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Rates of Returns to Education and the Determinants of Earnings in Pakistan

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This paper is a straightforward exercise in estimating earnings functions and computing the private rates of returns to different levels of education. The latter summarizes the incentives to the individual to invest in human capital formation, while the former helps in ascertaining the influence of both human and non-human capital variables on the earnings of the individual. A few studies conducted in the past found the rates of returns to education in Pakistan not in conformity with those of the majority of the developing countries for which such estimates exist. The estimated rates were lower for all levels of education in Pakistan than in the developing world. Moreover, the computed rates of returns had a positive association with the level of education.

In this paper updated estimates, using a larger, more recent and nationally representative data set, are presented to see if this phenomenon still persists. The paper is divided into two sections. The estimated earnings functions are presented and discussed in the first section. In the second section the rates of returns derived from them are analysed in the context of earlier findings for both Pakistan and the developing countries. Owing to space constraints, there is little discussion of methodological issues. The original and more standard sources have been referred to for the interested reader.

1. EARNINGS FUNCTIONS

The data set utilized for estimating earnings functions was generated by the Population, Labour Force and Migration (PLM) Survey, a joint project of the Pakistan Institute of Development Economics (PIDE) and ILO-UNFPA.[1] The 11,288 sampled households yielded an attained sample of 2,593 wage employees. In addition, information was also available from the PLM survey on second family earners,

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[1] See Irfan [8], for details.

who were mostly offsprings of the first earner. This permitted a test of the influence of the income of the first earner on the income of the second earner as evident from Table 1, which reports earnings functions for both earners.

Table 1

Earnings Functions for First and Second Earner Wage Employees

Variable	First Earner Monthly Earnings (Ln)	Second Earner Monthly Earnings (Ln)	
	B	B	Beta
Age	.0487	.0309	.4105
	(10.19)	(1.62)	
Age^2	−.0005	−.0004	−.4061
	(10.0)	(1.59)	
Education			
Primary	.2020	.2381	.1207
	(4.66)	(2.19)	
Secondary	.4816	.3038	.1212
	(7.96)	(2.08)	
High	.4126	.2915	.1022
	(5.67)	(1.47)	
Province			
Punjab	−.1220	−.2572	−.1627
	(5.10)	(2.19)	
Sind	−.0155	.0870	.0487
	(.57)	(.68)	
Occupation			
Administrative/professional	.2253	.5554	.2739
	(6.16)	(3.90)	

Continued –

Table 1 – (*Continued*)

Clerical/sales/services	−.0571	.0122	.0066
	(2.52)	(.11)	
Region			
Urban	.1818	.3317	.1857
	(4.45)	(3.30)	
Income, first earner	–	.0002	.2314
		(3.30)	
Interaction Terms			
(Primary X urban)	.0043	–	–
	(.01)		
(Secondary X urban)	.0574	–	–
	(.86)		
(High X urban)	.3396	–	–
	(4.45)		
Constant	5.1918	4.7508	–
$\bar{R}^2$	.35	.40	–
η	2593	218	–

Notes: 1. Excluded categories in hierarchical order are: less than primary or illiterate, Peshawar/Baluchistan, agricultural workers/blue-collar workers and rural. The aggregation for higher education and province was forced upon us by few sub-category cases.

2. Hourly wage is considered the appropriate income variable. For arguments as to why total earning per some time period may be preferable in a developing country context, see Fields [4, pp 126-127].

3. Parentheses contain t-values.

4. Pakistan's educational system has five years of primary education. The next five years, successfully completed, lead to the attainment of matriculation and the completion of secondary school. An intermediate degree may be earned in additional two years. In Pakistan, the intermediate level is part of college and so are the next two years in which a bachelor's degree can be earned. Often the bachelor level is part of a university education as is a two-year M.A/M.Sc. programme. The M. Phil. and Ph.D. options at some universities are rarely taken up.

