

**RETURNS OF EDUCATION IN PAKISTAN:
AN AGE PERIOD AND COHORT ANALYSIS**

Henna Ahsan, Muhammad Idrees and Eatnaz Ahmed¹

ABSTRACT

It may look strange but spread of higher education is becoming a challenge for the world especially for the developing countries and it is generally believed that young people are not enjoying as much earnings as their older counterparts used to. Therefore, in order to analyze this perception, we used PSLM data and applied mincer type earning model by incorporating the cohort variable and estimated it through age period cohort de-trended model (APCD). Our results show that earnings of young cohorts decline before and after introducing the control variables and interestingly returns of education show a significant decline for graduate and higher educated individuals. This indicates that education is rendering less value for young cohorts, born from 1979 to 1987 in Pakistan.

Key words: Returns of Education, education expansion, cohort analysis

Subject Classification Code: *I26, I23, J24*

1. Introduction

Over the time it has been observed that earning inequalities are increasing across cohorts in different societies of the world. Some cohorts gain and enjoy lucrative position in labor markets while others do not get same benefits, hence cannot enjoy the same living standards. It is argued that there is a cohort effect when large young labor force entering the labor market faces low earnings. After World War II when there was peak of baby boom and US age structure changed dramatically the labor force saw a growth of 21 percent from 1967 to 1975. This increased supply of labor had an effect on younger cohorts' wages that entered into the labor market during that period (Freeman 1979; Welch, 1979).

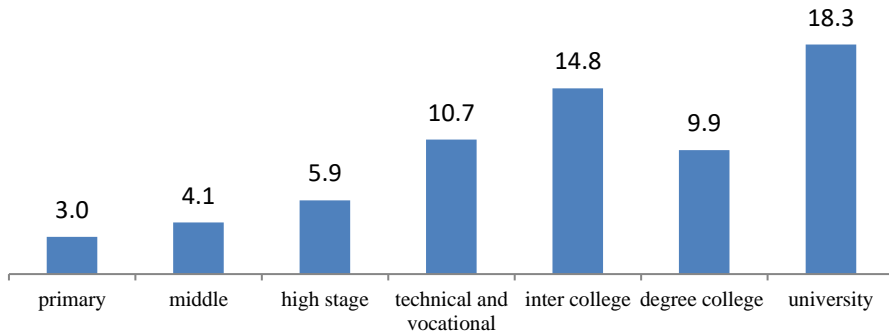
Expansion of tertiary education is one of the major societal changes of the Twentieth Century as the rate of enrollment in higher education increased by 200 percent worldwide (Schofer & Meyer, 2005). However, the labor markets were not as responsive and this led

¹ Authors are respectively Research Economist (PIDE)/Ph.D. Scholar at School of Economics, Quaid-i-Azam University, Islamabad and Professors at School of Economics, Quaid-i-Azam University Islamabad, Pakistan. (Email of corresponding author: henna.ahsan@pide.org.pk).

to the issues of unemployment and lower earnings in many countries of the world and the phenomenon is known as “Over Education” (Freeman, 1976; Sicherman, 1991) or “Education Inflation” (Collin, 1979) in the literature. Over education exists when the supply of highly educated people increases whereas demand in labor market remains stagnant. In such a scenario younger cohorts belonging to highly educated category face significant lower earnings as compared to their older counterparts (Haim et al., 2019).

In Pakistan too, higher education saw a great rise when University Grant Commission was converted to Higher Education Commission in 2002. Purpose was to upgrade the universities and degree awarding institutes to make access to higher education easy. A huge number of scholarships were awarded and as a result students’ enrollment kept on increasing more in higher education than in other levels of education. Figure 1 depicts the aforementioned scenario.

Figure 1: Average Growth rate of Enrollment by Education Level from 2001 to 2019.



Source: Authors Calculations from Pakistan Economic Survey, 2019.

Secondly Pakistan is also moving towards a demographic transition, as young population is touching numbers much higher than the past. As per latest statistics sixty four percent (64%) of the population is below 30 years of age and 29% lies between 15 to 29 age group. It is observed that Pakistan now has more young people than it ever had, and this increase is forecasted to continue till 2050 (Najam & Bari, 2017).

Now this education expansion along with demographic changes may create problems instead of opportunities for a developing country like Pakistan. As when economic growth is not sufficient and labor markets are not developed this expansion leads to unemployment and lower earnings as people have to adjust with jobs not at par with their educational abilities (Sial et al., 2019). Therefore, it is imperative to analyze whether individuals are becoming well off over the time or this massive increase in human capital is making matter worse against returns of education.

There are significant studies in past that have analyzed earning inequalities and returns of education in Pakistan by using cross section or short term accumulated data however these

studies do not consider time lags (Faridi et al., 2010; Afzal, 2011; Sarwar & Sial, 2012). So, it is necessary to analyze the returns of education over the period to evaluate whether these returns have remained stable across the cohorts or not.

Therefore, goal of our paper is to fill this gap by analyzing earning differences and returns of education over the time through Age Period and Cohort (APC) model. Cohort refers to a group of people who experience an event such as birth at the same time and cohort effects are defined as the formative effects of social events on individuals at a specific period during their life course (Ryder, 1965). Therefore, cohort effects are generated by the interaction between individuals' life histories and macro-socioeconomic effects. Further Age effect represents the social and biological process of aging and is used to measure the impact of experience on earnings of individual across their life span. Period effects are variations in the time period that affect all population in a society regardless of age and cohort (Yang & Land, 2013) and manifest in the form of macroeconomic movements, high unemployment and inflation etc.

Each of these three time-related factors have conceptually independent pathways to affect individuals' earnings and also equally matter to measure the true returns of education. Therefore, to understand the long-term changes, it is essential to estimate the independent effect of these three factors simultaneously by using the APC model. APC model enables us to observe an individual's earning profile throughout his life span and also compares the earning levels of different cohort groups at the same time (Fienberg & Mason, 1985; Tseng, 2018).

