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Sheepskin Effects in the Returns to Education in a Developing Country

TAYYEB SHABBIR

This paper tests for the sheepskin or diploma effects in the rates of return to education in a developing country, Pakistan; presumably the only study for the country that explicitly investigates this important question. One reason for this paucity of work may have been lack of appropriate data on an individual's educational status.

The Mincerian log-linear specification of the earnings function is generalized to allow for the possibility that the returns to education increase discontinuously for the years when diplomas/degrees are awarded. This provision is made in three different ways, i.e., by (a) introducing dummy variables for diploma years, (b) by specifying a discontinuous spline function, and (c) by specifying a step function. Empirical evidence based on a nationally representative sample of male earners shows that substantial and statistically significant sheepskin effects exist at four important certification levels in Pakistan, namely, Matric, Intermediate, Bachelor's, and Master's. This finding is consistent with the screening rather than the convential human capital view of the role of education. However, it should be noted that while diplomas seem to matter, it is not true that only diplomas matter; since even after controlling for diploma years the schooling coefficient, albeit smaller than before, is still substantial. Again, regarding the diploma effects, another interesting finding is that such effects are not significant in case of the Primary and the Middle levels of schooling.

In terms of the policy implications, it follows that, in the case of Pakistan, education is an important and significant influence on the individual earnings. However, to the extent that the diploma effects are significant, the potential for education as a source of enhancing worker productivity is lessened, thus reducing the scope of an activist public policy in this regard. This is particularly true for the Secondary levels of education. In fact, the findings support a reallocation of the available public funds away from the tertiary/higher education and towards the basic education, where the productivity enhancing human capital effects are relatively more apparent.

1. INTRODUCTION

The observed positive correlation between the labour market earnings of individuals and their years of completed education is a widely noted stylized fact. The standard interpretation of this phenomenon is that of the human capital school, which considers this correlation (with appropriate controls for labour market experience) as being consistent with their view that higher earnings reflect the higher worker productivity

Tayyeb Shabbir is Research Economist at the Pakistan Institute of Development Economics, Islamabad.

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caused by increments in education. Amongst the challengers to this view is the screening theory of education, which treats it merely (or, at least, mostly) as a signalling device for the pre-existing abilities that are useful in the world of work. The higher earnings of the more educated, the proponents of the screening view argue, really reflect payments for these 'latent' abilities that are sought by the employers. Both these theories have been described well in the literature. For instance, see Arrow (1973) and Spence (1974) for the screening view and Becker (1964) and Mincer (1974) for the human capital view.

It is important to know which theory is closer to the truth since their respective views about the role of education have important implications for public policy. This is particularly important for the developing countries where any misallocation is extra costly, since the resources are relatively scarce. However, distinguishing between the above theories on grounds of empirical evidence is complicated by the fact that the data on any explicit skills tests which may measure increments to human capital are rarely available. In fact, since the sheepskin hypothesis is considered as one of the testable predictions of the screening theory, testing this hypothesis is often considered to be an indirect way of resolving the above debate. Here a few words about the nature of the sheepskin hypothesis may be in order.[1] Quoting Riley (1979), the sheepskin prediction states that "wages will rise faster with extra years of education when the extra year also confers a certificate".

The objective of the present paper is to test the sheepskin hypothesis for Pakistan. This exercise is motivated mainly by the following two factors:

(a) There are no studies that specifically focus on testing the sheepskin hypothesis for Pakistan in spite of the fact that, since the 1970s, screening theories have figured prominently in the debate about the effects of education; and

(b) Presently there is a renewed interest in testing this hypothesis both for the developed as well as the developing countries.

Let me elaborate further on the nature of the above factors.

While apparently there are no studies for Pakistan which explicitly address the sheepskin hypothesis, there is some incidental and partial evidence in Hamdani (1977) and Guisinger *et al.* (1984) which suggests that there may be a higher (i.e., 'bonus') rate of return for completed 'Primary' relative to 'Incomplete Primary'. The above evidence lends support to the presence of sheepskin effects at the level of Primary School Certificate. However, the limitations of the data used in these studies of the private rate

[1] *Webster's Dictionary* characterizes "sheepskin" as a colloquial word that refers to a "a diploma, sometimes made of parchment (the skin of sheep etc., prepared for use as a writing material)". In this paper, diploma, degree, and certificate will be used interchangeably to represent formal evidence of completion of a course of study.

of returns to the different levels of schooling do not allow any inferences regarding the sheepskin question for other certificate/diploma levels.[2]

In any event, the above evidence is fragmentary at best and the fact remains that there is a vacuum in terms of studies for Pakistan on the important topic of the credentialist effects of education. One reason for this paucity of studies may have been the lack of appropriate data on an individual's educational status. As discussed further in the data section of the present paper, most of the available micro level surveys lack data on dropouts. Also, in such surveys the individual's education is reported not as years of completed schooling but rather as a discrete variable whose form does not allow testing of the sheepskin effect.[3]

Apparently, when it comes to specific studies of the sheepskin effects of education, the situation for other developing countries is not very different from that of Pakistan. In general, there have been few such studies for the developing countries.[4] However, there is evidence of substantial recent interest in this important area.[5] Studies by van der Gaag and Vijverberg (1989); King (1988) and Mohan (1986) are cases in point. The first study, i.e., van der Gaag and Vijverberg (1989), estimates the returns to schooling for a sample of male and female wage-earners in Côte d'Ivoire using the 1985 LSMS (Living Standards Measurement Study) data. It finds that when dichotomous dummy variables that represent completed diplomas are included in the earnings function, they have positive and significant coefficients. It turns out that schooling needs completion of diplomas for most, albeit not all, of its impact. Similar support for the

