Equalization of Returns to Education in Pakistan: A Dynamical District-Level Analysis

Muhammad Nauman Malik[4] & Masood Sarwar Awan[5]

Abstract

This study intends to seek the dynamical change (convergence/divergence) in returns to education at district level using Pakistan Social and Living Standard Measurement (PSLM) data (2004-05 to 2012-13) in Pakistan. This study finds out that the supply and demand forces are not working symmetrically for all districts of the country which is against the ideals of inclusiveness. Convergence phenomenon is being observed only for the districts of Punjab province. It shows that institutional mechanisms in deprived provinces are performing poor in the context of symmetric management of supply and demand of educated labor force.

1. Introduction

Vision 2025 is the premier economic planning document which lays down the envisaged future economic path of Pakistan. Inclusive Growth has been mentioned in it as one of the pillars upon which future economic development of Pakistan would rest (GOP, 2014). Potential economic constraints must be eliminated to realize the dream of inclusive growth (Hausmann et al., 2005). In the narrative of Inclusive Growth Analytics, all segments of population should participate in and get benefit from the growth process, especially those who are living in underprivileged and discriminated areas (Ianchovichina and Lundstrom, 2009).

In this regard, the dynamical movement (convergence/divergence) of returns to education would indicate us whether the supply and demand forces of educated labor are working symmetrically or not for all districts (sub-national level). Convergence would contribute towards inclusive growth whereas divergence would act against it (Crespo Cuaresma and Raggl, 2014). The non-equalization or divergence of returns to education at sub-national level acts as price signal which points towards the potential growth constraint in the form of sub-national inequality and inefficient labour market working. In this way,

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[4] Lecturer, Department of Economics, University of Sargodha, Sargodha
E mail: nauman.malik@uos.edu.pk
[5] Professor/Dean, Faculty of Management and Administrative Sciences, University of Sargodha, Sargodha E mail: awan811@hotmail.com

people of depressed and discriminated sub-national areas remain in the misery of exclusion.

Convergence or Divergence of returns to education[6] is a price signal which can tell us about the non-existence or existence of binding constraints for supply and demand of labor. Equalization or convergence of returns to education means that the forces of demand and supply of educated people are working in symmetry for all districts. Moreover, 'increase in productive employment' and 'productivity level' are two factors which contribute in inclusive growth (Bhalla, 2007). Hence, returns to education (wages) can be termed as labour productivity against human capital whose equalization among various districts would promote inclusiveness in terms of productivity.

The subnational analysis is important in the presence of known pervasive socio-economic imbalances within developing countries and Pakistan is not an exception to this fact. This socio-economic discrimination among provinces and their districts is prevalent since the independence of the country in 1947. It is important to evaluate whether returns to education coming out of labour market are indicating equalization over time or not. Non-convergence or divergence in returns to education at sub-national level would reveal constraints in the way of inclusive growth and development.

The basic objective of this paper is to evaluate the convergence/ divergence in returns to education at sub-national level. Convergence paves the way of inclusive growth whereas divergence would turn against it. Much work has been done on returns to education in Pakistan using Mincerian Earning Function (Mincer, 1974). Those studies deal with econometric biases (Aslam, 2006; Afzal, 2011, 2014; Kingdon and Soderbom, 2007; Malik and Awan; 2016), income inequality impacts of returns to education (Sial and Sarwar, 2013; Sarwar *et al.*, 2014), usage of different control variables (Ali *et al.*, 2013; Ali and Akhtar, 2014; Awan and Hussain, 2007; Guisinger *et al.*, 1984; Haque, 1977; Khan and Irfan, 1985; Nasir, 1999, 2002; Nasir and Nazli, 2000; Nazli, 2004; Shabbir, 1994), wage differential in private and public sector employees (Aslam and Kingdon, 2009; Hyder, 2007) and gender wage differential (Aslam, 2006; Qureshi, 2012). However, the phenomenon of convergence/divergence in the context of returns to education at district level has never been analyzed in Pakistan up to our current existing knowledge.

Subsequent sections are organized as; section 2 would provide the review of literature, section 3 would describe the data and methodology, section 4 discusses the estimation results and last section would conclude the paper.