The objective of our paper is twofold. First, we want to analyze how earnings have been changed across the cohorts through APC model. Secondly, we intend to analyze returns of education by dividing the education into sub-categories and estimating the returns separately for different education levels through APC model. The analysis is based on the standard APC model based on pseudo panel data by using the national level data from Pakistan Social Living Measurement (PSLM) for the period 2004-05 to 2014-15 comprised of six alternate years.

The study used Age period cohort de-trended APCD model proposed by Chauvel (2012) that allows disentangling the age period and cohort effect in a more appropriate way. Also, it helps to contain the control variables that include employment status, demographic and geographic characteristics. Our analysis confirms that in case of Pakistan inter cohort inequalities have been significant and young cohorts are far from enjoying same level of earnings as their older counterparts used to. Further, returns of education for young cohorts have been decreasing significantly and the impact is highest for the graduate and above educated individuals.

Rest of the paper is organized in the following manner. In the next section we will analyze the relevant literature related to cohort effect on earnings. Section 3 describes the data set and descriptive analysis whereas section 4 discusses the methodology. The empirical results of inter cohort earnings inequality and returns of education through APC analysis are discussed in section 5 and last section concludes the study.

2. Theoretical and Empirical Background Regarding Cohort Effect on Earnings

Research on the impact of cohorts on earnings has been emphasized more after World War II during period 1950-60, when there was peak of baby boom and age structure in USA was changing dramatically. Welch (1979) quantified the effect of cohort size on earning patterns in the United States by taking the data of males from 1968-76. His results also concluded that average earning was rapidly decreasing for large cohorts who entered the labor market during that period and also that these cohorts faced a tough competition as compared to the smaller ones.

Freeman (1976) was the first to raise the issue that excess supply of college educated workers in the U.S market was declining the earnings of these young graduates. Returns of education or education premium is determined through supply and demand of skilled labor force that enters the labor market (Machin,2009). However, when supply seems to outpace the demand, this results in declining returns to education for young graduated cohorts (Boockmann and Stainer,2006).

Haim et al., (2019) estimated the returns of tertiary education for twelve European countries by using Age Period Cohort Trended Lag Model. They pointed out that skilled biased labor demand is lagging with respect to education expansion in many countries. However, the countries where the skill biased technological change is stronger than the education expansion the higher demand of skilled labor leads to increased returns to education for young cohorts.

Dormont and Samson (2008) found that there is a significant cohort effect on earnings of self-employed general practitioners in case of France. They argued that due to availability of high number of medical schools, large number of general practitioners started their career at the same time and faced tough competition, consequently leading to their reduced earnings.

From Pakistan's perspective there are number of studies that have analyzed the impact of human capital on earning distribution like (Guisinger et.al., 1984; Faridi et.al., 2010; Afzal, 2011; Sarwar & Sial, 2012) traced out the effects of human capital determinants (education, technical training and schooling quality) on earnings potential of individuals and distribution of earnings in Pakistan. Most of the studies concluded that on average earnings have been increasing at a rate 5 to 7% with every additional year of schooling, however none of these studies have considered the impact of cohort effect while analyzing the returns of education.

All above literature suggests that cohorts could have a significant effect on the stability of average education premium for the individuals. It is possible that relative returns of highly educated workers may be greater than low educated workers, as highly educated workers crowd out the low educated people from the job market, but absolute returns of these highly educated cohorts may have decreased over the time.

3. Data and Descriptive Analysis

Data for this research has been taken from Pakistan Social Living Measurement (PSLM) published by Pakistan Bureau of Statistics during period 2004-05 to 2014-15. PSLM is conducted by one year gap starting from 2004-05 and onwards, therefore we have six waves from 2004-05 to 2014-15. PSLM is a repeated cross-sectional survey from an independent sample from which we cannot extract an individual’s information and behavior over a time period. However, PSLM can be used as pseudo panel data when only independent repeated cross section data are available.

Table 1: Average Monthly Earning Trend by Employment Status for Pakistan.

Year	Total	Earning for	Earnings	Earnings for	Earnings for
2004	73963	15171	13820	16233	41219
2006	63115	15955	15239	16873	37374
2008	78763	16807	14813	18809	23019
2010	79548	16393	14471	17563	57605
2012	78930	17150	15969	17126	53442
2014	81747	14688	13550	15316	35735

Source: Author calculations through PSLM data.

Table 1 shows that real earnings have declined over the period for all these categories of employment. It is possible that due to less opportunity in the labor market people not getting reasonable jobs may have been compelled to work as self-employed however not having a business background and due to weak experience, they may be earning less as compared to their older counterparts and same effect may have happen against employers too.

Figure 2: Age Earning Profile

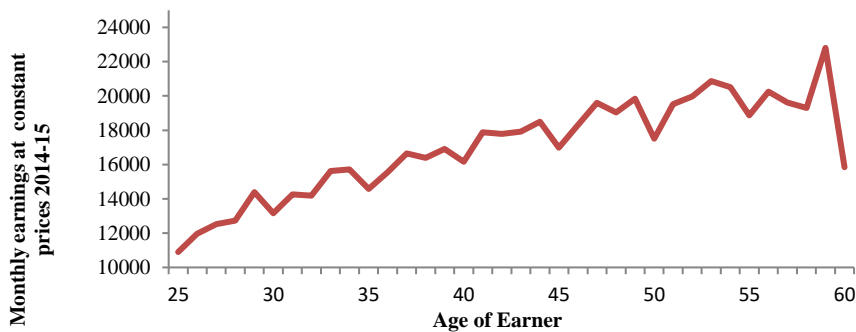


Figure 2 shows that there is an inverted U shape relationship between age and earnings. It is generally assumed that earnings of an individual increase with age and experience however after reaching at a peak level these earnings tend to decline continuously.

