A DYNAMIC ANALYSIS OF EDUCATION AND ECONOMIC GROWTH IN PAKISTAN: ANALYSIS IN FORM OF CO-INTEGRATION

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ABSTRACT
The paper focuses on Pakistan, which has over the years invested substantially to improve the educational attainment of the labor force and to raise productivity but yet still faces declining real output and slow economic growth. The study observes that this puzzle is attributable to labor market distortions, benefit captured syndrome, industrial dispute and job discontinuities as well as leakages in the Pakistani society such as brain drain, among others. The paper further suggests the improvement of the education system, appropriate pricing of teacher's labor and prevention of industrial disputes in order to upgrade and internalize the contributions of educational capital to economic growth in Pakistan.

INTRODUCTION:

The main engine of growth is the accumulation of human capital–of knowledge –and the main source of difference in living standards among nations is difference in human capital. Physical capital plays an essential but decidedly subsidiary role (Lucas, 1988).

It is widely accepted that education creates improved citizens and help to upgrade the general standard of living in a society. In Islam seeking knowledge is a scared duty. The first revealed word of the Holy Quran is "Iqra" READ! Educate your selves. It would seem to follow naturally that if more individuals are educated, the wealth of nation would rise, since more education attracts higher wages and aggregative higher national income. And if there are positive externalities of education, national income should increase by even more than the sum of the individual benefits. It has been stated by Quaid-e-Azam on Pakistan education conference (1947) that the future of our state will and must greatly depend upon the type of education we give to our children. This increasing faith in education as an agent of change in many developing countries including Pakistan has led to a heavy investment in it, and thus the delegation of manpower development to the school. The pressure for higher education and even school education in many

developing countries has undoubtedly been helped by public perception of financial rewards from pursuing such education.

However, the paradox accompanying this belief is that, despite the huge investment in education, there exist no strong evidence of growth-promoting externalities of education in Pakistan, but rather, education expansion further deepens social inequality and inculcate negative social changes such as cultism, rent seeking, sexual harassment, sorting, result racketeering, industrial disputes, brain drain among other social vices in the Pakistani school system and the society at large.

The need for the study, therefore, arises from the fact that there tends to be a severe socio-political pressure to expand education in developing countries, but the economic needs - however flexibility defined - very often fall far short of what the educational system delivers. There is considerable evidence that political and social pressures based on anticipated gains from additional education have frequently led to educational expansion far ahead of the economy's need for educated manpower. This may lead to a lot of frustration, since an 'educated labor force' feels entitled to jobs appropriate to the education qualification received, and it will not always be possible to guarantee that. This may generate some crowding out effect of such investment.

Most studies of human capital have estimated earnings on micro data Mincer (1974). Abbas (2001) analyzed the impact of human capital on economic growth for Pakistan and Sri Lanka. The results of empirical analysis show that primary schooling enrolment rates has negative while secondary and higher schooling enrolment rates has positive and significant impact on economic growth for both countries in the sample. Studies of this type are unlikely to capture all indirect benefits to economic growth, such as stimulating physical capital investments and technological development and adoption. Therefore there is a strong case for supplementing them with macroeconomic research, as attempted here.

REVIEW OF LITERATURE

At the microeconomic level, the very large literature that has analyzed the impact of educational attainment on

individual wages and other labor market outcomes leaves very little doubt that schooling has significant and quantitatively large positive effects on earnings, labor force participation rates and employment probabilities. At the macroeconomic level, academic economists have traditionally been optimistic about the contribution of education to economic development and have often assigned to the accumulation of human capital a central role in formal models, particularly in the recent literature on endogenous growth. The results of empirical cross-country studies on the determinants of economic growth have been largely consistent with this view. Barro (1991) and Mankiw, Romer and Weil (1992), among other authors, find that a variety of educational indicators have the expected positive effect on output levels. Barro & Lee, (1994) constructed a data set for human capital for almost 129 countries. The preliminary results showed that increased education of women leads to a quick decline in fertility and hence population which resulted into a better education for siblings. It was also found that male education has a direct impact on GDP growth.

Ramirez, Ranis, & Stewart (1997) examined the relationship between human development and economic growth of developing countries with a focus on Pakistan. The study found that most of the developing countries were at vicious cycle from 1960 to 1992. Pakistan was EG-lopsided in 1960s and 1980s while it was vicious in 1970s and 1990s. However, there exists a positive and significant relationship between economic growth and education. Barro (2001) analyzed the determinants of economic growth and investment in a panel of countries. The results revealed that growth was positively related to the initial level of average years of school attainment of adult males at the secondary and higher levels and was insignificantly related to years of school attainment of females at the secondary and higher levels. Growth was insignificantly related to male schooling at the primary level. The quantity of schooling was measured by average years of attainment of adult males at the secondary and higher level education was positively related to the economic growth. However, the effect of school quality rather quantity was found more important for economic growth.

During the second half of the nineties, however, a new round of empirical papers produced rather disappointing results on the effects of schooling on aggregate productivity. Unlike most previous studies (which relied on cross-section data to analyze the determinants of growth over long periods), most of these papers used pooled data at relatively short frequencies and relied on either panel techniques or on the use of differenced specifications to control for unobserved country heterogeneity. In this setting, educational variables are often found to be insignificant or even enter with the "wrong" sign in growth regressions. (Benhabib and Spiegel, 1994; Islam,1995 and Pritchett, 2001).