For the first earner, somewhat predictably, the human capital variables account for 85 percent of the explained variation. Interregional and occupational effects on earnings are assessed by three binary variables. The expected average earnings for urban areas are found to be 18 percent higher than those for the rural areas. Interestingly, the expected earnings of the clerical, sales and service workers are 6 percent lower than those of the blue-collar and agricultural workers, and workers in the Punjab have expected mean earnings 12 percent below the combined average for the NWFP and Baluchistan.

The Punjab province is generally believed to be the most prosperous province; therefore, the findings cited above appear surprising. In fact, this result may well be due to the sampling procedure in the two smaller provinces. In the NWFP, the more far-flung and poorer districts of Dir, Chitral, and Swat and the whole tribal areas were left out of the sample. Exclusion of similar areas was greater in the case of Baluchistan. The consequence of this, brought out in a study on poverty by Irfan and Amjad [10, p-29], was that the Punjab's rural per capita income for 1979 was lower than those of the NWFP and Baluchistan. An additional explanation could be that the data are reflective of the influence of out-migration. Compared to its share in the total population, the NWFP is responsible for a relatively larger out-migration to the Middle East. This could tighten up the labour market on the supply side and also the demand side (due to the subsequent remittance inflow), which can result in higher wages. Out-migration is certainly a larger part of the explanation of the other results too. The result that agricultural and blue-collar workers' expected average earnings are greater than those of low-level white-collar workers could be viewed as a consequence of out-migration since the overseas demand for Pakistani labour in the Seventies was mainly for the skilled and semi-skilled production workers.

2. RATES OF RETURN TO EDUCATION

Internal rates of return to different levels of education, as mentioned earlier, were also calculated by Hamdani, using the Rawalpindi city survey data collected in 1975.[2] Two separate studies utilized the same data, Haque [7] and Guisinger [5], to estimate earnings functions, from which rates of returns can be calculated through the direct method.[3] The results of all these studies are reported in Table 2.

[2] For a description of the survey data (with an attained sample size of 1642 wage employees), see Hamdani [6, pp. 148-150].

[3] Earnings functions are a necessary ingredient in the two main methods utilized for estimating rates of returns. The direct method, due to Becker [1], is based on setting the future returns (derived from the earnings functions) from a level of education equal to the direct and indirect cost (opportunity forgone) of that education and computing the internal rates of returns. The indirect method, due to Mincer [12] relies on drawing the rates of returns directly from the earnings functions of the kind presented in Section 1. Thus if S and P represent the secondary and primary education co-efficients respectively, the return to secondary education would be the difference between these coefficients divided by the time duration it takes to earn a secondary degree. For a concise description of these methods, see Psacharopoulos [15, pp 76–80].

Table 2

The Private Returns to Education by Level for Wage Employees

Education Level \ Year	1975 Hamdani (direct method)	1975 Haque (indirect method)	1975 Guisinger (indirect method)	1979 Up-dated Estimates (indirect method)
Incomplete primary	7		3.4	
Primary	20	2.6	3.5	4.0
Secondary	11	5.2	11.6	5.6
College	14			
University	27	9.8	13.1	6.3

Sources: Hamdani [6, p. 156p, Haque [7, p. 362], Guisinger *et al.* [5, pp. 260-261]. For the updated estimates, see Table 1.

The results shown for Haque are our estimates based on the specification he analysed. Apart from the human capital variables, he included migration, employment status, and occupation. Guisinger used natural log of hourly earning as his dependent variable and only included sectoral dummies (public vs private) apart from the human capital variables.

The differences in Haque's and Guisinger's estimates result partly from our use of 5 as a divisor for the difference in the coefficient of secondary and higher education whereas Guisinger *et al.* used a best-guess estimate of 3.3 years.[4] This difference results from their attributing returns to an average of schooling years between levels, i.e. primary drop-outs, primary plus, secondary plus and college plus. Re-estimating Haque's returns to the secondary level with a divisor of 3.3 gives a return of 7.9; the proportionality between the rates is almost identical.