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[6] Private returns to education as estimated by Mincer (1974)

2. Literature Review

In the basic Mincerian function (Mincer, 1974), the log of earnings is regressed on the components of human capital i.e. years of education and the potential experience. Using the same Mincerian earning equation, Montenegro and Patrinos (2014) analyzed the returns to education for 139 economies and concluded that years of schooling and experience are positively related to the earnings. They found that the returns are highest for tertiary education level. They also find that returns to schooling for men are higher as compared to women.

The literature on returns to education highlights many econometric problems in the estimation. Major econometric concerns are endogeneity and sample selection bias. The issue of endogeneity due to variable omission e.g. unobserved ability and family characteristics may cause inconsistency and bias in OLS results (Harmon, 2011). (reference). In this regard, Ashenfelter and Krueger (1994) considers the twins' dataset technique in which family effects and unobserved ability (owing to the same biological and family characteristics) can be controlled using fixed effect technique. Isacsson (1999, 2004) observed that when twins are stacked and OLS is applied to them the estimate of return to education happens to be upward biased in comparison with the fixed effect or first difference estimations.

Card (1999, 2001) preferred to use Instrumental Variable (IV) technique to have unbiased results in the presence of endogeneity problem. The instrument should be correlated with the endogenous schooling variable, but unrelated with the earnings. Different instruments are used in different studies like education of father, mother and spouse (Trostel et al. 2002); smoking behavior (Dickson, 2013) and distance from school (Soderbom et al. 2006)

Sample selection bias due to non-random selection also arises in returns to education estimation. The returns to education estimate may be biased because sample includes only those individuals who are getting wage or are on-job among those who have received an education. The two-step procedure of Heckman (1979) helps to cope with this problem (Cuaresma and Raggl, 2014; Kavuma et al., 2015). Endogeneity and sample selection issues can be simultaneously controlled through the Heckman (1979) two-step method and the Instrumental Variable (IV) estimation in tandem with each other (Arabsheibani and Mussurov, 2007; Foltz and Gajigo, 2012 & Wooldridge, 2013).

In Proxy methodology, personal characteristics like age, colour, education of father and his occupation and area of upbringing are used as a proxy of unobserved family characteristics which may ignite bias in OLS results and as remedy they introduced directly in the wage equation as regressors (Griliches and Mason, 1972). Scores of intelligence test and the knowledge of labour market test (Blackburn and Neumark, 1992; 1995) whereas job stress and job complication (Peng Yu, 2004) are used as proxy regressors.

Wage inequality is an important component of income inequality. As one of the major reasons behind the fall of income inequality is fall of hourly labor

income inequality (Lustig et al., 2013). Demand for and supply of skills and/or education are the forces which shape the wage inequality (Autor, 2014). Returns to cognitive skills differs significantly across countries. It has been observed that in fast growing economies returns to skills are very much high and that approves the supposition that skills are an important tool for the adaptation to economic change (Hanushek et al., 2017). Tansel and Bodur (2012) used the quantile regression technique and analyzed that education could contribute towards further inequality by more benefitting the upper wage distribution relative to lower segment of distribution. Contrary to it, Balestra and Backes-Gellner (2017) observed that returns to education are higher for lower quantiles of wage distribution relative to higher ones once the endogoneity of schooling issue is being controlled for. Cruces et al. (2014) analysed Latin American countries and observed that education expansion contributes towards the equalization of earnings and income distribution in 2000s as compared to 1990s. The reasons for failure in 1990s were unbalanced education upgradation and relative demand for low skilled labor fell. Adams et al. (2017) used the institutional coordinated perspective to explain how workers are sorted among employer entities and wage differential among workers having similar education. Sorting process appears to be responsible for a significant part of returns to education differential. Further, the intensity of sorting varies as education degree changes. One interesting study found that returns to education are also positive in illegal or illegitimate activities rather than just in the legal ones. After comparing the criminals with their closest non-criminal individuals, it is found that there are positive returns to education of criminals which are slightly less than the non-criminal elements (Campaniello, 2016).

