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RETURNS TO EDUCATION AND EARNING INEQUALITY NEXUS: A MICROECONOMETRIC ANALYSIS FOR PAKISTAN

This study investigates a nexus between returns to education and earning inequality in Pakistan. The study utilizes quantile regression method to demonstrate how effect of different level of education varies across conditional earning distribution. The results show that education plays a significant role in determination of within group earning inequality at all levels of education. Within a group earning inequality is higher for the individuals having tertiary education as compared to the individuals having secondary and primary education. Earning inequality does not remain constant within the education groups during 2005–07. Moreover, education also causes earning inequality between educational groups. The findings of the study reveal that education has a positive effect on within as well as between groups earning inequality.

Keywords: *returns to education, earnings distribution, quantile regression, labor market.*
JEL Classification: C21, D31, I24, J31.

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ВЗАЄМОЗВ'ЯЗОК ПРИБУТКОВОСТІ ОСВІТИ І НЕРІВНОСТІ ДОХОДІВ: МІКРОЕКОНОМЕТРИЧНИЙ АНАЛІЗ ЗА ДАНИМИ ПАКИСТАНУ

У статті вивчено взаємозв'язок між прибутковістю освіти і нерівністю доходів у Пакистані. Використано метод квантильной регресії, що демонструє різницю впливу різних рівнів освіти на умовний розподіл прибутку. Результати показали, що освіта відіграє важливу роль у визначенні внутрішньогрупової нерівності доходів на всіх рівнях освіти. Внутрішньогрупова нерівність доходів вища у осіб, які мають вищу освіту, у порівнянні з тими, хто здобув середню і початкову освіту. Нерівність доходів варіюється в групах протягом 2005–2007 років. Крім того, рівень освіти також впливає на нерівність доходів між групами, виділеними за фактором освіти. Результати дослідження показали, що освіта має позитивний вплив як на внутрішньогрупову, так і міжгрупову нерівність доходів.

Ключові слова: *прибутковість освіти, розподіл доходів, квантильна регресія, ринок праці.*
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ВЗАИМОСВЯЗЬ ПРИБЫЛЬНОСТИ ОБРАЗОВАНИЯ И НЕРАВЕНСТВА ДОХОДОВ: МИКРОЭКОНОМЕТРИЧЕСКИЙ АНАЛИЗ ПО ДАННЫМ ПАКИСТАНА

В статье изучена взаимосвязь между прибыльностью образования и неравенством доходов в Пакистане. Использован метод квантильной регрессии, демонстрирующий разницу влияния различных уровней образования на условное распределение прибыли. Результаты показали, что образование играет важную роль в определении внутригруппового неравенства доходов на всех уровнях образования. Внутригрупповое неравенство доходов выше у лиц, имеющих высшее образование, по сравнению с теми, кто получил среднее и начальное образование. Неравенство доходов варьируется в группах в течение 2005–2007 гг. Кроме того, уровень образования также влияет на неравенство доходов между группами, выделенными по фактору образования. Результаты

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исследования показали, что образование имеет положительное влияние как на внутригрупповое, так и межгрупповое неравенство доходов.
Ключевые слова: *прибыльность образования, распределение доходов, квантильная регрессия, рынок труда.*

1. Introduction. Distribution of earnings has long been an area of interest among economists. Initially, concentration was focused on the relationship between earnings inequality and economic development. The most important idea on this relationship was established by Kuznets (1955). Since the work of Kuznets, there has been an interest in understanding the determinants of earnings distribution. The current literature on inequality underlines education as a contributing factor to earning inequality. Human capital model illustrates that level and distribution of education determines the earning distribution of a society (Becker, 1993).

The contemporary research on returns to education has exposed a relationship between returns to education and earnings inequality (e.g., Bushinsky, 1994; Machado and Mata, 2001; Fersterer and Winter-Ebmer, 2003). They have taken into account the heterogeneity in earnings due to education. To provide evidence on whether education is a contributing factor to earning inequality or not, they provide distributional analysis of earnings of educated workers. In doing so, they utilize quantile regression to understand whether returns to education for individuals at upper tail of earning distribution are different from the returns to education for those who are at lower tail of earning distribution with the same level of education. If there is a difference then it is concluded that earning inequality is present due to education. The presence of such differences in returns to education has obvious implication for labor market.

The present study contributes to the existing literature on earning inequality by analyzing the relationship between returns to education and earning inequality during 2005–07 in Pakistan. The study examines returns to different levels of education as a source of earning inequality. For this purpose, the quantile regression method has been employed. The layout of study is as follows: the empirical specification of earning function based on quantile regression is presented in Section 2. Results and discussion are given in Section 3. Finally in Section 4, concluding remarks are provided.

2. Empirical Specification of the Model. Following Buchinsky (1998), the quantile regression earning function can be written as follows:

$$Lnw_i = x_i\beta_\theta + u_{\theta i} \text{ with } Quant_\theta(Lnw_i \mid x_i) = x_i\beta_\theta. \quad (1)$$

To examine the effect of different levels of education on earning, we estimate the extended Mincerian earning function. The empirical earning function is specified as follows:

$$Lnw_i = \alpha + \beta_{\theta 1} primary + \beta_{\theta 2}\,\text{sec}ondary + \beta_{\theta 3} tertiary + \sum_i \delta_{\theta i} Z_i + u_{\theta i}, \quad (2)$$

where LnW_i is quantile being analyzed, LnW is the natural log of monthly earnings for the ith individual. Primary, secondary and tertiary refer to dummy variables for primary, secondary and tertiary education. Primary is equal to 1 if an individual has education from 1 to 5 years of schooling and zero otherwise. Secondary is equal to 1 if an individual has education from 6 to 12 years of schooling and zero otherwise while tertiary is equal to 1 if an individual has education higher than 12 years of schooling

(or higher than secondary education) and zero otherwise. No education is omitted. Z includes labor market experience, square of labor market experience, dummies for gender, marital status, region of residence, occupation and province of residence. The above specified earning model is estimated at 9 deciles of conditional earnings distribution. The standard errors of estimates are obtained by bootstrapping with 100 repetitions. In addition to quantile estimations, we also perform OLS regression.