The other interesting contrast is in the difference in the Hamdani and Guisinger/Haque estimates. These can essentially be explained by the difference in the method employed. Hamdani estimated a much higher private return at all levels, but particularly at the primary level. This partly resulted from the understatement

[4] Rates of returns derived from the indirect method are very sensitive to the time between levels of schooling. These are utilized to divide the difference in the educational level dummy coefficients. We feel that the labour market only responds to completed levels. Thus we use five as denominator for both less than matric (primary plus) and matric but less than intermediate (secondary plus). We feel that the Pakistani job market does distinguish between completed intermediate, bachelor's, and master's degrees. Unfortunately, neither the Rawalpindi city survey data nor the PLM survey generated enough observations to allow for these distinctions in the earnings functions and post-secondary has been lumped as higher education in both cases.

of the primary level built into the indirect method.[5] Also, there is an overstatement of all rates in the direct method if the contribution of other factors to earnings, included as independent variables in the earning functions, is not allowed for. This probably explains why Hamdani's returns at the secondary and higher levels are also greater. It is also possible that the α– factor (the contribution to earnings of the non-human capital variables) is positively associated with the level of education which would, at least partly, explain why Hamdani's estimated private returns to university education are so high.[6]

The low rates of returns on an absolute level (even though probably overstated at the higher levels) are explained by Guisinger *et al.* by reference to the wage structure. They mustered evidence to support their assertion that low rates of return in the Rawalpindi city sample could be traced to conscious government policy (from the late Sixties up into the mid-Seventies) to compress skill pay differentials. Owing to the overwhelming importance of the government as an employer in the city, the private sector was also viewed as affected.[7]

Our updated rates of returns, compared with those of Guisinger's, confirm that the process of wage compression continued in the Seventies. This process has been documented and analysed by Irfan and Ahmad [9] for the late Seventies. They suggest that an erosion of educational margins may be occurring as a consequence of out-migration and institutional rigidities.

The decline in the returns at the secondary level, which as a terminal degree equips people for low-level white-collar jobs, probably reflects a growing saturation of the market with matriculates. Since the bulk of the Middle East demand was for the semi-skilled or unskilled production workers, fewer at the secondary level were syphoned off. The fact that even the illiterates can pick up a modicum of the skills that are in demand, probably explains the low primary-level returns to begin with.

More important has been the influence of the rigidities of the government pay scale. The government sector is viewed as the only labour market segment which remained apparently immune to the influence of emigration on wages. Within the government sector, the erosion of real wages was considerably more dramatic for the highly educated professionals.[8] Owing to the large size of the government sector, its influence on the remaining portion of the higher-educated labour market is inevitable.

[5] See Psacharopoulos [15, p. 80].

[6] See Blaug [2, pp. 12-13].

[7] Guisinger *et al.* [5, p. 263].

[8] Irfan and Ahmed [9] cite statistics to show that the wage differential between a high ranking government officer and a skilled worker (carpenter) shrank from 7/8: 1 in 1972 to 3:1 in 1982.

It may be noted that our estimates of rates of returns do seem in keeping with the statistics of the educated unemployed. In a study sponsored by the Ministry of Education/UNESCO [13, Table 3] unemployment by level of education, based on the 1982-83 Labour Force Survey, revealed an inverted U-shaped pattern. The peak unemployment was for secondary-school leavers. In comparison with those of the developing world, Pakistan's rates of return seem to be anomalous as is evident from Table 3.

Table 3

The Returns to Education by Level, Region and Country Type

Region or Country Type	Private		
	Primary	Secondary	High
Developing			
Africa	45	26	32
Asia	31	15	18
Latin America	32	23	23
Intermediate	17	13	13
Advanced	NA	12	12

Source: This table of averages was compiled by Psacharopoulos [14, Table 1] on the basis of carefully conducted rates-of-returns studies.

The reason for the lower rates on an absolute level have already been discussed. Guisinger *et al.* sought an explanation for the ranking inconsistency in Pakistan's British-type schooling system which "contains a strong filtering or screening mechanism through which more able students, or students from households in the higher end of the income distribution, transit up the educational hierarchy."[9] The screening for ability is through examinations whereas presumably family background can open doors that would be shut on account of an individual's poor performance. The authors recognised that this amounts to saying that the α – factor was high and positively related to the level of education, although they were unable to make adjustments for this distortion. This explanation addresses the issue of the positive relationship of returns to the level of education. Although Guisinger *et al.* conjectured about the existence of such a phenomenon, they failed to provide any evidence.

