	11,968,548	19,083,201	12,330,372	19,936,425	12,691,386	20,297,559
NPV at r=8.67	1,823,443	2,031,503	2,371,247	2,616,948	2,559,653	2,871,285	2,192,914	2,563,013
IRR	30.41%	30.42%	56.24%	56.24%	47.87%	47.88%	24.35%	24.43%

Source: Calculations are based on PSLM 2004-05 and BPSs 2008.

NPV for PhD degree holders decreases from Rs.2.406 to 2.193 million and remains lower than those for M Phil and master degree holders. NPV for M Phil degree holders decreases from Rs.2.735 to Rs.2.560 million and remains the highest one. NPV for professional bachelor degree holders decreases from Rs.1.939 to Rs.1.823 million and remains the lowest one. The effect of change in retirement age on IRR is negligible.

In case of 65 years as retirement age, lifelong earnings for all degree holders increase significantly. However ordering of absolute earnings and NPV remain the same. In absolute terms, lifelong earnings for PhD degree holders are at the top (Rs.20.298 million), followed by those for M Phil degree holders (Rs.19.936 million), and at the bottom are for professional bachelor and master degree holders (Rs.19.083 million). With respect to NPV, M Phil is at the top (Rs.2.871 million), followed by master (Rs.2.617 million), then by PhD (Rs.2.563 million) and at the bottom is professional bachelor degree (Rs.2.032 million). The effect on IRR is in few basis points.

Many students take more than the minimum prescribed period to complete a given degree. Therefore, degree completion time for each degree is increased by one year arbitrarily to measure the cost of each degree. This change affects both costs and earnings as the average cost of another year of education is added to total costs and one-year earnings are deducted from lifelong earnings. Table 4 shows total costs and earnings for different degrees.

**Table: 4. Total Costs, Earnings, NPV and IRR for an Extra Year to Complete Each Degree**

<b>Education Level</b>	<b>Professional Bachelor</b>	<b>Master</b>	<b>M Phil</b>	<b>PhD</b>
Direct Cost	58,427.5	39,081	30,735	51,225
Indirect/Opportunity Cost	610,806	422,892	630,450	1,272,750
Total Cost	669,233.5	461,973	661,185	1,323,975
Life Long Earnings	15,181,461	15,181,461	15,815,085	16,275,819
NPV at $r = 8.67\%$	1,627,731	2,139,082	2,278,187	1,926,391
IRR	23.54%	35.36%	30.39%	19.29%

Source: Calculations are based on PSLM 2004-05 and BPSs 2008.

Though NPV for each degree decreases due to one year increase in degree completion period, yet their ordering remains the same. That is, M Phil is at the top (Rs.2.278 million), followed by master (Rs.2.139 million), then by PhD (Rs.1.926 million) and at the bottom is professional bachelor degree (Rs.1.627 million). In this case, IRR decreases significantly but ranking of degrees does not change. Master degree remains at the top as its IRR decreases from 56.24 percent to 35.36 percent; M Phil degree remains at number two as its IRR decreases from 47.88 percent to 30.39 percent, professional bachelor degree remains at number three as its IRR decreases from 30.42 percent to 23.54 percent; and PhD degree is at the bottom as its IRR decreases from 24.41 percent to 19.29 percent.

In stead of relying on a single interest rate (8.67%) to calculate NPV, we have considered three different interest rates; 5, 10 and 15 percent, because any of them may actually prevail in future. This change has no effect on IRR for any degree. It affects only NPV values as given in table 5.

It is interesting to note that NPV for M Phil degree remains the highest and for professional bachelor degree remains the lowest for all three interest rates used for discounting future costs and future earnings. However, NPV for PhD degree is the second highest at 5 percent discount rate that drops down to number three at higher discount rates. The reverse is true for master degree that is at number three at 5 percent discount rate but moves to number two at 10 and 15 percent discount rates. The reason is that earnings for PhD

**Table: 5. Total Costs, Earnings and NPV for Different Degrees at Alternative Interest Rates**

Education Level	Professional Bachelor	Master	M Phil	PhD
Total Cost	510,944	302,342	431,910	1,041,420
Life Long Earnings	15,181,461	15,181,461	15,815,085	16,275,819
NPV at r=5 percent	4,155,648	4,795,582	5,177,248	4,980,755
NPV at r=10 percent	1,509,404	2,045,714	2,230,658	1,868,780
NPV at r=15 percent	634,461	1,063,747	1,144,545	719,444

Source: Calculations are based on PSLM 2004-05 and BPSs 2008.

degree accrue in later periods and as a principle in finance, the later in time accrue the returns of a project, the less profitable it becomes at increasing interest/discount rates.

## V. Summary and Policy Implications

Endogenous growth theory in general and human capital theory in particular emphasize education as a powerful determinant of prosperity and economic uplift of an individual and of a nation alike. Any individual who lacks education and any nation which ignores education of its citizens remain lowest in economic ranking. Implication of human capital theory that education is the fastest route to achieve economic prosperity, however, does not seem to be working in Pakistan because demand for higher education is not increasing as expected.

To understand this contradiction in theory and practice, an educational degree should be treated as an investment. Since investors of physical and financial assets compare NPVs and IRRs of competing investment options and choose the one which has highest NPV or IRR, therefore the same criterion should be applied to any degree of higher education. In this regard, private rather than social return on educational investment should be estimated because the former determines the demand for education while the latter shows the importance of education in a society. Therefore, this research has estimated only private return on higher education in Pakistan.

Initially NPVs and IRRs for various degrees have been estimated by using base case assumptions that are 60 years as retirement age, a single

interest rate of 8.67 percent that is the average of last 3 years' interest rates on T-Bills of 3 month maturity for discounting future costs and earnings of a degree holder, and the minimum prescribed time for completion of a degree as the actual time to complete that degree. In sensitivity analysis we have relaxed these assumptions one by one. Two alternative retirement ages, 55 and 65 years are considered in lieu of 60 years; degree completion time is increased by one year from the minimum prescribed time for completion of each degree; and to calculate NPV three arbitrarily selected interest rates; 5, 10 and 15 percent are used.

Overall result is that the rate of return for master and M Phil degrees is much higher than that for professional bachelor and PhD degrees. The reason for lower rate of return for professional bachelor degree is due to high cost of this degree that includes additional opportunity cost of simple graduation that may be arguable. However, lower rate of return for PhD degree explains precarious demand for this degree of highest learning. This research discovers another anomaly that besides low rate of return for PhD degree, its holders remain one-year behind M Phil degree holders with regard to their promotion in next higher BPSs.

Change in retirement age though affects total earnings of degree holders significantly, yet the IRR for these degrees do not change much. One year increase over the minimum prescribed time for completion of each degree affects both costs and earnings of a degree. It reduces IRR for various degrees tremendously. It means that if a longer than minimum prescribed period becomes common that is currently in case of M Phil and PhD degrees, then demand for these higher degrees would reduce significantly. Use of different interest rates to estimate NPVs for various degrees highlights that an increase in interest rate lowers the demand for PhD degree the most because its earnings start coming relatively late in potential working life.

In spite of all the emphasis of human capital theory that education is the most rewarding investment, still demand for the highest degree of education, PhD, is extremely low and is not catching up in Pakistan as expected. The results of this research explain this contradiction in theory and practice to a great extent. Potential degree seekers look at private rate of return for a degree whereas human capital theory proclaims obtaining of education as one of the best investments on the basis of social rate of return.

Policy implications of this research are that private rate of return should be improved for professional bachelor and PhD degrees. It can be achieved in following three ways:

- One is to raise the pay scale or give advance increments to professional bachelor and PhD degree holders. The current reward structure is anomalous not only from pure economic point of view as IRR is lower for professional bachelor and PhD degree but also from social point of view as PhD degree holders lag behind M. Phil degree holders for promotion to next BPSs.
- The other is to grant interest free loans in stead of scholarships and stipends to students of these degrees so that the cost of these degrees decreases only for successful degree seekers and remains high for unsuccessful ones. The reason is that a successful degree holder will pay back the loan at a latter period out of high earnings; therefore the present value of costs will decrease for him/her. On the other hand, since an unsuccessful degree seeker will have to pay back the loan just after he/she drops out, therefore present value of costs will be higher. Consequently only committed students will take admission in higher degrees.
- Retirement age for M Phil and PhD degree holders may be increased at least by the minimum prescribed time for completion of these degrees so that earning span for all degree holders becomes equal. The retirement age for PhD degree holders may further be increased in compensation of having their earnings late in life due to longer period of their studies.

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**Appendix Tables**

**Table: 1. University-Wise Students Interviewed for Direct Cost**

Education Level	Professional Bachelor	Master	M Phil	PhD	Total
IIUI	08	08	06	12	34
QAU	-	07	06	13	26
NUML	02	05	05	05	17
AIOU	03	10	05	08	26
Total	13	30	22	38	103

*Source:* Survey conducted by the researchers in summer 2006.

**Table: 2. Detail of Relevant Basic Pay Scales (BPS)**

BPS	Existing Pay Scales 1/7/2005	Stages	Existing Pay Scales 1/7/2007	Stages
19	14260-705-28360	20	16400-810-32600	20
18	9355-675-22855	20	10760-775-26260	20
17	7140-535-17840	20	8210-615-20510	20
16	4375-340-14575	30	5050-390-16750	30
9	2770-165-7720	30	3185-190-8885	30

*Source:* Regulation Wing, Finance Division, Government of Pakistan, June 2008.

**Table: 3. Life Time Plan of a Degree Seeker**

Education Level	Age to begin degree	Min. period of study	Age when starts job	Working years
Professional Bachelor	19	4	22	38
Master	20	2	22	38
M Phil	22	2	24	36
PhD	24	4	28	32

*Source:* Various prospectuses of educational institutions.

## Changing Demographic Trends and Housing Market in Pakistan

Parvez Azim and Rizwan Ahmad<sup>1</sup>

### Abstract

*This paper analyzes the impact of changing demographic trends on housing market in Pakistan. An analytic device, a phase diagram, has been used to show the relationship between demographic change and demand for housing in Pakistan. The characteristics of this paper are as follows. First, a model comprising four equations is developed to investigate the relationship between different variables such as housing stock, demand for housing, real rental price, rate of depreciation, net investment in housing, gross investment in housing, real price of housing unit and growth in population. Second, set of four equations is reduced to two differential equations which are used to solve for house prices ( $P$ ) and number of houses per adult in a country ( $h$ ). These two equations are also used to draw phase diagrams and to draw our conclusions. It is concluded that house prices are directly related to growth rate of population and inversely related to the number of houses per adult. In Pakistan, a rise in the growth rate of the adult (house-buying years segment) population will increase the demand for housing for the next four decades. Moreover, a fall in the total population growth rate could not cause downward trend in house prices because of changing age structure. We have to consider the composite impact of all related factors on house prices which in turn impact the supply and demand for housing in country.*

### I. Introduction

House prices have been one of the hotly debated topics in Pakistan. Like food, housing is a basic need and house rent constitutes twenty four

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percent of the total weight<sup>2</sup> of basket of goods and services considered in calculation of the consumer price index number. For past ten years, the Housing and Construction sector has been playing an important role in economic development of Pakistan by providing substantial employment opportunities because of its forward and backward linkages in economy. Nearly 40 industries are linked with construction activities<sup>3</sup> with employment elasticity of 0.6. House prices like other goods and services are determined by the market forces. Supply of houses depends on house prices, the price of land, the cost of construction material, the cost of financing and the amount of un-depreciated housing stock. On demand side, the demand depends on house prices, the level of mortgage rates, expectations of permanent income or wealth, rates of return on other investments such as national saving schemes and demographic factors. This paper focuses mainly on a demographic factor, i.e. change in age structure and its impact on housing market in Pakistan.

Age distribution is an important demographic factor that needs to be considered while analyzing the demand and prices of housing in a country. A young population between 0-19 of age generates little housing demand while housing demand rises from age 20 and above. Homeownership is also expected to vary by different age brackets. To analyze the impact of changing age structure on demand for housing in Pakistan, we use a combination of mathematical model developed by Mankiw and Weil (1988) and an analytic device known as phase diagram. We organize this paper as follows:

Section II presents brief literature review about demographic change and its impact on housing demand. Section III gives an overview of demographic changes and situation of housing market in Pakistan while section IV analyzes the relationship between changing age structure and its impact on housing demand in Pakistan with the help of phase diagrams and model presented by Mankiw and Weil (1988). In the end, we give our conclusions in section V.

## **II. Literature Review**

Mankiw and Weil (1988) are considered as the two main researchers who initially analyzed the relationships between demographic changes and housing market empirically<sup>4</sup>. For this purpose, they developed a demographic

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<sup>2</sup> GOP, 2001-01.

<sup>3</sup> GOP, 2006-07a.

<sup>4</sup> Fortin and Leclerc (2000).

index of housing demand and showed how demand for housing changes with age. They found that age-specific demand for housing reach its maximum by the age of 40. They estimated that due to ageing of baby-boom generations, real prices of housing in US could fall by 47% from 1990 to 2010. However, they also concluded that this effect of demographic changes on house prices will be counterbalanced by increase in real income.

This interpretation of housing demand by Mankiw and Weil (1988) was criticized by Swan (1995) who suggested that other than adult population, real income, relative prices and real interest rates are also important determinants of housing demand which needed to be considered in the model.

A study by Thomas and Malmberg (2005) also found that planning for residential construction should depend upon the age structure of population. By using Swedish time series and OECD panel data, they found a positive association between young adult population and residential construction in Sweden. They also found negative impact of ageing population of above 75 years and concluded that ageing population in industrialized countries may have negative impact on the construction industries in future.

In Finland, Kuismanen et al., (1999) applied Mankiw and Weil model to analyze the role of demographic factors on the demand for housing. Using time series data they concluded that a one percent increase in demographic demand leads to one percent growth in housing demand. Similarly, studies by Foot and Stoffman (2000) in Canada showed that increase in ageing population may negatively affect the demand for housing but increase in real income of people will likely to offset this negative impact on housing demand in future.

Fortin and Leclerc (2000) analyzed the demographic change and its impact on real prices of housing in Canada. By using data for the period of 1956 to 1997, they developed a structural model of Canadian housing market. They concluded that other than real income of people, the growth rate of population between the age of 25 to 54 years have significant impact on housing prices. They also concluded that slowing the rate of this age group in future or ageing population may reduce the real prices of housing in future.

Contrary to above studies, Pitkin and Myers (1994) and Green and Hendershott (1996) found that housing demand does not fall even after the age of 40 and continues to rise to the age of 70.

In Pakistan, only few studies related to housing market exist but none of them analyze the impact of age structure on demand for housing. For example, Ghaus and Pasha (1990) analyzed the trends in housing conditions in Pakistan. By using Housing Census of 1960 and 1980, they quantified different indicators of housing consumption like household size, real rental per capita and persons per room. Their results show a significant improvement in housing conditions over the time and relatively slow growth in housing shortages.

Nazli and Malik (2003) analyzed the relationship between poverty and inadequate housing facilities in Pakistan. They concluded that inadequate housing facilities create sense of insecurity and disempowerment among poor people.

Most of the studies cited above analyzed the impact of ageing population on the demand for housing in advanced countries. However, in country like Pakistan where majority of population is in young and working age (15-64 years), population ageing is not a problem<sup>5</sup>. Instead, here is a need to analyze the impact of youthful population on demand for housing in future. This paper is an effort to serve this purpose.

### **III. Demographic Changes and Housing Market in Pakistan**

Pakistan is the sixth largest country in the world by population. Estimated population of Pakistan in year 2009-10, was 170 million people with an annual growth rate of 1.8 percent. It is not the population size and the growth rate only that matters but the age structure of population also plays an important role in decision making of individual's economic life<sup>6</sup>.

Pakistan is now going through the stage of demographic transition in which generations of children who were born in the period of high fertility are entering into the working age, this will increase the labor supply in future<sup>7</sup>. Moreover, as fertility rate is now falling, female labor force participation rate will also rise. A direct impact of this change will be decrease in young and old aged dependency ratios and increase in ratio of working age to dependant population (table 1).