Figure 3: Trend of Earning Across period by Age

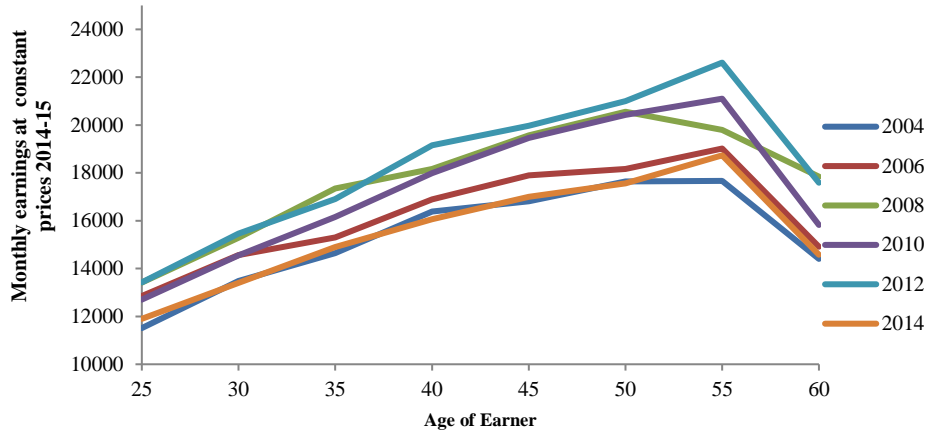


Figure 3 shows individuals' earnings from period 2004-2014 with reference to different age groups. The trend shows that earnings have been rising along whole period for 25-59 age group and after that these start decreasing. All age groups face a slump in their earnings in year 2014. This may be due to huge energy crisis in the country resulting in extra expenditures and shutdown of many enterprises thus leading to cost cutting initiatives and reduced earnings by the individuals. So, we see period effect has been same for all age groups.

Figure 4: Earning Profile across the Birth Cohort

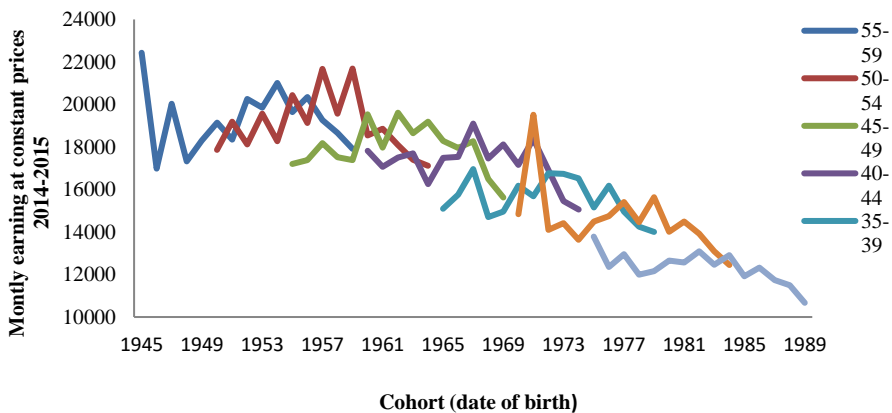


Figure 4 shows the cohort diagram in which cohorts are on horizontal axis and curves represent the age groups, so we can compare the earnings of different cohorts at the same age level. The trend shows that earnings of the later born cohorts have been decreasing as compared to their earlier counterparts of same age group. Individuals lying in the age 55-59, those born after 1945, have been enjoying the highest levels of earnings and after that earnings of later cohorts are declining for same age group. Similar earning patterns have been observed for other age groups across different birth cohorts, that is the cohorts who came later didn't get same earnings as their older counterparts used do. This is known as cohort effect.

4. Methodology

To analyze the cohort effect on earnings Mincer human capital earning model (1974) is modified by developing new features augmented by APC analysis (Boockmann & Steiner, 2006). Mincer earning equation, controlling the cohort effect, is stable while assuming that supply of labor grows smoothly and is equal to demand. However, it has been observed later that when demand of labor does not match the supply, cohort effect occurs and simple Mincer earning equation gives biased results against life cycle earning growth (Lemieux, 2006; Card and Lemieux, 2001).

The new augmented APC-Mincer earnings equation is given below

$$\text{Ln } Y_i = \alpha_0 + \beta D_{\text{age}} + \gamma D_{\text{period}} + \pi D_{\text{cohort}} + \alpha_j Z_j + U_i \quad (1)$$

In above equation $\text{Ln } Y_i$ is natural log for real monthly income of individual i . In order to convert nominal income into real income we deflated the nominal income in 2014-15 consumer price index as a base year. D_{age} represents the effects of differences in the ages of the individuals at the time of observation. We took age group from 25-60 years assuming that most individuals complete their education at the age of 25 and retire at most at the age of 60. Further D_{period} is a vector of period dummy (for six years) from 2004-05 to 2014-15. D_{cohort} represents the cohort dummy that indicates the generation to which the individual belongs.

Z_i represents the control variable that consists of human and non-human capital. For this we took education of individual and divided this into six broad categories (illiterate, below secondary, secondary and intermediate, bachelor and higher education). To measure the employment status of individual we categorized it into paid employee, self-employed and employer. In order to analyze earning gap with respect to gender, female has been used as a reference category. Moreover, geographical variables are also very important because in large cities one usually have highly paid jobs and more opportunities as compared to small cities. Similarly, industry where the individual works is also very important because there is great diversification in earnings with reference to different industries in Pakistan. Therefore, to measure the impact of industry on earnings and on returns of education as well, we divided the industries into sub categories. A detailed view of variable construction is given in table 2.