In our regression exercise, income of the first earner was found to be a significant explanatory variable of the earnings of the second earner (Table 1). Among

[9] Guisinger *et al.* [5, p. 265].

the significant variables, it has the second highest beta coefficient. Admittedly, the magnitude of the coefficient is small, showing that every Rs. 3000 higher than average monthly salary of the first earner can be expected on average to be associated with a 3-percent higher salary for the second earner. This percentage difference acquires more importance if one keeps in mind that only the very early part of the second earner's career was captured by the sample. The highest beta coefficient is for the professional or administrative occupational status. Second earners in this category have a mean expected earning up to 56 percent higher than those of production workers. In all probability, the effect of the first earner's income works through occupation to influence the income of the second.

Earnings functions that included family background variables were also estimated for Pakistan by Khan [11, Table IX-2], using data on graduate employees gathered for the Ministry of Education. Parental income was a significant explanatory variable, but among the other variables included in the statistical model (province, field of specialization, experience, parental education and performance), it had the lowest beta coefficient. The most important variable in this respect was the mother's educational level. Respondents with highly educated mothers had a mean expected earning about 25 percent greater than those of respondents whose mothers had a middle or lower level of education. Father's educational level was not picked up by the step-wise regression.[10] This direct effect of family background on earnings is, of course, additional to the finding that the upper income bracket (relative to its distribution in the population) is considerably over-represented in higher education.[11]

CONCLUDING REMARKS

Our updated (1979) earnings functions estimates of private rates of returns to the different levels of education confirm the findings of earlier (1975) studies. The rates of returns are low on an absolute level when compared to an average of developing countries for which these estimates exist. Furthermore, we were able to substantiate that an important reason for this phenomenon is likely to be a policy of wage compression engendered both by government policy and by economic forces.

[10] This result in some way corroborates the small amount of evidence so far accumulated in the development literature on the influence of family background on earnings. Of the six such studies cited by Fields [3, p. 246], the mother's education (specifically as opposed to parent's education) was found statistically significant in two of them while it was found insiginificant in none. The father's education turned up as insignificant in half of these studies, including cases where the mother's education was significant. Even if highly educated women are not as yet pursuing careers in large numbers, they appear to be playing an important part in determining the career success of their children.

[11] See Khan [11, Tables 1–5].

Government policy was instrumental in restricting salaries of the highly educated professionals and administrators in the government sector (numerically large and therefore influential on the labour market). Simultaneously, emigration was instrumental in raising the salaries of the unskilled and semi-skilled production workers who generally attain at most a primary level of education and who represent the bulk of out-migration.

Our findings also confirm that, at least by using the earnings functions method, the computed rates of returns vary positively with the level of education. This also is not in keeping with comparable findings for other developing countries. One part of the reason for this is attributed to the system of education that simultaneously causes the filtering up of both bright students and those from influential backgrounds. That influence counts is quite likely since we did find a significant positive association between an individual's family background and his earnings.

One can conclude from this study that, overall, the private incentive to pursue education in Pakistan is low since returns are below the market rate of interest. Thus, it is not entirely for economic motivations that education is pursued. The expected returns to the higher level would rise for those using it as a stepping stone for advanced education abroad. However, given that there may exist discrimination in the labour market, the private incentive to invest in the higher level of education would be lower for those not well placed economically and socially. This would suggest the need for strict policing of hiring practices in public and private sectors.

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Comments on "Rates of Returns to Education and the Determinants of Earnings in Pakistan"

The paper is an example of an often recurring menu in the conference papers – regular but containing tasty surprises. The paper falls into three parts: an hors-d'oeuvre, the main dish and the dessert. Let me briefly summarize the content of each before entering into a selective discussion.