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<sup>5</sup> See, Ahmad and Azim (2008).

<sup>6</sup> See, Lee et al. (2006).

<sup>7</sup> See, Nayab (2008).

**Table: 1. Demographic Indicators of Pakistan, 1950 -2050**

<b>Years</b>	<b>1950</b>	<b>1975</b>	<b>2000</b>	<b>2025</b>	<b>2050</b>
Population growth rate (%)	2.4	2.6	2.2	1.3	0.7
Aging index	21.7	13.1	13.8	21.1	53.8
Broad age groups (%)					
0-14	37.9	42.0	41.8	34.4	23.1
15-60 and above	62.1	58.0	58.2	65.6	76.9
Median age (years)	21.2	19.0	18.9	22.8	31.8
Dependency ratio					
Total	76.3	83.0	83.4	64.6	45.9
Youth	66.9	76.8	76.6	56.7	33.8
Old age	9.4	6.2	6.7	7.9	12.1
Potential support ratio	10.6	16.1	14.8	12.7	8.2
Ratio of working to dependant population	1.31	1.21	1.31	1.58	2.13

Source: United Nations, 2002 and author's own calculations.

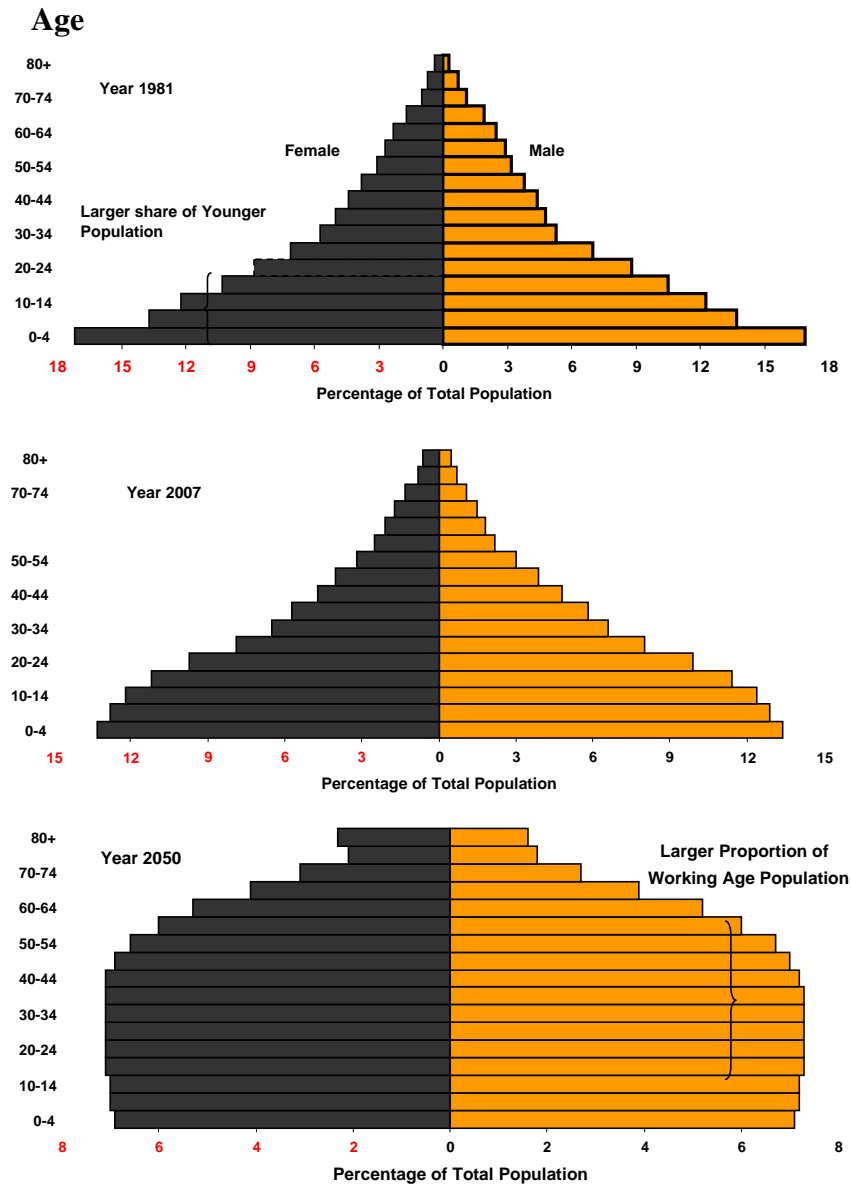
Population pyramids of Pakistan (figure 1) also indicate changing age structure in Pakistan. Housing buying segment of population (20 years and above) has increased from 47 percent to 50 percent since 1981 and is expected to increase up to 72 percent in year 2050. Since the share of adult population (house-buying years) is rising there would be a rise in the demand for housing which would exert an upward pressure on house prices in the next four decades.

Housing statistics of Pakistan shows the shortage of houses in the country. According to the population census 1998, there were 19.3 million housing units with an average household size of 6.6 and 3.3 persons per room. Currently, incremental demand for housing is 570,000 units per annum but only 300,000 units are being built, so every year there is a shortage of 270,000 units per annum (table 2).

Due to this shortage and rising demand, house rent has increased by 40.45 percent since the year 2000-01 and is expected to increase further. In order to meet the housing shortfall and address the backlog of 8 million housing units, the housing supply will have to be increased to 970,000 units annually for next 20 years<sup>8</sup>.

<sup>8</sup> GOP, 2004-05.

Figure: 1. Population Pyramids of Pakistan



Source: U.S Bureau of Census, International Data Base.

**Table: 2. Housing Statistics in Pakistan**

Total population	170 Million (2009-10)
Urban population	38 % of total population
Total housing units	19.3 million
Owned housing units	85.9 %
Household size	6.5
Room density	6.7 persons per room
Demand for housing	570,000 units per annum
Supply of housing	300,000 units per annum
Net shortfall of housing	270,000 units per annum
Total housing backlog	8 million units
Housing finance, as percentage of GDP	0.7%

Source: GOP 2006-07b and SBP, 2009-10

#### IV. The Model

The main purpose of this study is to analyze the impact of increase in the share of population (house buying years) on housing market in the country. For this purpose we use the model developed by Mankiw and Weil, 1988, and an analytic device known as Phase diagrams to establish the relationship between demographic change, housing demand and prices. This forward-looking model<sup>9</sup> is presented in the following set of four equations.

$$Hd = f(R) N \dots\dots\dots (i)$$

$$R = R(h) \frac{\partial R}{\partial h} = R^* > 0 \dots\dots\dots (ii)$$

$$R(h) = rP - P^* \dots\dots\dots (iii)$$

$$H^* + dH = g(P)N \quad \frac{\partial g}{\partial P} = g' > 0 \dots\dots\dots (iv)$$

Where:

$H$  = stock of housing

$Hd$  = demand for housing

$R$  = real rental price

<sup>9</sup> This model draws heavily on Shone, (2002) and Mankiw and Weil, (1988).

$N$  = adult population

$h = \frac{H}{N}$  = number of houses per adult (20 years and above) of the population

$h^*$  = growth in number of houses per adult in population

$P$  = real price of a standardized housing unit (value of the house)

$P^*$  = growth in house prices

$rP$  = operating cost of owing a home

$d$  = rate of depreciation

$H^*$  = net investment in housing

$H^* + dH$  = gross investment in housing

$n = \frac{N^*}{N}$  = rate of growth in population

Differentiation of equation (i) with respect to  $N$  gives us  $\frac{dH_d}{dN} = f(R) > 0$

which implies that demand for housing will increase with a rise in adult population.

Differentiation of (iv) with respect to  $N$  gives us

$\frac{d(H^* + dH)}{dN} = g(P) > 0$  which implies that gross investment in housing sector will increase with a rise in adult population.

Differentiation of  $h = \frac{H}{N}$  with respect to time gives us

$$h^* = \frac{NH^* - HN^*}{N^2} = \frac{H^*}{N} - \left(\frac{H}{N}\right) \frac{N^*}{N} \text{ where } h^* = \frac{dh}{dt} \text{ and the like. } = \frac{H^*}{N} - nh$$

Substituting the respective values from above gives us

$$= \frac{g(P)N - dH}{N} - nh$$

$$h^* = g(P) - (d + n)h$$

The model is reduces to the following two differential equation which determine the motion of the model.

$$P^* = rP - R(h)$$

$$h^* = g(P) - (d + n)h$$

These two equations give us a solution for  $P$  and  $h$ . A steady or stationary state occurs where the values of the variables remain constant over time. ( $h^*, P^*$  at the intersection of  $P^* = 0$  and  $h^* = 0$  lines). These are determined by setting  $P^* = 0$  and  $h^* = 0$ .

In the price equation, in a steady state  $P^* = 0$  which yields

$$\begin{aligned} rP - R(h) &= 0 \\ \Rightarrow rP &= R(h) \\ \Rightarrow P &= \frac{R(h)}{r} \dots\dots\dots (v) \end{aligned}$$

Differentiating equation (v) with respect to  $h$  gives us

$$\frac{dP}{dh} = \frac{\frac{dR}{dh}}{r} = \frac{R'(h)}{r} < 0 \text{ since } R'(h) < 0 \text{ implying real rental price and number of houses per adult vary inversely.}$$

Hence the price stability condition gives rise to a negatively sloping line in the phase plane as shown in figure 2. To the left and below the line  $P^* = 0$  the condition  $P > \frac{R(h)}{r}$  prevails, which implies that  $P^* > 0$ , and so the house prices are rising shown by upward directing arrows. The converse holds to the right and above the line where  $P < \frac{R(h)}{r}$  prevails, which implies that  $P^* < 0$ , and so the house prices are falling shown by downward directing arrows in figure 2.

In the second differential equation  $h^* = g(P) - (d+n)h$ , in equilibrium there is no change in the number of houses per adult of the population which is shown by  $h^* = 0$ . Hence,

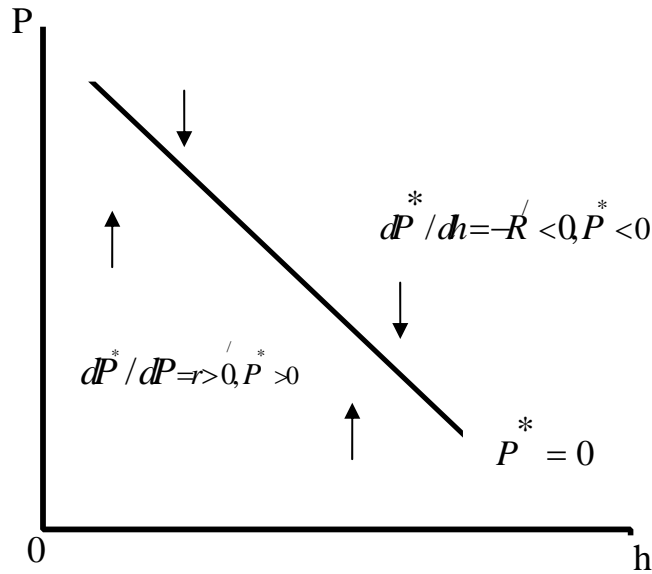
$$g(P) = (d+n)h \dots\dots\dots (vi)$$

Differentiating (vi) with respect to  $h$  yields

$$\begin{aligned} g'(P) \frac{dP}{dh} &= d+n \\ \Rightarrow \frac{dP}{dh} &= \frac{d+n}{g'(P)} > 0 \text{ since } \frac{dg}{dP} = g'(P) > 0 \text{ implying that gross investment in} \end{aligned}$$

housing rises with rise in house prices.

Figure: 2.



Relationship between  $P$  and  $h$  with respect to growth in house prices

This stability condition gives us a positively sloping line in the phase plane as shown in figure 3. Above and to the left of the stability condition  $h^* > 0$  and so  $h$  is rising shown by right ward pointing arrows, and the converse holds to the right and below the line where  $h$  is falling shown by leftward pointing arrows in figure 3. Now differentiation of (vi) with respect to 'n' and 'd' gives us:

$$\frac{dP}{dn} = \frac{(d+1)h}{g'(P)} > 0 \text{ Implies that price of housing varies directly with 'n'}$$

(population growth rate)

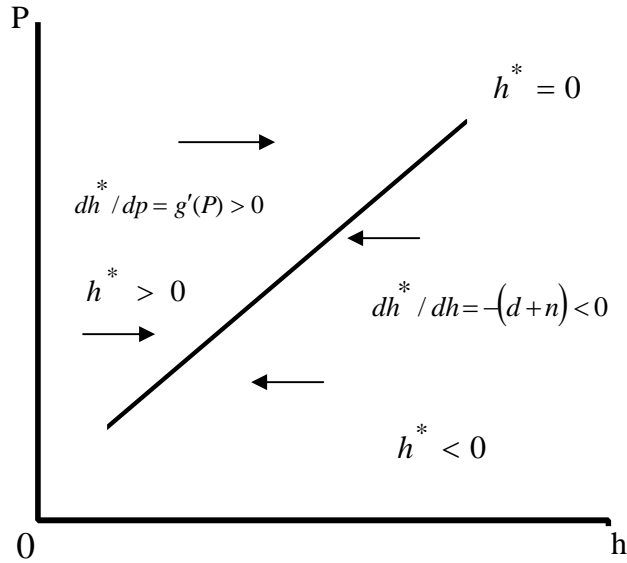
$$\frac{dP}{dd} = \frac{(n+1)h}{g'(P)} > 0 \text{ Implies that price of housing varies directly with 'd' (rate of}$$

depreciation of house).

Superimposition of figure 2 on figure 3 gives us figure 4. Phase diagram depicted in figure 4 shows the vector of forces in the four quadrants I, II, III and IV. Any point in sectors I and III, other than the equilibrium point will move away from the equilibrium because they will be on unstable arm

where resultant of two vectors will take them away from the equilibrium as shown in figure 4. Point A is called a saddle point lying on the stable arm  $Z_1 Z'_1$ .

**Figure: 3.**

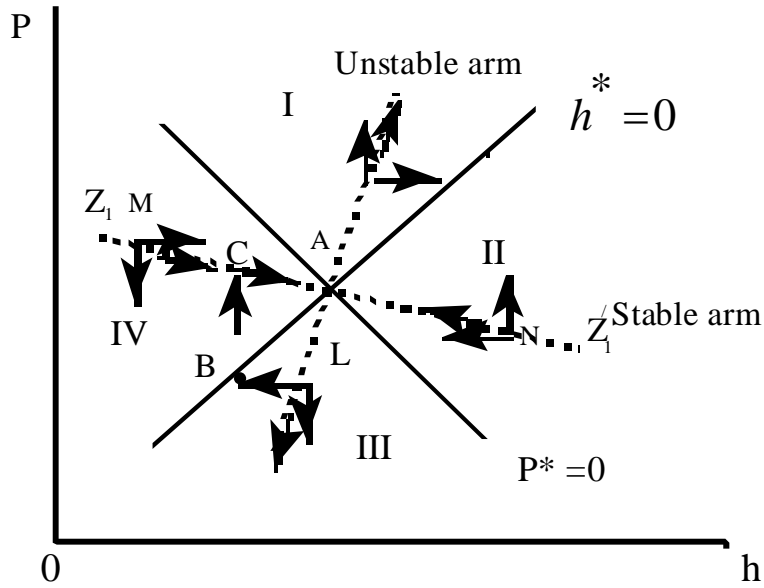


Relationship between  $P$  and  $h$  with respect to growth in house prices

A market which starts out of equilibrium, such as point B will initially show a rapid rise in house prices (B to C) to reach the stable arm at C and then eventually will move down to the equilibrium point A. At points such as L and K, the paths diverge from the steady state while at points such as M and N, they converge to the steady state.