While some researchers have been willing to take such counter intuitive results at face value and have even started to seriously consider the reasons why educational investment may not contribute to productivity growth (Pritchett 1999). These authors have tended to attribute negative results on schooling and growth to various econometric and specification problems and to poor data quality. The research carried out over the last few years strongly suggests that the negative results found in the previous literature can indeed be largely attributed to deficiencies in the human capital data used in earlier studies. Papers that make use of improved data sets on attainment or allow for measurement error find that increase in schooling do indeed have a substantial impact on productivity growth. Results are generally even stronger and sharper when direct measures of skill levels are used to proxy for human capital, suggesting that improvements in the quality of schooling can have an even larger effect on aggregate output than increases in its quantity.

Krueger and Lihdhal (2001) show that the amount of noise in the most widely used schooling data sets is large enough to explain some of the most widely cited negative findings on human capital and growth as the result of measurement error. Cohen and Soto (2001) draw on previously unexploited sources of information to construct new attainment series that appear to contain a considerably smaller amount of measurement error. But the use of these refined data leads to very significant improvements in the performance of schooling indicators in several standard

growth specifications. The results of these papers indicate that the contribution of schooling to aggregate productivity growth is at least of the size implied by micro econometric estimates of wage equations and may be considerably larger, suggesting that human capital accumulation may be the source of important positive externalities at the aggregate level which are likely to be related to the role of education in promoting the development and absorption of new knowledge. There remains, however, considerable uncertainty regarding the size of these externalities, both because the existing range of estimates of the relevant parameter is broad, and because it is quite likely that some of these estimates may be biased upward due to a reverse causation problem that reflects the feedback effects of rising income on the demand for education (Bils and Klenow, 2000). Another interesting development is the use of direct measures of skills which are likely to be better proxies for human capital than years of schooling. While such data are still rather scarce, some recent papers suggest that this is likely to be a rather fruitful line of research. Hanushek and Kimko (2000) construct an indicator of labor force quality using mean country scores in a number of international student achievement tests in mathematics and science. The results of growth regressions point to even larger output effects than those obtained using even revised attainment data. These estimates imply that the return to improvements in schooling quality could be extraordinarily high, for not only are their expected benefits large, but the relevant costs will generally be much lower than those of increasing attainment for they do not involve a further sacrifice of student time and output.

Following Barro (1991) and Mankiw, Romer, and Weil (1992), there has been an upsurge of empirical research on the effects of human capital on economic growth. The main issues analyzed are whether higher levels of education or greater improvements in education are associated with faster output growth. Overall, the cross-country evidence is mixed on both counts (not withstanding the emphasis on human capital in new growth theories and recent neoclassical growth theories). This could be because of difficulties when specifying cross-

country growth regressions (Temple, 1999). For example, the limited number of countries forces researchers to use parsimonious pacifications to avoid the degrees of freedom problem. Another reason could be attenuation bias due to mis measured schooling data (Krueger and Lindahl, 2001; Cohen and Soto, 2001). Such attenuation bias could be magnified by multi-collinearity, often present in cross-country growth regressions, as high-growth countries tend to have higher rates of human capital accumulation, deeper financial markets, stronger property rights protection, higher savings and investment rates etc. Mixed results could also be due to schooling indicators used in empirical work often missing cross-country differences in educational quality (Hanushek and Kimko, 2000; Barro, 2001). In any case, a significantly positive correlation between schooling and output growth does not imply that schooling affects growth. Instead, both schooling and output growth could be driven by an omitted variable, total-factor-productivity growth (Bils and Klenow, 2000). One way to progress in our understanding of the effects of human capital on growth is to focus on channels through which such effects could work. It is often argued that high levels of human capital facilitate technology adoption (e.g. Barro, 1991; Benhabib and Spiegel, 1994).

THEORITICAL MODEL:

To promote economic growth, factors of production such as capital and labor are used. But the efficient use of labor and capital resources for greater productivity requires that the workers are well trained and skilful. The training and skills acquisition are mainly accumulated through education. Education is an economic good because it is not easily obtainable and therefore need to be apportioned or traded. Economists regard education as both consumer and capital good because it offers utility to a consumer and also serves as an input in the production of other goods and services. As a capital good, education can be used to develop human resources necessary for economic and social transformation. The focus on education as a capital good relates to the concept of human capital, which emphasizes that the development of skills is equally an important factor in production as are finance, natural resources, and physical equipment. Thus the framework for this study assumes a stable production function in which changes in output are due to changes in the quantity and quality of inputs and advances in knowledge. Considering such aggregate function, Solow in Jhingan (2000: 591)

postulates the production function in a special form as:

$$Y = f[(K, L); A] \quad (1)$$

Where; Y= real aggregate output; K= capital inputs; L= labor inputs and A= efficiency parameter

Here, the efficiency parameter (A), resulting from total factor productivity (TFP), is assumed to be a function of educational training (T). It is used here to augment the Classical production function Y = f(K, L).

Hence, Y = f [(K, L); A(T)]

$$Y = f[(K, L); A(T)] \quad (2)$$

Therefore, growth of output is a function of the capital stock and the labor force as well as a measure of educational training (T), which is a policy variable that also contributes to output.