The first part – the hors-d'oeuvre – surveys a whole host of previous calculations of rates of returns to various levels of education in Pakistan, compares these results with 'international' results obtained elsewhere in the Third World and seeks explanations for the deviation of the Pakistani results from the international results. The Pakistani results are characterized by increasing private rates of returns to education while international results, as have been stylized by some proponents, notably G. Psacharopoulos, are reported to show decreasing private rates of returns to education.

The second part – the main dish – presents more of the same. The authors calculate private rates of returns to education for Pakistan, making use of a recent set of data from the Population, Labour Force and Migration Survey of 1979. Again, the authors take pains to explain why their results differ from those found elsewhere.

It is as if the authors get suddenly fed up with regular recipes and proceed in the third part – the dessert – with giving additional results from the survey of earnings functions, which, if anything at all, form a challenge to the conventional viewpoint on private returns to education. Just about in time the authors succeeded in presenting results which form a significant starting point in a very promising research area.

My comment on the first part is inversely related to its length. I would have expected the usual survey of previous studies to be much shorter without any loss of information.

My comments on the second part are mostly of a technical nature. Although what the authors attempt to do is a straightforward regression of well-known earnings functions so as to isolate the impact of education on wages, and thereby, calculate private rates of returns to education, yet the way they have done it raises some questions. The tested equation explains wages in terms of educational level, age,

province, occupation, location and the interaction between education and location. This equation differs in several respects from the theory of human capital and empirical applications of it.

Firstly, the earnings profits of graduates from different school levels are known to diverge as the graduates become older. The interaction between education and age is a major contribution to returns. Why did the authors ignore this interaction?

Secondly, if the authors choose to explain earnings through education, it is hardly justifiable to include occupation as well. It is either accepting the postulates of human capital, which explains labour productivity in terms of accumulated education, or denying human capital and resorting to a segmented model of job competition where earning levels are tied to specific occupations and the role of educational diplomas is reduced to that of a screening device monitored by the employer. What is the justification for including in the equation two polarized views when the interaction between them is not and cannot be specified with any precision?

Thirdly, what is the reason for the interaction between education and location?

Fourthly, why don't the authors give the contribution of each additional independent variable in explaining earnings?

A fifth remark relates to the authors' interpretation of their results of a narrowing tendency in educational returns in Pakistan. They rightly mention outward migration and government policy which tend to relatively depress upper incomes (higher education). However, depressed incomes of graduates of higher education are also due in a greater degree to an increasingly biased mix which contains a short supply of very highly paid technical graduates and a surplus of low-paid graduates of humanities. It will be very instructive to attempt a disaggregated analysis of higher education.

A sixth remark relates to the authors' noticeable concern for harmonizing their results for Pakistan with the so-called international results obtained elsewhere. This is an undue concern since the conditions under which the so-called international results have been made an international standard are far from meeting rigorous criteria.

In commenting on the third part, which is the more interesting part, I can only think loudly as the authors must have been doing. The earnings of a wage employer are found to be significantly dependent on the earnings of his father and, implicitly, the educational level which the father has achieved. In another tested function, the wage is reported to be dependent on the educational level of the mother. This is a situation of interpersonal dependence which is hardly permissible within the neo-classical framework, in general, and human capital, in particular. This major shortcoming of the neo-classical model has been elaborated upon in the writings of Boulding, Galbraith, Gerboa, Scitovsky and others.

In other words, labour productivity of an individual X is not only dependent on the education of X but also on the education of Y and Z. Several interesting questions may be raised. How can an analysis of the returns to X accommodate the external effects relating to Y and Z? Is it more logical to conceive of a private rate of return for the combined household of X, Y and Z? Does the household take decisions on the education of its members, or are individuals free to decide? What would be an optimal allocation of education between father, mother and child(ren)? Does it make sense, in the circumstances, to calculate individual returns to various educational levels, and not to mention the wild comparisons of such results across highly differentiated socio-cultural boundaries?

The authors have reported their empirical results without further elaborations. That is fair enough. It needs time to integrate these results in the established conventions. I would suggest that if the authors would elaborate a little further on the third part, they may be forced to revise downwards the importance and meaning of calculating individual rates of returns. The results reported in the third part are important and they require attention and care to make them mature.

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