Now suppose share of adult population (house buying segment) increases as shown by a rise in the shift parameter  $n$  causing an anticlockwise tilt in the housing line  $h_1^* = 0$ . This new housing line is shown by  $h_2^* = 0$  in figure 5. This new line  $h_2^* = 0$  is steeper than the old line  $h_1^* = 0$  because  $\frac{dh^*}{dh} = -(d+n) < 0$ , thus when  $n$  (higher growth rate of population) rises the slope of the housing line rises and vice versa.

Figure: 4



Phase Diagram showing saddle point stability

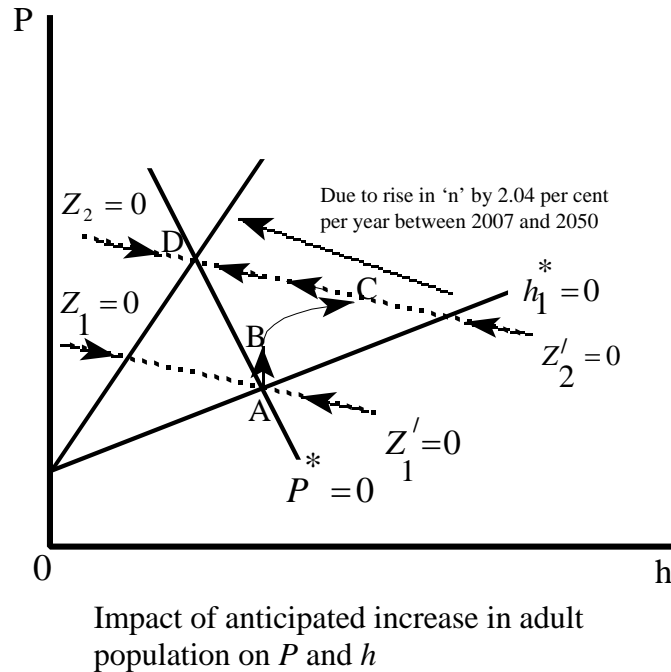
The rise in 'n' will raise the absolute slope ( $d+n$ ). Consequently, the new housing line  $h_2^* = 0$  will be to the left of the old housing line  $h_1^* = 0$ . Now there will be another saddle point D and a new saddle path  $Z_2 Z_2'$  as shown in Figure 5. It is evident that as house buying segment of population (N) rises number of houses per adult (h) will fall. This will increase investment in housing sector which will increase  $h^* > 0$  i.e. a fall in h will increase  $h^*$  ( $\frac{dh^*}{dh} < 0$ ).

Similar will be the situation of Pakistan, the overall population growth rate is projected to fall from 2.9 percent in 1981 to 0.7 percent in 2050, but the share of adult population (house buying segment) is projected to rise from 47 to 72 per cent during the same period with a growth rate of 2.046 percent per year.

To see the impact of this change in population growth on house prices  $P$  and housing per adult  $h$ , with market having perfect foresight, there would be upward surge in  $P$  shown by moving from A to B in figure 5. This

movement in the system is called the announcement effect of rate of growth in adult population. There will be no rise in housing demand  $h$  from A to B because the babies have not become adult yet. The system will move in the north easterly direction which is the resultant of the two forces, one pulling in the east ( $h^* > 0$ ) and the other in the north ( $P^* > 0$ ) along a path like BC. When the adult population increases and becomes the part of the housing market, then the market will be on the new saddle path shown by  $Z_2 Z_2'$  in figure 5. Now the system will operate on this new saddle path towards point D. It is to be noted that the system will reach from C to D under the assumption of perfect foresight. If this assumption does not hold, the point D will not necessarily be achieved.

**Figure: 5.**



In coming half century, share of adult population (house buying segment) will increase at annual growth rate of 2.046 percent. This rising trend in house-buying segment of the population will definitely exert an upward pressure on house prices and will swing the  $h_1^* = 0$  line counterclockwise and will become  $h_2^* = 0$  as shown in figure 5, showing a rise

in demand for housing and house prices. Given the price elasticity of demand for housing 0.5 (as used by Mankiw and Weil) and assuming that the growth of house demand would be equal to the rate of growth of house-buying segment of population, which happens to be 2.046, the house prices would rise by 4.09 percent annually between 2007 and 2050 due to changing demographic trend in Pakistan. It is trivial to show a rise in the price of a certain house during 43 years (2007 to 2050). If its price in 2007 was say rupees 5 million and the growth rate of house prices is 4.09, the same house would cost rupees 28 million in 2050, The initial price is multiplied by a factor<sup>10</sup> of 5.60. The actual rise in the prices in fact could be more because of other inflationary factors such as rising trend in the cost of construction materials and labor.

## **V. Conclusions**

Experience of advanced countries has shown the relationship between housing market and age structure of population. Pakistan is also going through the phase of demographic transition when generations of baby boom have been entering into the phase of their working lives. In general, we can make a reliable prediction that this trend of youthful population will increase the demand for housing in the country as young and married people are usually keener to live separately and independently of their joint family<sup>11</sup>.

Therefore, it is expected that house prices will tend to rise over the next four decades, after 2050, they might flatten out over long periods of time because of a negative demand shock like the setting in of aging population and exiting of youthful population. Besides, the large cities will be magnets for rural to urban migration that will increase demand for housing in big cities. It warrants government intervention in housing sector to provide affordable housing by keeping in view the changing demographic factors in Pakistan.

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$$^{10} G = \left( \left[ \sqrt{\frac{P_1}{P_0}} \right]^T - 1 \right) 100 \text{ where } G \text{ (average annual growth rate in \%)} = 4.09,$$

$T$  (time period in years) = 43,  $P_0$  = 5 million (price in year 2007),  $P_1$  = 28 million (price in year 2050).

<sup>11</sup> Unlike Western world, joint family system is quite strong especially in rural areas of Pakistan but in recent past it has been observed that young people prefer to live independently after marriage.

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## **Growth, FDI and Exports in Pakistan: A Co-integration Analysis**

**Ghulam Shabbir and Amjad Naveed<sup>1</sup>**

### **Abstract**

*Most of the empirical work has identified openness with trade to analyze the impacts of outward-oriented policies in developing countries. The exports promote both growth and foreign trade, and foreign direct investment is one of the important factors of foreign trade. Therefore, this study analyses the long run co-integrating relationship among foreign direct investment, exports and GDP. The result shows that long run relationship exists between growth and exports but not with FDI. Therefore, FDI is not a significant determinant of growth in the long run. This study also analyses the causality among these variables in the short-run, FDI is also not affecting the growth, but growth affects both FDI and exports. Moreover, export and FDI are also not significantly influencing each other in the short-run.*

### **I. Introduction**

A large numbers of empirical studies have analysed the impacts of foreign direct investment (FDI) and exports on economic growth. Most of the studies focussed the export-led-growth hypotheses (ELG) to analyze the relationship between exports and growth. The ELG hypothesis (ELG) suggests a positive correlation between export and growth, and also considered exports as a main determinant of overall economic growth. Because export sector; generates positive externalities through more efficient management and improved production techniques (Feder, 1982), increase productivity by offering potential for scale economies and alleviate foreign exchange constraints and greater access to international market. Therefore, export-oriented policies always positively contributed to economic growth. The Growth rates attained by the South-East Asian tigers since the mid 1960s (higher than those achieved elsewhere in the world) are normally cited as the

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best example for the success of the ELG strategy. These export oriented policies not only increased the trade but also foreign direct investment.

The flow of FDI to was significantly increased during the decades of 1980s & 1990s, and is considered as an important source of advanced technologies for the recipient countries (Barrell and Pain 1997, Cuadros 2001 and Henrik et al 2004). The FDI has grown at least twice rapidly as trade (Meyer, 2003). The very first reason for this increase is the shortage of capital in developing countries that leads to higher marginal productivity of capital in these nations. The second reason is capital owner's desire for higher return on their capital. According to Borensztein et al, (1998), FDI played a key role in the technological progress of the recipient countries. Besides this, FDI also effects economic growth by generating productivity spill over. Blomstrom (1986) found that FDI has positive significant spillover effects on the labour productivity of domestic firms and growth of domestic productivity in Mexico.

The developing countries have changed their strategies from import substitution to export-orientation. These policies were in line with the body of literature, created to examine the determinants of exports & FDI and their impacts on economic growth. The FDI has multi-dimensional issues that include trade, employment, cost of production etc<sup>2</sup>. The inward FDI not only stimulate the local investment but also increase the host country's export capacity. Therefore, liberalization policies of developing countries increased their trade as well as inflow of FDI (Goldberg and Klien, 1999).

Pakistan has also followed the export-oriented policies and reframed its commercial policy towards fewer and fewer controls. The tariffs rates were reduced to enhance the degree of openness. These policies have significantly affected the infow of FDI and it reached to \$500.27 million in the decade of 1990s as compared to \$88.83 million in the decades of 1980s. These liberalization policies further enhanced the inflow of FDI that reached to \$3.52 billion in 2005-2006, \$5.14 billion in 2006-2007 and \$5.41 billion in 2007-2008. But poor economic performance and terrorist's activities badly affected the flow of FDI. The FDI was suddenly dropped to the level of \$3.72 billion in 2008-09 and \$1.72 billion in 2009-10. This reduction in FDI was 53% as compared to previous year and 68% as compared to its highest value in 2007-08. The main sectors that have shows largely reduction in FDI were

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<sup>2</sup> See, Freenstra and Hanson (1997).

telecommunication and financial services. Only these two sectors contribute 81% of total reduction in FDI<sup>3</sup>.

This study has tried to analyse the long run relationship among GDP, Exports and FDI in the present scenario. We used annual data series and cointegration technique to investigate this relationship. Before proceeding to cointegration, we checked all data series for stationarity which one is basic condition for cointegration. For this purpose, we applied two tests; Augmented Dickey-Fuller (ADF) and Kwiatkowski, et al. (KPSS). Both tests results show that all data series are non-stationary but their first differences are stationary. This implies that all data series are having integrating order one I(1). We used Johansen and Juselius (1990) procedure to examine the long run relationship among variables. The results show that GDP has long run relationship with exports but not with FDI. Therefore, FDI is not considered as a determinant of GDP in the long run. We also tried to capture the short-term dynamics by using the error correction model (ECM). The results of Granger Causality tests predict that FDI is not affecting the GDP whereas GDP affects both FDI and Exports. The study's results also argued that exports and FDI are also not causing each other in the short-run.

The rest of the study is organized as follows: Section II deals with literature review and theoretical framework, section III is specified to specify methodology and data sources whereas section IV discusses empirical results. The last section gives the brief summary of study and conclusion.

## **II. Literature Review and Theoretical Framework**

The existing empirical studies focused a number of factors that determined the flow of FDI but technology and domestic market size got special attention. The FDI will be considered as growth enhancing if it positively influences technology or it increases production through spillover and technological transfers (Shiva and Somwaru, 2004). Some studies like Lim (2001), and Moosa (2002) tried to create a link between domestic market sizes, differences in factor costs and location of FDI. The importance of market size and its growth will further intensified in case of those foreign investors who prefer to invest in those industries, which exhibit relatively large economies of scale. The most of the studies have used GDP, GDP/Capita or growth in GDP as a proxy to measures the market size. All these studies predict a positive relation between FDI and market size.

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<sup>3</sup> Pakistan Economic Survey (various issues).

Therefore, growth augmenting FDI and its positive relation with market size created a bi-directional behaviour between two variables FDI and GDP. This bi-directional behaviour also becomes the cause for simultaneity bias between these two variables. In contrast, Charkovic and Levine (2005) have shown either insignificant or negative impact of FDI on growth. This might be due to crowding out effect of FDI on domestic capital.

A similar two-way causality discussion exists in empirical literature for exports and GDP. The first way makes export led growth hypothesis (ELG), while the other way is also equally appealing hypothesis that GDP growth leads to exports growth also. According to Shiva and Somwaru (2004), argued that export growth leads to increase in factor productivity. This might be result of gains acquired from increasing returns to scale. Moreover, export's growth enhances the foreign exchange reserves that make possible to increase the import of capital/technology-intensive intermediate inputs. The rises in exports also enhance the efficiency of exporters and make them able to compete in foreign markets. This practice results in domestically improvement in technology and grooming of domestic entrepreneurs. The open trade regime supports the inflow of better technologies that lead to better investment environment (Grossman and Helpman, 1991). This hypothesis is further supported by the findings of studies like Giles and Williams (2000) and, Ahmad, Alam and Butt (2004).

On the other hand, Jung and Marshal (1985) supported the second hypothesis and suggested that in a growing economy, the process of technological change and learning are not the results of government's export promotion policies. This process might be the result of human capital formation, cumulative productive process, transfer of technology via direct investment or physical capital accumulation. This increased growth leads to increase in the production of goods and if domestic market not able to absorb it. Then, exporters look outward to sell this increased output. This implies that increased growth leads to increase in exports. This causal relationship becomes negative if increased output result in decrease in export instead of increase. This might be due to domestically increased consumers demand for these exportable goods.

At last, there exists a third bi-directional causality between FDI and export. According to Hsiao and Hsiao (2006), exports increase the inflow of FDI. This might be through paving the way for FDI by gathering information about the host country that helps in reduction of investors' transaction costs.

The FDI also become the source of reduction in exports by serving the foreign markets through establishing production facilities there. Therefore, Petri and Plummer (1998) argued that it is not clear whether causality runs from FDI to exports or exports to FDI. Some studies have also mentioned other aspects of FDI like Gray (1998) pointed out market seeking FDI or efficiency seeking FDI, Kijima (1973) mentioned whether FDI is trade oriented or anti trade oriented and Vernon (1966) explored that FDI can be at the early product life cycle stage (substitute) or at the mature stage (complement). Moreover, Johanson & Widenshen (1975), Nicholas (1982) and UNCTAD (1996) tried to analyze the linkages between exports and FDI. These studies suggest that manufacturing firms first start trade with foreign nation before making the investment in these economies. They consider it less risky than FDI. After getting full informations about these countries economies, political and social conditions, these firms establish subsidiaries in these nations and then subsidiary exports. Therefore, FDI-export nexus is also as complicated as the other bivariate causal discussion.

This study uses a multivariate cointegration instead of bi-variate causality tests using three variables FDI, exports and GDP. When we consider two relations like export-GDP and GDP-FDI, then relation between exports and FDI might be through GDP. Because export's growth leads to GDP growth and GDP growth make possible further inflow of FDI. This implies that exports are the driving force for FDI through GDP. After pinpointing the channeling effect, it is necessary to explore that this established causality is either effective in the short run, long run or both.

### **III. Methodology and Data Sources**

This study used Vector Auto Regressive (VAR) model and co-integration to investigate the short run and long run relationship among exports, FDI and Growth. For VAR model estimation and co-integration analysis, it is necessary that all data series must have same cointegration order. Therefore, first we examined the all data series for the presence of unit root (stationarity test for data series). The stationarity of data series can be verified by various techniques like plotting the correlogram of the data series, applying Dickey and Fuller (1979), Augmented Dickey-Fuller (1981), Phillips-Perron test (1988) and Kwiatkowski, et al. (KPSS, 1992). Out of these, we used two main tests KPSS and ADF to check the stationarity problem of all three data series.