A growing body of research suggests that even after physical and human capital accumulations are accounted for, something else also accounts for the growth rate of gross domestic product (GDP) per capita. Economists typically refer to the something else as total factor productivity (TFP) (Easterly and Levine, 2001:177). According to Klenow (2001:221) the TFP could reflect disembodied technology, human capital externalities, access to specialized or high-quality capital or intermediate goods, the degree of competition, or measurement error. Research has barely begun to quantify the contributions of each of these factors. Expressing the equation in growth terms, we differentiate equation (2) totally and obtain;

$$dY = Y\,kdK + Y\,LdL + Y\,T_o dT_o \quad (3)$$

Where; Yi is the partial derivative of Y with respect to its arguments in equation (1). For instance, Yk = ∂Y / ∂k

Equation (3) indicates that the level of real aggregate output (Y) can be higher with the same capital and labor inputs if productivity is higher due to a greater educational training. Dividing equation (3) through by Y gives;

$$dY/Y = [(\partial Y/\partial K)dK]/Y + [(\partial Y/\partial L)/dL]/Y + [(\partial Y/\partial T)dT]/Y \quad (4)$$

Thus,

$$dY/Y = dK/K + dL/L + dT_o/T_o \quad (5)$$

Where, dY/Y, dK/K, dL/L and dT/T are the rates of change of output, capital, labor and education policy respectively. Equation (5) says that the growth rate of output (dY/Y) is equal to the rate of growth of physical capital (dK/K) and the growth rate of labor (dL/L) plus the growth rate of total factor productivity (dT_0/T_0), which is attributed in this study to changes in capital formation and improvement in human capital resulting from education. This contention is derived from the 'new' growth theories.

For estimation purposes, equation (5) is stated in a more flexible form with constant term, thus;

$$Y = \alpha_o + \alpha_1 K + \alpha_2 L + \alpha_3 T_o \quad (6)$$

It is also useful to estimate equation (6) in different forms and to extend the model to accommodate other related variables such as the number of University graduates and time factor, since we are dealing with a time series analysis. Therefore, by extension, equation (6) can be expressed as

$$Y = \beta_o + \beta_1 K + \beta_2 L + \beta_3 T_o + \beta_4 G + \beta_5 t \quad (7)$$

Where;

Y = index of domestic output (GDP)

K = index of capital input (GFCF)

L = index of labor input (LABF)

T = education expenditure (EDUEXP)

G = number of university graduates (GRAD)

t = time = 1 in 1970, 2 in 1971, etc; and all the indices were in real terms, with 2000 = 100.

It is expected from the model that the more the number of laborers, physical capital, educational capital and university graduates that is employed, the higher the level of national productivity. The extended Solow model facilitates simple regression-based estimates of how educational capital ought to contribute to growth promotion. And the Solow's approach also plays an important part in initiating systematic thinking on the problem under consideration.

DATA ANALYSIS

Annual time series data covering 1971 to 2007 have been used for estimation. These data were collected from three main sources: International Financial Statistics Year Book - a publication of the IMF; World development indicators- a publication of the World Bank; Handbook of Statistics on Pakistan Economy 2008- publication of State Bank of Pakistan. In terms of measurement of the variables, the dependent variable is the real growth rate of the gross domestic product (GDP), which is conceptually more appropriate in growth-accounting regressions than per capita GDP (Pritchett, 2001). Since the estimation equation is a well-behaved production function, which relates aggregate output (GDP) to inputs we are therefore permitted to use proxies to represent the explanatory variables in the model as follows: Real capital formation derived by deflating the gross fixed capital formation (GFCF) by GDP deflator is the proxy for physical capital; aggregate labor force (LABF) is the proxy for

labor input; while real education expenditure (EDUEXP) is used to represent educational capital. The choice of educational expenditure as opposed to years of schooling or test scores, which Jolliffe (1998:81) argues to be a better proxy for human capital, is partly because of the paucity of data on Jolliffe superior variables. However, the estimation model is further extended to consider the number of University graduates (GRAD) and time (t) as a markup for the difference.

The finding that macroeconomic time series data are characterized by wild swings has spurred the development of the theory of non-stationary time series analysis. Consequently, an attempt has been made to render the data stationary prior to specification and estimation. Moreover, the observation that the residuals of nonstationary time series regressions are correlated with their own lagged values violates the standard assumption of the ordinary least squares (OLS) regression theory that disturbances are not correlated with each other. Hence, OLS estimates of such series are biased and inconsistent, and standard errors computed with such random walk variables are generally underestimated. In this case, OLS is no longer efficient among linear estimators (Ndiyo, 2003).

Vector Autoregressive (VAR) Regression

The VAR approach sidesteps the need for structural modeling by modeling the endogenous variable as a function of its lagged values. Since only lagged values of the endogenous variable appear on the right hand side of the equation, there is no issue of simultaneity. The strength of the VAR model lies in its ability to incorporate the residual form the past observation into the regression model for the current observation. The coefficients may be interpreted in the usual manner, but the results involving the residuals, differ however, from those computed in OLS.

EMPIRICAL RESULTS

The empirical analysis is presented in two stages: the stationarity test and variance decomposition.

