Education Inequality and Economic Growth: Framework for the Evaluation of Pakistan's Education Policy

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EDUCATION INEQUALITY AND ECONOMIC GROWTH: FRAMEWORK FOR THE EVALUATION OF PAKISTAN'S EDUCATION POLICY

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ABSTRACT

This paper attempts to substantiate the Education-Growth relationship with a view to evaluate Pakistan's Education Policy over the last two decades. With a view to the inadequacy of the generally used measures of education, we first estimate the no enrollment ratios, the average schooling years, the standard deviation of education and educational gini for Pakistan and its four provinces across gender domains as measures of the level and spread of schooling for 1973-1998. Then using these measures we estimate some standard econometric relations to understand the evolution of the distribution of education, its impact on economic growth and the role of government policy therein. The paper confirms the existence of a negative relationship between average schooling years and inequality in educational opportunities, along with a strong support for the existence of the Education Kuznets Curve both as a time series and as a cross sectional phenomenon for Pakistan and its four provinces across gender domains. The paper also corroborates the education-growth hypothesis through panel estimation of a modified Macro-Mincerian function. We find that the commitment of the public sector to education provision has a very strong impact both on educational inequality and on the rate of economic growth. Our estimates establish the failure of Pakistan's education policy on account of the inefficiency of current education expenditure and shows that if the declining commitment to education does not reverse and the public sector does not take care of its inefficiency, then Pakistan will suffer in terms of reduced economic growth and high educational inequality for future generations. The paper recommends that Pakistan's education reforms should focus on primary education provision for all rather than on higher education for a limited segment of the population.

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I. INTRODUCTION

Education, Its Distribution and Economic Growth

As economic activity becomes increasingly knowledge-based, the average level of education attainment and disparities in educational opportunities play a more important role in determining both the growth prospects of the economy and the distribution of income therein. From a theoretical standpoint, an increase in average educational attainment results in a relative increase in the supply of skilled work force, which, in turn, enhances average labour productivity and increases the rate of economic growth [Barro, 1991; Barro and Lee, 1993,1997; Barro and Sala-i-Martin, 1995; Aghion and Howitt, 1998]. The resulting higher levels of output tend to represent a higher inequality in the distribution of incomes, and therefore more poverty, if equal educational opportunities are not provided to all [Glomm and Ravikumar, 1992; Banabou, 1996a; Thomas, Wang and Fan, 2000; Lopez, Thomas and Wang, 2002]. The slightest concern with equitable growth for the current and future generations, therefore, cannot remain oblivious of the state of human development.

Education and its equitable distribution therefore make for important ingredients in a poverty-reducing growth strategy. Education, however, is also otherwise important. It is the key to improvement in the quality of social life. It contributes to the improvement of general health conditions. It helps reduce the social, cultural and ethnic divides among a people. And it facilitates the creation of a more responsible, decentralized, civilized and globalized community. The positive

externalities thus created through education provision further enhance the processes of economic growth and development.

Education in Pakistan

Recognizing the meritorious role of education in social and economic development, successive political governments in Pakistan have shown concern over providing educational facilities for the general masses. Pakistan's education policy, however, has remained unsuccessful. Pakistan is still among the countries where the level and the spread of education are poor, the level of illiteracy is very high and gender inequality in educational opportunities persists [World Bank, 2003, 2004; Government of Pakistan, 1998, 2004]. Apart from this, Pakistan has only gained increased social disharmony and earned a higher income inequality out of continued investment in education provision for about twenty years[1]. It is thus evident that Pakistan has so far not been able to reap any benefits, direct or indirect, from the provision of educational opportunities to the general masses.

This paper addresses two very important issues in respect of the above. First, we contend that the measurement of education in terms of an overall literacy rate and growth in number of schools, number of teachers and number of enrollments is not sufficient to understand the efficiency of education expenditures. These statistics only represent the supply of educational services and are not an adequate way to measure the output and effectiveness of education programs [see section II below]. For the latter purpose, we estimate a set of parameters that determine the level and

[1] Education gained priority in public expenditure programs in 1985 when the '*NAI-ROSHNI* Schooling Scheme' was launched. Since then, successive political governments have kept the pace of education spending under different headings, but similar contents. In 1985, the income gini coefficient was 34.94% which increased to 40.85% in 1998. (Income Gini estimates have been taken from Hassan, R. and M. Shahzad, "An Econometric Appraisal of Poverty and Inequality in Pakistan", Working Paper, Department of Economics, University of Karachi, 2004).

distribution of education in Pakistan. We compute these parameters to estimate the distribution of education using public sector education institution's enrolment data over the period 1973-1998 for Pakistan and its four provinces across gender domains[2]. Secondly, we seek to establish quantitative estimates of the importance of different dimensions of education for economic growth. In this connection, we also estimate some standard empirical relationships among the estimated education statistics with a view towards the evaluation of Pakistan's education policies over the last two decades. These estimates also provide the cornerstone of a successful education policy.

In the following section, we review some of the standard methods used in literature to measure various aspects of education. This is followed in section III by the description of the methodology to measure the level and spread of educational opportunities along with the specification of regression equations to be estimated. Section IV presents the results of our computation and estimation exercises for Pakistan and its four provinces across gender domains. The paper concludes with a brief discussion of its policy implications in section V.

II. THE MEAUSREMENT OF EDUCATION

Education is a multifaceted phenomenon. As such, a wide variety of methods are used to measure different aspects of education. These include, among others, enrollment ratios, education attainment indicators, quality of education indicators and measures of absolute and relative dispersion of education.

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[2] Before 1998, the Pakistan Education Statistics, NEMIS / AEPAM, Ministry of Education, Government of Pakistan presented education statistics for only public sector institutions. After 1998, the NEMIS started publishing education statistics for both private and public sector institutions. The two, hence, are not comparable. This is one reason why we have limited our analysis only up to 1998.

The *'quality of education'* literature emphasizes the importance of differences in the quality of education while making comparisons among the schooling attributes of different populations. It focuses on comparing student-teacher ratios, expenditures on teacher's wages, spending on books and materials (*the input approach*) and objective examination's results across different segments of a population (*the output approach*) [For details, see Behrman and Birdsall, 1983; Lockheed and Verspoor, 1991; and Hanushek and Kim, 1995]. As we are using only Pakistan's public sector institutions' data for the present purpose, this supply-oriented debate does not concern us here.

Measures of the level of education attained by a population can be obtained using either the *Enrollment Ratios* [Barro, 1991; Mankiw, Romer and Weil, 1992] or *Average School Attainment* [Barro and Lee, 1993, 1997; Thomas, et al, 2000]. One of the key merits of enrolment ratios is that they are easily computable given the population and enrolment data. However, these ratios only measure the access to education of the population and are, accordingly, only flow measures that cannot completely account for the stock of human capital already accumulated [Thomas, *et al*, 2000]. Unlike enrollment ratios, school attainment is a stock variable, which represents the average stock of human capital accumulated by an arbitrary person belonging to a population. School attainment can be measured as the mean of the distribution of schooling for a certain population [Barro and Lee, 1993, 1997; Thomas, et al, 2000].

The distributional dimension of education is extremely important for both welfare considerations and for production. "If an asset, say physical capital, is freely traded across firms in a competitive market, its marginal product will be equalized through free-market mechanism. As a result, its contribution to output will not be affected by its distribution across firms or individuals. If an asset is

not completely tradable, however, then the marginal product of the asset will not be equalized across individuals, and there is an aggregation problem. In this case, aggregate production function depends not only on the average stock of that asset but also on its distribution" [Thomas et al, 2000]. Because education is only partially tradable, the average level of education attainment is not sufficient to reflect the characteristics of a country's human capital. We need to look beyond averages and investigate both the absolute and relative dispersions of human capital.

Inequality in the distribution of educational opportunities can be explained both in terms of absolute and relative measures. The *Standard Deviation of Schooling* is a measure of absolute dispersion of educational attainment that has been used to document educational inequality [see, for example, Lam and Levinson, 1991; Ram, 1990]. It describes the spread of educational opportunities around mean schooling for a certain population. One hypothesis in this connection is the existence of the Education-Kuznets-Curve. The education Kuznets curve relationship implies that as the average level of schooling increases, educational inequality, as measured by the standard deviation of schooling, first increases, and after reaching a peak starts to decline. The turning point of the curve may vary for populations with differing schooling distributions [Ram, 1990]. Like most measures of absolute dispersion, the standard deviation of schooling is also dependent on the scale of measurement. This means that if each individual's education attainment changes in the same proportionate way, the standard deviation of schooling would also change. This negative attribute of the standard deviation measure of inequality limits its use as a proper indicator of distributional inequality [Litchfield, 1999].

There are many ways of measuring relative distributional inequality for any given population. The term relative inequality disqualifies all measures that are either scale or population dependent, asymmetric and that do not pass the Pigou-Dalton transfer-principle [Cowell, 1998; Litchfield, 1999]. Several classes of measures satisfy these properties. The *Generalized Entropy* class of measures (Mean-Log Deviation, Theil Index of Inequality and the Coefficient of Variation), the *Atkinson* class of measures and the *Foster-Greer-Thorbecke* '***P***-measures' all provide efficient and ordinally equivalent way of measuring relative inequality. The most common and useful of the measures of relative inequality is the Gini-coefficient. It is a simple-to-compute and efficient way of measuring relative inequality based on the weighted-sum of absolute differences of some attribute (usually income) of a population [Cowell, 1998]. In a game theoretic framework, the Gini coefficient can be understood as the expected loss to an individual from 'trading' his endowments with a randomly chosen person in the economy [Yitzhaki, 1997].