Summing up, we can say the continued assessment of returns to education tells us how labor markets are incentivizing education. Education-earning relationship makes the returns to education studies more relevant for inequality related policies. However, Crespo Cuaresma and Raggl (2014) have identified that in the backdrop of Inclusive Growth narratives (Hausmann et al., 2005; Ianchovichina and Lundstrom, 2009) it is important to see the dynamics of return to education. This becomes the premise of this study and we will see the convergence/divergence of returns in this context.

3. Data and Methodology

Pakistan Social and Living Standard Measurement (PSLM) survey is a detailed source of information about the socio-economic indicators at district level in Pakistan. It is periodically conducted across Pakistan by Pakistan Bureau of Statistics (PBS). This data is representative for district level analysis in Pakistan and available from the year of 2004-05 when its first round was conducted. For this study, we have used the data sets of 2004-05 and 2012-13. The basic objective of the study is to analyze the convergence/divergence pattern of returns to education at national and sub-national level. The federation of

Pakistan has four 'Provinces' (sub-national level) where each province is further subdivided into different 'districts' (sub-national level).

For the estimation of returns to education (at district level in this study) only wage employees should be considered as their earnings are free of returns to capital (Montenegro & Patrinos, 2014). The wage workers of age 15 to 65 would be considered. Moreover, we will use real wage returns using the Consumer Price Index[7] (CPI) values with the base year 2000-01 to get real wage returns for 2004-05 and 2012-13[8].

Table 1 shows us that the highest growth rate in real annual wage earnings comes from the Punjab Province (23.78%) followed by Sindh (11.82%), KPK (15.21%) and Baluchistan (7.01%) during the time period 2004-05 to 2012-13. At the same time, grave differences exist across provinces in both time periods. The same aspect is visible in gender(female/male) and region (rural/urban) groups.

Table 1: Summary Statistics: Average Annual Wage earnings and growth rates

Provinces	Rural	Urban	Male	Female	Total	Districts
2004-05						
Punjab	371.77	588.05	517.52	164.87	461.47	34
Sindh	411.41	712.60	559.42	354.30	549.14	16
KPK	392.43	597.92	459.74	289.89	447.25	24
Balochistan	502.91	661.29	544.01	461.10	541.85	24
2012-13						
Punjab	468.18	715.90	635.37	235.04	571.22	34
Sindh	424.16	824.88	634.36	360.15	614.05	16
KPK	453.68	674.49	529.63	361.45	515.28	24
Balochistan	538.53	703.64	601.12	233.33	579.93	24
Growth Rates (%)						
Punjab	25.93	21.74	22.77	42.56	23.78	34
Sindh	3.10	15.76	13.40	1.65	11.82	16
KPK	14.89	12.81	15.20	24.69	15.21	24
Balochistan	7.08	6.40	10.50	-49.40	7.03	24

Table 2 presents the average year of education in which Punjab Province is at the highest level and there is glaringly vivid inequality across provinces in both years.

7Economic Survey of Pakistan 2014-15, Statistical Appendices, Inflation, Table 7.1 (A).
8 Jaffry, Ghulam, & Shah (2007)

Table 2: Summary Statistics: Average Years of Education

Provinces	Rural	Urban	Male	Female	Total	Districts
2004-05						
Punjab	2.48	4.70	3.96	2.79	3.38	34
Sindh	1.91	4.78	3.92	2.13	3.08	16
KPK	2.11	3.88	3.62	1.46	2.54	24
Balochistan	1.60	3.47	2.93	0.99	2.04	24
2012-13						
Punjab	3.25	5.35	4.52	3.67	4.10	34
Sindh	2.43	5.65	4.58	2.93	3.79	16
KPK	3.08	4.65	4.48	2.47	3.47	24
Balochistan	2.22	3.10	3.59	1.58	2.65	24