Table 2: Variable Construction

Variables	Description
$\ln(Y_i)$	Natural log of real earnings of individual i .
D_{age}	Age of individual i where $i=25 \dots 60$.
D_{year} 2008-09,	represents the year of survey from 2004-05, 2006-07, 2010-11, 2012-13 to 2014-15.
D_{cohort}	Cohort is birth of individual i that is measured in APCD model through $[\text{period}_{\min} - \text{Age}_{\max} + 1, \text{period}_{\max} - \text{Age}_{\min} - 1]$. That range is from 1945 to 1988.
Education level	Education of individuals is calculated through highest level of education they have attained during the survey year.
Below Secondary	If individual education is greater than 4 but less than 9 years, assign the value one and zero otherwise.
Secondary and Intermediate	Individual who have completed 10 th to 13 th grade is assigned the value 1 and zero otherwise.
Bachelors	The individual who has completed 14 th or 15 th grade is assigned the value one and zero otherwise.
Higher education	Individual who has completed more than 15 years of education is assigned the value one and zero otherwise. The illiterate group is our reference category.
Gender	Dummy variable is for male individual. Male is assigned the value 1 and zero otherwise.
Married	Dummy variable for Married individual. The individual who is married is assigned the value one and zero otherwise?
Employment Status	Employment status has been divided into three sub categories self-employed, paid employee and employer.

Self-employed	We considered those individuals self-employed who are owner, cultivator, sharecropper, contract cultivator and livestock. If individual belongs to any of these categories assign the value one and zero otherwise.
Paid employee	If individual is paid employee assign the value one and zero otherwise.
We take employer as a reference category.	
Industries	
Agriculture and Mining	If individual belongs to agriculture and mining sector assign value one and zero otherwise.
Manufacturing	If individual belongs to manufacturing sector assign value one and zero otherwise.
Construction	If individual belongs to construction sector assign value one and zero otherwise.
Retail trade and Transportation	If individual belongs to retail trade and transportation services sector assign value one and zero otherwise.
Services Sector	Includes accommodation and hoteling services, information and communication, financial and insurance activities, administrative services, Health, education and defense services. Here other-services are reference category.
Big Cities	We took big cities as considered by PSLM. If individual belongs to this city assign value one and zero otherwise.

In order to avoid singularity, one dummy must be dropped from all of the above discrete variables. But there exists a linear relationship between age, period, and cohort variables. As cohort is defined as, $Cohort = Period - Age$.

Therefore, we cannot estimate through Ordinary Least Square (OLS) as period and cohort variables are not identified. This identification problem is well known in literature and several methods have been developed by researchers to measure the age, period, cohort effect separately (Mason & Fienberg, 1985; Deaton and Paxson, 1994; Beaudry and Green, 2000). Each of these methods have their own advantages and limitations to solve the identification problem. However, Chauvel (2012) proposed the Age, period, cohort (APCD) de-trended model that distinguishes between linear and non-linear trends in a more appropriate way; the linear dimension expresses the long-term change in income due to economic factors whereas nonlinear dimension measures the fluctuations around the linear trend showing specifically that some cohorts are above and below the linear trend.

APCD model detects how the age period and cohort fluctuate around the linear trend and gives unique solution by imposing restriction on the parameters. Pertaining set of age period and cohort parameters have zero sum and zero slope that solves the identification problem of APC.

In APCD the above model is written as

$$Y^{apc} = \alpha_0 + \beta_a + \gamma_p + \pi_c + \beta_0 \text{rescale (a)} + \pi_0 \text{rescale (c)} + \sum_j \alpha_j X_j + u_i$$

$$\text{Where } \sum_a \beta_a = \sum_p \gamma_p = \sum_c \pi_c = 0 \tag{2}$$

$$\text{Slope}_a(\beta_a) = \text{Slope}_p(\gamma_p) = \text{slope}_c(\pi_c) = 0$$

$$\text{Min (c)} < c < \text{max (c)}$$

In model 2, we considered Y^{apc} as dependent variable, α_0 denotes the constant, β_a represents age effect, γ_p is the vector of period effect and π_c is cohort effect whereas α_j is vector of control variables which we described above. These vectors exclusively reflect the non-linear effect of age, period and cohort, as we assign two sets of constraints: each vector sums up to zero and its slope is also zero. The terms $+\beta_0 \text{rescale (a)} + \pi_0 \text{rescale (c)}$ absorb linear trends; Rescale is a transformation that standardizes the coefficients β_0 and π_0 : it transforms age from the initial code age min to age max to the interval -1 to +1. As first and last cohorts appear just once in the model, therefore APCD model excludes first and last cohorts from the estimation to improve the confidence interval of parameters.

5. Empirical Results

5.1. Impact of Cohort Effect on Earning

The empirical results of APCD model for analyzing cohort effect on earnings are given in below table 3. Model 1 gives the impact of cohort effects on earnings without control variable while model 2 shows effect with control variable

Table 3: Results of APCD model to Analyze the Cohort Effect on Earnings

Variables	Model 1	Model 2
Cohort 1947	-0.0873*** (0.00724)	-0.1000*** (0.00599)
Cohort 1949	-0.00784 (0.00493)	-0.000182 (0.00408)
Cohort 1951	-0.0377*** (0.00467)	-0.0337*** (0.00387)
Cohort 1953	0.0104** (0.00412)	0.00867** (0.00341)
Cohort 1955	0.0197*** (0.00345)	0.0178*** (0.00285)
Cohort 1957	0.00568	0.00718**

Variables	Model 1	Model 2
	(0.00360)	(0.00298)
Cohort 1959	0.0293***	0.0310***
	(0.00328)	(0.00272)
Cohort 1961	0.0186***	0.0218***
	(0.00348)	(0.00288)
Cohort 1963	0.0338***	0.0351***
	(0.00332)	(0.00275)
Cohort 1965	0.0336***	0.0334***
	(0.00305)	(0.00252)
Cohort 1967	0.0238***	0.0255***
	(0.00315)	(0.00261)
Cohort 1969	0.0177***	0.0195***
	(0.00286)	(0.00237)
Cohort 1971	0.0166***	0.0158***
	(0.00298)	(0.00246)
Cohort 1973	0.0168***	0.0139***
	(0.00283)	(0.00234)
Cohort 1975	0.00423	0.00595***
	(0.00261)	(0.00216)
Cohort 1977	0.00465*	0.000524
	(0.00261)	(0.00216)
Cohort 1979	-0.00507**	-0.00898***
	(0.00246)	(0.00203)
Cohort 1981	-0.00735***	-0.00285
	(0.00274)	(0.00227)
Cohort 1983	-0.0257***	-0.0269***
	(0.00296)	(0.00245)
Cohort 1985	-0.0332***	-0.0310***
	(0.00332)	(0.00275)
Cohort 1987	-0.0306***	-0.0325***
	(0.00398)	(0.00329)
Age 25	-0.0435***	-0.0202***
	(0.00278)	(0.00236)
Age 27	-0.00945***	-0.0111***
	(0.00261)	(0.00217)
Age 29	-0.00573**	-0.00868***
	(0.00240)	(0.00198)
Age 31	0.00156	-0.00653***
	(0.00259)	(0.00215)
Age 33	0.0138***	-8.10e-05
	(0.00298)	(0.00247)
Age 35	-0.00555**	-0.00153
	(0.00226)	(0.00188)
Age 37	0.0147***	0.0130***
	(0.00284)	(0.00236)