Educational Gini is similar to income gini in that it measures inequality in the distribution of schooling for a certain population. However, unlike standard income gini coefficient that measures the distribution of a continuous and unbounded variable (income), the educational gini coefficient measures the distribution of a discrete and bounded variable. Education attainment cannot be less than zero; it takes on only discrete values and has an upper bound (usually between 15 to 20 years of education). Furthermore, the measurement of educational gini must take into consideration the proportion of population that does not receive any schooling at all [Thomas et al, 2000].

Educational Gini has been used as a measure of educational inequality in various studies. Earlier attempts to document education inequality focused on computing the gini coefficient for education

finance data [Maas and Criel, 1982; Rosthal, 1978]. Sheret [1988] was the first attempt to use enrollment data for Papua New Guinea to measure inequality in educational opportunities. This approach was furthered after the publication of 'schooling cycles' data [Psacharopoulos and Arriagada, 1986] and was used by López, Thomas and Wang [1998] and Thomas *et al* [2000].

III. METHODOLIGICAL FRAMEWORK

The Level and Distribution of Education

In this section, we explain the construction of the variables that we will use to measure the level and spread of educational opportunities in Pakistan. Consider a population Π with C mutually exclusive and collectively exhaustive age cohorts $\pi_0, \pi_1, \pi_2, ..., \pi_C$. The population has an education system Σ consisting of $j = 0, 1, 2, \ldots\ldots, J$ education attainment levels each denoted by S_j. The number of children enrolled at each education attainment level is denoted by E_j where $j = 1, 2, \ldots\ldots, J$. Let π_0 be the group of children with ages 5 to 9 years and assume that children with education attainments S_1, S_2, S_3, S_4 belong to this age cohort. Define $E_0 = \pi_0 - E_1 - E_2 - E_3 - E_4$[3]. E_0 represents the number of children who do not get the opportunity to receive any education at all. The E_j's, $j = 0, 1, 2, \ldots\ldots, J$, represent the complete distribution of enrollments. Finally, define $\aleph = \left\{ P_j = E_j \Big/ \sum_{j=0}^{J} E_j \text{ for } j = 0, 1, 2, \ldots\ldots, J \right\}$ to be the proportions of children enrolled at each level of education attainment.

[3] This is in accordance with the definition used by the Pakistan Integrated Household Survey, Federal Bureau of Statistics, Government of Pakistan.

The information set $\Lambda \equiv [\Sigma, \aleph]$ is all that we need to derive the statistics required to determine the level of education attainment and the various attributes of the distribution of educational opportunities. The stock mean of the distribution of enrollments (Average Schooling Years), the proportion of un-enrolled children (No Enrollment Ratio), the dispersion in educational attainment (Standard Deviation of Schooling) and the Educational Gini are respectively defined as:

$$ASY = \mu = \sum_{j=0}^{J} P_j \cdot S_j \qquad \textbf{E. 1}$$

$$NER = \frac{E_0}{\pi_0} \qquad \textbf{E. 2}$$

$$SDS = \sigma = \sqrt{\sum_{j=0}^{J} P_j \cdot (S_j - \mu)^2} \qquad \textbf{E. 3}$$

$$G_E = \frac{1}{2 \cdot J \cdot \mu} \cdot \sum_{k=0}^{J} \sum_{m=0}^{J} P_k \left| S_k - S_m \right| P_m \qquad \textbf{E. 4}^4$$

---------- Figure No. 1 ----------

Finally, the Lorenz Curve of Education (LCE) can be identified as the set:

$$LCE = \left\{ (\overline{P}_k, \overline{S}_k) \middle| \overline{P}_k = \sum_{j=0}^{k} P_j \text{ and } \overline{S}_k = \frac{1}{\grave{\imath}} \sum_{j=0}^{k} P_j S_j \text{ for } k = 0,1,2 \cdots J \right\} \qquad \textbf{E. 5}$$

The straight line from the origin to the top left corner represents the egalitarian line. As $(\overline{P}_0, \overline{S}_0) = (P_0, 0)$, therefore unlike the standard income Lorenz curve, the LCE begins at P_0

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[4] This definition of the Educational Gini Index is in line with Thomas, et al [2000]. For computational purposes we use the matrix version of this equation:

$$G_E = \frac{1}{2 \cdot J \cdot \mu} \cdot \begin{bmatrix} P_0 & P_1 & \cdots & P_J \end{bmatrix} \cdot \begin{bmatrix} S_0 - S_0 & S_1 - S_0 & \cdots & S_J - S_0 \\ S_0 - S_1 & S_1 - S_1 & \cdots & S_J - S_1 \\ \vdots & \vdots & \ddots & \vdots \\ S_0 - S_J & S_1 - S_J & \cdots & S_J - S_J \end{bmatrix} \cdot \begin{bmatrix} P_0 \\ P_1 \\ \vdots \\ P_J \end{bmatrix}$$

along the horizontal axis and represents the cumulative distribution of schooling attained by a certain cumulative proportion of the population. The education gini can also be interpreted as the percentage deviation of LCE from the egalitarian line.

In order to compute **E**.1 to **E**.5, we use a value of $J = 14$. The fourteen groups, in order, represent no education at all, then class one education up to class ten education, intermediate level education, graduation level education, and postgraduate or university level education. The fourteen groups are thus collectively inclusive and mutually exclusive for the concerned population. We assign discrete numbers to each schooling level. Thus, $S_0 = 0$ represents no schooling at all, $S_5 = 5$ represents five years of schooling, $S_{11} = 12$ represents intermediate education while $S_{13} = 16$ represents post-graduate or university level education. This is a deviation from the standard method that has so far been used in literature to measure educational attainment and educational inequality. The standard approach is to set $J = 7$[5] and then make computations based on 'schooling cycles' data of Psacharopoulos and Arriagada (1986) [Barro, 1991; Thomas et al, 2000]. The primary purpose this approach serves is to take care of the number of dropouts each year, so that education attainment indicators are true representatives of the population's human capital endowments. As we are using enrollment data for each schooling level of the entire population, our approach automatically takes care of the latter and we can make the calculations independent of 'schooling cycles' data.

Econometric Framework for Education Policy Evaluation

The measured attributes of the level and spread of education enable us to develop the framework for the evaluation of public policy towards education. The first important task that we confront is the

[5] The seven categories are no schooling, partial primary, complete primary, partial secondary, complete secondary, partial tertiary and complete tertiary.

establishment of the quantitative importance of various dimensions of education for economic growth. For this purpose, we specify a hybrid of the standard growth equation of Barro and Sala-i-Martin [1995] and the first-differenced Macro-Mincerian equation of Kreuger and Lindahl [2001] slightly modified to take care of endogenously changing returns to education. The equation reads:

$$D(Ln(Y_{it})) = c_0 + c_1 \cdot Ln(Y_{i,t-1}) + c_2 \cdot ASY_{i,t-1} + c_3 \cdot ASY^2_{i,t-1} + c_4 \cdot D(ASY_{i,t}) + c_5 \cdot G_{E\,i,t-1} + c_6 \cdot Ln(EET_{i,t-1} / Y_{i,t-1}) + u_{it} \qquad \textbf{E. 6}$$

The left hand side represents the rate of growth of per-capita income, while the right hand side variables include lagged real per-capita income, lagged average schooling and its square, first difference of average schooling, educational inequality and the ratio of total education expenditures to nominal GDP. The last variable represents the commitment of the public sector to providing educational facilities for the general masses. The coefficient c_4 measures the baseline average rate of return to education while the value of the derivative $\frac{\partial D(Ln(Y_{it}))}{\partial ASY_{i,t-1}} = c_2 + 2 \cdot c_3 \cdot ASY_{i,t-1}$ measures the change in the return to education in period t. The coefficient c_5 measures the impact of inequality in the distribution of educational opportunities on economic growth while c_6 measures the effectiveness of government spending on education to economic growth.

Once the importance of the distribution of educational opportunities is established, we attempt to signify the explanatory variables associated with educational inequality. The baseline relationship rests on Thomas *et al* [2000] that finds a very strong negative association between inequality in the distribution of schooling opportunities and average schooling years. We modify this relationship to

allow for the evaluation of the efficiency of public education expenditures. The equation that we estimate is:

$$G_{E\,it} = a_0 + a_1 \cdot ASY_{it} + a_2 \cdot Ln(EEC_{it}) + a_3 \cdot Ln(EED_{it}) + \varepsilon_{it} \qquad \textbf{E. 7}$$

The equation states that educational inequality depends on average schooling years and on public sector education expenditures on current and development accounts. We estimate this equation for Pakistan and its four provinces across gender domains.

The final regression equation is the famous Education Kuznets Curve. The relationship states that as average school attainment increases, the standard deviation of education first increases and declines afterwards. The relationship can be observed both as a time series and as a cross sectional phenomenon [Londoño, 1990; Ram, 1990; Thomas et al, 2000].

$$SDS_{it} = b_0 + b_1 \cdot ASY + b_2 \cdot ASY^2 + \upsilon_{it} \qquad \textbf{E. 8}$$

The estimated equation can be used to find $ASY^* = -b_1 / 2b_2$: the optimal value of average schooling that public authorities need to target. A comparison of current average schooling with this optimal value could then be made to set the direction for public education policy.