### 3.1. Augmented Dickey-Fuller (ADF) Test

The Dickey-Fuller (1979) used first order auto-regressive model to test the stationarity of data series by including drift and linear time trend in the model as follows:

$$Y_t \text{ is a random walk: } \Delta Y_t = \delta Y_{t-1} + \varepsilon_t$$

$$Y_t \text{ is a random walk with drift: } \Delta Y_t = \beta_1 + \delta Y_{t-1} + \varepsilon_t$$

$Y_t$  is a random walk with drift around a stochastic trend

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \varepsilon_t$$

According to Dickey and Fuller (1979), under the null hypothesis ( $\delta = 0$ ), the estimated t value of the coefficient of  $Y_{t-1}$  follows  $\tau$  (tau) statistic instead of following t distribution even in large samples. In empirical literature, tau statistic or test is called Dickey-Fuller test.<sup>4</sup> This test suggests that if ( $\delta = 0$ ) is rejected against the ( $\delta < 0$ ), then concerned data series is stationary (no unit root). This test assumes that error term ( $\varepsilon_t$ ) is uncorrelated. Dickey and Fuller also developed a new test to resolve this issue. This test is known as Augmented Dickey-Fuller (1981), ADF test. This test adjusts the Dickey-Fuller test to take care of serial correlation in the error terms by including lagged difference terms of dependent variable ( $\Delta Y_t$ ) in the above mentioned equations and becomes as follow:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

This test also faces some weaknesses; Blough (1992) discussed the trade-off between the size and power of unit root tests, these tests have either a high probability of falsely rejecting the null of non-stationarity when the DGP (data generating process) is a nearly stationary process, or low power against a stationary alternative. Because, in finite samples, it was observed that some unit root processes display their behaviour closer to stationary (white noise) than to a non-stationary (random walk), while some trend-stationary processes behave more likely to random walks (Harris, 1995). Therefore, considering these issues, we also used KPSS test to examine the unit root problem of all data series.

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<sup>4</sup> For detail see, Basic Econometrics (4<sup>th</sup> edition), page 815.

### 3.2. KPSS Test

The Augmented Dickey-Fuller test, tested the null hypothesis (unit root exists) against the alternative of no unit root (stationarity). However, Charemza & Syczewska (1998) and Maddala & Kim (1998) argued that null hypothesis of no unit root (stationary) must be tested against its alternative, unit root exists (non-stationary) also. This implies that the null hypothesis of data series is stationarity (no unit root) is tested against the alternative of a unit root. For this purpose, Kwiatkowski et al. (1992) developed a test that is known as KPSS test. This test is based on LM test and formulated as follows:

$$Y_t = \delta_t + r_t + \varepsilon_t$$

Where  $\varepsilon_t$  is stationary but  $r_t$  is random walk component and treated as:

$$r_t = r_{t-1} + v_t \quad v_t \sim i.i.d(0, \sigma^2_v)$$

The initial value of  $r_0$  is treated as fixed and it plays as a role of an intercept.

The stationary hypothesis is simply,  $H_0 : \sigma^2_v = 0$  (Stationary process). Then KPSS statistic can be calculated as:

$$KPSS = LM = T^{-2} \frac{\sum_{t=1}^T S_t^2}{s^2(l)}$$

$$s^2(l) = T^{-1} \sum e_t^2 + 2T^{-1} \sum_{\tau=1}^l w_{\tau l} \sum e_t e_{t-\tau}$$

Where  $S^2(l)$  indicates long-run

variance,  $w_{\tau l} = 1 - \frac{\tau}{l+1}$  is Bartlett weight function

and  $S = \sum_{i=1}^t e_i$   $t = 1, 2, \dots, T$  is partial sum process of the residuals.

This study used both ADF and KPSS tests to check the stationarity problem of data series. According to Baillie et al. (1996), combination of both ADF and KPSS tests statistic make following four possible outcomes:

- (i) Rejection of null hypothesis by ADF and failure to reject it by the KPSS will considered as a strong evidence of covariance stationary I(0) process.
- (ii) Failure to reject null hypothesis by ADF and rejection by the KPSS statistic will strongly recommend a unit root I(1) process.

- (iii) Failure to reject null hypothesis both ADF and KPSS will indicate that data is not able to give sufficient information required for the long-run characteristics of the process.
- (iv) Rejection of null hypothesis by both tests ADF and KPSS indicate that the process is described by neither I(0) nor I(1) processes.

### 3.3. Multivariate Cointegration Analysis and Error Correction Modeling

A common method for testing the long run relationship (cointegration) among the economic series is the Engel-Granger's two-step bivariate, residual-based method. According to Banerjee et al. (1990), "this method is incapable to deal multivariate cases due to; a priori assumption of a single co-integrating vector in the system, it tends to yield biased parameter estimates in small samples and is sensitive to the choice of endogenous variables in the co-integrating regression". Therefore, Johansen (1988), Johansen and Juselius' (1990), Maximum Likelihood (ML) procedures are considered the best alternative to the Engle-Granger technique. The main charm in this method is its capability to test the possibility of multiple co-integrating relationships among the variables. Johansen and Juselius (1990), further formulated time series in the form of reduced rank regression. In this procedure, they calculated the ML estimates in the multivariate cointegration model with the help of Gaussian Errors. This model is based on the Error Correction that can be shown as follows:

$$\Delta X = \mu + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \quad (\text{A})$$

Where  $X_t$  is an  $(n \times 1)$  column vector of  $k$  variables,  $\mu$  is an  $(n \times 1)$  vector of constant terms,  $\Gamma$  and  $\Pi$  represent coefficient matrices,  $\Delta$  is a difference operator,  $p$  denotes the lag length and  $\varepsilon_t$  is i.i.d.  $k$ -dimensional Gaussian Error, which has mean zero and variance matrix (white noise disturbance term). The coefficient matrix  $\Pi$  is called impact matrix that contains information about the long-run relationships among variables. Equation (A) shows VAR model in first differences, except the term, lagged level of  $X_{t-1}$  and an error correction term. This error correction term provides information about the long run relationship among variables in the vector  $X_t$ . This way of specifying the equation system is known as VECM model. This model gives information about short run as well as long run adjustment to changes in  $X_t$  through the estimates of  $\Gamma$  and  $\Pi$ , respectively. The VECM equation allows three following model specifications.

- (i) If  $\Pi$  is of full rank, then  $X_t$  is stationary in levels and a VAR in levels is an appropriate model.
- (ii) If  $\Pi$  has zero rank, then it contains no long run information, and the appropriate model is a VAR in first differences.
- (iii) If the rank of  $\Pi$  is a positive number,  $r$  and is less than  $k$  (where  $k$  is the number of variables in the system), there exists matrices  $\alpha$  and  $\beta$ , with dimensions  $(k \times r)$ , such that  $\beta \alpha = \Pi$ . In this presentation  $\beta$  contains the coefficients of the  $r$  distinct long run co-integrating vectors that render  $\beta' X_t$  stationary, even though  $X_t$  is itself non-stationary, and  $\alpha$  contains the short run speed of adjustment coefficients for the equations in the system.

Johansen's methodology requires the estimation of the VAR, equation (A) because its residuals are used to compute two likelihood ratio (LR) test statistics that can be used in the determination of the unique cointegrating vectors of  $X_t$ . The first test, which considers the hypothesis that the rank of  $\Pi$  is less than or equal to  $r$  cointegrating vectors, is given by the 'trace test' as below:

$$Trace = -T \sum_{i=r+1}^n \ln(1 - \lambda_i)$$

The second test statistic is known as the maximal eigen value test or 'max test' that computes the null hypothesis that there are exactly  $r$  cointegrating vectors in  $X_t$  and is as follows:

$$\lambda_{mas} = -T \ln(1 - \lambda_r)$$

The distributions for these tests are not usual chi-squared distributions. The asymptotic critical values for these likelihood ratio (LR) tests are calculated by Johansen & Juselius (1990) and Osterwald-Lenum (1992) through numerical simulations.

For short run dynamic analysis, we included an Error Correction (EC) term in the differenced model to capture the equilibrium relationship among the co-integrating variables in their dynamic behavior, following the Granger Representation Theorem. This addition of EC in the first differentiated VAR model, make possible to separate the long-term relationship among economic variables from their short-run responses. This will also determine the direction of the Granger causality. Following Johansen and Juselius (1990), the corresponding ECM can be written as follows:

$$\Delta GDP_t = \mu_1 + \delta_1 \Delta GDP_{t-1} + \delta_2 \Delta FDI_{t-1} + \delta_3 \Delta EXP_{t-1} + \Phi_1 ECT1_{t-1} + \varepsilon_1$$

$$\Delta FDI_t = \mu_2 + \delta_4 \Delta GDP_{t-1} + \delta_5 \Delta FDI_{t-1} + \delta_6 \Delta EXP_{t-1} + \Phi_2 ECT2_{t-1} + \varepsilon_2$$

$$\Delta EXP_t = \mu_3 + \delta_7 \Delta GDP_{t-1} + \delta_8 \Delta FDI_{t-1} + \delta_9 \Delta EXP_{t-1} + \Phi_3 ECT3_{t-1} + \varepsilon_3$$

We used annual data series to investigate long run as well as short run relationships among these three variables; FDI, exports and GDP for Pakistan. All data series are collected from International Financial Statistic (IFS) for the period of 1960 to 2010, except FDI that is taken from the annual publications of State Bank of Pakistan<sup>5</sup>.

#### IV. Empirical Results

We used Johansen & Juselius (1990) Cointegration technique to investigate the long run equilibrium relationship among the variables; FDI, exports and growth. For this, we need to address the issue of unit root for all data series. We used two unit root tests ADF and KPSS.

##### 4.1. Unit Root Test Results

Before applying the unit root tests, we plot the graphs for all data series. These graphs show that all data series have trend<sup>6</sup>, so we included trend in the model in case of unit root tests. The results of both tests are presented in table 1. The statistic estimated with the help of both unit root tests gave the strong evidence of difference stationary because ADF is failed to reject the

**Table: 1. Unit-root Analysis on Nominal Variables**

Variables	Level		First difference		Second difference		Decision
	ADF	KPSS	ADF	KPSS	ADF	KPSS	
<b>GDP</b>	-1.30 (-3.5162)	0.237 [0.146(2)]	-5.88 (-3.53)	0.145 [0.463(5)]	-6.23 (-2.94)	0.065 [0.463(2)]	Both recommend for <b>I(1)</b>
<b>FDI</b>	-2.36 (-3.5162)	0.251 [0.146(2)]	-7.55 (-2.94)	0.152 [0.463(3)]	-7.57 (-2.94)	0.0461 [0.463(2)]	Both recommend for <b>I(1)</b>
<b>EXP</b>	-2.92 (-3.5162)	0.194 [0.146(2)]	-4.92 (-2.94)	0.060 [0.463(1)]	-5.60 (-2.94)	0.029 [0.463(2)]	Both recommend for <b>I(1)</b>

Values in parenthesis () are MacKinnon critical values while in KPSS tests, we used Automatic bandwidth selection (maxlag) and Autocovariances weighted by Quadratic Spectral kernel.

<sup>5</sup> Annual Publications of State Bank of Pakistan (various issues).

<sup>6</sup> For detail see, figure 1 in appendix.

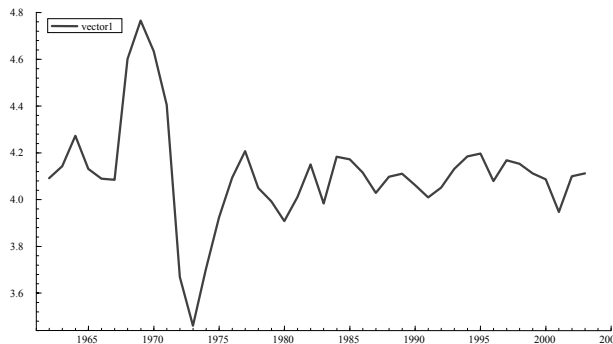
null hypothesis while KPSS rejected the null hypotheses in all cases. As all data series are having same integrating order I(1), so we further proceed for the investigation of long run equilibrium analysis through co-integration. The co-integration concept is closely linked with the notion of long-run equilibrium in case of economic theory. According to this notion, the variables in a system may deviate from their steady state value in the short run but in the long run, it is expected that they ultimately converge to their steady state. To examine the long run equilibrium relationship among FDI, exports and GDP, we used Johansen and Juselius (1990) procedure.

#### 4.2. Multivariate Cointegration Results

The results of unit root tests predict that all data series are first difference stationary I(1). We used VAR to investigate the relationship between variables. First, we determined the lag length of the VAR model using AIC and SC criterion. We also applied LR test by estimating VAR twice, each with different lags (to compute LR statistic). We estimated VAR with lag order 2 and 3<sup>7</sup>. Since the lower the values of AIC or SC, statistics give the evidence for better model. On the basis of these values, we can say that model one with lag order 2 is more parsimonious than the model with lag order 3. The same is confirmed by the results of LR test.

We estimated VAR (2) to investigate the long run relationship among Exports, GDP and FDI. We applied Johansen (1988) procedure to estimate the VAR (2) cointegration analysis because it gives the most efficient estimate of the long-run relationship between non-stationary variables at level. The Trace test results indicate that only one co-integrating vector exists. The co-integrating vector is shown in figure 1. The results of trace test are presented

**Figure: 1. Co-integrating Vector**



<sup>7</sup> For results see, table A1 in appendix.

in table 2. With one cointegrating vector ( $r = 1$ ) and three variables ( $k=3$ ), there are ( $k-r = 2$ ) common stochastic trend driving the system. As the co-integrating vector is not identified, cannot be interpreted without further restrictions. Therefore, we assume that the cointegration rank is one and GDP is normalized to have a unit coefficient in order to identify  $\beta$ . The results are reported in table 3.

**Table: 2. Johansen’s Cointegration Test VAR (2)**

Hypothesis	Trace Test	P Value	Decision
<b>H0: <math>r=0, r&gt;0</math></b>	35.321	0.010*	Trace test results indicate that there is only one co-integrating vector
<b>H0: <math>r&lt;1, r&gt;1</math></b>	8.8833	0.383	
<b>H0: <math>r&lt;2, r&gt;2</math></b>	0.17264	0.678	

**Table: 3. Identification of Restriction**

Variables	GDP	FDI	Export
<b>Coefficient of <math>\beta</math></b> (standard errors)	<b>1.000</b> <b>(0.000)</b>	0.101 (0.046)	-0.8001 (0.0651)
<b>Coefficient of <math>\alpha</math></b> (standard errors)	-0.0487 (0.0223)	-1.6621 (0.429)	0.41754 (0.152)

We analysed co-integrating vector further by imposing different restrictions on  $\beta$  matrix. For example, we impose zero restriction on coefficient of FDI in  $\beta$  matrix. This restriction is accepted by applying LR test and indicates that FDI is not co-integrated with GDP and Exports in the long run. These results differ from previous studies carried on Pakistan<sup>8</sup>. This might be due to difference in sample periods or estimation technique. We excluded the FDI variable from long run co-integrating vector due to its zero performance and test results are presented in table 4. We also imposed zero restriction on export variable but it was rejected<sup>9</sup>. So we concluded from long run co-integrating vector that GDP and exports are co-integrating in long run but not with FDI. Beside co-integrating vector, we also imposed and tested different restriction on adjustment (weighting) coefficient ( $\alpha$ ). The variables

<sup>8</sup> See for example, Ahmad et al. 2004.

<sup>9</sup> For results see, appendix table A2.

GDP and FDI have negative sign in  $\alpha$  metrics. This implies that both variables also respond to correct their own past disequilibrium error. According to the signs of the adjustment coefficient, co-integrating relation is error correcting<sup>10</sup>.

**Table: 4. Identification Restrictions on  $\beta$**

Variables	GDP	FDI	Export	LR Test	Status
<b>Coefficient</b> (standard errors)	1.000 (0.000)	0.000 (0.000)	-0.662 (0.029)	2.89 Prob. (0.09)	Accepted
<b>Coefficient</b> (standard errors)	1.000 (0.000)	0.4356 (0.072)	0.000 (0.000)	16.065 Prob. (0.0001)	Rejected

Moreover, we also applied a test on constant, whether it should be included inside the cointegrating vector or not. By imposing restriction on constant, two models are estimated; one restricted and other is unrestricted. Then, we used LR test to select more parsimonious model. The null hypothesis assumes that constant lie inside the cointegrating vector and is rejected. It means, we cannot restrict the constant inside the cointegrating vector. It is due to the fact that series has trend and it was confirmed by the graph of these series. The test results are presented in table 5. All these results

**Table: 5. Restriction on Constant**

	Log-Likelihood	LR Statistics with $\chi^2(1)$	P value
Restricted Constant	78.20	17.56	0.0002
Un restricted Constant	86,98		

confirm that long-run equilibrium relationship exists between GDP and export but FDI is not co-integrating with these variables. We also carried out short run dynamic analysis to capture the short-run affects.