Returns of Education in Pakistan: An Age Period and Cohort Analysis

Variables	Model 1	Model 2
Age 39	0.00169 (0.00257)	0.0109*** (0.00214)
Age 41	0.0248*** (0.00307)	0.0220*** (0.00254)
Age 43	0.0339*** (0.00365)	0.0224*** (0.00302)
Age 45	-0.00269 (0.00269)	0.00321 (0.00222)
Age 47	0.0237*** (0.00324)	0.0198*** (0.00268)
Age 49	-0.0178*** (0.00291)	-0.0125*** (0.00241)
Age 51	0.0130*** (0.00349)	0.00467 (0.00289)
Age 53	0.0371*** (0.00409)	0.0188*** (0.00338)
Age 55	-0.0216*** (0.00309)	-0.0140*** (0.00256)
Age 57	0.0147*** (0.00426)	0.00661* (0.00353)
Age 59	-0.0726*** (0.00401)	-0.0468*** (0.00333)
Period 2004	0.0185*** (0.00116)	0.0483*** (0.000967)
Period 2006	-0.0830*** (0.00144)	-0.107*** (0.00120)
Period 2008	0.0526*** (0.00144)	0.0485*** (0.00119)
Period 2010	0.0276*** (0.00142)	0.0174*** (0.00118)
Period 2012	0.0264*** (0.00131)	0.00458*** (0.00109)
Period 2014	-0.0421*** (0.00110)	-0.0122*** (0.000914)
Cohort Trend	0.189*** (0.00691)	0.414*** (0.00580)
Age Trend	0.138*** (0.00364)	0.268*** (0.00308)
Below Secondary		0.0915*** (0.00140)
Secondary and Intermediate		0.224*** (0.00153)
Bachelor		0.401*** (0.00242)

Variables	Model 1	Model 2
Higher Education		0.565*** (0.00280)
Male		0.468*** (0.00196)
Married		0.0469*** (0.00219)
Paid Employee		-0.264*** (0.00547)
Self-Employed		-0.179*** (0.00549)
Agriculture and Mining		-0.178*** (0.00171)
Manufacturing		-0.0465*** (0.00210)
Construction		-0.0692*** (0.00216)
Retail trade and Transportation		-0.0105*** (0.00168)
Big Cities		0.118*** (0.00153)
Constant	4.019*** (0.000827)	3.699*** (0.00625)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Cohort effect in model 1 shows that the earliest cohorts 1947 to 1951 are below the long run linear trend. However, cohorts that grew steadily with economic growth are from 1953 to 1973 and are significantly above the linear trend. After that earnings have been decreasing and for young cohorts these are significantly below the linear trend. Hence, we see a decline of 3 percent against younger cohorts lying between 1985-1987. The age effect assures the concavity of earnings with respect to age profile of individual. With experience earnings of the individuals grow and reached their maximum level by the age of 43 and then these start to decline.

The period effect shows the trend of earnings fluctuations. As we see during the period 2004-05 GDP growth was on rise, perhaps due to Coalition Support Fund for War Against Terror. Then in 2006-07 the earnings started declining however 2008-09 period shows that earnings increased up to 5 percent which is the peak period in our observation span. The variables cohort trend and age trend control the linear rise or decline of earnings for different cohorts and for individuals during their life span.

The model 2 gives the results of age period cohort effect on earnings with control variables that include education, gender, demographic variable (married) employment status, industry where one works and geographical variables captured through big cities. After

introducing the control variables with education, the impact of cohort effect on earnings is somehow same as before the control variables, however the earliest and youngest cohorts show worse trend than before. We see earliest cohorts born from 1947-1948 are now 10 percent below the long run income trend and youngest cohorts born from 1987-88 are 3.2 percent below the linear trend. This indicates that education has not a positive role in increasing earnings of the young cohorts. Our results are consistent with the study of (Chauvel & Schroder, 2015) which show the earnings decline for younger cohorts in West Germany and France. Therefore, our second objective is to analyze the returns of education through age period and cohort analysis.

5.2. Returns of Education by Age Period and Cohort

Our second objective is to estimate the returns of education by age period and cohort model. For this we estimated the equation 2 for three levels of education group separately; i.e., for below secondary, secondary and intermediate, and for bachelor and higher education, by assuming the hypothesis that individuals having the same level of education compete in the job market with one another as considered by (Welch, 1979; Dahlberg & Nahum, 2003). Our control variables are same as we considered in above model and estimated the returns of education for age, period cohort analysis through APCD model. To make comparison across returns of education for different levels of education we presented the coefficients of age, period and cohort variables in below figure whereas the coefficients of control variables are presented in Table 4.