In order to estimate **E**.6, **E**7 and **E**.8, we use data on average schooling, educational gini and standard deviation of schooling constructed for each province and Pakistan across gender domains as explained above. Estimates of real per-capita GDP for Pakistan and its four provinces have been obtained from Bengali [1995, 2002] while education expenditures on current and development

accounts have been obtained from Federal Bureau of Statistics [1998]. The next section presents the results of our computation and estimation exercises.

IV. EMPIRICAL RESULTS

Time Profile of Estimated Education Statistics

The public and private sectors share education provision in Pakistan rather inequitably. The share of Public Sector institutions in total education institutions is estimated to be about 78%, and this ratio is assumed to remain almost intact over the next few years [PRSP, 2001]. Furthermore, private sector shares education provision mostly in urban areas of Pakistan and educating the rural masses remains the responsibility of the public sector. Even in the urban areas, private schools are usually attended by the relatively high-income groups of society, while children belonging to the middle and lower income groups usually attend public schools. Accordingly, public sector remains the major supplier of education services to the general masses in Pakistan.

---------- Figure No. 2 ----------

The graph on the right shows the trends in no enrollment ratio for Pakistan and its four provinces across gender domains. Table no. 1 provides estimates of the same for some selected years. Although the NER's have registered a decline over the entire sample period, most of this reduction has taken place during 1985-1995. Before 1985, the NER's were quite stagnant and after 1995, they have either stagnated again or have registered an increase in value. It is not difficult to see that the reduction in NER's is not significant enough to guarantee education for all in any short run. The *number* of children without educational opportunities is increasing in every population segment throughout the sample period. Thus, the number of children aged between 5 and 9 years who did not

enroll in public schools in Pakistan increased from 7.81 million to 9.92 million between 1990 and 1998. This means that every year, about 0.265 million children get added to the pool of un-enrolled. If population in this age-cohort grows at an average annual rate of 2.3 percent (computed as average 5-9 years population growth during 1990-1998), then each year about 0.461 million children get added to the population. This means that with given education provision structure in the public sector, only 0.196 million children (*equal to* 0.461 *less* 0.265) can be accommodated to receive education each year. It needs only simple arithmetic to see that education expenditure need to be more than doubled in every respect before we can say that we are moving towards global primary education in Pakistan.

The table also shows the gender differences in NER's. For every population segment, we find that the gender gaps in no enrollment ratio were either increasing or stagnant before 1990. Following 1990, there has been a significant decline in gender gaps in NER's. This has mainly occurred either because of the stagnation of male NER's along side a reduction in female NER's (for e.g. in Baluchistan) or because of a more than proportionate increase in female enrollments as compared to male enrollments (Punjab and NWFP) or because of a reduction in male enrollments accompanied by an increase in female enrolments (Sind). Ignoring the shift in the preferences of

---------- Table No. 1 ----------

the masses away from public schooling for male children, a comparison of the estimates of NER's and associated gender gaps for 1985 and 1998 reveals that much of the changes in the gender gaps have taken place through a reduction in female NER's for every population segment. Thus, the

reduction in gender gaps in NER's is not associated with any significant increase in overall enrollments in every population segment. This again reveals the inefficiency of the public sector in delivering the merit commodity.

Table No. 2 below shows the growth in real per-capita income and the ratio of education expenditure to GDP for each of the four provinces and Pakistan. The small values of the percentage of public expenditures on education to GDP reflect the degree of adherence of the public sector to meritorious education provision. Again, we find that the same percentages were stagnant before 1985, increased between 1985-95 and are on a decline since then. It is thus not surprising if the general state of education is worsening in every population sub-group in Pakistan. Table No. 3 below and the accompanying graphs highlight what the fragile commitment of the public authorities to education provision has translated into over the last decade.

---------- Table No. 2 ----------

The graphs below show the time profile of average schooling years and educational gini coefficients for Pakistan and its four provinces over the entire sample period. Again we find that most of the improvement in the state of education in Pakistan and its sub-populations took place between 1980 and 1995 when the proportion of public expenditure on education increased. Before 1980 both average schooling and inequality in educational opportunities are stagnant. Since 1995, education statistics reveal a general stagnation of the state of education in Pakistan and its sub-populations as shown by the shifting of the Lorenz curve of education for Pakistan farther from the egalitarian line.

---------- Figures 3, 4 and 5 ----------

Table No. 3 provides estimates of educational gini coefficient, average years of schooling and the standard deviation of schooling for selected years for Pakistan and its four provinces across gender domains. The average years of schooling estimate the mean of the distribution of schooling at any point in time. The gini coefficient and the standard deviation of schooling measure the dispersion of education attainment across populations. The tables provide quantitative estimates of the trends in educational attainment and its distribution and highlight the differences in schooling attributes of the four provinces across gender domains.

----------Table No. 3 ----------

Education, Its Distribution and Economic Growth

In the previous section, we presented the results of our computations regarding the level and spread of education. This section presents results on the quantitative importance of the various aspects of education for economic growth.

Table No. 4 below presents panel estimates of equation **E.6**. The Hausman test for fixed vs. random effects indicates a better fit of the fixed effects model. All coefficients are robust and significant and bear the expected signs. The negative coefficient of lagged average schooling years indicates that the returns to education are declining in Pakistan across all sub-populations, while the positive sign on the square of lagged average schooling shows that higher average schooling endogenously increases the returns to education. The estimates show a very large and significant negative impact of education inequality on economic growth. Similarly, our estimates also highlight the importance of

public sector education spending in increasing the rate of economic growth. The LM statistic indicates that a mall amount of heterogeneity is still left in the residuals and the corresponding F-tests indicate that a more general model with cross section specific coefficients be estimated. However, as the results of the two were not very much different, the latter are not reported.

---------- Figure No. 6 ----------

It is important to see what our estimates mean in practical terms. A commonly held belief by the general public as well as the authorities in Pakistan is that people do not prefer to educate their children and instead seek some earning-activity for them. The graph on the right offers an explanation for this. We find that the elasticity of income to education has remained negative for all cross sections of the population for much of the sample period. The exception to this is only Punjab for which the elasticity became positive after 1990. The above tables show that Punjab is the district with highest average education attainment, least gender disparity and least inequality in educational opportunities. The conclusion is plain; if government authorities increase the ratio of education spending, aim specifically at increasing average school attainment, and reducing educational inequalities, then education can be made a more attractive option for future earners and the rate of economic growth can be increased through increased productivity of these future earners.

Secondly, educational inequality turns out to be a very important factor that limits the rate of economic growth. As a matter of fact, public sector education programs in Pakistan (and in many countries of the world) have never been evaluated in terms of their distributional impact. Our estimates suggest that public authorities should monitor the distributional impact of their education programs and make efforts to reduce educational disparities as much as possible. As education

inequality turns out to have the strongest impact on the rate of growth, this is the most efficient way to achieve a higher growth prospects for all future generations.

Table No. 5 and Table No. 6 provide explanations for why education inequality is high and what can be done by public authorities to reduce educational inequalities. Our estimates indicate a better fit of the random effects model for both overall and gender disaggregated panel regressions. Results show that average schooling has a very strong negative impact over reducing educational inequalities. Secondly, and more importantly, we find that education expenditures on current and development accounts affect educational inequality asymmetrically. Thus, an increase in education expenditures on current account simply increases educational inequality while an increase in education expenditures on development account decreases educational inequality. The current expenditures on education consist of the salaries of the teachers, rents of buildings and other fringe benefits for the teaching staff. Over the last twenty years, there have been numerous instances where '*ghost schools*' have been created and '*ghost teachers*' have been appointed[6]. These simply do not translate into education for the masses and therefore become patches of inefficiency in the whole structure of public education provision. The positive sign on the coefficient of current education expenditures simply indicates the generality of this occurrence and hence bears testimony to the inefficiency of education expenditures on current account of the public sector over the last twenty years across all population domains. In contrast to this, whenever a new school is established or new faculty appointed, there is a net increase in enrollments that contributes to the improvement in education indicators.

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[6] Ghost School and Ghost Teacher are commonly referred terms in Pakistan. They refer to situations where a school has been established and a teacher has been appointed in official documents but the same are not functioning due to some or the other reason.

The gender disaggregated results also confirm to the above. In addition, they show that public education programs are more effective towards female education rather than male education. Thus current education expenditures contribute more to increase inequality among the females as compared to males and education expenditures on development account contribute more to reduce inequality among the females as compared with the males. Perhaps, this indicates the intensity of the efforts of the public sector towards eradicating gender disparities in education.

One more feature of our estimates is that the coefficients of education expenditures on current and development accounts are almost equal in magnitude but bear opposite signs. This means that the impact of a one dollar increase in development expenditure is completely offset by a one dollar increase in current expenditures. It is therefore not surprising if Pakistan has not been able to benefit out of its education provision programs. Furthermore, the estimates show that if the current trends are allowed to continue, then all public sector education programs would result in zero overall benefits regarding reduction in educational inequalities and enhancing economic growth.

The Education Kuznets Curve

Table No. 7 provides estimates of the Education Kuznets Curve both by province and by years. The Education-Kuznets curve relationship indicates that as the average years of schooling increase the standard deviation of education first increases and only then registers a decline. Estimates show that there are significant differences among different provinces regarding the standard deviation of schooling. These differences, however, are best captured in the fixed effects model. For each of the provinces, we find a significant positive non-linear relationship between average years of schooling and the standard deviation of schooling (SDS).