<sup>10</sup> For restrictions on  $\alpha$  metrics, see appendix table A3.

### 4.3. Short-run Dynamics Analysis

We used Johansen's (1988) technique to determine the order of integration between data series and identify the possible long-term relationships among the integrated variables. Following the Granger Representation Theorem, we included ECT in equation of the first difference VAR model in order to capture the equilibrium relationship among the cointegrated variables in their dynamic behavior. We estimated the model after adding ECT and imposed different exclusion restriction on the coefficients of lag differenced variables and ECT. Then, we apply exclusion restrictions test of the joint significance of lags of other variables (Wald test), and the significance of the lagged ECT. The results for these tests are reported in table 6.

**Table: 6. Results of Short-run dynamic analysis on ECM model (Imposing exclusion restrictions)**

Variables	$\Delta GDP_{t-1}$	$\Delta FDI_{t-1}$	$\Delta EXP_{t-1}$	$ECM_{t-1}$	Wald Test	Prob	Status
$\Delta GDP_t$	-----	00000	-----	-----	2.73	0.11	Accepted
$\Delta GDP_t$	-----	-----	00000	00000	2.71	0.08	Accepted
$\Delta FDI_t$	00000	-----	-----	-----	4.63	0.04	Rejected
$\Delta FDI_t$	-----	-----	00000	-----	0.204	0.654	Accepted
$\Delta EXP_t$	00000	-----	-----	00000	5.75	0.007	Rejected
$\Delta EXP_t$	-----	00000	-----	-----	3.13	0.08	Accepted

0000 indicates the exclusion restrictions on particular variable and ----- indicates no restrictions just their coefficients.

The results indicate that there is a uni-directional causality that runs from GDP to FDI but not in reverse order. It implies that FDI play zero roles in GDP growth in short run. The results also predict uni-directional causality from GDP to exports but not from exports to GDP. It means the export-led-growth (ELG) hypothesis does not hold in short-run in case of Pakistan. The Granger Causality test also explores that FDI lead growth in trade sector also does not hold. We can conclude that FDI and exports both does not causing the GDP in short-term in case of Pakistan where as GDP causing both FDI and exports in short run.

## **V. Summary and Conclusions**

This study has tried to investigate the long-run co-integrating relationship among GDP, Exports and FDI for Pakistan. Annual data series are used for this analysis. The ADF and KPSS unit root tests are used for the presence of unit root. The results of these tests indicate that all data series are stationary at their first difference. After resolving the issue of stationarity, we used VAR model for long run cointegration analyses. The estimated results with VAR suggest that long-run relationship exists between GDP and exports but not with FDI. It means FDI has very little role in determining the GDP growth in long run for Pakistan. However, VAR results suggest that exports are having long run co-integrating relation with GDP.

We also tried to capture the short-term dynamics by using the error correction model. In short-run analysis of Granger causality indicates that FDI not affecting the GDP even in the short run whereas GDP affects both FDI as well as Exports. We also tried to investigate the notion that FDI increases the host country's exports. The causality results fail to support this hypothesis also in case of Pakistan. It means, both export and FDI are not causing each other in the short-run. The results indicate that role of FDI in Pakistan's economy is very negligible in long run as well as in short run. Therefore, it is recommended that government must increase the inflow of FDI along with its direction towards those sectors that has spill over effects and can increase Pakistan's exports.

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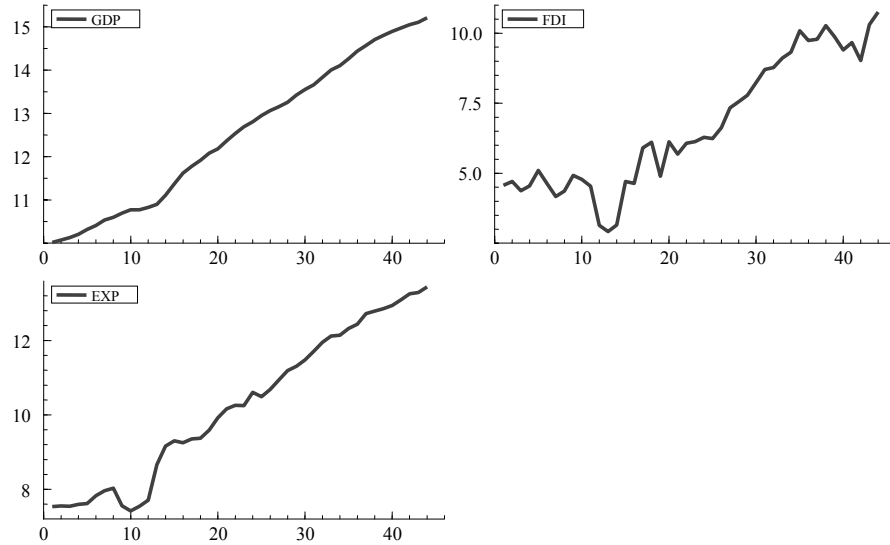
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**Appendix**

**Figure: A1. Graph of all data series showing trend**



**Table: A1. Choice of Lag length of VAR**

Lag Interval	Lag 1-3 (sample 1960-2010)	Lag 1-2 (sample 1960-2010)	LR Statistic
Log Likelihood	93.927850	89.898203	Chi <sup>2</sup> (9)= 8.0593 [0.5282]
AIC	-3.1184	-3.3609	

**Table: A2. Imposing different Restrictions on Coefficient  $\beta$**

Dependent Variable	Independent variable	$\beta$ Coefficient	Standard error of $\beta$	LR Stat Chi <sup>2</sup> (1)	P value
<b>GDP</b> (Export=0)	Export	0.0000	0.0000	12.667	0.0004
	FDI	0.41912	0.0734		
<b>FDI</b> (Export=0)	EXP	0.000	0.000	12.667	0.0004
	GDP	2.3860	0.38434		
<b>Export</b> (FDI=0)	FDI	0.0000	0.000	2.1316	0.1443
	GDP	1.5286	0.0625		

**Table: A3. Test results of imposing different Restrictions on Coefficient  $\alpha$**

<b>Restrictions</b>	<b>Variables</b>	<b>Coefficient of <math>\alpha</math></b>	<b>Standard error of <math>\alpha</math></b>	<b>LR Statistics <math>\chi^2(1)</math></b>	<b>P value</b>
<b>Alpha coefficient of GDP=0</b>	GDP	0.0000	0.0000	2.667	0.0246
	FDI	-1.73	0.41		
	EXPORT	0.46	0.14		
<b>Alpha coefficient of FDI=0</b>	GDP	-0.06	0.03	10.498	0.0012
	FDI	0.000	0.000		
	EXPORT	0.63	0.19		
<b>Alpha coefficient of EXPORT=0</b>	EXPORT	0.000	0.000	6.1599	0.0131
	GDP	-0.035	0.015		
	FDI	-1.1745	0.28014		

## **Dynamics of Poverty in Rural Punjab: A Case Study of Rural Area of Tehsil Samundri**

**Irum Naz, Sadia Ali and Babar Aziz<sup>1</sup>**

### **Abstract**

*Present study is an attempt to analyze the causes of absolute and relative poverty in Pakistan. Data for the study has been taken from a household survey in a village named 142-GB Tehsil Samundri, District Faisalabad. Its results show that 67 percent of the households are poor in absolute terms. The incidence of relative poverty is 52 percent, 62 percent and 67 percent at 50 percent, 66.6 percent and 75 percent of average per person income, respectively. Binary logistic regression analysis, using international poverty line was used to analyze the causes of both type of poverty. The results indicate that land, education, occupation, dependents, livestock and female participation are the significant determinants of absolute poverty. Furthermore, land, livestock and female participation has intensified the incidence of relative poverty, whereas education has decreased it.*

### **I. Introduction**

The concept of absolute poverty is based on two concepts: subsistence and basic needs approach. Subsistence approach presented a limited picture of poverty that is only in terms of physical requirements whereas basic needs approach broadened the concept and included social needs also. But with the passage of time, it was realized that concept of absolute poverty was more appropriate for developing countries, it had nothing to do with the phenomenon of poverty found in developed world. Circumstances of developed countries and growing attention towards inequality required poverty definition in relative terms. Relative poverty referred to low level of

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income or consumption as compared to average income or consumption level in a particular country<sup>2</sup>.

Pakistan is located in South Asia. It is the 6<sup>th</sup> most populous country of the world with a population growth rate of 1.8 percent per year (GOP, 2009-10). The incidence of absolute poverty in Pakistan declined during 1970s and 1980s but rose during 1990s then it tended to decrease. Poverty decreased from 30.6 percent in 1999 to 22.3 percent in 2006 (GOP, 2003 and 2008). The incidence of relative poverty was 39 percent in 1984-85 which increased to 52.3 percent in (2001-02) at 75 percent of national average per capita expenditures (Anwar, 2005). Pakistan had been a poor country since its creation but the incidence of poverty remained higher in rural areas as compared to urban areas (World Bank, 2002; GOP, 2003, 2008). According to latest estimates, incidence of rural poverty was 27 percent and of urban poverty was 13 percent (GOP, 2008).

In lower income countries, agriculture growth was found to be more influential towards poverty reduction as compared to non-agriculture growth (Christiaensen *et al.*, 2006). Agriculture is the primary occupation in rural Pakistan. It employed near about 44 percent of total work force and 60 percent of the rural labor force was engaged in agriculture sector (GOP, 2008). Over all agriculture productivity played a significant role in determining poverty. It was found that agriculture productivity had negative relationship with rural poverty in Pakistan (Hussain and Ishfaq, 1997). It is also explored that the proportion of poor in agriculture sector is greater as compared to other sectors in Pakistan<sup>3</sup>. In rural areas of Pakistan higher incidence of poverty was found among share croppers (48 percent) and lower among owner cultivators (25 percent)<sup>4</sup>. The findings of Arif *et al.* (2000) revealed that incidence of poverty was higher among agricultural laborers (46 percent) as compared to non-farm wage employees (34 percent).

Land is the principle asset in rural agrarian economy of Pakistan. It was found that landlessness was the main determinant of rural poverty in Pakistan (Malik, 1996; Chaudhry, 2003; Anwar *et al.*, 2004). Distribution of land was unequal in Pakistan. It was found that in rural areas of Pakistan, 67.23 percent households were landless. 32.67 percent households owned less than 1 hectare of land. Just 0.1 percent households owned 1 hectare and

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<sup>2</sup> See, Rio (2006), for a detailed discussion on the subject.

<sup>3</sup> For example, see, Jan *et al.* (2008).

<sup>4</sup> See, for instance, Anwar *et al.* (2004).

above landholdings. The over all Gini coefficient for land distribution was 0.62 (Anwar *et al.*, 2004).

Non-farm occupation possessed a central position in decreasing poverty not only among landless households but also for landholding households as it enabled households to overcome risk and uncertainty attached with agriculture income. Non-farm income had been associated with poverty. The incidence of poverty was found to be higher among non-farm households as compared to farm households (Qureshi and Arif, 2001).

Characteristics of the household head such as age gender, education, occupation also played a significant role in determining poverty. It was found that households with female heads were more likely to be poor as compared to household with male heads (Awan *et.al.*, 2008). This was mainly attributed to discriminatory atmosphere prevailed in labour markets. Earnings of the individuals in non-farm occupations depended mainly on their education attainment. It is generally agreed that education attainment reduced the chances of poverty but relationship between the two is not so simple. There existed two-fold relationship between education attainment and poverty. At one side education reduced the chances of poverty and on the other hand poverty is a big impediment in education attainment. In case of Pakistan, proportion of poor decreased significantly with the increase in education attainment of individual worker or household head. It was found that households whose heads had obtained at least 10 years of schooling were less likely to be poor as compared to households with illiterate heads (Qureshi and Arif, 2001). Attainment of professional education reduced the probability of poverty significantly as compared to primary education (Awan *et al.*, 2008). Besides this household head's wealth holdings like assets ownership and livestock holdings etc. were found to be negatively related with poverty (Chaudhry, 2003) whereas household size was positively related with poverty (Qureshi and Arif, 2001 and Chaudhry, 2003).

Poverty analysis in Pakistan mostly confined to absolute poverty. Only the studies of Anwar (2005) analyzed relative poverty. A number of studies had also analyzed determinants of absolute poverty (Malik, 1996; Qureshi and Arif, 2001 and Chaudhry, 2003). The aim of the present study was to analyze absolute and relative poverty and their determining factors.

Rest of the paper is organized as: section II discusses data and methodology used in the paper. Section III, IV and V are meant for the results of empirical analysis and discussion. More specifically, section III highlights

the profile of poverty in that specific region. Section IV analyzes the determinants of absolute poverty using FGT measures and regression analysis. Section V analyzes determinants of relative poverty with the help binary logistic regression analysis. Section 6 discusses the conclusions and suggested policy implications followed by references and result tables in the appendix.

## **II. Data and Methodology**

Keeping in mind the nature, scope and objectives of the study primary data was employed. A detailed household questionnaire was developed after the pre-testing. Data was collected from the Tehsil Samundri of District Faisalabad. The selected village comprised of 450 households from which a sample of 104 households was drawn by using stratified random sampling technique as it assured the representation of all groups in the sample. The population was divided mainly between landholders and landless households and then sub samples were drawn from each group randomly.

### **2.1. Indicator of Welfare**

It had been a controversial topic in all research studies concerning poverty analysis that what would be the indicator of welfare (*e.g.* either income or consumption)? The present study selected income over consumption due to the following reasons:

- It was found that households did not maintain proper record of consumption expenditures.
- Most of the households tended to over estimate their consumption expenditures.
- Consumption expenditures were seasonal in nature. The seasonal variations in consumption expenditures were not observable and cannot be adjusted easily whereas the variations in income were comparatively observable and can be easily incorporated.
- Nature of expenditures varied from household to household. Poor households tended to spend more on food items as compared to clothing, education, health etc. So due to the inconsistent behavior of the households, it was very difficult to sketch out any sort of comparison among the consumption expenditures of various households.

- Moreover, respondents gave clear and relatively reliable information about income as compared to consumption<sup>5</sup>.

## **2.2. Poverty lines**

Determinants of absolute poverty were analyzed using international poverty line of 1 US dollar (\$) per day, per person income. Poverty line was set at Rs. 2454.625, per month, per person income. It was derived from the dollar price of rupee (80.70 Rs.) during surveyed months.

Determinants of relative poverty were also analyzed. Average per person income of sampled households was taken as approximation of relative poverty. The study used three cut off points of half, two third and three fourth of average per person income of the sampled households as three relative poverty lines following previous study of Anwar (2005). Average income of the households was 3221 rupees. So per person income of 1610, 2145 and 2416 rupees were used as relative poverty lines respectively at 50 percent, 66.6 percent and 75 percent of average per person income.

## **2.3. Foster Greer and Thorbecke (FGT) Decompositions of Poverty**

FGT measures were utilized to see the prevalence of absolute and relative poverty among sampled households. However variables were decomposed only for absolute poverty. There were three forms of FGT measures namely head count, poverty gap and poverty gap squared. They measured respectively poverty incidence, poverty depth and severity. They were calculated with the help of following formulas:

(i) Head Count =  $q/n$ , Where  $q$  = number of poor and  $n$  = sample size

(ii) Poverty Gap =  $\frac{1}{n} \sum_{i=1}^q \left( \frac{Z - Y_i}{Z} \right)$ , Where  $Z$  = Poverty Line,  $Y_i$  = income of the  $i^{\text{th}}$  poor and  $q$  = number of poor

(iii) Poverty Gap Squared =  $\frac{1}{n} \sum_{i=1}^q \left( \frac{Z - Y_i}{Z} \right)^2$

Head count index is the most widely used and simple method to measure poverty. It simply gave the percentage of the people falling below poverty line but it violated the principles of distributional sensitivity, population

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<sup>5</sup> Malik (1996), Javad et al. (2001) and Chaudhry (2003) have also made use of income as indicator of welfare.

independence and strong monotonicity. In other words it failed to take into account the intensity of poverty and distributional aspects. Poverty gap and poverty gap squared fulfilled all the four criteria namely anonymity, population independence, monotonicity and distributional sensitivity (Anwar, 2005; Todaro and Smith, 2008).