Stationarity Test:

In this study, unit root test is conducted on all the variables in order to ascertain their stationarity status. The stationarity status of the series was established by considering the order of integration of each series using the Augmented Dickey-Fuller (ADF) and the Philips-

Perron (PP) classes of unit root tests. We use PP approach to test for stationarity of the variables because PP test statistics, which is a modification of the ADF, takes into account the less restrictive nature of the error process. Moreover, this replaces the use of lags in the ADF test, which has been criticized as being arbitrary (Nyong, 2003). Both the ADF and the PP tests strongly support the hypothesis that the variables used are non-stationary. Thus, the hypothesis of stationarity was rejected. The results shows that the variables are integrated of order one and are stationary after first difference. We thus conclude that they have unit roots (Dickey and Fuller, 1981; Hendry, 1986; Philips and Peron, 1988; Johansen, 1988).

All the series are stationary at their 1st differenced form, which tends to support for the application of JJ-Co-integration and VAR technique for long run relationship among the variables.

TABLE 1: UNIT ROOT TEST

	Augmented Dickey Fuller Test		Phillips Peron Test		Remark
Varaibles	without trend	with trend	without trend	with trend	
LnGDP	-1.838183	-2.430227	-2.532398	-3.048561	I(1)
DLnGDP	-4.552324	-5.194529	-4.92374	-5.528047	I(0)
lnGFCF	-0.744176	-4.187155	-0.879297	-1.74251	I(1)
DLnGFCF	-4.355762	-4.423292	-4.318194	-4.351436	I(0)
LnLABF	0.046773	-1.909615	0.097436	-1.909615	I(1)
DLnLABF	-6.366371	-6.236391	-6.359703	-6.232862	I(0)
LnEDUEXP	-1.256701	-1.977699	-1.223638	-2.034318	I(1)
DLnEDUEXP	-4.702964	-4.937275	-4.761203	-4.960728	I(0)
LnGRAD	1.389889	-0.958453	0.819077	-0.895953	I(1)
DLnGRAD	-5.980314	-0.76597	-5.992651	-6.133818	I(0)
Critical Vlaues					
i) level					
1%	-3.626784	-4.234972	-3.626784	-4.234972	
5%	-2.945842	-3.540328	-2.945842	-3.540328	
ii) 1st Difference					
1%	-3.639407	-4.252879	-3.6329	-4.243644	
5%	-2.951125	-3.54849	-2.948404	-3.544284	

Table-2 shows the results of Co-integration analysis between domestic output and capital, labor, education expenditures and university graduates to test for Co-integration; we utilized Johansen informative maximum likelihood approaches both the maximum Eigen values and Trace statistics.

TABLE 2: Johansen First Information Maximum Likelihood Test for Co-integration			
Hypothesized	**Trace Statistic**	**5% Critical value**	**Prob-value**
R = 0*	108.7953	69.8189	0.0000
R ≤ 1*	54.9869	47.8561	0.0093
R ≤ 2	22.5803	29.7971	0.2673
R ≤ 3	10.1311	15.4947	0.2708
R ≤ 4	2.7811	3.8415	0.0954
Max-Eigen Statistic			
Hypothesized	**Max-Eigen Statistic**	**5% Critical value**	**Prob-value**
R = 0*	53.8084	33.8769	0.0000
R ≤ 1*	32.4066	27.5843	0.0111
R ≤ 2	12.4491	21.1316	0.5040
R ≤ 3	7.3501	14.2646	0.4486
R ≤ 4	2.7811	3.8415	0.0954

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

The results from the Johansen Co-integration analysis are shown in Table-2, where both the maximum Eigen values and trace-test values examine the null hypothesis of no Co- integration against the alternative of Co-integration. Starting with the null hypothesis of no Co-integration ($R = 0$) among the variables, the trace-test statistics is 108.79, which is above 5% critical value 69.8189 respectively (prob-values are also shown in the **Table-2**). Hence, it rejects null hypothesis $R \leq 0$ in the favor of general alternative $R = 1$. As is the evidence in Table-2, the null hypothesis of $R \leq 1$can be rejected at 5% level of significance hence it's alternative of $R = 2$ is accepted. But the null hypothesis of $R \leq 3$ *and* $R \leq 4$ can be accepted at 1% level of significance. Consequently, one may conclude that there are two Co-integrating relationships (vectors) among the real growth rate of GDP, Labor, capital. Educational expenditures and number of university graduates, turning to the maximum Eigen value test, the null hypothesis of no Co-integration ($R = 0$) is rejected at 1% level of significance in the favor of general alternative, that is one Co-integrating vector, $R = 1$. The test also rejected the null hypothesis of $R = 1$ in the favor of the alternative $R = 2$. But accept the null hypothesis $R=3$ and $R=4$ at 1% significance level. This result shows that four long run Co-integrating relationship amongst the four I(1) variables.

The Johansen procedure also produces the normalized coefficients associated with unique cointegrating vector,

obtained from the results of Table 2, which are given as follows:-

Ln(GDP)=15.65–2.615LnGFCF+7.746LnLABF - 3.058LnEDUEXP – 10.873 LnGRAD

University graduates and education expenditure have negative elasticity with respect to GDP. Surprisingly, the coefficient of GFCF variable is negative and has a smaller magnitude than expected.