The estimated fixed effect relationship indicates that the standard deviation of schooling would start declining (in the short run) after every population domain of Pakistan has attained approximately 4.3 years of schooling[7]. The standard deviation of schooling simply measures the dispersion of school attainment levels attained by different proportions of a population. Its value can increase if more children get enrolled in primary as well as secondary classes. If this could somehow be attained, may be through re-enrolment of the dropouts, then not only the standard deviation but also the average school attainment of the population would start increasing. However, once all dropouts get re-enrolled and there does not remain any further possibility of a *simultaneous* increase in enrolments at all levels, the standard deviation of schooling would start declining. Our estimates show that this would be the case when, on average, Pakistan has attained something close to global primary education.

The table also provides estimates of the time-specific Education Kuznets Curves. These can be seen to follow the random effects model, probably due to the large number of fixed effect coefficients. Again, we find that the optimal inter-temporal level of education attainment after which the dispersion in educational attainments would start declining, is about 4 years of schooling.

A comparative look at the Gini Coefficients of Education, No Enrolment Ratios, Average Years of Schooling and the Standard Deviation of Schooling along with our estimated regressions yields some interesting insights regarding education policy. When a large proportion of the population is out of schools, average schooling would be low while educational gini would be very high. At this stage, helping more people to become educated would reduce educational inequalities while it would

[7] This is simply the maximum value the estimate function would take.

simultaneously increase the spread of education. This would happen because a bulk of the population will have very low education attainment while some proportion would have attained higher education simultaneously. What is needed at this stage is an increase in education expenditures on development account, so that although the scale dependent standard deviation is increasing, inequality in educational opportunities in relative terms continues to decline[8]. At a later stage, when average schooling has attained a certain optimum level, roughly 4 years of schooling in case of Pakistan, the spread of education would start declining with increase in average schooling of the population. The same would then translate into a higher growth path for all future generations. The optimum level of schooling for the entire population at one point in time can then be interpreted as some baseline educational attainment level that should be targeted by the authorities.

IV. CONCLUSION AND POLICY IMPLICATIONS

Recognizing the key role of education for social and economic prosperity and identifying the adverse situation of education in Pakistan, we set ourselves two tasks in this paper. First, we contend that the conventional approach of measuring the success of public sector education programs in terms of increased enrolments, more schools, more teachers and growing literacy rates is at best insufficient to depict the true picture of human development. We use population and enrollment data to measure the efficiency of public sector education programs in terms of no enrollment ratios, average schooling years, standard deviation of schooling and educational gini coefficient. Secondly, we estimate a number of regressions to explain the evolution of educational inequality and its relationship with economic growth, with a view to ascertain implications for Pakistan's education policy.

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[8] As development expenditures increase, they force the authorities to increase current expenditures in future. The inefficiency of current expenditures can then only be circumvented through a monitoring and control system that limits the abuse of resources devoted to meritorious education provision.

Empirical estimates of all education statistics have been obtained for the period 1973-1998 for Pakistan and its four provinces across gender domains. The statistics reveal that the general state of education and human development in Pakistan was stagnant before 1985 with high educational disparities and low average school attainment. Then with the onset of the interest of the public sector in providing education to the general masses, education indicator statistics started improving; average educational attainment increased, educational inequality declined, gender gaps in no enrollment declined and the standard deviation in schooling increased. However, as public sector education programs lost their efficiency and the public sector itself lost interest in providing meritorious education, the general state of education deteriorated after 1995. Within the limits imposed by data availability, we cannot deduce whether this worsening of the state of education is real or reflects merely a shift towards public schooling.

The paper presents quantitative estimates of the importance of education statistics on economic growth and corroborates the education-growth hypotheses through panel estimation of a modified Macro-Mincerian equation. The fixed effect estimates of the growth regression indicate that educational inequality is the strongest factor that limits economic growth in the case of Pakistan. The regression also explains why educating children is not a general priority among Pakistani parents on the basis of a significant negative elasticity of income to schooling for all populations segments across all time periods (with the exception of Punjab after 1990). Finally, our estimates show that the commitment of the public sector to education provision also exerts a positive influence on the rate of economic growth.

We also show that the high levels of educational inequality in Pakistan are primarily due to low average schooling, inefficient current education expenditures on education and low level of development expenditures on education. In this connection, we find that the public sector education expenditures are more effective in reducing education inequality for the females rather than for the males. Nevertheless, the equal magnitudes and opposite signs of the current and development expenditures for education in the regression equation nullify the overall impact of public sector education spending on educational inequalities.

The paper also confirms the existence of the Kuznets Curve relation both across provinces and over time. The relationship implies that the standard deviation of education would keep increasing until average educational attainment level reaches 4.3 years of schooling. Once global primary education has been attained, the possibility of a simultaneous increase in enrollments at all levels would cease and the standard deviation of education would start declining.

Finally, we argue that the most efficient education policy for Pakistan would be to aim for attainment of primary education for all. In this connection, it is important that the public sector eliminates inefficiencies that underlie its current education expenditures and simultaneously increase development expenditures on education provision. This on the one hand, will reduce the number of children that do not have the opportunity to receive any schooling, while on the other would also help in reducing educational inequality. Once educational inequalities are reduced, average schooling has increased and the public sector's commitment to educating the general masses is firmly established, the returns to education would increase to become positive for every sub-group of the population and would thereby translate into a higher growth prospects for the future generations.

It is important to note that although the National Education Policy 1998-2010 [Government of Pakistan, 1998] identifies the importance of primary education and stresses on '*attainment of a respectable level of literacy*' and '*eliminating gender disparities at all levels*' it does not spell out any means by which this may be made possible. Fundamentally, the National Education Policy does not address the problem of inefficiency of public sector education programs associated with the existence of '*ghost schools*', '*ghost students*' and '*ghost teachers*'. It talks about the doubling of education expenditures in relation to GDP but mainly through an increase in current expenditures (for e.g. teacher training, salary increases, new appointments of teachers, etc.).

In stark contrast to what we have argued above, the National Education Policy focuses on diversifying secondary education, making intermediate level education more *info-tech* oriented, making higher education purposeful and job-oriented, improving the quality of inputs into the education process (especially higher education) and installing a management layer in the education delivery system. Over the past few years, i.e. from 1999 onwards, the government has translated its commitment into a '*Higher Education Commission*' (the largest resource center in education sector) whereby a small proportion of the population is being served and the masses are again deprived of their fundamental right to education. The underlying belief of the public sector, therefore, is in sharp contrast with the corroboration that the returns to education are endogenously determined through increases in average school attainment. Our analysis recommends that the public sector should focus on the provision of primary educational facilities for the masses rather than tertiary and higher education for a limited segment of the population. In the longer run, this would enable all to reap direct and indirect benefits from education.

---------- Table No 4 ----------

---------- Table No 5 ----------

---------- Table No 6 ----------

---------- Table No 7 ----------

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Figure No. 1: A Comparison of Income and Education Lorenz Curves