Figure 5: Cohort Effect

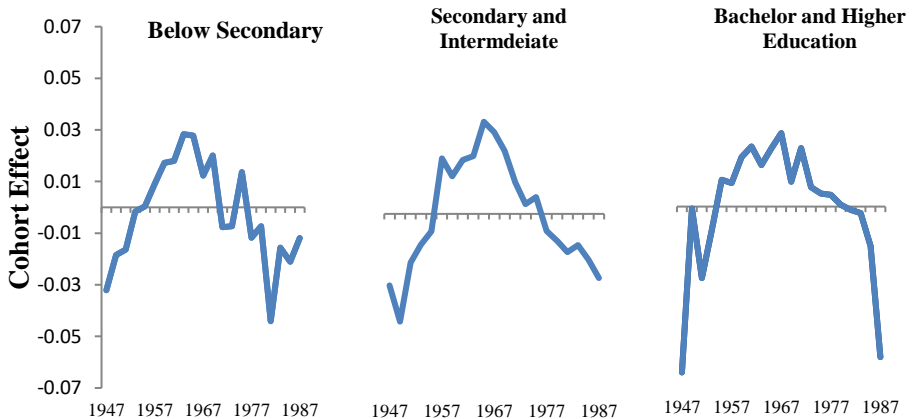


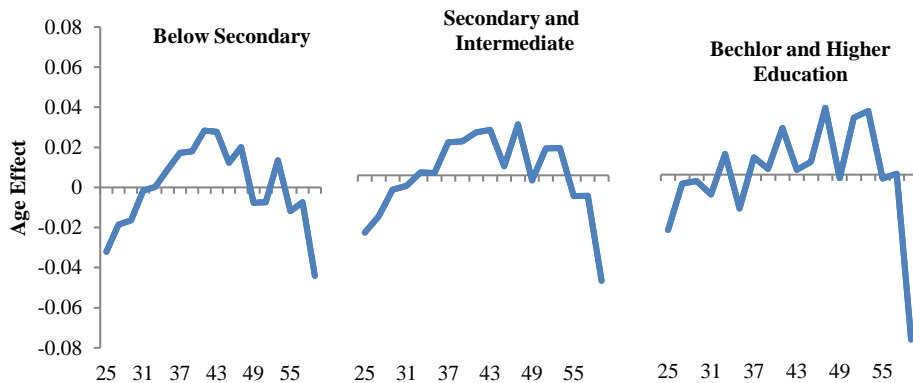
Figure 5 shows the returns of education by cohort for below secondary, secondary and intermediate, and for bachelor and higher education. The negative values show that

cohorts are below the linear trend and positive values show that cohorts are above the linear trend. Here the cohort effect shows that cohorts born from 1947 to 1953 are below the linear trend for all levels of education attainment. However, education seems to be worthwhile for all levels of education for cohorts that are born from 1954 to 1975 as these all cohorts are above the linear trend. The cohorts that were born between 1965 to 1970 enjoy the lucrative position as on average their earnings are 2 to 3 percent above the linear trend and they seem to gain more from their education as compared to their older counterparts. However, these returns are not stable and instead start declining for the youngest cohorts who were born during 80's and later on. Their returns of education have been declining from the linear trend for all levels of education attainment and situation is more distressing for individuals who have attained bachelor and above education.

The returns for bachelor and higher education decreased by 6 percent from the linear trend whereas it is 1 percent for lower secondary and only 0.3 percent for secondary and intermediate for the cohort that were born on 1987 and after that. These results are consistent with the studies of (Welch, 1979; Freeman, 1976; Haim et al., 2019) where the younger cohorts faced the decline in returns of education and its impact is higher for highly educated people.

Now there could be two reasons for these declining returns of education: first when large young cohort enter the labor market there is less substitution between young and older cohorts for more educated individuals. Secondly the higher education expanded more rapidly in Pakistan during the last decade as compared to other levels of education, whereas the labor market has not been developed to absorb this high surge of educated people therefore the earnings of young cohorts have been declining more for higher education.

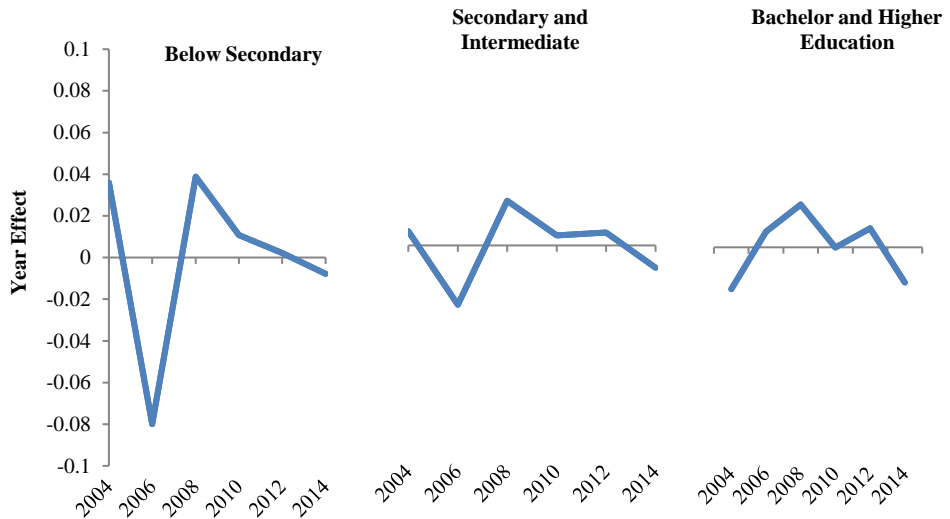
Figure 6: Age Effect



Returns of Education in Pakistan: An Age Period and Cohort Analysis

The age effect in figure 6 shows that earning profile is an inverted U-shaped curve for all education levels. With age, earnings have been increasing or are above the linear trend and at age 45 these reach to the maximum level and after fifties earnings have been declining and are below the linear trend.

Figure 7: Year Effect



The year effect in figure 7 gives the trend of earnings for different education attainment levels and shows several bumps over the time. In 2006 the returns declined for both below secondary, secondary and intermediate education level, whereas for higher education there was a boom. Reasons for increase in returns against bachelor and higher education could be due to huge growth in telecom and media sectors during this period. However, bachelor and higher educated people along with other educational groups saw a decline in 2008 till 2012 may be due to global financial crisis. All of these cohort, age and period effects are overall statistically significant.