We just showed that variables are cointegrated; that is; there is long term, or equilibrium, relationship exist. Further investigation can be obtained using short run Error Correction Mechanism (ECM). The ECM was first used by Sargan. This is constructed by employing the residuals saved from the long run estimation as the error correction variable (ecv). In estimating the short run model using the general to specific modeling procedure, the following short-run coefficients are recorded.

$$\Delta LNGDP=0.0834+0.3454\Delta LNGFCF+0.0112\Delta LNGRAD-0.1871\Delta LNLABF+0.0663\Delta LNEDUEXP-0.1160\,\hat{u}_{t-1}$$

Regression Estimates

The first part of result shows the linear regression of domestic output against capital, labor and education expenditure.

t = (5.139) (5.88) (0.395) (-0.518) (0.9086) (-1.14)

$R^2 = 0.61$, d = 1.42

According to t-statistics, only capital is statistically significant at 5% level. Labor force has negative sign. The short run responses of explanatory variables are inelastic. Statistically the equilibrium error term is non zero (-0.116) the model is out of equilibrium in short run suggesting that GDP is 11% away from equilibrium which will recover in coming years. Short run changes in education expenditure have positive impact on short-run changes in GDP. The plot of the actual and fitted values in Fig 1 suggests that the short-run model tracks the data well.

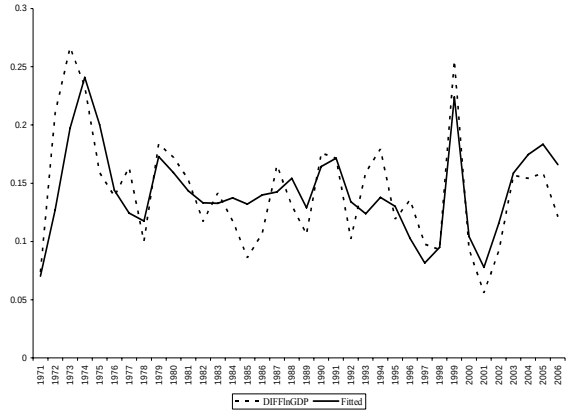

Fig 1. Plot of actual and fitted values from the short run error correction model

Dependent Variable: LNGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.799163	1.052447	-0.759338	0.4534
LNGFCF	0.391189*	0.062910	6.218266	0.0000
LNLABF	0.538076	0.357847	1.503647	0.1428
LNGRAD	**-0.080317***	0.027085	-2.965321	0.0058
LNEDUEXP	0.036574	0.059015	0.619738	0.5400
T	0.069354*	0.009142	7.586193	0.0000

R-squared	0.999348	**Mean dependent var**	2.998833
Adjusted R-squared	0.999242	**S.D. dependent var**	1.513350
S.E. of regression	0.041652	**Akaike info criterion**	-3.371557
Sum squared resid	0.053781	**Schwarz criterion**	-3.110327
Log likelihood	68.37380	**F-statistic**	9498.672
Durbin-Watson stat	1.072127	**Prob(F-statistic)**	0.000000

*Significantat5%

The result indicates that the elasticity of output with respect to number of university graduates is negative, implying that an increase in graduates would cause output to fall. It is reasonable to assume that at least part of the problem is multi collinearity, since the correlation coefficients of GRAD is high (the correlation coefficient matrix was computed but not displayed). The coefficient of GRAD is also statistically significant at 5% level. However, the F-ratios indicate that in all cases, the overall estimates are statistically significant. Therefore, over annual data from 1971 to 2007 appears to reject the proposition that expanding education promotes economic growth and from the analysis there appears a paradox that in Pakistan, no stable long-run relationship exists among growth rate of income and educational expenditures.

The Results of Variance Decomposition and Impulse Response Function

Variance decomposition gives information about the proportion of the movements in the dependent variables that are due to their own shocks, versus shocks to the other variables. A shock to any variable, for example a shock to Labor, will directly affect that variable (Labor), but this shock will also be transmitted to all of the other variables in the system (here GDP, Capital, Education expenditure and Number of graduates) through the dynamic structure of the Vector Auto- regression (VAR)