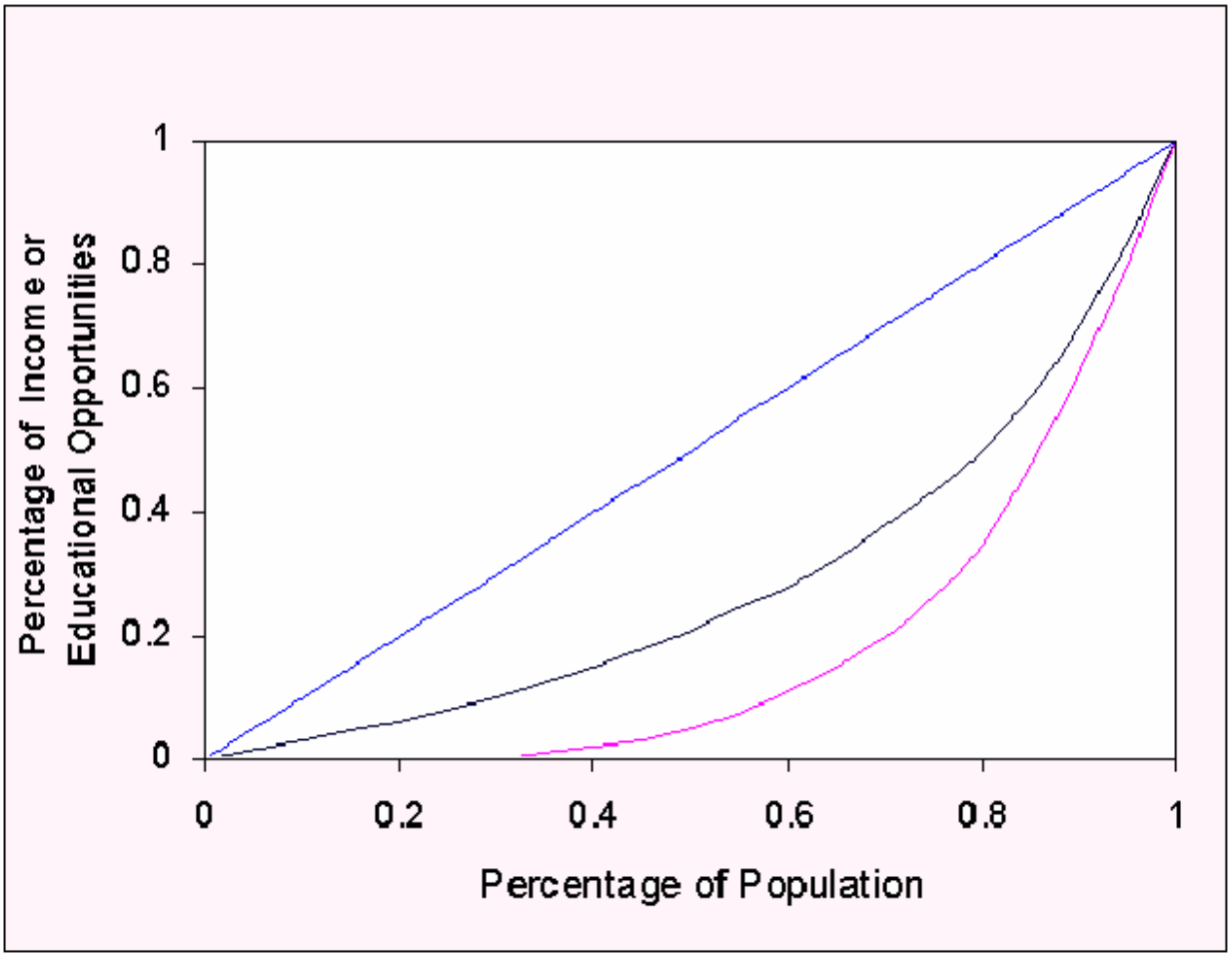

Figure No. 2: Time Profile Of NER's For Pakistan And Its Provinces Across Gender Domains

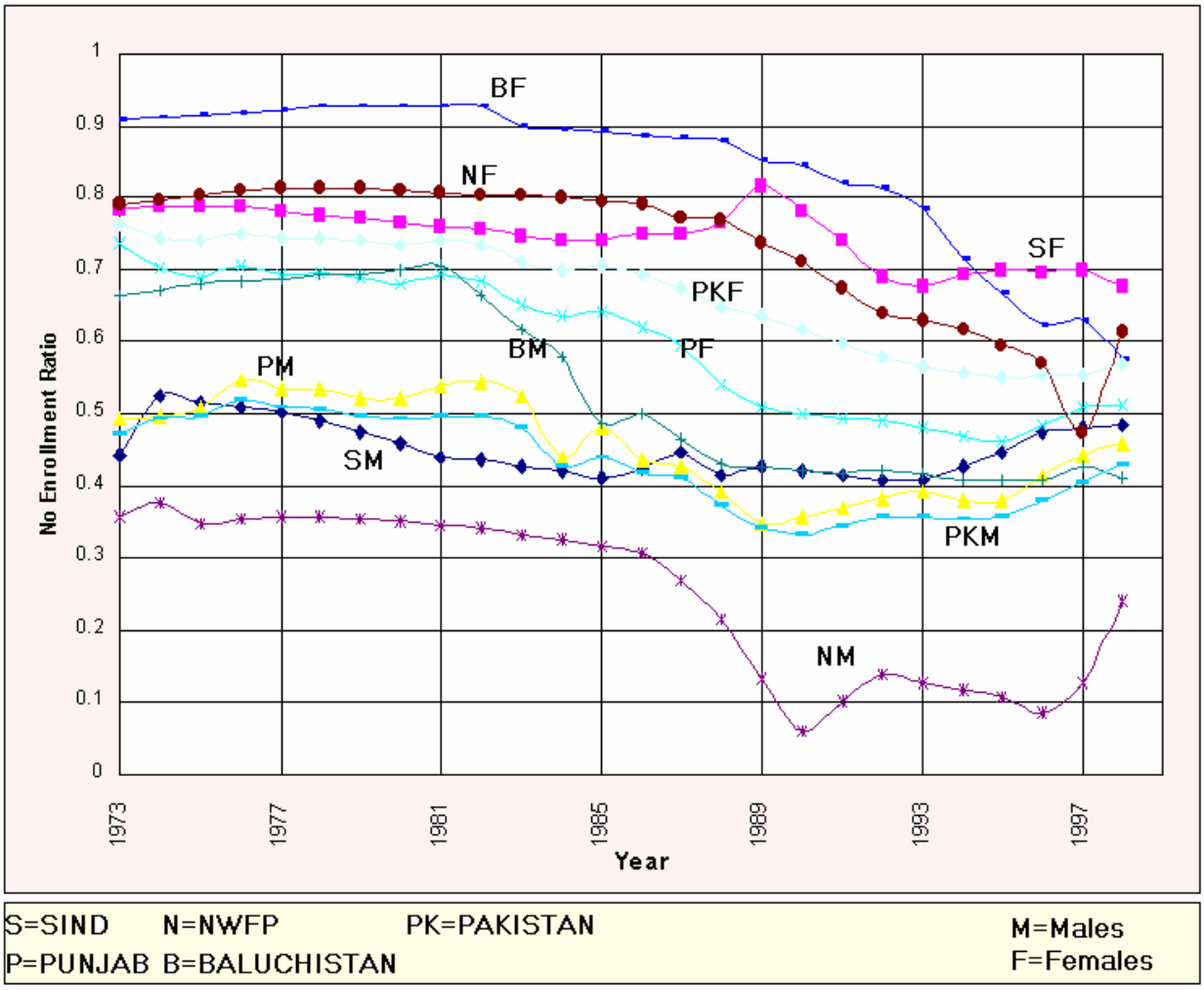

Figure No. 3: Time Profile of Average Schooling Years for Pakistan and its four Provinces

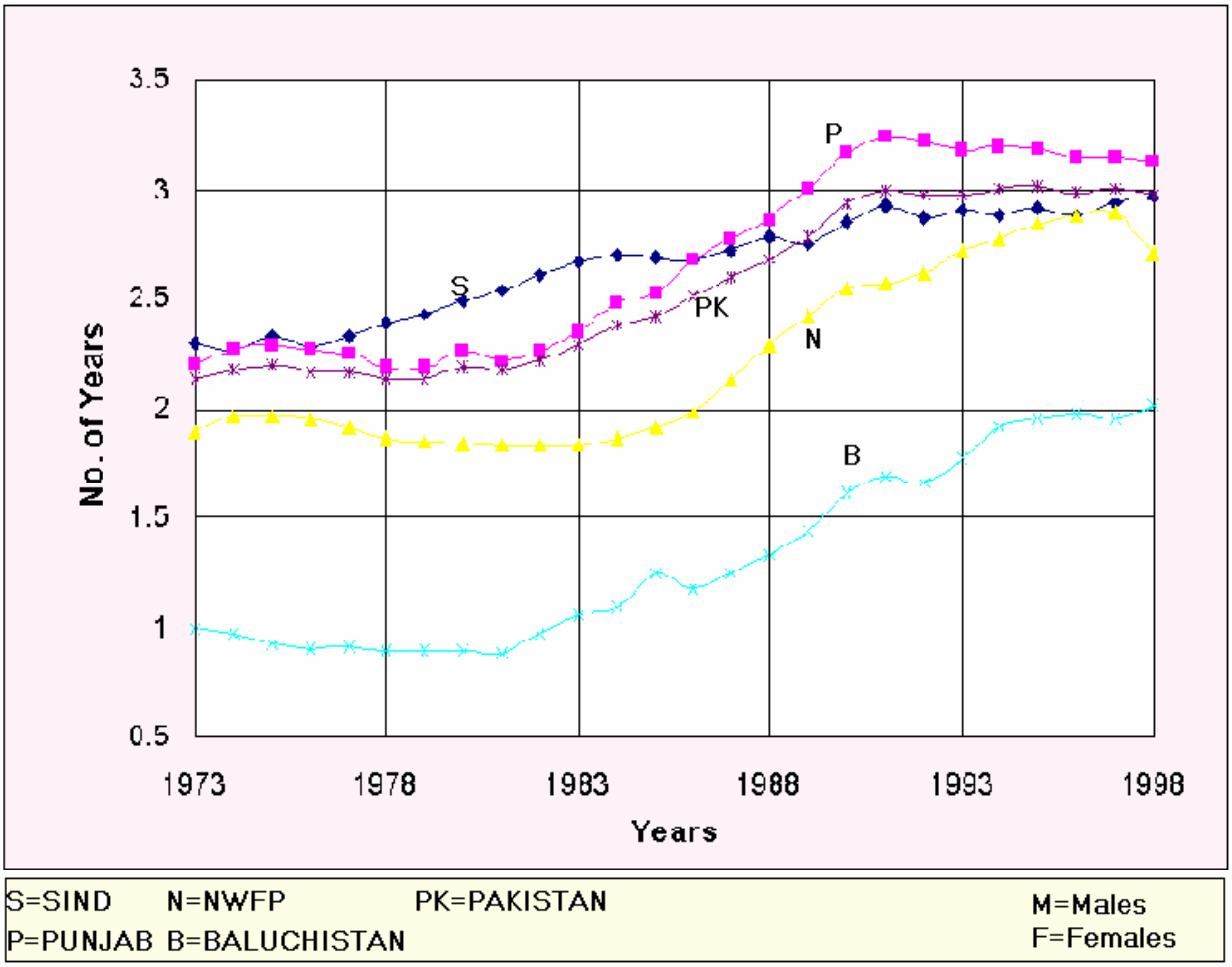

Figure No. 4: Time Profile of Educational Gini for Pakistan and Its Four Provinces