#### **2.4. Description of Explanatory Variables**

Explanatory variables were same for both absolute and relative poverty models. Characteristics of the household head such as age, gender, education and household characteristics like landholding, occupation, dependents, earners and livestock holdings were used as explanatory variables. Age of the household head was measured in years. Gender of the household head was approximated by a qualitative variable named gender (male = 1, female = 0). Land variable was approximated as total land holdings of the household in acres. Education variable was approximated by educational years of household head. Occupation variable was measured by a qualitative variable named occupation (1 if both occupations, 0 otherwise). Variables dependent and earners were measured by the number of dependents and earners in a household. Impact of female participation in income generation was also approximated by a qualitative variable named participation (1 if female participation, 0 otherwise). Livestock variable was measured in rupees by the market value of the total livestock holdings of the household.

In logistic regression analysis, dependent variable assumed the value of 1 for poor households and zero for non poor households. Here dichotomous dependent variable was used. So we can not use OLS to estimate the regression parameters so maximum likelihood method of estimation is used. Traditionally qualitative response models can be estimated by three methods: (a) linear probability model (b) logit model (c) probit model.

The main criticism on the linear probability model is that it gives rise to heteroscedasticity problem and there is no guarantee that probability will lie between 0 and 1 but most important thing is that in this model, probability is linearly related with explanatory variables. To avoid this problem dependence is made on the logit and probit models. In these models probability remained between 0 and 1 and here probability is none linearly related with explanatory variables. Probit model is sensitive of normality assumption whereas logit model assumes a logistic distribution. So logit model is used in the present study. The specification of the logistic model is as follows:

$$P_i = E\left(\frac{Y=1}{X_i}\right)$$

Here  $Y = 1$  means that a particular household was poor and  $X$  denotes the set of explanatory variables used. Here  $P_i$  is the conditional probability that a particular household was poor. In context of logit model it is:

$$P_i = E\left(\frac{Y=1}{X_i}\right) = \frac{1}{1 + e^{-(\beta_o + \beta X_i)}}, \text{ Let } Z_i = -(\beta_o + \beta X_i), \text{ and } P_i = \frac{1}{1 + e^{-Z_i}}, \text{ and}$$

$$P_i = \frac{e^{Z_i}}{1 + e^{Z_i}}.$$

If  $P_i$  gives the probability of being poor then  $(1 - P_i)$  will give the probability of not being poor, which is as  $1 - P_i = \frac{1}{1 + e^{Z_i}}$ . The ratio of the poor to non poor is written as  $\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i}$ , where  $\frac{P_i}{1 - P_i}$  is called the odd ratio in favor of being poor. Taking the natural log of the odd ratio we obtain  $L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = Z_i$ , hence we know that  $Z_i = \beta_o + \beta X_i$ . So we can say that  $L_i$  is linear in parameters and in explanatory variables denoted by  $X_i$ . The point of advantage of this model is that here only  $L_i$  the logit is linearly related with  $X_i$  but not the probabilities.<sup>6</sup>

### III. Profile of Poverty

All the three measures of poverty i.e. poverty incidence, poverty gap and poverty severity were utilized to understand the varying nature of absolute poverty among sampled households. Table 1 (see appendix A) showed relationship between poverty and explanatory variables, and also indicates a cyclical relationship between age and poverty. Incidence of poverty was higher among female headed households as compared to male headed households. Results are consistent with that of Awan *et al.* (2008).

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<sup>6</sup> For further explanation, see, Gujarati (2004).

There existed negative relationship between poverty and land holding of household. Higher incidence of poverty was found among landless households. 95 percent landless households were poor. They needed 58 percent of the poverty line (additional income of 1424 rupees) to escape poverty. All the three measures decreased sharply with the increase in per person land holding and it was very interesting that poverty vanished with the per person land holding of 3 acres and above. Result is consistent with the previous finding of Anwar *et al.* (2004).

Education was also found to have negative relationship with poverty. Highest incidence of poverty was found among households with illiterate heads. Poverty incidence decreased with the increase in education attainment so is the case with poverty depth and poverty severity measures. Results are consistent with that of Qureshi and Arif (2001) and Awan *et al.* (2008). The incidence of poverty was 5 percent among the households with higher educated heads. They needed 2 percent of the poverty line (additional income of 49 rupees) to escape poverty and there was lowest income inequality among these households.

Highest incidence of poverty was found among households depending on only non farm occupation. Result is consistent with the findings of Qureshi and Arif (2001). Incidence of poverty was also higher among households depending exclusively on farm income. Incidence of poverty was lower in the households adopting both farm and non farm occupations. Poverty depth and severity measures were also lower. It was concluded that adoption of both occupations by a households reduced the risk of poverty.

A positive relationship was observed between the number of dependents and poverty. Poverty measures increased with the increase in the number of the dependents in a household. All the three measures of poverty were lower among households with 2 and less dependents as compared to households with 7 and more dependents. Result is consistent with the findings of Jan *et al.* (2008).

Number of earners in a household was negatively related with poverty. The incidence of poverty decreased with the increase in the number of earners. 79 percent incidence of poverty was found among the households with one earner and it decreased to 50 percent for households with 4 and more earners. Poverty depth and severity were also lower in the households with more earners as compared to households with one earner but the incidence of poverty was not sufficiently lower to reach some meaningful conclusion

roughly one can say that there existed negative relationship between poverty and number of earners.

Incidence of poverty was only 6 percent among the households that also had female earners among male earners. It was lower as compared to 78 percent of other households. Poverty gap of 0.3 percent (additional income of just 7 rupees) among households with female participation was also sufficiently lower from the 45 percent (additional income of 1105 rupees) of other households. It was concluded that female participation in a household reduced the chances of falling below poverty line.

Incidence of poverty decreased with the increase in livestock holdings. In households with higher valued livestock holdings incidence of poverty was lower sufficiently as compared to households with lower valued livestock holdings.

It is concluded that gender, land, education, occupation, female participation, number of earners and livestock were negatively related whereas number of dependents was positively related with poverty. Variable age showed cyclical relationship with poverty.

Table 2 (see appendix A) showed that 67 percent of the sampled households were poor. Poor households needed 38 percent of the poverty line (additional income of 933 rupees) to come above poverty line and there existed 25 percent income inequality among poor households.

Table 3 (see appendix A) showed that 52 percent households were relatively deprived at lower cut off point. Relative deprivation increased sharply by 10 percent at medium cut off point. It was highest at highest cut off point of 75 percent.

#### **IV. Determinants of Absolute Poverty**

In order to understand the complex nature of poverty and to be more confident about the determinants of poverty binary logistic regression analysis was also performed using Minitab. Table 4 (see appendix A) showed results of binary logistic regression analysis of absolute poverty.

Dependent variable assumed the value of 1 for a household living on and below poverty line and 0 otherwise. Age of the household head, gender of the household head, total land holding of the household, education attainment of the household head, occupation of household, number of dependents, number of earners, female participation and total monetary value of livestock

holdings of household were used as explanatory variables. Results indicated that land, education, occupation, number of dependents, female participation and livestock holdings were significant in determining poverty as indicated by the FGT measures of poverty.

It was found that variable number of dependents was positively related with the probability of being poor and was significant at 5 percent level. Probability of poverty increased with the increase in number of dependents in a household. Jan *et al.* (2008) assessed the impact of dependency burden on poverty with the help of two explanatory variables namely number of household members below 10 years of age and number of members above 60 years of age. But these variables tended to under estimate the dependency burden of household. It is not necessary that all dependents fall with in the above mentioned two groups of age. However their results showed that these two variables were positively related with poverty. Same was indicated by the findings of the present study.

Variables land, education, occupation, female participation and livestock were significantly and negatively related with the probability of poverty. Land and female participation were significant at 5 percent level whereas education, occupation and livestock were significant at 10 percent level.

Results indicated that there existed significant negative relationship between poverty and land holdings as indicated by the table 3 (see appendix A) of profile analysis. Recent studies of Chaudhry (2003), Anwar *et al.* (2004) and Jan *et al.* (2008) on determinants of poverty also indicated that there is a negative relationship between poverty and land holdings.

Education attainment of the household head possessed negative relationship with the probability of poverty. Probability of poverty among sampled households decreased with the increase in educational years of household heads. Results were consistent with the findings of Wodon (1999), Chaudhry (2003), Owuor *et al.* (2007) and Awan *et al.* (2008). Findings of the Awan *et al.* (2008) showed that probability of poverty of employed person decreased significantly with the increase in education attainment. It was found that professional education reduced the chances of falling below poverty line by 99 percent as compared to primary education.

Chaudhry (2003) measured education variable with the help of education codes. Education codes were in the form of 0, 5 and 10 where 0 was

assigned to illiterate members, 5 for educated up to secondary level and 10 up to college/university level. Sum of these points was divided by the household size. However, findings revealed that education codes were also negatively related with poverty.

Results of profile analysis given in table 3 (see appendix A) showed that households depending on only non farm or only farm occupation were more likely to be poor as compared to households adopting both occupations. Results of regression analysis also showed that households with adoption of both farm and non farm occupations were less likely to be poor as compared to households with adoption of single occupation.

Livestock holdings were negatively related with the probability of poverty. Probability of poverty among sampled households decreased with the increase in monetary value of livestock holdings of households. Results were consistent with the findings of Kenala (2006) and Owuor *et al.* (2007). Findings of the Chaudhry (2003) showed that livestock was significant in the income function model but was insignificant in the logistic regression.

The variable female participation showed that households with female participation were less likely to be poor as compared to households with no female participation. The variable age and gender possessed correct signs but were not significant whereas results regarding number of earners seemed to be biased. According to results, it was positively related with the probability of poverty whereas its expected sign was negative as indicated by the results of profile analysis. One explanation for this positive relationship is that in the present case a sufficient number of households were living in extended family structure with large families and dependents. Moreover, in poor households there was greater tendency towards unskilled works in early ages.

It is concluded that households with landholdings, educated heads, both occupations, less number of dependents, female participation and higher valued livestock holdings were less likely to be poor. Results also supported the findings obtained from poverty profile analysis.

## **V. Determinants of Relative Poverty**

Table 5 (see appendix A) showed that 52 percent relative deprivation was mainly due to lack of education. It was negatively related with poverty and highly significant at 1 percent level. Although coefficient for land variable was also significant at 10 percent but education was more influential. This was due to the fact that attainment of education increased the earnings of

households in non-farm sector. Households with less educated household heads were more likely to depend on farm or low yielding non-farm activities. That resulted in low productivity and earnings. Higher level of education increased the chances of adoption of non farm occupations (Arif et.al., 2000). It is concluded that severe deprivation in households was due to low tendency towards education attainment.

Further contribution of 10 percent in relative deprivation was due to influencing forces of land and dependency burden. Here the significance of education reduced and of land increased due to skewed distribution of land. Number of dependents was positively related with poverty. Here dependency burden was dominating factor. Distribution of land was highly skewed as indicated by previous studies on rural Pakistan (Chaudhry, 2003 and Anwar *et al.*, 2004). This skewed distribution of land contributed to relative deprivation greatly. Land ownership enabled household to obtain food items in the form of wheat and vegetables at least for their own needs whereas landless households had to purchase these items. This could be the reason due to which landlessness always remained a significant determinant of poverty in Pakistan as well as in the rest of world (Wodon, 1999; Malik, 1996; Javad *et al.*, 2001; Geda *et al.*, 2005; Chaudhry, 2003; Zamal, 2008 and Jan *et al.*, 2008).

Relative deprivation was highest (67 percent) at highest cut off point (75 percent). Contribution of 5 percent in relative deprivation was due to differences in occupation, female employment and livestock holdings. Findings of Adams (1995) indicated that livestock was the chief asset of poor and was significant in reducing income inequality. It was recognized as equalitarian source of income. The difference between their results and present findings was due to the fact that they analyzed livestock income but here we analyzed monetary value of livestock holdings not obtained income. This showed that better off households were also having higher possessions of livestock along with land. However, livestock along with female participation and occupation contributed a little to over all inequality. In table 7 (see appendix A), female participation in income generation (1 if household included a female earner, 0 otherwise) was dominating factor that increased relative deprivation significantly. This was due to the fact that rich households were more likely to educate their female members and bring them in practical field.

Results indicated that land, education, occupation, livestock and female participation were significantly and negatively related whereas variable number of dependents was positively related with relative poverty.

It was concluded that education was primary determinant of relative deprivation. It was significant in all the three regression analyses. Education was the principle factor in explaining relative deprivation. Land was also significant in all regressions but it was less influential than education in regression 1 but more in other two regressions. This was due to the skewed distribution of land ownership. Relative deprivation became severe due to adoption of single occupation, no female participation and lower livestock holdings.

## **VI. Conclusions and Policy Implications**

It was found that 67 percent of sampled households were poor in absolute terms. Incidence of relative poverty was also high. Land was the most powerful determinant of rural poverty. Land reforms are required to deal with this problem. Education and livestock holdings helped to decrease poverty among landless households whereas numbers of dependents was likely to increase the incidence of poverty. Quality of education can be improved by establishing primary and secondary education commissions. Study pointed out to the increasing importance of non-farm occupations although highest incidence of poverty was found among households depending exclusively on non-farm income but majority of the households adopted both farm and non-farm occupations. Adoption of both occupations reduced poverty significantly. There is a dire need to create linkages between farm and non-farm sector in rural areas. Results indicated that households with educated working women were better-off than others. Female employment and literacy can be increased by providing the facilities of separate transportation, micro credit and child care centers. Moreover, studied area, proved to be a good representative of rural Pakistan as all findings of study supported the findings of previous studies.

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**Appendix A: Tables of Empirical Results****Table 1. Foster Greer and Thorbecke (FGT) Decompositions of Poverty**

<b>Variables</b>	<b>Head Count (%)</b>	<b>Poverty Gap (%)</b>	<b>Poverty Severity (%)</b>
<b>Age (years)</b>			
30 and less	66	33	20
31-40	66	40	28
41-50	66	33	21
51-60	66	47	36
61-70	66	34	21
71 and above	100	51	26
<b>Gender</b>			
Male	67	37	25
Female	100	59	43
<b>Land(Acres)</b>			
Landless	95	58	42
Less than 1	75	38	24
1 - < 3	27	12	6
3 and above	0	0	0
<b>Education (Years)</b>			
Illiterate	95	72	56
Primary	87	50	33
Secondary	68	28	15
Higher Education	5	2	1
<b>Occupation</b>			
Only Farm	92	58	39
Only Non Farm	95	59	43
Both	36	14	7
<b>Dependents (Numbers)</b>			
2 and Less	27	15	8
3-6	71	39	26
7 and above	72	44	31
<b>Earners (Numbers)</b>			
One	79	46	32
2-3	55	30	20
4 and above	50	21	15
<b>Female Participation</b>			
Yes	78	45	30
No	6	0.3	0.01
<b>Livestock Holdings (Rupees)</b>			
Null	61	30	18
10000 and Less	93	65	48
11000-30000	67	34	22
Above 30000	40	19	11

Source: Calculated from Author's Household Survey, 2008.

**Table: 2. FGT Decompositions of the whole Sample**

Poverty Incidence (%)	Poverty Depth (%)	Poverty Severity (%)
67	38	25

Source: Calculated from Author's Household Survey, 2008.

**Table: 3. Incidence of Relative Poverty among Sampled Households**

Poverty Incidence (50 Percent)	Poverty Incidence (66.6 Percent)	Poverty Incidence (75 Percent)
52	62	67

Source: Calculated from Author's Household Survey, 2008.