Table-4: Results of Variance Decomposition

Variance Decomposition of GDP						
Period	S.E.	LNGDP	LNGFCF	LNGRAD	LNLABF	LNEDUEXP
1	0.0450	100.0000	0.0000	0.0000	0.0000	0.0000
2	0.0601	93.9999	4.2233	0.6839	0.2219	0.8709
3	0.0712	85.6339	10.6198	0.9123	0.8537	1.9803
4	0.0808	77.2081	17.3233	0.8131	1.6054	3.0501
5	0.0895	69.5341	23.5277	0.6618	2.2255	4.0508
6	0.0978	62.7982	28.9454	0.6281	2.6120	5.0163
7	0.1059	56.9516	33.5139	0.7854	2.7636	5.9856
8	0.1137	51.8773	37.2608	1.1484	2.7265	6.9869
9	0.1215	47.4535	40.2468	1.7011	2.5621	8.0365
10	0.1293	43.5733	42.5432	2.4126	2.3312	9.1397
Variance Decomposition of GFCF						
Period	S.E.	LNGDP	LNGFCF	LNGRAD	LNLABF	LNEDUEXP
1	0.0968	57.0451	42.9549	0.0000	0.0000	0.0000
2	0.1293	62.5670	30.2718	5.8467	0.9157	0.3987
3	0.1485	64.1596	23.8840	10.5036	0.8515	0.6013
4	0.1608	64.5971	20.4121	13.5865	0.7529	0.6513
5	0.1694	64.3841	18.5036	15.4821	0.9956	0.6347
6	0.1761	63.6928	17.5973	16.5066	1.6037	0.5997
7	0.1817	62.6476	17.4110	16.9017	2.4743	0.5654
8	0.1867	61.3592	17.7697	16.8581	3.4771	0.5359
9	0.1914	59.9214	18.5454	16.5267	4.4954	0.5112
10	0.1958	58.4069	19.6355	16.0244	5.4405	0.4927
Variance Decomposition of GRAD						
Period	S.E.	LNGDP	LNGFCF	LNGRAD	LNLABF	LNEDUEXP
1	0.2056	8.9487	0.0000	91.0513	0.0000	0.0000
2	0.2548	7.6632	0.4722	86.1095	3.9385	1.8166
3	0.2906	6.6796	0.8247	79.6656	8.3432	4.4868
4	0.3209	5.8950	0.9450	73.7714	12.2147	7.1738
5	0.3478	5.2464	0.9194	68.7046	15.5476	9.5820
6	0.3720	4.7054	0.8350	64.3810	18.4409	11.6379
7	0.3938	4.2558	0.7463	60.6794	20.9686	13.3499
8	0.4137	3.8847	0.6820	57.4969	23.1823	14.7542
9	0.4316	3.5798	0.6545	54.7510	25.1213	15.8934
10	0.4478	3.3295	0.6671	52.3755	26.8191	16.8087

Variance Decomposition of LABF						
Period	S.E.	LNGDP	LNGFCF	LNGRAD	LNLABF	LNEDUEXP
1	0.0159	0.3553	0.7818	8.1691	90.6938	0.0000
2	0.0202	3.6050	1.6587	19.3402	75.2278	0.1683
3	0.0234	6.7193	2.5890	24.4742	65.5851	0.6324
4	0.0259	8.5994	3.7005	26.1419	60.3349	1.2234
5	0.0281	9.5873	5.0409	26.1347	57.4539	1.7832
6	0.0299	10.0430	6.6022	25.3324	55.7950	2.2273
7	0.0316	10.2021	8.3515	24.1734	54.7452	2.5278

8	0.0331	10.2051	10.2485	22.8865	53.9704	2.6894
9	0.0344	10.1326	12.2539	21.5956	53.2838	2.7342
10	0.0356	10.0298	14.3315	20.3681	52.5795	2.6911
Variance Decomposition of EDUEXP						
Period	S.E.	LNGDP	LNGFCF	LNGRAD	LNLABF	LNEDUEXP
1	0.0892	18.5678	0.4644	16.1413	0.0029	64.8236
2	0.1266	27.9008	0.3126	18.3702	2.4060	51.0105
3	0.1497	33.3839	0.2235	18.6926	3.3707	44.3293
4	0.1646	37.0330	0.2647	18.4917	3.5328	40.6778
5	0.1746	39.5556	0.5277	18.0811	3.3893	38.4463
6	0.1818	41.2646	1.0778	17.5482	3.1758	36.9337
7	0.1875	42.3375	1.9396	16.9343	2.9879	35.8008
8	0.1923	42.8985	3.1003	16.2754	2.8514	34.8744
9	0.1966	43.0465	4.5193	15.6081	2.7593	34.0668
10	0.2008	42.8645	6.1395	14.9665	2.6930	33.3365

The first part of the Table 4 shows the variance decomposition of GDP. In the first round, the entire change in GDP is explained only by a shock to the GDP. This shock also causes an immediate change in Capital, Number of university graduates, capital and education expenditure, but the resulting changes in these variables have no effect on GDP at this time. In round two, Labor accounts for 22.2% of the variation, Capital accounts for 4.22%, the university graduates account for 6.53%, GDP itself accounts for 93.99% of its own variation and 0.87% of education expenditure variation. When the entire 10-year period is taken into account, the effect of Education expenditure on GDP is 9.14%, the effect of GDP itself is 67.44%, the effect of No of university graduates is 6.14% the effect of capital is 43.57% and effect of Labor is 2.32% after the 10-year period.

The second part of the Table 4, which traces the variance decomposition of Capital. In round one, a shock to the Capital innovation accounts for 42.95% of the variation in the Capital, while GDP accounts for the rest of the variation. In round two, GDP accounts for 62.56% of the variation in Capital, Capital itself account for 30.27% of its own variation, 5.85% of number of graduates variation, 0.916% of labor variation, and 0.398% of education expenditure variation. When the entire 10-year period is taken into account, the effect of Education expenditure on Capital, following the initial shock to the Capital innovation is 0.49%, the effect of

GDP is 58.4%, the effect of number of university graduates is 66.02% and the effect of Labor on Capital is 5.44% after the 10-year period.