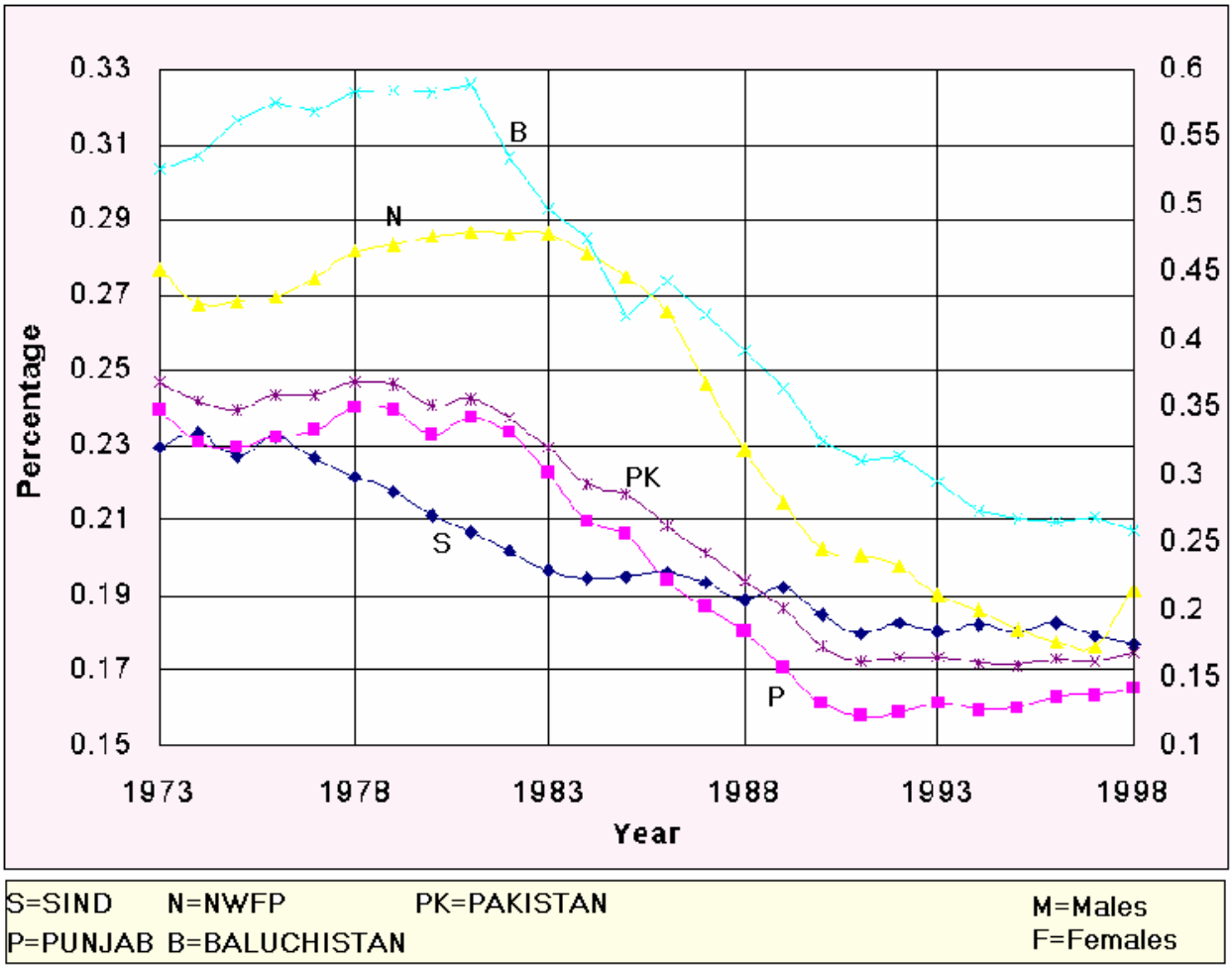

Figure No. 5: Lorenz Curves of Education for Pakistan----- 1980, 1995 and 1998

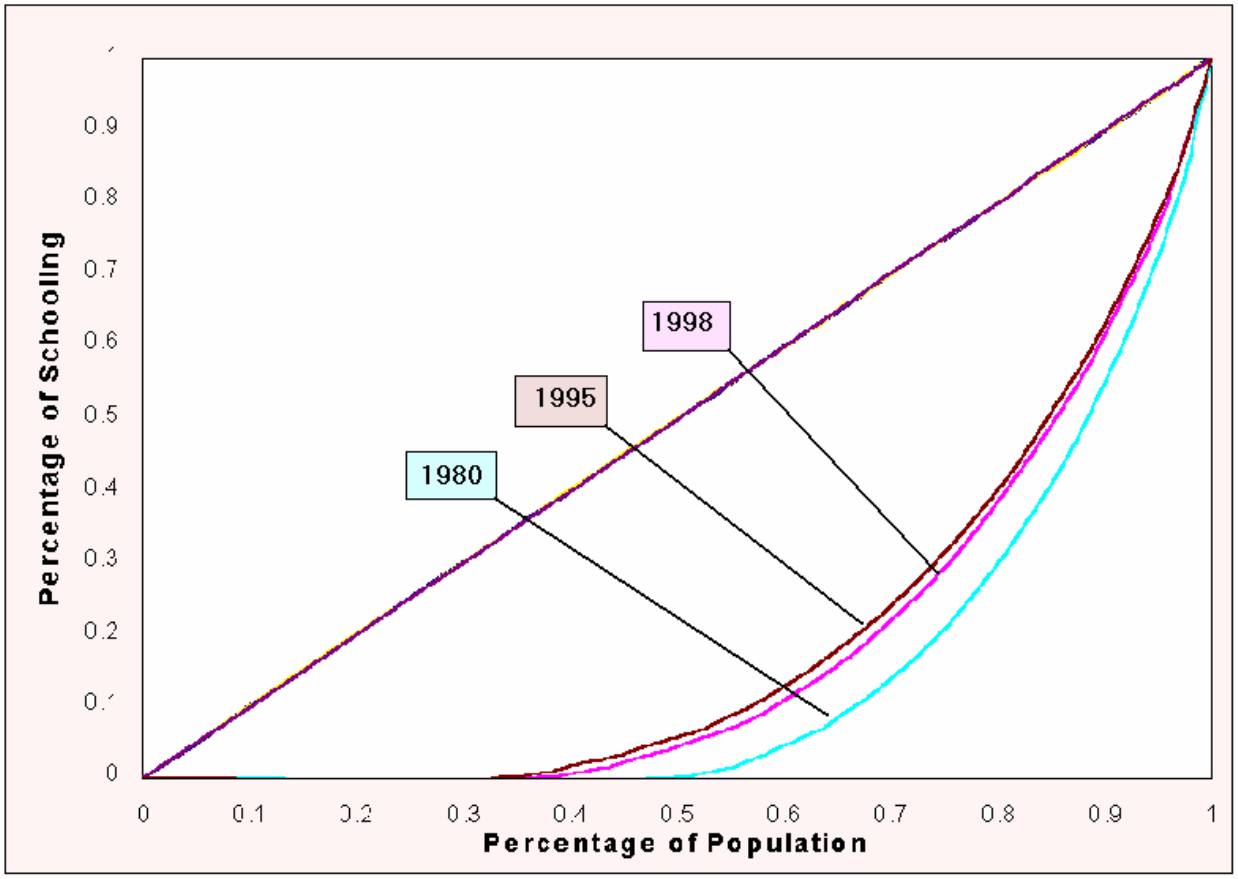

Figure No. 6: The Elasticity of Income to Average Schooling in Pakistan

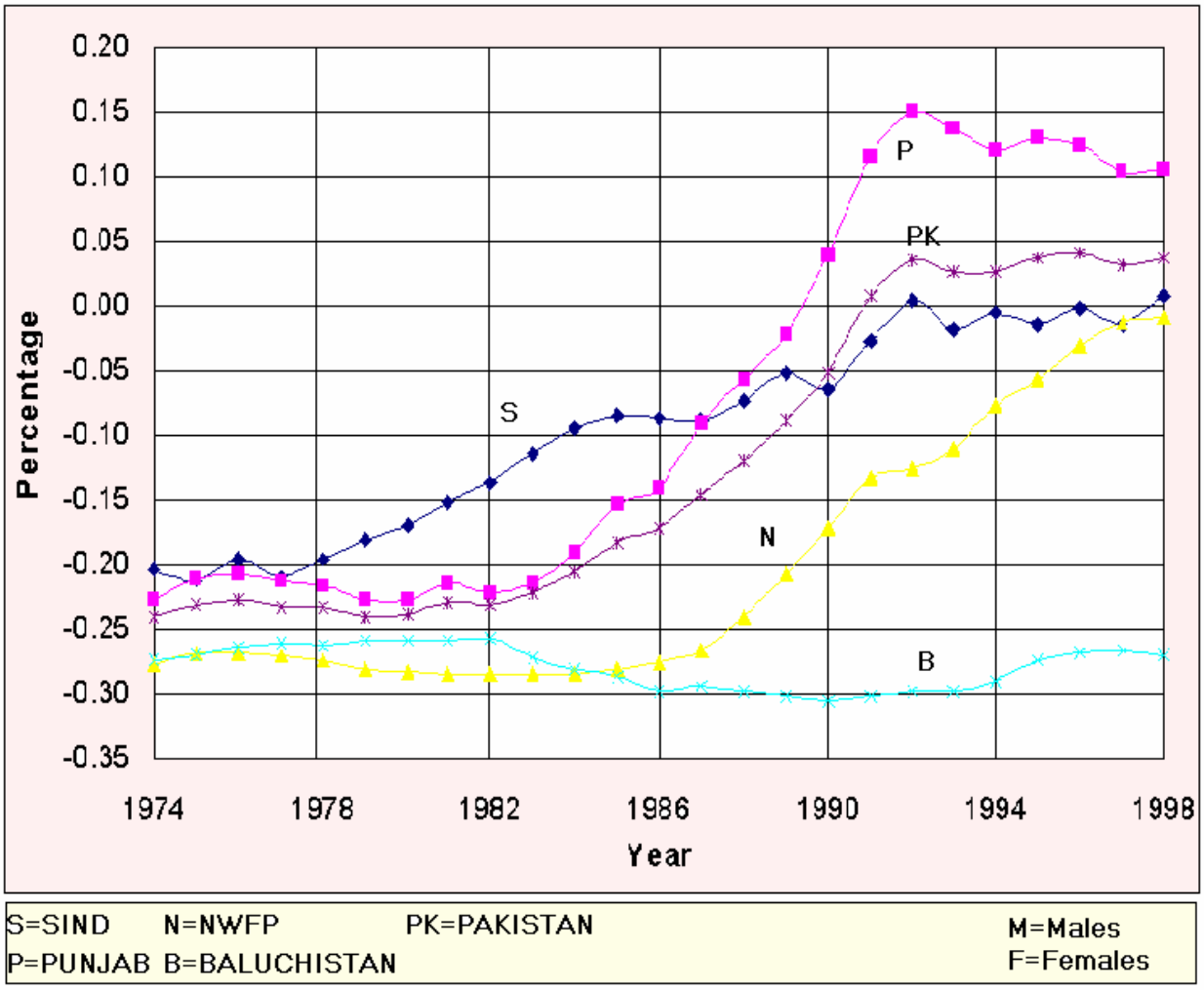

Table No.1 **The Distribution of No. Of Children Not Enrolled in Public Schools and NER's By Gender and Province**

	1975		1980		1985		1990		1995		1998	
	No. of Children	**NER**	**No. of Children**	**NER**	**No. of Children**	**NER**	**No. of Children**	**NER**	**No. of Children**	**NER**	**No. of Children**	**NER**
Sind	1.6548	0.646	1.8665	0.609	2.0112	0.573	2.3539	0.596	2.5095	0.568	2.7149	0.576
Males	0.6876	0.515	0.7199	0.458	0.7435	0.413	0.8603	0.422	1.0257	0.446	1.1899	0.483
Females	0.9672	0.788	1.1466	0.767	1.2677	0.741	1.4936	0.781	1.4838	0.699	1.5250	0.677
Gender Gap		0.273		0.309		0.328		0.359		0.253		0.194
Punjab	3.7809	0.594	4.2774	0.598	4.5607	0.559	3.9371	0.426	4.3655	0.420	5.3969	0.485
Males	1.6991	0.508	1.9548	0.523	2.0433	0.481	1.7202	0.359	2.0482	0.380	2.6467	0.460
Females	2.0818	0.689	2.3225	0.680	2.5174	0.644	2.2168	0.499	2.3172	0.462	2.7502	0.512
Gender Gap		0.181		0.157		0.163		0.140		0.082		0.052
NWFP	0.9003	0.569	1.0605	0.572	1.1713	0.547	0.9142	0.373	0.9551	0.343	1.2623	0.421
Males	0.2857	0.350	0.3381	0.352	0.3512	0.316	0.0757	0.060	0.1553	0.107	0.3736	0.240
Females	0.6146	0.804	0.7224	0.810	0.8201	0.795	0.8385	0.711	0.7998	0.596	0.8887	0.615
Gender Gap		0.454		0.458		0.479		0.651		0.489		0.375
Baluchistan	0.4123	0.794	0.6110	0.811	0.5982	0.682	0.6060	0.620	0.5701	0.527	0.5555	0.485
Males	0.1810	0.679	0.2693	0.699	0.2211	0.487	0.2174	0.421	0.2382	0.407	0.2579	0.410
Females	0.2312	0.916	0.3417	0.928	0.3771	0.892	0.3886	0.844	0.3319	0.669	0.2976	0.577
Gender Gap		0.237		0.229		0.405		0.423		0.262		0.167
Pakistan	6.7483	0.612	7.8153	0.609	8.3413	0.568	7.8112	0.470	8.4002	0.450	9.9295	0.497
Males	2.8535	0.495	3.2821	0.493	3.3591	0.441	2.8736	0.333	3.4674	0.357	4.4681	0.430
Females	3.8948	0.740	4.5332	0.734	4.9822	0.704	4.9376	0.618	4.9328	0.550	5.4615	0.570
Gender Gap		0.245		0.241		0.263		0.285		0.193		0.140

* No. of Children are in Millions. The No Enrollment Ratios (NER) are calculated as indicated above

Table No. 2 **Real Per-Capita GDP Growth and Ratio of Education Expenditures (Current and Development) to GDP By Province**

		Sind	Punjab	NWFP	Baluchistan	Pakistan
1975	Growth in Real Per Capita Income	-2.41	0.48	-6.23	0.80	-0.94
	Ratio of Education Spending (Current) to GDP	1.03	1.12	1.08	1.05	1.18
	Ratio of Education Spending (Development) to GDP	0.16	0.31	0.38	0.03	0.45
1980	Growth in Real Per Capita Income	4.64	1.37	3.41	1.07	2.77
	Ratio of Education Spending (Current) to GDP	0.95	1.12	1.18	1.32	1.35
	Ratio of Education Spending (Development) to GDP	0.13	0.15	0.54	0.05	0.40
1985	Growth in Real Per Capita Income	4.03	2.90	5.16	1.53	3.49