**Table: 4. Determinants of Absolute Poverty in Rural Pakistan  
(Results of Logistic Regression Analysis)**

Predictor	Coefficient	Std. Error	Z-stat	Odd Ratio
Age (Years)	0.057	0.0433	1.32	1.06
Gender (Dummy)	-17	14233	-0.00	0.00
Land (Acres)	-0.363**	0.173	-2.10	0.70
Education (Years)	-0.544*	0.297	-1.83	0.58
Occupation (Dummy)	-2.867*	1.469	-1.95	0.06
Dependents (No.)	1.430**	0.659	2.17	4.18
Earners (No.)	1.219	0.815	1.50	3.38
Participation (Dummy)	-4.710**	2.104	-2.24	0.01
Livestock (Rupees)	-1.244E-05*	6.4117E-06	-1.94	1.00
Constant	17	14233	0.00	2415

Dependent Variable = assumed the value of 1 if poor and 0 otherwise.

\*\*\*, \*\* & \* significant at 1, 5 & 10 percent respectively.

**Table: 5. Determinants of Relative Poverty  
(Results at 50 Percent of Average Income)**

Variables	Coefficients	Std. Error	Z-stat	Odd Ratio
Constant	3.074	2.331	1.32	
Age (Years)	-0.02914	0.03062	-0.95	0.97
Gender (Dummy)	2.787	1.888	1.48	16.22
Land (Acres)	-0.15598*	0.09392	-1.66	0.86
Education (Years)	-0.5553***	0.1886	-2.94	0.57
Occupation (Dummy)	0.0166	0.7465	0.02	1.02
Dependents (No.)	0.2365	0.1451	1.63	1.27
Earners (No.)	-0.0358	0.4264	-0.08	0.96
Participation (Dummy)	-23	4418	-0.01	0.00
Livestock (Rupees)	1.2275E-10	2.9153E-06	0.00	1.00

Dependent variable =1 if relative poor at 50 percent, 0 otherwise.

\*\*\*, \*\* & \* significant at 1, 5 & 10 percent respectively.

**Table: 6. Determinants of Relative Poverty  
(Results at 66.6 Percent of Average Income)**

Variables	Coefficients	Std. Error	Z-Statistics	Odd Ratio
Constant	26	12606	0.00	
Age (Years)	-0.00237	0.03748	-0.06	1.00
Gender (Dummy)	-15	12606	-0.00	0.00
Land (Acres)	-0.2430**	0.1030	-2.36	0.78
Education (Years)	-1.1384**	0.4924	-2.31	0.32
Occupation (Dummy)	-1.525	1.068	-1.43	0.22
Dependents (No.)	1.0217***	0.3913	2.61	2.78
Earners (Numbers)	-0.8121	0.6640	-1.22	0.44
Participation (Dummy)	-28	3935	-0.01	0.00
Livestock (Rupees)	-3.373E-06	4.1193E-06	-0.82	1.00

Dependent variable =1 if relative poor at 66.6 percent, 0 otherwise.

\*\*\*, \*\* & \* significant at 1, 5 & 10 percent respectively.

**Table: 7. Determinants of Relative Poverty  
(Results at 75 Percent of Average Income)**

Variables	Coefficients	Std. Error	Z-Statistics	Odd Ratio
Constant	17	14233	0.00	
Age (Years)	0.05710	0.04333	1.32	1.06
Gender (Dummy)	-17	14233	-0.00	0.00
Land (Acres)	-0.3633**	0.1733	-2.10	0.70
Education (Years)	-0.5444*	0.2970	-1.83	0.58
Occupation (Dummy)	-2.867*	1.469	-1.95	0.06
Dependents (Numbers)	1.4302**	0.6593	2.17	4.18
Earners (Numbers)	1.2189	0.8152	1.50	3.38
Participation (Dummy)	-4.710**	2.104	-2.24	0.01
Livestock (Rupees)	-1.244E-05*	6.4117E-06	-1.94	1.00

Dependent variable =1 if relative poor at 75 percent, 0 otherwise.

\*\*\*, \*\* & \* significant at 1, 5 & 10 percent respectively.

## **Trade, Poverty and Employment: Empirical Evidence from Pakistan**

**Muhammad Tariq Majeed<sup>1</sup>**

### **Abstract**

*This study investigates the development effects of trade liberalization in Pakistan. The results show that the effect of trade liberalization on per capita GDP is insignificant, though the sign is positive. However its effect on employment is negative. Although trade theory predicts that trade openness is the potential source of economic growth that in turn spills over its positive effects on labor market but this study reveals jobless-openness phenomenon in Pakistan. It is also found that trade liberalization has increased income inequalities because it creates winners and losers simultaneously that results in negative welfare impact. As far as eradication of poverty is concerned, it has been found that trade accentuates, not ameliorates, and that it intensifies, not diminishes, poverty in the case of Pakistan. The role of human capital emerged as a favorable factor in enhancing per capita GDP and eradication of poverty. The conclusion of this study is that trade liberalization is not pro-development in the case of Pakistan and investment in human capital is the effective tool for development and fighting against poverty.*

### **I. Introduction**

It is a general perception among academic researchers and policy makers that open economies, in the long run, are relatively more rewarding than closed economies and outward looking economies contribute relatively more to economic development of a country as policies towards openness significantly increase economic growth and employment while reduce poverty and inequality. In the short-run, nevertheless, one of the steps towards openness-trade liberalization hurts poor actors in the economy. It is not necessary that successful open regimes, even in the long run, benefits all

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economic actors equally and may leave many people behind in poverty traps. Trade liberalization by its nature, in affect, implies a new adjustment in the economic setup of a country that is likely to have distributional effects that normally hurt poor people in the economy.

The recent anti-globalization critics argue that trade liberalization- or openness to trade, causes adverse consequences on economic development in general and on income distribution, poverty and employment in particular. In the wake of trade liberalization episodes, issues of inequality, poverty and employment are drawing significant attention of development practitioners and policy makers. The critics argue that trade liberalization does not ameliorate but accentuates, and that it does not diminish but intensifies, inequality, poverty and unemployment in poor countries. In literature two arguments namely static and dynamic are used to explain the relationship between trade liberalization and economic development.

The static argument builds on the channel between real wages of unskilled workers and trade liberalization in poor countries. This argument is basically a natural conjecture of Stolper-Samuelson theorem which predicts that free trade reduces poverty in poor countries because they use their comparative advantages to export labor intensive goods. Trade liberalization leads to increase in demand of exports and when these exports based on labor intensive techniques of production then demand and wages for unskilled labor are likely to rise, thereby reducing poverty.

This argument has been confirmed empirically by Anne Krueger's (1983)'s multi country project on the theme of effects of free trade on employment and wages of workers in developing world. Another argument, based on microeconomic theories, also predicts that free trade helps in reducing poverty because foreign competition in the wake of trade liberalization reduces domestic prices that, in turn, increase consumer surplus and reduce poverty.

The dynamic argument builds on two steps. Where, initially, trade increases growth and in second step, the growth reduces poverty. For instance, Dennis Robertson (1940) characterized trade as an "engine of growth." In regard to the growth reduces poverty, Smith (1776) argued that when society is "advancing to the further acquisition . . . the condition of the laboring poor, of the great body of the people, seems to be the happiest." Macdonald and Majeed (2010) analyze the poverty effects of economic growth in a sample of 65 developing countries and find out that growth helps in reducing poverty.

According to new growth theory, trade liberalization extends the markets, restructures labor market towards more innovative activities that require more human capital, induces an increase in research and development and increases knowledge flow among countries (see for example Romer, 1994).

The trade liberalization incurs some costs as well. One major cost to the government of developing countries is a loss of tariff revenues in the wake of trade liberalization. According to an estimate tariff revenues accounts 10-20% of government revenues in developing world. The compensation of this loss, in developing countries, naturally requires imposition of non-tariff taxes to maintain the government budget, nevertheless, such type of government tax policies cause economic distortions.

In literature, a striking example of the favorable effects of trade liberalization is considered growth miracle in East Asian countries. These countries followed outward looking development approach by the mid 1960s. These countries invested in human capital and followed trade liberalization policies which enable them to produce high economic growth rates, exports and living standards. The high growth rates not only helped these countries to improve their living standards but also enabled them to survive during the oil shocks in 1970s and debt crises in 1980s. The per capita income of Taiwan, Korea, Singapore and Hong Kong rose at annual rates of 8.1%, 7.1%, 6.5% and 6.2% over the period 1965-1990<sup>2</sup>.

Greenaway *et al.* (2002) examine the growth effects of trade liberalization for 73 developing countries. The overall results of their study suggest that trade liberalization significantly affect economic growth. Using a Computable General Equilibrium (CGE) model Yang and Huang (1997) pointed out that lower tariff rates improve income distribution in China. Tabassum and Majeed (2008) examine the growth effects of trade openness for 65 developing countries over the period 1965-2003. Findings of their study suggest that the trade openness causes a favorable and significant effect on economic growth.

Ali and Tahir (1999) examine the relationship between GDP per capita, poverty and income inequality in Pakistan. Their results show that income inequality worsens as GDP growth rate increases while poverty level increases as income inequality increases. The study concludes that GDP per

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<sup>2</sup> See, for further details (Behrman and Srinivasan, 1995).

capita helps in reducing poverty level but deteriorates income inequality at national level. Jamal (2004) also analyzes the impact of GDP per capita and income inequality on poverty level over the period 1973-2003. The study shows that elasticity of poverty with respect to various measures of income inequality is negative and significant.

In literature, several studies investigated the effects of trade liberalization on growth and use cross-country regressions to quantify the growth impacts of trade. Although these studies suggest that free trade causes high growth but growth, in itself, is necessary condition of economic development but not a sufficient condition. There are several other dimensions such as inequality, poverty and employment that can be taken into account while assessing development effects of trade liberalization. This study fills the gap by employing different development indicators for the economy of Pakistan.

Using different development indicators and a simultaneous equations model, this study examines the development effects of trade liberalization over the period from 1970-2006 for Pakistan. The rest of the discussion is structured as follows. Section II explains the model and theory of variables. Section III introduces the data set and construction of variables. Section IV puts forward the main findings from empirical analysis. Section V presents a summary of results with some policy implications.

## **II. Variables Justification and Methodology**

In this section a brief description of theory of variables and specified equations has been provided. The relationship of trade development is to be measured by tracing the effects of trade liberalization on four indicators of the economic development. The following indicators have been used to proxy the level of economic development in Pakistan: per capita GDP, poverty, income inequality and employment.

### **2.1. Per Capita GDP**

The level of per capita GDP is generally used to measure the level of economic development in a country. This study uses it as a dependent variable to assess the overall economic development effects of trade liberalization. Human capital and capital stock are standard variables that are used in PGDP regression equations. This study also follows the conventional approach of literature. The expected signs for both variables human and physical capital are positive. The expected effect of trade liberalization on PGDP is positive.

## **2.2. Poverty**

The most important thing that determines poverty level is the income of people. In this study per capita income has been taken at aggregate level. Lack of education is a principal factor of income poverty and absence of reasonable income/earnings cannot overcome the poverty of education. Hence, income poverty and education poverty have a mutually reinforcing relationship both at macro and micro levels (Tilak, 2005). The education is more conducive variable in reducing poverty as it is the source of more productive and employment opportunities. The expected behavior of this variable is negative. Furthermore, education is an important opportunity and absence of it constitutes poverty. We can say that poverty of education is a vital portion of human poverty. It is true that education is an important and effective tool of poverty eradication whether it is specifically the income poverty or broadly the human poverty.

Trade liberalization by its virtue increases the inflow of goods and services across countries that put downward pressure on domestic prices, thereby increasing consumer surplus and reducing poverty. Thus, expected relationship between trade liberalization and poverty is a negative one. In addition, trade liberalization also extends the existing markets and enhances employment that is negatively related with poverty. So we can expect that poverty may reduce in response to a rise in GDP, education, employment and trade liberalization.

## **2.3. Income Inequality**

Trade liberalization by its nature implies reallocation and adjustment of economic resources in an economy and thus likely to have distributional effects. According to the Kuznets curve, the relationship between PGDP and income inequality is an inverted U-shape which implies that at lower levels of economic development inequalities increase while at higher levels of economic development income inequalities fall. In order to capture Kuznets curve, this study introduces two variables PGDP and PGD in the inequality equation. The expected sign for PGDP is positive while the expected sign for PGD is negative.

The inflation has been used as another variable in inequality equation. High inflations increase the gaps between rich and poor thereby increasing inequalities in the economy. The effect of trade liberalization on inequality could be either way. It may have reduced or increased inequalities in Pakistan.

## 2.4. Employment

It is generally considered that an increase in PGDP cause positive effect on employment level because it implies that wheel of the economy is turning and creating jobs. However, the effect of GDP on employment can be reverse as well when labor-intensive techniques of production have declining trend. The expected relationship between trade liberalization and employment is positive because trade liberalization by its nature implies specialization in goods and services where a country has comparative advantages and developing countries have comparative advantages in labor intensive techniques of production. So it is expected that trade liberalization will increase the demand for unskilled labor force, thereby increasing employment in the country.

Having discussed theory of variables, this study specifies following four mutually dependent equations:

$$PGDP_t = \gamma_0 + \gamma_1 EMP_t + \gamma_2 HK_t + \gamma_3 KP_t + \gamma_4 TL_t + \varepsilon_t \quad (1)$$

$$POV_t = \alpha_0 + \alpha_1 G_t + \alpha_2 PGDP_t + \alpha_3 EMP_t + \alpha_4 HK_t + \alpha_5 TL_t + \varepsilon_t \quad (2)$$

$$G_t = \beta_0 + \beta_1 PGDP_t + \beta_2 (PGDP_t)^2 + \beta_3 CPI_t + \beta_4 TL_t + \varepsilon_t \quad (3)$$

$$EMP_t = \vartheta_0 + \vartheta_1 PGDP_t + \vartheta_2 W_t + \vartheta_3 KP_t + \vartheta_4 TL_t + \varepsilon_t \quad (4)$$

This study specifies a model which contains four mutually dependent equations. The specified equations contain four dependent variables that are per capita GDP, poverty, inequality, and employment level. The model contains following independent variables: human capital, capital stock, real wages, inflation and trade liberalization. The trade liberalization variable has been inserted in every equation to test for its effects on different indicators of economic development.

$PGDP_t$  = It is determined by dividing the GDP by population of the country.

$POV_t$  = Poverty for the purpose of this study is measured by Head Count Ratio Index.

$EMP_t$  = Employed labor force is that portion of the total labor force which is employed in paid jobs and self-employed.

$G_t$  = The Gini coefficient measures income inequality. It is based on the percentage share of income received by different proportions of the population

$HK_t$  = It is measured as literate population as a percentage of total population.

CPI = It stands for Consumer Price Index which is an indicator of inflation.  
W = It denotes real wage rates, which have been measured as dividing the annual wage rates by corresponding CPI.

$KP_t$  = Estimated capital stock for the private sector at the end of the year t. The series of  $KP_t$  used in the regression equation is estimated by the following method.

$$K_1 = I_1 / g + \delta$$

Where

g = compound growth rate of GDP at constant price (1959-60=100) and  $\delta$  is rate of depreciation per year. Here  $\delta = 0.05$ .  $I_1$  is gross fixed capital formation in the initial period.

$K_2 = (1 - \delta) K_1 + I_1$  and so on.

TL = It shows trade liberalization, which has been constructed by taking the ratio of total trade (exports plus imports) and GDP.

### III. Data and Estimation Procedure

This study uses annual data set for empirical investigation over the period 1970-2006. In the case of poverty and inequality variables annual observations are missing for some of years. The missing values have been filled using data interpolation methods. The variables are measured in million of rupees at constant prices with 2000 as the base year. The data has been derived from different sources. The data on poverty, inequality and employed labor force has been derived from *Pakistan Economic Survey (various issues)* while data on CPI, PGDP deflator, population, human capital, exports and imports has been taken from *World Development Indicators (WDI)*. The data on real wages is collected from *Pakistan Labor Force Survey (various issues)*. Data on private investment is collected from the Statistical Year Book (various issues).