Wage earning is used as the dependent variable in the Mincerian Earning Function that shows how the labour market is rewarding individuals for their education. Potential experience (proxy of actual experience) is measured as: Age minus Years of Education minus 6, where 6 is the school starting age (Bhatti, Bourdon, & Aslam., 2013; Mincer, 1974). The different control variables include region, gender, industry and occupation. The omitted variable bias can be removed with the help of Instrumental Variable[9] and Fixed Effect techniques but in these techniques, we must bear the issues of missing values and loss of observations respectively (Kingdon et al., 2007; Aslam et al., 2009). These issues get aggravated when we go for individual district level estimations as we have less number of observations at district level relative to national level. Sample selection bias can be overcome with the help of Heckman's two step method (Heckman, 1979). In this method, sample selection variables (Exclusion Restrictions) are believed to determine the participation in work but do not directly affect the wages and help us identifying the selectivity hazard (Boo, 2010). In this scenario, land ownership and non-earned income are the useful sample selection variables (Asadullah, 2006) but in our dataset (PSLM-district level) there has been no detail about the non-earned incomes. At the same time, land-ownership detail has not been given at individual level. Hence, this study employs the conventional Mincerian Earning Function (Mincer, 1974) for the estimation of returns to education at district level of Pakistan. This function is semi-logarithmic in nature with dependent variable is in log form.

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[9]PSLM data gives the information of parental education which is the only suitable instrument variable whose information is provided in data but the problem of missing values comes out as there is no explicit question about parental education in questionnaire of PSLM survey (Kingdon et al., 2007; Aslam et al., 2009).

The basic Mincerian function can be described as:

$$\ln y_i = \alpha_0 + \alpha_1 s_i + \alpha_2 e_i + \alpha_3 e_i^2 + \sum_j \beta_j z_j + \varepsilon_i$$

Where s_i stands for Years of Schooling of wage workers, e_i stands for Experience of an individual and e_i^2 is its quadratic term (Square of Experience) to incorporate the non-linear earnings-experience relationship. z_j represents various dummy control variables like gender, region, occupation and industry. The sub-national regions of Pakistan are known as 'Provinces' which are four in number named as Punjab, Sindh, Khyber Pakhtunkhawa (KPK) and Balochistan. Each of these provinces is further divided into different 'Districts'. Data of 98 districts have been used in this study whose data were available in both PSLM 2004-05 and PSLM 2012-13.

After the estimation of extended Mincerian model for all districts as described above, the study followed the approach of Crespo-Cuaresma and Raggl (2016) and Barro and Sala-i-Martin (1992). for standard convergence analysis model for regions of the same country mentioned below;

$$\Delta \hat{r}_{ij} = \lambda_{0j} + \lambda_{1j} \hat{r}_{ij} + \varepsilon_i$$

$\Delta \hat{r}_{ij}$ stands for the change of estimated returns to education of district i from province j, $\hat{r}_{ij}$ stands for the initial returns to education in the base year for districts in respective provinces.

Firstly, the above-mentioned specification would run for convergence across districts of provinces. Convergence would be implied by the negative sign of the coefficient of r_{ij}; otherwise, divergence. Here, convergence would be interpreted as districts with high initial returns to education would attract and get more supplies of labour along with appropriate labour market absorption, returns would tend to settle down or rationalize. On the other side, the returns would adjust in upward direction for districts with relatively lower initial returns when labour moves out to the high return districts. Such convergence adjustment would imply that labour markets are efficiently working with suitable interaction of supply and demand forces.

Secondly, the same model would be run to observe convergence within provinces using Fixed Effect, assuming a common speed of convergence for all provinces.

Lastly, we will relax that assumption to go for provincial speeds of convergence by introducing slope-interaction variables using initial returns and provincial fixed effects dummy variables.

4. Results and Discussion

The returns to education as 'price indicator' at district level tells us about the symmetrical or non-symmetrical movement of labour among districts. If the

return to education is equalizing or converging among districts, it means symmetric movement of labour is taking place among districts as well. On the other hand, if the return to education is non-equalizing or diverging among districts, it will show the non-symmetric movement of labour among provinces. Symmetric movement of labour among districts would encourage inclusive growth by ensuring productive participation of people and benefit-sharing in growth process.

All convergence regression results have been shown in Table 3. The column (1) shows that overall convergence in returns to education significantly exists on average across districts of provinces in Pakistan over time-period. The negative sign of initial return means returns to education are overall converging on average.

Assuming a common speed of convergence for provinces, column (2) shows the results of within-province convergence with the help of provincial fixed effect via the introduction of provincial dummies. The estimated district returns to education are converging within provinces as well over time period assuming a common speed of convergence for all districts.