	Ratio of Education Spending (Current) to GDP	0.93	1.42	2.07	1.99	1.67
	Ratio of Education Spending (Development) to GDP	0.17	0.22	0.55	0.70	0.49
1990	Growth in Real Per Capita Income	-4.48	7.03	0.83	13.30	2.90
	Ratio of Education Spending (Current) to GDP	1.18	1.60	2.47	2.22	1.92
	Ratio of Education Spending (Development) to GDP	0.28	0.24	0.53	0.67	0.56
1995	Growth in Real Per Capita Income	2.67	3.90	3.81	3.46	3.52
	Ratio of Education Spending (Current) to GDP	1.70	1.75	2.78	2.32	2.17
	Ratio of Education Spending (Development) to GDP	0.19	0.25	1.16	1.12	0.41
1998	Growth in Real Per Capita Income	0.93	4.74	0.82	1.78	3.07
	Ratio of Education Spending (Current) to GDP	1.34	1.79	2.77	2.28	1.96
	Ratio of Education Spending (Development) to GDP	0.09	0.20	0.45	0.74	0.26

Source: Regional Accounts of Pakistan: 1973-1992, [Bengali, 1995] Regional Accounts of Pakistan: 1991-1995 [Bengali, 1997], Regional Accounts of Pakistan: 1973-2000 [Bengali, 2002] and Fifty Years of Pakistan Statistics [F.B.S, 1998]. All figures are in percentage.

Table No. 3 **Education Inequality Statistics for Selected Years By Province and Gender**

	1975			1980			1985			1990			1995			1998		
	EG	**ASY**	**SDS**	**EG**	**ASY**	**SDS**	**EG**	**ASY**	**SDS**	**EG**	**ASY**	**SDS**	**EG**	**ASY**	**SDS**	**EG**	**ASY**	**SDS**
Sind	0.227	2.33	3.63	0.212	2.49	3.66	0.195	2.69	3.74	0.185	2.85	3.99	0.180	2.91	4.00	0.177	2.97	4.10
Males	0.181	2.89	3.85	0.167	3.10	3.84	0.154	3.34	3.88	0.144	3.57	4.16	0.148	3.48	4.16	0.150	3.46	4.28
Females	0.323	1.63	3.21	0.301	1.76	3.30	0.280	1.89	3.38	0.273	1.94	3.57	0.241	2.20	3.67	0.224	2.36	3.79
Punjab	0.229	2.29	3.17	0.233	2.26	3.19	0.206	2.53	3.36	0.161	3.17	3.53	0.160	3.19	3.54	0.165	3.13	3.67
Males	0.178	2.91	3.40	0.183	2.83	3.41	0.166	3.09	3.56	0.137	3.66	3.64	0.143	3.52	3.60	0.151	3.40	3.73
Females	0.361	1.45	2.60	0.348	1.51	2.71	0.292	1.80	2.93	0.204	2.55	3.27	0.185	2.79	3.43	0.185	2.81	3.57
NWFP	0.268	1.96	2.80	0.286	1.84	2.74	0.275	1.91	2.82	0.203	2.55	3.10	0.181	2.84	3.19	0.192	2.71	3.25
Males	0.180	2.84	3.05	0.192	2.67	3.01	0.184	2.78	3.11	0.140	3.50	3.15	0.134	3.68	3.29	0.147	3.43	3.40
Females	0.647	0.80	1.89	0.696	0.75	1.84	0.699	0.74	1.82	0.427	1.23	2.50	0.317	1.66	2.61	0.303	1.74	2.77
Baluchistan	0.562	0.93	2.23	0.582	0.89	2.23	0.417	1.25	2.50	0.325	1.62	2.82	0.268	1.96	3.00	0.260	2.02	2.96
Males	0.374	1.40	2.62	0.384	1.37	2.63	0.278	1.87	2.83	0.222	2.33	3.15	0.203	2.56	3.30	0.212	2.46	3.23
Females	0.997	0.38	1.49	0.996	0.35	1.49	0.995	0.52	1.76	0.766	0.68	1.94	0.462	1.13	2.27	0.371	1.41	2.42
Pakistan	0.240	2.20	3.22	0.241	2.19	3.24	0.217	2.42	3.37	0.176	2.93	3.57	0.171	3.01	3.59	0.175	2.97	3.70
Males	0.183	2.83	3.45	0.185	2.80	3.46	0.169	3.05	3.57	0.142	3.55	3.69	0.145	3.49	3.68	0.153	3.37	3.80
Females	0.386	1.36	2.66	0.373	1.41	2.75	0.327	1.61	2.92	0.246	2.14	3.25	0.216	2.42	3.38	0.210	2.49	3.50