Table 4: Results of Control Variables while Estimating Returns of Education

Variables	Below Secondary	Secondary and Intermediate	Bachelor and Higher Education
Male	0.551*** (0.00569)	0.232*** (0.00503)	0.115*** (0.00457)
Married	0.0364*** (0.00398)	0.0444*** (0.00380)	0.0479*** (0.00485)
Agriculture Mining	-0.144*** (0.00328)	-0.171*** (0.00356)	-0.0937*** (0.00575)
Manufacturing	-0.00828** (0.00376)	-0.0677*** (0.00385)	0.0398*** (0.00578)
Construction	-0.0557*** (0.00391)	-0.142*** (0.00499)	-0.00280 (0.0109)
Retail Trade Transportation	0.0135*** (0.00301)	-0.0470*** (0.00299)	-0.0446*** (0.00498)
Big Cities	0.0891*** (0.00288)	0.106*** (0.00261)	0.179*** (0.00318)
Self Employed	0.110*** (0.00236)	0.0836*** (0.00258)	0.0547*** (0.00416)
Cohort Trend	0.323*** (0.0115)	0.247*** (0.0127)	0.305*** (0.0174)
Age Trend	0.216*** (0.00607)	0.235*** (0.00670)	0.341*** (0.00925)
Constant	3.430*** (0.00702)	3.927*** (0.00604)	4.225*** (0.00609)

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 4 shows the result of control variables while estimating the returns of education by age period and cohort. The male coefficient represents the gender earning gap for all education levels which means that male earn more than female. However, with increasing education level this gap is decreased from 55% to 23% and 11% for below secondary, secondary and above secondary, and for bachelor and higher education respectively. Therefore, it predicts that education can play an important role to eliminate gender earning gap.

The married coefficient is significant at 1 percent level of significance which shows that married individuals earn more than unmarried for all levels of education. Reason for these higher earnings against married could be high number of dependents which compel married individuals to work extra hours for getting better earnings. There are also earning

inequalities against education levels with respect to industry type. For below secondary level the retail trade and transportation earn more than other industries. However, in case of secondary and intermediate education group the services relatively earn more than agriculture, manufacturing, retail trade and transportation. For higher educated people the manufacturing industry renders more returns as compared to other industries. These findings are also supported by Ali (2007).

A country's geography also plays an important role in diversification of earnings (Wu et al., 2008). Hence the major cities are also subject to empirical investigation in the present study. Unlike small and under developed areas of a country, large cities offer better earning opportunities to educated people due to their developed infrastructure and enhanced facilities and the results are consistent with the study of (Burki & Abbas, 1991; Ali, 2007).

The Cohort trend shows the linear increase in returns of education for different cohorts lying at 32 percent for below secondary, 28 percent for secondary and intermediate and 30 percent for bachelor and higher education. This indicates that linear trend is high for below secondary educated people as compared to secondary and intermediate and for bachelor and higher education. The linear trend for age shows that returns of education have been increasing relatively more for higher education followed by below secondary, secondary and intermediate. This indicates that as education level goes up experience also contributes more towards enhancing earnings of an individual.

6. Conclusion

The study has analyzed earning differences and returns of education through APC model, a more appropriate tool for analyzing earning over a long period of time. For this we used the comprehensive and national level data of PSLM collected for period 2004-05 to 2014-15 for Pakistan. The results indicate that there is significant increase in inter cohort earnings inequality and young cohorts are facing low earnings than their old counterparts. However, earnings didn't improve even when we introduced the education with other control variables which indicates that education is not being worthwhile as it used to be.

Secondly the returns of education show that earnings have been declining for all levels of education especially for young cohorts, and its impact is high for those who attained bachelor and higher education as these are far below the linear trend. Our results are consistent with the studies of (Boockmann & Steiner, 2006; Haim et al., 2019) which illustrate that merely increasing the education expansion without developing the labor markets does not improve the living standard, instead it leads to decline in terms of earnings. In fact, higher education achievers from young cohorts struggle to get better position in labor market by accepting jobs requiring lesser ability resulting in lower earnings as compared to the older counterparts.

From policy point of view there is a great need to develop country's labor market so it can easily absorb the increasing labor force especially those who have attained bachelor and higher levels of education. This will not reduce unemployment but will also help individuals to get earnings as per their educational achievements and capabilities.

Secondly, we see that returns of self-employed are far above than paid employees suggesting that government should heavily focus in this area to encourage entrepreneurship among young graduates. Government should sponsor self-employment schemes, micro financing and interest free loans which would help to create more employment opportunities and will also boost the economy.

Last but not least, government should seriously focus on developing small cities both in terms of quality education availability and also by creating better employment opportunities to reduce earning disparity. This will also help government to reduce massive flow of population from small to big cities thus helping to handle the problems of urbanization as well. Finally, it will be good if government seriously reviews its higher education policies as only increasing higher education without developing the stable labor markets could lead to dire consequences.

References:

- Afzal, M. (2011). Microeconomic analysis of private returns to education and determinants of earnings. *Pakistan Economic and Social Review*, 49 (1), 39–68. <https://www.jstor.org/stable/24398860>
- Ali, L. (2007). Returns of education in Pakistan. M.Phil. Thesis, Hamdard University, Islamabad.
- Beaudry, Paul., & David A. Green. (2000). Cohort patterns in Canadian earnings: Assessing the role of skill premia in inequality trends. *Canadian Journal of Economics*, (33), 907–36. <https://doi.org/10.1111/0008-4085.00047>
- Boockmann, B., & Steiner, V. (2006). Cohort effects and the returns to education in West Germany. *Applied Economics*, 38 (10). <https://doi.org/10.1080/00036840500439168>
- Burki, A. A., & Abbas, Q. (1991). Earnings functions in Pakistan urban informal Sector: A case study of Pakistan. *The Pakistan Development Review*, 30(4) Part II, 695-706.
- Card, D., & Lemieux, T. (2001). Can falling supply explain the rising return to college for younger men? A cohort-based analysis. *Quarterly Journal of Economics*, 116(2):705–746. <https://doi.org/10.1162/00335530151144140>
- Chauvel, L. (2012). APCD: Stata Module for estimating age-period-cohort effects with detrended coefficients. Statistical Software Components S457440, Boston College Department of Economics.
- Chauvel, L., & Schroder, M. (2015). The Impact of Cohort Membership on Disposable Incomes in West Germany, France, and the United States. *European Sociological Review* ,31(3), 298-311. doi: 10.1093/esr/jcu091