The study uses Pakistan Social and Living Standards Measurement (PSLM) survey data for the periods 2005–06 and 2007–08. Keeping in the view the standard definition of labor force, only individuals ranging from age 15 to 65 are kept in the sample.

3. Results and Discussion. The specified earning function has been estimated at 9 deciles for each of 2 years. Only the coefficients of primary, secondary and tertiary dummies in the earning function and their respective t-statistics are presented in Table 1. These results show that the effect of each level of education on earnings is positive and statistically significant at each of the deciles analyzed for both set of the years. Returns to each level of education are not equal at each decile. In other words, each level of education has a different effect on earnings across the earning distribution.

It reveals that the effect of each level of education on earning increases as we move from lower to upper quantiles of the earnings distribution. It implies that there is heterogeneity in returns to each level of education. However, this heterogeneity in returns for primary and secondary education is less as compared to tertiary education. The results show that the effect of education at upper tail of earning distribution is higher than at the lower tail of earning distribution in the two years. Therefore, we can conclude that education is a factor which promotes within group earning inequality.

Table 1. **Estimated Coefficients of Primary, Secondary and Tertiary Education Dummies for 2005–06 and 2007–08**

	Primary		Secondary		Tertiary	
Deciles	2005	2007	2005	2007	2005	2007
0.1	0.133*	0.147*	0.384*	0.379*	0.800*	0.802*
	(5.27)	(5.46)	(13.12)	(18.75)	(21.45)	(23.46)
0.2	0.135*	0.172*	0.364*	0.423*	0.830*	0.855*
	(9.30)	(9.74)	(18.05)	(28.78)	(29.43)	(34.16)
0.3	0.151*	0.188*	0.390*	0.442*	0.860*	0.858*
	(11.02)	(12.70)	(23.33)	(35.95)	(35.54)	(46.12)
0.4	0.151*	0.191*	0.397*	0.452*	0.895*	0.875*
	(12.15)	(12.05)	(26.90)	(41.12)	(30.10)	(41.70)
0.5	0.165*	0.209*	0.423*	0.471*	0.920*	0.924*
	(15.32)	(16.33)	(31.15)	(46.56)	(35.82)	(49.57)
0.6	0.187*	0.222*	0.454*	0.492*	0.983*	0.978*
	(17.04)	(13.85)	(39.88)	(40.71)	(43.89)	(50.18)
0.7	0.194*	0.221*	0.485*	0.507*	1.030*	1.014*
	(17.74)	(16.08)	(34.33)	(47.61)	(30.97)	(36.21)
0.8	0.192*	0.235*	0.519*	0.542*	1.087*	1.073*
	(12.46)	(14.12)	(31.98)	(35.52)	(37.41)	(41.04)
0.9	0.219*	0.257*	0.600*	0.564*	1.220*	1.142*
	(13.79)	(12.47)	(19.84)	(25.37)	(30.17)	(29.76)
OLS	0.175*	0.220*	0.466*	0.519*	0.996*	1.014*
	(12.74)	(16.74)	(35.75)	(42.36)	(46.20)	(49.53)

Note: t - statistics are in parentheses; * - significant at 1%.

Changes in the returns to education for different levels of education over time can also be observed from the table. For primary education, there is an increase in the returns at all deciles during 2005–07. The returns to secondary education have increased at almost all deciles except at 0.1 decile during the period under study. For the period 2005–07, returns to tertiary education are higher in 2007 than in 2005 until 0.3 decile while returns are identical at median of the distribution in 2005 and 2007. However, higher returns are obvious after 0.6 deciles in 2005 over 2007. This implies that returns to tertiary education have decreased at upper part of the earning distribution during 2005–07. This may be attributed to the increase in supply of university graduates at labor market during this period. These results follows the findings of previous studies (e.g., Hartog et al., 2001: Patrinos and Sakellariou, 2006; Fiszbein and Patrinos, 2005; Fersterer and Winter-Ebmer, 2003; Gonzalez and Miles, 2001).

Furthermore, in both the years set, returns to education are convex that is, effect of education on earnings tends to increase as the level of education increases. These returns are higher for tertiary education as compared to primary and secondary levels across all quantiles of earnings distribution. The pattern of higher returns as level of education becomes higher is also obvious by the OLS results. This confirms that education also causes earning inequality between different education groups.

4. Conclusion. The study analyzes the role of education in raising earning inequality in Pakistan over the period 2005–07. This issue has not received much attention so far in the literature on earning inequality. By employing quantile regression method, the results show that the effect of each level of education at upper tail of earning distribution is higher than at lower tail of earning distribution. Moreover, the returns to education for different levels of education have changed during the period under study. Based on the econometric findings, we conclude that education is a factor which promotes within group earning inequality. In addition, returns to education are convex which confirm that education also causes earning inequality between educational groups. The results of study unveils that goal of fair income distribution through education is conflicting, that is, it rings alarm bells for policy design which based on the ground that investing in education reduces earnings inequality.

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