The economic development indicators used in this study are mutually dependent on each other. This study uses four dependent variables; however, these dependent variables are also supposed to affect each other. For example, following Kuznets curve, economic development (PGDP) determines inequality while inequality, in turn, also affects PGDP. Such interdependence among development indicators raises the issue of endogeneity that needs to be tackled effectively. In order to cure the problem of endogeneity, a system of equations and GMM econometrics technique has been used for this study. For estimation of the model using GMM econometrics technique a sufficient number of instruments is required. Following a standard approach in literature

the equations have been estimated using lagged first difference as instruments (Majeed and Ahmad, 2009).

#### **IV. Empirical Results and Interpretation**

Empirical results of the model, in which the openness index (sum of export and import as a percentage of GDP) is used to represent trade liberalization, are reported in table-1. The first column provides the list of variables. The second column provides the estimates obtained from 1st equation of the model with dependent variable PGDP already specified. The third column reports the results of the 2nd equation where poverty is a dependent variable. The results for 3<sup>rd</sup> equation, where inequality is a dependent variable, have been reported in the fourth column. Finally, last column of the Table 1 shows the results obtained for last equation (4) of the model, where employment is a dependent variable. Overall, results reported in Table-1 indicate that number of parameter estimates which are theoretically consistent are considerably higher than that of inconsistent results.

The estimated values for the adjusted  $R^2$  indicate that overall fitness of the model is good. Nevertheless, adjusted  $R^2$  values are relatively high in case of equations 1 and 4 and low in case of equations 2 and 3. Such a variation in adjusted  $R^2$  could be explained by taking account of following factors: First, equations 1 and 4 use dependent variables in transformed form and equations 2 and 3 use dependent variables in the form of indexes. Second, equations 1 and 4 suffer from the problem of auto correlation that was removed by applying AR (1). Third, PGDP and employment, dependent variables in equation 1 and 4, may have high correlation that explains high values of adjusted  $R^2$ . The problem of auto correlation has been detected by Durbin Watson test and it has been removed by using auto regressive scheme, AR (1). The problem of multicollinearity is not plaguing the results of this study because endogeneity of key variables of concerns has been tackled using system of equations and GMM technique of estimation. Furthermore, a major symptom of multicollinearity- high adjusted  $R^2$  and few significant variables has not been found in the results of this study.

The coefficient on trade liberalization in the first equation of the model turns out to be insignificant with positive sign that is inconsistent with prior expectations. According to the predictions of new growth theory trade liberalization extends markets, restructures labor market towards more innovative activities, induces an increase in research and development and

increases knowledge flow among countries. However, in case of Pakistan, trade led growth hypothesis is not significant. The primary reason could be

**Table: 1. Parameters Estimates of the GMM Model**

Variables	PGDP	Poverty	Gini	Employment
<b>C</b>	1119 (1.44)	-269 (-2.08)**	-2.10 (-5.98)*	-19.57 (-1.66)***
<b>PGDP</b>	-	0.06 (2.01)**	0.001 (7.55)*	0.015 (5.13)*
<b>(PGDP)<sup>2</sup></b>	-		-1.34E-07 (-6.87)*	
<b>EMP</b>	5.56E+09 (2.25)**	-3.14 (-2.06)**	-	-
<b>GINI</b>	-	20.97 (1.65)***	-	-
<b>CPI</b>	-	-	0.002 (2.05)**	-
<b>HK</b>	20.8 (2.24)**	-5.69 (-1.77)***	-	-
<b>INV</b>	0.32 (6.93)*	-	-	-0.002 (-1.71)***
<b>W</b>		-	-	-0.06 (-2.13)**
<b>TL</b>	386 (0.58)	64.5 (2.01)**	0.27 (2.25)**	-28.14 (-1.28)
<b>R<sup>2</sup></b>	0.98	0.31	0.39	0.95
<b>D.W</b>	1.42	2.046	1.86	1.69
<b>AR (1)</b>	0.57 (5.98)*			0.61 (7.14)*

Note: The t-statistics are given in parentheses (\*\*\*), (\*\*) and (\*) indicate statistical significance at 10%, 5% and 1% levels, respectively.

unsustainable growth pattern over the study period in this country. Furthermore, institutional strength, good governance and macroeconomic stability play an important role in transferring the true effects of trade openness on PGDP. Human capital plays an important role in determining PGDP. The level of employment is also positive and significant in explaining PGDP.

The impact of trade liberalization on poverty is positive and significant implying that trade is not beneficial for poor people in the country. Even if trade liberalization is linked to more rapid growth, this does not necessarily

imply that it is an effective instrument for reducing poverty. For instance, if a growth strategy based on trade openness leads to a significant worsening of income inequality of households at the bottom of the income strata, it may not make any discernible in-roads in alleviating poverty. In such state of affairs it would be essential for outward orientation to promote growth at a “sufficiently rapid” pace for the poor to have any chance of benefiting via “trickle down” effects. However, the political sustainability of such inequitable growth is doubtful; the distributional character of economic growth matters as much as the rate of growth

The effect of education in reducing poverty is significant with correct negative sign. It implies that investment in human capital through education is the effective tool in eradicating poverty. This variable has multiple positive dimensions, as it increases the productivity of a worker. General awareness among the people has been increased and they find the opportunities in the market. The education is more conducive variable in reducing poverty as it is the source of more productive and employment opportunities. Furthermore, education is an important opportunity and absence of it constitutes poverty. We can say that poverty of education is a vital portion of human poverty. It is true that education is an important and effective tool of poverty eradication whether it is specifically the income poverty or broadly the human poverty. The coefficient of trade liberalization in the employment equation turns out to be different as compared to other development indicators. The results show that increased trade has reduced employment levels in the country that is not consistent with prior expectations as free trade by its virtue extends market and provides more employment opportunities. However, findings may imply that trade liberalization has changed the labor proportion in production process where share of labor has decreased while capital has increased.

This negative relationship between trade liberalization and employment implies that increased trade is not contributing in overall employment of the country. The demand for skilled labor in the wake of trade openness could sustainably reduce the demand for unskilled labor that can cause adverse effects on overall employment of the country. The effect of employment on PGDP is positive and significant. PGDP has also affected employment significantly and positively.

The coefficient on PGDP in poverty equation turns out to be positive and significant which is not consistent with the earlier studies. There are two plausible reasons of such positive relationship. First, it is quite possible that a

rise in population undermines the rise of GDP. Secondly, the growth of PGDP causes further inequalities that potentially spill over negative effects on poverty. This phenomenon has been supported with the positive sign of Gini coefficient in explaining poverty and positive sign of PGDP in explaining Gini. So, high growth prospects enhance the existing gaps between rich and poor and deprived portion of the economy remain behind despite growth bearing facts.

Employment is an important factor which can reduce poverty levels in a country. Results of this study show that the effect of employment on poverty is favorable and significant at 5 % level of significance. The relationship between trade liberalization and poverty is positive and significant. It means trade liberalization in case of Pakistan is not good for poor actors of the economy. This finding also lends support to the better interpretation of inverse relationship between trade and employment. It can be argued that trade liberalization decreases employment and lower levels of employment, in turn, yield high incidence of poverty as employment and poverty are negatively associated.

The relationship between trade liberalization and income distribution also turns out to be positive and significant at conventional level of significance (5%). It means trade liberalization increases the gap between rich and poor people in the country. As discussed before, trade liberalization has changed the production structure where proportion of unskilled and semi-skilled labor force has declined while share of capital has increased. It means returns have changed in the favor of capital owners, thereby increasing existing income inequalities in the economy. Findings of this study suggest that Kuznets curve holds in the case of Pakistan since non-monotonic effect of economic development on inequality is negative and significant while its linear effect is positive and significant.

The relationship between inflation and inequality is positive and significant at conventional level of significance. It means high inflation rate increases poverty incidence in the economy. In fact inflation hurts poor hard and redistributes income in favor of rich people in the economy. The positive impact of inflation on income inequality found in this study is consistent with Kemal et al. (2002).

I applied Wald tests on the various null hypothesis involving sets of regression coefficients. The results are shown in table 2. The P-value indicates that this analysis rejects the null hypothesis that regression coefficients of all

the variables in the four simultaneous equations are equal to zero. The null hypothesis that regression coefficient in each equation is also rejected as shown by the p-values. The same exercise has been done for trade liberalization variable in the all four equations jointly. The test results confirm

**Table: 2. Results of Wald Test on Parametric Restrictions**

Null hypotheses	Chi-Square Statistic	Computed Rejection Prob.
Regression coefficients of all the variables in the four equations are equal to zero	26888.02	0.000
Regression coefficients of all the variables in the PGDP equation are equal to zero	927.81	0.000
Regression coefficients of all the variables in the poverty equation are equal to zero	48.15	0.000
Regression coefficients of all the variables in the inequality equation are equal to zero	91.15	0.000
Regression coefficients of all the variables in the employment equation are equal to zero	178.87	0.000
Regression coefficients of the trade liberalization variable in the four equations are equal to zero	10.27	0.036
Regression coefficient of the trade liberalization variable in the PGDP equation is equal to zero	0.34	0.558
Regression coefficient of the trade liberalization variable in the poverty equation is equal to zero	4.04	0.044
Regression coefficient of the trade liberalization variable in the inequality equation is equal to zero	5.07	0.024
Regression coefficient of the trade liberalization variable in the employment equation is equal to zero	1.64	0.199

the joint significance of trade liberalization in the model. The null hypothesis that trade liberalization do not affect PGDP can not be rejected. However the hull hypothesis that trade liberalization does not have affect in the system seems rejected.

## V. Conclusion and Policy Implications

The objective of this study has been to assess the development effects of trade liberalization using PGDP, poverty, inequality and employment as development indicators. For this purpose the study used a time series data over the period 1970-2006. The data are derived from the World Development Indicators (WDI) 2006, *Pakistan Economic Survey (various issues)* and *Labor Force Survey (various issues)*. GMM model is employed for the estimation of

the relationship of PGDP, poverty, inequality and employment with their potential determinants based on the time series data.

Although it is generally considered among economists and policy makers that trade liberalization generates more gains and increases the development level of a country. Nevertheless, in the case of Pakistan, trade liberalization has not affected development indicators in a desirable manner. All chosen development indicators show that trade liberalization has not yielded a desirable outcome. Though it has affected PGDP positively but this effect is not significant. The results have revealed that trade liberalization accentuated not ameliorated inequality and poverty in the case of Pakistan. Similarly, the relationship between trade and employment turns out to be negative. On the one hand, high imports of raw material and machinery in the wake of moves towards free trade have affected PGDP positively. While, on the other hand, exports of capital-intensive manufacturing goods led to decrease of employment in country.

The role of human capital emerged as a most favorable factor in enhancing economic growth and eradication of poverty because education is an important opportunity and absence of it constitutes poverty. We can say that poverty of education is a vital portion of human poverty. It is true that education is an important and effective tool of poverty eradication whether it is specifically the income poverty or broadly the human poverty. The central message of this study is that trade liberalization is not pro development in case of Pakistan and investment in human capital is the effective tool for development and fight against poverty.

Based on study's result, it is recommended that Pakistan needs to invest heavily in the basics of human development. In order to combat with jobless-openness, it might be appropriate to give more importance to the production of labor intensive products. Since Kuznets curve holds in Pakistan, it necessitates the importance of high and sustained economic devolvement in the economy.

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## *Book Review*

### **European Union Enlargement from EU 15 to EU25 Trade Implications for Pakistan**

**VDM Verlag Publishing House, Germany, 2010**

**By: Rashid A Naeem, Allama Iqbal Open University, Islamabad.**

The importance of International Trade is enhanced with the passage of time and it has acquired a central place in the economic literature. The birth of World Trade Organization (WTO) has further boosted its implications for all countries. Because WTO has created new challenges in terms of competitiveness for developed, as well as under developed economies and survival of these are closely linked to meet new challenges. All these issues are the main focus of this book. The author has not only highlighted the role of European Union's (EU) expansion from EU 15 to EU 25 but also provided a list of policy implications for Pakistan and European Union. He has applied the theory of economic integration with the help of reviewing the results of enlarging volume of European Union from; EU15 to EU25. The importance of this region (EU) is increased due to its lion's share in the world trade. As concerned to Pakistan, it is also vital because final destination of its major exports is the same region of the world.

The author has analyzed the impacts of enlargement of EU on intra-region trade and especially on Pakistan's economy. He has not only identified the role of tariff and non-tariff instruments of the complicated trade regime of EU to restrict the trade but also discussed the benefits associated the expansion of this trade regime. He has also addressed the issue of newly born economic integration in the new era of discrimination, divergence and preferences in trade, along with regionalism. For this, he distinguishes Most Favorite Nations (MFN) from other trading partners in terms of trade expansion and discrimination. Pertaining to Pakistan, he analyzed the pattern of major exports consisting upon textile family products and their future prospects in the scenario of enlargement of EU. He predicted that flourishing of Intra-EU trade and its expansion has not significantly affected the pattern of Pakistan's exports so far, which is a good signal for Pakistan and other trading partners. Thus, integration has not brought such expected negative results but it does

not mean that the threat is over. Pakistan continually depends on EU market for its exports and it is unable to find new markets, such a trend is not encouraging. Risk continually exists; i.e. don't put all eggs in one basket and a lesson must be learned from it. The author suggested that Pakistan's need is to evaluate its trade pattern, since the problem could arise in future due to increased competition emerged from the EU's integration.

The research work contained in the book is very interesting for both EU nations and Pakistan. The outcomes of the analysis indicate that tariff preferences given to exporting countries by EU not guaranteed the success of these countries. Because, tariff is not the only tool by which trade preferences are presented. Therefore, sole tariff preference might be unable to enhance the exports to EU nations. Thus, exporting countries and especially, Pakistan must also look for other economic preference to gain from trades. At present, Pakistan is facing the challenges like; few goods' exports, commodity concentration and geographical concentration. These challenges are expected to increase in future, if not properly addressed.

The outcome of this research has also put forward important policy implications for EU countries and Pakistan. The increased in the degree of openness need to change the supporting environment by public policies; in terms of bring change at micro as well as macro level to face the international challenges. The public sector must bring such reform to face international changing environment. Pakistan needs to come out of low level equilibrium (or disequilibrium) to an open and expanded market competition across borders to fully enjoy the trade benefits.

No doubt that the book has made a significant contribution in the literature. Because, it pointed out valid empirical evidences which are very helpful to understand the prevailing trade pattern of trade partners of EU and complex trade system of EU, its policies and roots of competition. The arguments could be strengthen further if the author reviews more recent literature on the subject matter and then provide a sound base for trade policy. The results explained therein may be fine at macro level but such findings may not hold at micro level; the very reason is that the author has stressed again and again for developing competition at micro-level. Non-competitive environment at micro-level is a challenge for developing countries, which requires reforms in major sectors. The countries that opened their economies for international trade but failed in reshaping their domestic economies are the mainly victim

of this unhealthy competition and trade openness. Such aspects have been ignored in this study. There is a need to extend the analyses for the provision of sound foundations for shaping up domestic economy at micro and macro level. In brief, reshaped economy of Pakistan might expect to bear the fruits of trade. So far Pakistan has not gained much from trade, in spite of substantial openness of its economy. Besides, the changing cost structure (inputs/utilities), high transaction cost and fragile policies at home (Pakistan) hardly help to understand how it will continue to maintain its trade share in future. These hidden aspects also needed to be highlighted. Therefore, macro-level results presented by this book also need to focus on micro-foundation to portray the true picture and then provide a sound base for trade policy.

Notwithstanding the above, the book is surely very interesting, contains valuable analysis, useful for future policy and the contribution is also at the right time.

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