- Collins, R. (1979). *The Credential Society: An Historical Sociology of Education and Stratification*. New York: Academic Press.
<https://www.jstor.org/stable/10.7312/coll19234>
- Dahlberg S. and Nahum R. A. (2003) 'Cohort Effects on Earnings Profiles: Evidence from Sweden', Uppsala University, Department of Economics, Working Paper, (11).
- Dahlberg S. and Nahum R. A. (2003) 'Cohort Effects on Earnings Profiles: Evidence from Sweden', Uppsala University, Department of Economics, Working Paper, (11).
- Dahlberg, S., & Nahum, R. A. (2003) Cohort effects on earnings profiles: Evidence from Sweden, Uppsala University, Department of Economics, Working Paper, (11).
- Deaton, A., & Paxson, C. H. (1994). Savings, growth, and aging in Taiwan, in D. Wise (ed.), *Studies in the Economics of Aging*, NBER and University of Chicago Press, Chicago.
- Dormont, B., & Samson, A.-L. (2008). Medical demography and intergenerational inequalities in general practitioner's earnings. *Health Economics*, 17 (9), 1037-1055. <https://doi.org/10.1002/hec.1387>
- Faridi, M.Z., Hussain, S. & Bashir, F. (2010). Impact of education on students' earnings: A case of public sector universities in Pakistan. *International Research Journal of Finance and Economics*. ISSN 1450-2887 Issue 42.
- Fienberg, S. E., and W. M. Mason. (1985). Specification and implementation of age, period, and cohort models. In *Cohort analysis in social research: Beyond the identification problem*, ed. W. M. Mason and S. E. Fienberg, 45–88. New York: Springer-Verlag.
- Freeman, R.B. (1976). *The overeducated American*. New-York: Academic Press.
- Freeman, R.B. (1979). 'The effect of demographic factors on age earnings profiles. *Journal of Human Resources*, 14, (3), 289-318. <https://doi.org/10.2307/145573>
- Government of Pakistan, (2019). *Pakistan economic survey 2019-20*, Finance division, Economic advisor's wing, Ministry of Finance Islamabad.
- Guisinger, S. E., Henderson, J.W., & Scully, G.W. (1984). Earnings, rate of returns to education and earning distribution in Pakistan. *Economics of Education Review*, Vol. (3) 4.

- Haim, E. B., Chauvel, L., & Hartung, A. (2019). More necessary and less sufficient: an age-period-cohort approach to over education from a comparative perspective. *Higher Education*, 78(3), 479-499.
- Lemieux, T. (2006). The “Mincer Equation” thirty years after schooling, experience, and earnings, in Jacob Mincer: A pioneer of modern labor economics, Shoshana Grossbard, ed. (New York NY: Springer Science). DOI: 10.1007/0-387-29175-X_11.
- Machin, S. (2009). Education and inequality. In W. Salverda, B. Nolan, & T. M. Smeeding (Eds.), *The Oxford handbook of economic inequality* (pp. 406–434). Oxford: Oxford University Press.
- Mason, W. M., and S. E. Fienberg, ed. (1985). *Cohort analysis in social research: Beyond the identification problem*. New York: Springer-Verla
- Mincer, J. (1974). *Schooling, experience, and earnings*. National Bureau of Economic Research, New York, Columbia University Press, 145 – 152.
- Najam, A. and Bari, F. (2017). *Pakistan National Human Development Report 2017. Unleashing the Potential of a Young Pakistan*. Islamabad: United Nations Development Program Pakistan.
- Pakistan, Government of, *Pakistan Social Living Measurement (PSLM) for 2004-05 to 2014-15*. Islamabad: Pakistan Bureau of Statistics. <http://www.pbs.gov.pk/content/pakistan-social-and-living-standards-measurement>
- Ryder, N.B. (1965). The cohort as a concept in the study of social change. *American Sociological Review*, 30(6):843–861. <https://doi.org/10.2307/2090964>
- Sarwar, G., & Sial, M. H. (2012). Education and distribution of earnings in Pakistan. *World Applied Sciences Journal*, 17 (6), 679-683, ISSN 1818-4952.
- Schofer, E., & Meyer, J. W. (2005). The worldwide expansion of higher education in the twentieth century. *American Sociological Review*, 70(6), 898–920. <https://www.jstor.org/stable/4145399>
- Sial, M.H., Sarwar, G and Saeed, M. (2019). Surplus education and earnings differentials in Pakistan: A Quantile regression analysis. *The Lahore Journal of Economics*, 24(2), 93–114
- Sicherman, N. (1991). Overeducation in the labor market. *Journal of Labor Economics*, 9(2), 101–122. <https://www.jstor.org/stable/2535236>

Returns of Education in Pakistan: An Age Period and Cohort Analysis

- Tseng, H.L. (2018). Effects of age, period and cohort effects on wage trajectory: An application of Panel Study of Family Dynamics (PSFD). Master Thesis. National Taiwan Normal University.
- Welch, F. (1979). Effects of cohort size on earnings: the baby boom babies financial bust. *Journal of Political Economy*, 87, S65–S97. <https://www.jstor.org/stable/1829909>
Working Paper 2003: 11
Working Paper 2003: 11
Working Paper 2003: 11
- Wu, F., Zhang, D., & Zhang, J. (2008), Unequal education, poverty and low growth-A theoretical framework for rural education of China. *Economics of Education Review*, 27 (3)
- Yang Y. and Land, K. C. (2013). Age-period-cohort Analysis. New models, methods, and empirical applications, Boca Raton: CRC Press and Taylor & Francis Group.