Table No. 4 **Education, Its Distribution and Economic Growth**

Dependent Variable : Growth in Real Per Capita GDP

Panel Regression : Variables Stacked by Province

Variables	Plain OLS Estimates	Fixed Effects	Random Effects
Lagged Real Per Capita GDP	-0.014995 *	-0.069281 *	-0.022352 *
	(0.015470)	(0.045041)	(0.018773)
Average Schooling (Lag 1)	-0.312057	-0.418137	-0.314514
	(0.161583)	(0.181647)	(0.150289)
Average Schooling (Lag 1) Square	0.051917	0.071665	0.052590
	(0.025549)	(0.028665)	(0.025051)
Change in Average Schooling	0.348816	0.265840	0.338199
	(0.126353)	(0.125770)	(0.094375)
Education Gini Coefficient	-0.706010	-0.844455	-0.712231
	(0.358345)	(0.369555)	(0.292945)
Ratio of Education Expenditure (T) to GDP	0.003125 *	0.018740	0.004665 *
	(0.003442)	(0.009032)	(0.004560)
Intercept (s)	0.734550	1.34963 (SIN)	0.795234
	(0.330628)	1.31702 (PUN)	(0.308825)
		1.29514 (NWF)	
		1.29934 (BAL)	
		1.31547 (PAK)	
Adjusted R-squared	0.2095	0.2933	0.2457
Hetroscedasticity (LM Statistic)	0.768281	2.06852	0.84314
	[0.381]	[0.150]	[0.358]
Autocorrelation (DW Statistic)	1.92860	1.88998	1.90011
	[0.161, 0.574]	[0.113, 0.488]	[0.125, 0.510]
F-Test [A, B = A_i, B_i]	1.4025	_ _ _ _	_ _ _ _
	[0.1180]		
F-Test [A_i, B = A_i, B_i]	_ _ _ _	1.3099	_ _ _ _
		[0.1812]	
F-Test [A, B = A_i, B]	_ _ _ _	1.8381	_ _ _ _
		[0.1263]	
Hausman Test:	_ _ _ _	_ _ _ _	17.975
Random vs. Fixed Effects			[0.0012]

- All coefficients except marked with * are significant.
- Standard errors of the coefficients are in parentheses, while P-values are reported using square brackets.

Table No. 5 **What Explains Education Inequality in Pakistan**

Dependent Variable : Education Gini Coefficient
Panel Regression : Variables Stacked by Province

Variables	Plain OLS Estimates	Fixed Effects	Random Effects
Average Schooling Years	-0.134259	-0.153300	-0.135219
	(0.025429)	(.0302220)	(0.018427)
Education Expenditure (Current)	0.012650	0.014010	0.0128470
	(0.002297)	(0.002468)	(0.001818)
Education Expenditure (Development)	-0.011301	-0.010649	-0.011373
	(0.002047)	(.0024243)	(0.001447)
Inertia Effect	0.576636	0.572030	0.5775410
	(0.078115)	(0.082216)	(0.051082)
Intercept (s)	0.182800	0.189730 (SIN)	0.1822590
	(0.034239)	0.185470 (PUN)	(0.023528)
		0.186500 (NWF)	
		0.176930 (BAL)	
		0.185210 (PAK)	
Adjusted R-squared	0.9935	0.9936	0.9935
Hetroscedasticity (LM Statistic)	35.2318	38.6710	34.3690
	[0.000]	[0.000]	[0.000]
F-Test [A, B = A_i, B_i]	12.235	_ _ _ _	_ _ _ _
	[0.000]		
F-Test [A_i, B = A_i, B_i]	_ _ _ _	14.154	_ _ _ _
		[0.000]	
F-Test [A, B = A_i, B]	_ _ _ _	1.6202	_ _ _ _
		[0.1738]	
Hausman Test:	_ _ _ _	_ _ _ _	5.0899
Random vs. Fixed Effects			[0.1653]

- All coefficients except marked with * are significant.
- Standard errors of the coefficients are in parentheses, while P-values are reported using square brackets.

Table No. 6 **Education Inequality in Pakistan: Gender Disaggregated Results**

Dependent Variable : Education Gini Coefficient

Panel Regression : Variables Stacked by Province

Variables	Plain OLS Estimates		Fixed Effects		Random Effects	
	Male	Female	Male	Female	Male	Female
Average Schooling Years	-0.14682	-0.12157	-0.17245	-0.13318	-0.15580	-0.12043
	(0.01846)	(.05799)	(0.02070)	(0.06678)	(0.01313)	(0.03055)
Education Expenditure (Current	0.00725	0.032292	0.00848	0.03241	0.00790	0.03195
	(0.00106)	(0.01409)	(0.00114)	(0.01486)	(0.00092)	(0.00739)
Education Expenditure (Development)	-0.00644	-0.03285	-0.00581	-0.03086	-0.00649	-0.03258
	(0.00108)	(0.01145)	(0.00128)	(0.01197)	(0.00084)	(0.00566)
Inertia Effect	0.38945	0.76931	0.35795	0.78910	0.37333	0.77249
	(0.07748)	(0.09721)	(0.07312)	(0.11115)	(0.04885)	(0.04593)
Intercept (s)	0.25147	0.08280	0.27543	0.07472	0.25926	0.08351
	(0.03183)	0.03223	0.27021	0.07111	(0.02116)	(0.02792)
			0.27432	0.05866		
			0.26559	0.04330		
			0.27010	0.77391		
Adjusted R-squared	0.9933	0.9909	0.9939	0.9910	0.9932	0.9909
Hetroscedasticity (LM Statistic)	26.4852	43.8180	28.9403	44.7084	20.2401	43.0624
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
F-Test [A, B = A_i, B_i]	20.311	6.9596	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _
	[0.000]	[0.000]				
F-Test [A_i, B = A_i, B_i]	_ _ _ _ _	_ _ _ _ _	21.760	7.9769	_ _ _ _ _	_ _ _ _ _
			[0.000]	[0.000]		
F-Test [A, B = A_i, B]	_ _ _ _ _	_ _ _ _ _	3.7576	1.4729	_ _ _ _ _	_ _ _ _ _
			[0.0065]	[0.2149]		
Hausman Test:	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _	2.0178	0.42600
Random vs. Fixed Effects					[0.3646]	[0.9348]

- All coefficients except marked with * are significant.
- Standard errors of the coefficients are in parentheses, while P-values are reported using square brackets.

Table No. 7 **Education Kuznets Curve**

Dependent Variable : Standard Deviation of Schooling

Panel Regression : Variables Stacked by Province and By Year

Variables	By Province		By Time Period	
	Fixed Effects	**Random Effects**	**Fixed Effects**	**Random Effects**
Average Schooling Years	0.40364	0.19316	1.23055	1.24204
	(0.08906)	(0.05228)	(0.04796)	(0.05293)
Average Schooling Years (sq)	-0.04664	-0.02555	-0.14874	-0.15355
	(0.01284)	(0.00915)	(0.01276)	(0.01230)
Inertia Effect	0.66337	0.87903	0.18151	0.17139
	(0.06961)	(0.03499)	(0.02026)	(0.01630)
Intercept (s)	0.55636	0.11045 *	*1975:* 0.64791	0.66132
	0.41087	(0.06575)	*1980:* 0.66591	(0.06303)
	0.34410		*1985:* 0.64313	
	0.42609		*1990:* 0.60716	
	0.44189		*1991:* 0.60466	
			1992: 0.60713	
			1993: 0.58704	
			1994: 0.57234	
			1995: 0.56601	
			1996: 0.57717	
			1997: 0.59913	
			1998: 0.62834	
Adjusted R-squared	0.9939	0.9909	0.8999	0.9048
Hetroscedasticity (LM Statistic)	0.091526	0.61574	26.2506	29.8636
	[0.762]	[0.433]	[0.000]	[0.000]
F-Test [A_i, B = A_i, B_i]	5.5283	_ _ _ _	0.16654	_ _ _ _
	[0.000]		[1.000]	
F-Test [A, B = A_i, B]	8.1484	_ _ _ _	0.30099	_ _ _ _
	[0.000]		[0.9996]	
Hausman Test:	_ _ _ _	26.443	_ _ _ _	3.2244
Random vs. Fixed Effects		[0.000]		[0.1994]

- All coefficients except marked with * are significant.
- Standard errors of the coefficients are in parentheses, while P-values are reported using square brackets.