The third part of the Table 4 shows the variance decomposition of number of university graduates. In round one, a shock to the University graduates innovation accounts for 91.05% of the variation in itself, while GDP accounts for the rest of the variation. In round two, Labor accounts for 3.94% of the variation in the university graduates, Capital accounts for 0.472%, the university graduates itself account for 86.1% of its own variation, 7.66% of GDP variation, and 1.82% of education expenditure variation. When the entire 10-year period is taken into account, the effect of Education expenditure on Capital, following the initial shock to the Capital innovation is 16.81%, the effect of GDP is 3.33%, the effect of No of university graduates itself is 52.37% the effect of capital is 0.667% and effect of Labor is 26.82% after the 10-year period.

The fourth part of the table-4 shows the variance decomposition of Labor. In the first round, the 90.69% change is explained only by a shock to the Total labor innovation. In round two, Education expenditures account for 0.168% of the change in labor, GDP account for 3.6% of the change in labor, number of university graduates account for 19.3% of the change in labor and Capital accounts for 1.65% of the change in Total labor force. When the entire 10- year period is taken into account, the effect of Education expenditure on total labor force, following the initial shock to the labor force innovation is 2.69%, the effect of GDP is 10.03%, the effect of No of university graduates is 20.36% and the effect of Capital on labor is 14.33% after the 10-year period. Labor itself accounts for 52.57% variation.

The last part of the table 5 shows the variance decomposition of Education expenditure. In round one, a shock to the Education expenditure innovation accounts for 64.82% of the variation in the Education expenditure, while Labor Capital university graduates and GDP accounts for the rest of the variation 0.009%, 0.464%, 16.14% and 18.57% respectively. In round two, Labor accounts for 2.4% of the variation, Capital accounts for 0.31%, the

university graduates account for 18.37%, GDP accounts for 27.9% Education expenditure itself account for 51.01% of its own variation. When the entire 10-year period is taken into account, the effect of Education expenditure itself is 33.34%, the effect of GDP is 42.86%, the effect of number of university graduates is 14.96% the effect of capital is 6.14% and effect of Labor is 2.69% after the 10-year period. The important result is that when shock occurs in GRAD it cannot significantly explained by the education expenditure (EDUEXP). On the other hand when Shock occurs in the EDUEXP then the GRAD do not explains it. So we concluded here, no long-run relationship between G and T. Granger causality test also showed that education expenditure does not granger cause university graduates.

EXPLAINING THE PARADOX

The macroeconomic data used on the standard growth-accounting model suggest that education has not had the expected positive impact on economic growth in Pakistan. The resolution of this puzzle begins with a proper understanding of the causes of such unanticipated relationship. Pritchett (2001) in a similar study observes that a single explaining to this puzzle is grossly insufficient, and rather proposed three possibilities that could account for such results. These possibilities, Pritchett argues, may be due to the fact that the newly created educational capital has gone into piracy; that is, privately remunerative but socially unproductive activities, or there has been slow growth in the demand for educated labor, so that the supply of educational capital has outstripped demand and returns to schooling have declined rapidly, or perhaps the education system has failed, such that a year of schooling provides few (or no) skills. However, several other empirical studies on schooling such as Spiegel (1994), Lan et al (1991), Dasgupta and Weale (1992), Islam (1995) seem to support these arguments. The Nigerian experience would include the following explanations.

Labor Market Distortions

Since emphasis is on paper qualification, today the Pakistani labor market is flooded with misfits and incompetent workers as people struggle to obtain certificates (and degrees) by all means,

at times with the aid of their parents and/or examination officials. Sometimes, employment is based on man-know-man rather than training, competence and experience. Next is the issue of job mismatch, in which a qualified medical doctor may be employed as a schoolteacher in the absence of something to do in order to survive. Another reason is as a result of the introduction of new technology such as the computer, which renders the old crop of workers redundant. Also, excess qualified manpower also tends to draw wasteful investment from the domestic economy in the form of costs that may bear little return. Again, it leads to arbitrary substitution of qualified people by people who are over qualified which indeed is one reason why additional education tends to be socially wasteful although personally profitable. These problems are certainly counterproductive. Such imbalance can decrease the prevailing level of output.

Brain Drain

That there can be a wasteful oversupply of education in one of today's poor countries is not just a theoretical possibility. It happens. In it's best known manifestation it has come be called the external brain drain. Brain drain will cause good school products to travel abroad for greener pastures. Clearly the brain drain is not the result of a simple quantitative oversupply of trained people. It comes about because too many are supplied with the kind of skills for which there is an insufficiency of effective demand at home (Gordon, 1973:3-4). However, the resources devoted on training of drained labor force convey little or no positive benefit to Nigeria after their departure.

Industrial Disputes and Job Discontinuities

Pakistan has experienced increasing strike activity since independence caused by workers' agitation for salary increases and improved conditions of service. Existence of industrial disputes and job discontinuities create a non-integrated educational system in Pakistan.

Benefit Captured Syndrome

Another important explanation for this paradox is the "benefit capturing syndrome" in Pakistan. Benefit capture depicts a scenario where benefits that should have accrued to the end-user or beneficiary of a designed programme are

captured away at different stages of the programme's development (Ekong, 1997:560). This in our discussion implies the illegal diversion or legal misappropriation of benefits (financial and otherwise) meant for an educational programme such that the programme collapsed or suffer some drastic setbacks and frustrations. This has a severe negative impact on our educational system and the economy generally.