Table 3: Results of Convergence Regressions

	(1)	(2)	(3)
Constant	0.0347* (0.0061)		
Initial Return	-0.7282* (0.1032)	-0.7895* (0.0939)	
Punjab		0.0410* (0.0053)	0.0434* (0.0084)
Sindh		-0.0003 (0.0033)	-0.0016 (0.0161)
KPK		-0.0021 (0.0031)	-0.0110 (0.0131)
Balochistan		-0.0091*** (0.0039)	-0.0083 (0.0160)
Initial Return*Punjab			-0.8297* (0.1574)
Initial Return*Sindh			0.0216 (0.2620)
Initial Return*KPK			0.1576 (0.2260)
Initial Return*Balochistan			-0.0211 (0.2802)
Provincial Fixed Effects	No	Yes	Yes
Province-specific convergence speed	No	No	Yes
Observations	98	98	98

Note. (*), (**) and (***) stands for significance at 1%, 5% and 10% level. All Regressions are based upon district estimates of returns to education.

In column 3, we have introduced both provincial fixed effect as well as province-specific convergence speeds (assumption of common speed of convergence is dropped over here) with the help of interaction terms using provincial dummies and initial returns of districts. This column gives us the provincial or province-specific speeds of convergence.

If we compare the results of column (2) and (3), it is quite evident that within-province convergence phenomenon is being driven by only Punjab province districts for which we get the highly significant speed of convergence shown by the coefficient value of interaction term (Initial Return*Punjab province) in column (3). This finding was hard to unveil in overall average estimates of across and within province convergence in column (1) or column (2) respectively where we assumed a common speed of convergence shown by the coefficient of Initial Return.

Symmetric movement of labor in Punjab districts produces convergence unlike the other provinces. Such inequality is glaringly against the ideals of inclusive growth and development in which districts of provinces must be moving in tandem with one another.

In terms of educational attainment, quality and infrastructure in schools, Punjab is the best province relative to other ones as other provinces remained in deplorable condition (Alif Ailaan, 2013). Moreover, Punjab is ranked at first place, in terms of human capital index based upon both health and education factors where other provinces are far off in terms of human capital accumulation (Khan and Rehman, 2012). In terms of both Gross Provincial Product (GPP) and manufacturing output, Punjab again performed better relative to others (Jan and Chaudhary, 2011). This information indicates us that both demand and supply forces of labour in Punjab province are much better as compared to the rest of Pakistan.

For the last fifteen years, law and order situation has persistently remained worse in the KPK and Balochistan provinces because of the continuing war against terrorism in the former province (Khan, 2008; Salaman, 2012) and military insurgency against state in the latter one (Bansal, 2008). The province of Sindh is plagued with socio economic inequalities and Governance issues (Nawaz-ul-Huda et al., 2013).

The above mentioned discussion shows that symmetric interaction of supply and demand forces of educated labor force is being hampered by the poor conditions of Sindh, KPK and Baluchistan relative to Punjab. This non-symmetric interaction results in divergence of deprived provinces from Punjab.

5. Conclusion

According to the inclusive growth narrative, both pace and pattern of growth are important for sustained improvement in standard of living. Pattern of growth necessitates that supply and demand forces of labor should work

symmetrically for all districts of the provinces. Symmetric working of forces can be checked with the help of convergence (equalization) or divergence (non-equalization) in returns to education.

It has been found in case of Pakistan that overall results of convergence are not representative for subnational level. Severe dynamical inequality in the context of returns to education has been observed. All provinces failed to show significant convergence except Punjab province which is factually known to be better in socio-economic conditions among provinces. This fact has been revealed when we set loose the assumption of common speed of within convergence for provinces and found that only Punjab province has significant within convergence speed. Hence, returns to education are significantly equalizing or converging only for the districts of Punjab province relative to all other provinces in Pakistan. Equitable steps should be taken by so that fluid interaction of labour demand and supply forces in underprivileged and deprived provinces can be made. Policy interventions like infrastructure development for educated labor mobility, educational support (supply side), along with appropriate economic opportunity for labour absorption (demand side) should be implemented.

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