Government Failure

First, public expenditure on education, expressed as a percentage of GDP, is generally low and the situation of teachers is deteriorating. In general, teacher's salaries and public spending on education have failed to progress in line with average spending in other sectors of the economy. Technical equipment is often outdated and schools often fail to receive appropriate funding and on time. Education as a public good should be provided through the federation account. But the dropout rate is increasing mainly as a result of social problems and difficulties faced by students in adapting to their educational and training systems. Violence and cultism used for political campaigns is breed in institution of learning.

POLICY IMPLICATIONS:

It is not a noble achievement for any sector of the economy to exist for many years only to make a negligible (or at worst negative) contribution to economic growth, which is not commensurate with its life span and investment. Part of the effective demand management might be produced by improving the education sector and the reorganization of the school system by, say, improving incentives for teachers to show up for classes, or by introducing a new generation of teachers to energize the existing system. The aim is to reform the education system so that the system is upgraded to be more productive and thus promote economic growth in Pakistan. In this case, reform might represent more commitment by the authorities not to interfere with decisions such as curriculum or teachers' responsibilities. Such commitment can lead to greater risk taking and innovation by decision makers, teachers and learners all together, which is worthwhile in the long-run.

Secondly, parents should not wish to fulfill their life expectations in their children by selecting career for them or by suggesting subjects that they should study. They should not also encourage or assist their children to purchase certificates or degrees. Government in her employment policies should lay more emphasis on specialization and competence rather than on paper qualification and ill-gotten certificates. Although strikes can be regarded as part of industrial growth, the frequency of strike actions should be minimized in Pakistan because of the huge cost to the economy in terms of output loss. The brain drain example therefore demonstrates one way in which an oversupply of education can produce a lesser output of goods and services than would have resulted had the same amount of investment been alternatively allocated to other productive sectors of the economy. Since policy makers must be concerned to balance measures to expand the supply of education against its likely effective demand, the planners can help limit supply expanding measures or seek to expand effective demand. While such evidence is only suggestive, it is strongly so. The reader may think that my observations about effective demand are simply another way of putting the case of "appropriate education" or for "getting prices right". Certainly, a consideration of effective demand leads one to consider ways to enlarge institutional possibilities for making particular supply-expanding measure more effective.

In spite of high educational attainment and enrolment rate, Pakistan overall needs to upgrade the skills of the workforce, whose knowledge and competencies are often not updated and ill-suited to new challenges. In a knowledge-based economy, individuals need to become lifelong learners, continually adapting to changes and utilizing new opportunities both at work and beyond. Reputed strengths in mathematics and science, a solid tradition of scientific and technical research, as well as long established and stable university systems are essential features of a knowledge growing society.

To address these issues, priority should be giving to improving out-dated technical equipment in the school system, particularly for vocational education and training. Moreover,

deteriorating conditions for teachers need to be improved, as teachers are the key players in the fields. New means must also be found to increase the critically low level of private sector involvement in the education business if efforts to develop lifelong learning for the promotion of economic growth in Pakistan must be fulfilled. Students and teachers training needs to be improved and updated to deal with the requirements of the new pedagogical and methodological approaches, including the use of information and communication technologies (ICT) and e-learning.

There is also the need to strive for relevance in our educational and training systems. This will involve making curricula changes, and development at all levels of our educational system with a view to aligning our teaching programmes with the objectives of development. There is need for the development of new training package to compliment the current efforts. The new package will be focused exclusively on officials at the federal, state and local government levels, and should be aimed at stimulating attitudinal changes more favorable to reforms.

Trained personnel should be made to work where the know-how or skills acquired would be most relevant. This means putting square pegs in square holes. Training should be limited to that which produces direct returns on the job. Where the need is to expose employees to knowledge beyond immediate job requirements, the extent and purpose must be clearly determined. Such training is not necessarily for professional advancement but for flexibility.

CONCLUSION

The present study suggests that negative trend between educational capital, university graduates and economic growth in Pakistan. This result can derive by employing new short run and long run estimates. But on the other hand there was no significant causal relationship between economic growth and educational capital. It is never our intention in this paper to insinuate for less government's involvement in the education sector. Rather we are advocating for a reform of the system to upgrade and internalize the contributions of educational capital to economic growth. Since education is a public

(merit) good, its provision need not be justified on economic grounds only. The social and political pressures that bear on educational decisions are not geared to meeting industrial demands precisely. Moreover, education has numerous direct benefits to the individual learner beside its contribution to the growth of the national income. Furthermore, even when some category of educated workers is over supplied, persons receiving that education may still benefit personally. It puts them in a better position with respect to others with lower qualifications. Thus, being educated may be personally beneficial even though socially unproductive. Thus, economic productivity alone cannot be used in drawing up an educational plan. For these reasons, it may indeed be possible to get two fairly clear boundary conditions - one representing minimum needs and the other for maximal absorption of manpower in the economy. The minimal expansion plan may be used to ensure that lack of educated labor does not act as a bottleneck to industrial expansion, while the maximal condition should try to ensure that there is no excess supply of education in the country. However, we do not claim that the issue has received exhaustive treatment, but we maintain that the puzzle raised and dismissed can help in future debate and policy formulation in this area.

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