[2]Both these studies focus on calculating rates of return to different levels of education and are based on the 1975 PIDE-sponsored 'Rawalpindi City Survey'. Hamdani (1977); using the 'direct', i.e., Becker's internal rate of return method, reports (marginal) rates of return of 7 percent for 'Incomplete Primary' and 20 percent for 'Completed Primary' while Guisinger *et al.* (1984), using the 'indirect' i.e., Mincer's earnings function approach, report 3.4 percent and 3.5 percent as the respective rates of return for the same levels of education. The design of the questionnaire for the Rawalpindi City Survey led to schooling being measured as a discrete response variable with responses such as 'Primary and Incomplete Secondary', 'Secondary and Incomplete Bachelor's', etc. Thus, one can not distinguish between those individuals who finish a certain certification level, say, Secondary school, and stop there from those who go on but fail to successfully complete the next certification level (i.e., Bachelor's). Only for the case of Primary was there a distinct category for those respondents who did not complete this level. Hence, in the text, we are able to report the 'sheepskin-related' results only for the Primary level certificate.

[3]In the past, most of the studies of the rates of return to education have been based either on the 1975 Rawalpindi City Sample [Hamdani (1977); Guisinger (1984); Haque (1977)], or the 1979 household Income and Expenditure Survey [Khan and Irfan (1985)]. In both these cases, data on education is reported as a discrete variable. However, a recent study, Sabot (1989), is based on a specialized sample where education is reported as a continuous variable, i.e., years of schooling completed.

[4]For the developing countries, while a large number of the Becker/Mincer type of studies have been done [Psacharopoulos (1980)], it is only recently that studies challenging the human capital school's view have appeared [for additional details see Behrman and Birdsall (1987)].

[5]Amongst the older studies, there is one for the Philippines and another one for Colombia. Based on the results reported by [Berry (1980), p. 202], these studies indicate a tendency for higher payoff to certain completed educational levels relative to their partial completion.

sheepskin hypothesis is reported by King (1988) which is based on a 1985-86 LSMS sample of 5600 women in Peru.[6] Mohan (1986), on the other hand, finds that diploma variable is important only for men but not for women in Colombia.

As against the situation for the developing countries, considerable work has been done on testing the screening theories for the developed countries. At this point, in order to provide a broad perspective to the debate, let me present an overview of the screening-related literature for the United States.

In fact, starting from the middle 1960s, the fortunes of the screening theories seemed to have ebbed and flowed. In the early 1970s, such theories had started to seriously challenge the human capital view. In fact, Taubman and Wales (1973) was an early important study which concluded that screening effects were very important in the U. S. labour market. However, an oft-cited study, Layard and Psacharopoulos (1974), after critically reviewing several empirical studies of the screening theory, dismissed it on the grounds that several of its refutable predictions, including the sheepskin hypothesis, were not supported by the available evidence. With particular reference to the sheepskin hypothesis they conclude,[7] ". . . . rates of return to dropouts are as high as to those who complete a course, which refutes the sheepskin version of the screening hypothesis".

The response to the above criticism ranged from a complete acceptance of the views regarding the demise of the screening theory [Addison and Siebert (1979), p. 139] to a defensive re-statement of the screening theory which stressed that some versions of the screening hypothesis do not imply sheepskin effects [Riley (1979)]. However, a different approach has been taken in a recent article by Hungerford and Solon (1987). It specifically questions the conclusion reached by Layard and Psacharopoulos (1974) by arguing that the estimated rates of return used by them were based on data that failed to disaggregate the earnings of the dropouts by the number of years of schooling they had actually completed. In fact, using a U. S. data set, Hungerford and Solon (1987) present new evidence about "substantial and statistically significant" sheepskin effects.[8] Thus, they maintain that some of the earlier studies such as by Layard and Psacharopoulos may

[6][King (1988), p. 32] reports that "the estimated rates of return to post-secondary education without receiving a diploma are negative for both non-university tertiary and university education . . . –5 and –4 percent a year, respectively. Gaining a diploma greatly increases the return to post-secondary education; the rates of return to earning a diploma is 19 percent in the all-Peru estimates". Again, the [van der Gaag and Vijverberg (1989), p. 378] study shows that, as a result of introducing controls for diplomas, the rate of return for the various levels of schooling falls precipitously for all levels except for university level, where the drop is relatively moderate. More specifically, the rate declines from 11.9 percent to 2.3 percent for elementary school, from 20.9 percent to 8.8 percent for junior high school, from 20.8 percent to –3.2 percent for senior high school, and from 22.7 percent to 20.8 percent for university level.

[7][Layard and Psacharopoulos (1974), p. 995].

[8]Their analysis was based on the May 1978 Current Population Survey data on 16,498 white, male, non-agriculture wage and salary workers between the ages of 25 and 64. For the individuals in the sample, earnings increments associated with each year of a course including the year of its completion are available.

have prematurely "dismissed screening theories of education partly on the ground that diploma years of education do not confer especially large earnings gains".

The rest of this paper is organized as follows:

Section 2 presents the proposed methodology while Section 3 describes the data. Section 4 reports the results. Finally, Section 5 contains conclusions as well as certain caveats.

2. METHODOLOGY

Testing the sheepskin hypothesis is tantamount to asking the question whether the returns to education increase discontinuously in diploma years. The proposed methodology to do so essentially involves a re-specification of the traditional human capital earnings function given by Mincer (1974). In fact, a good starting point for our discussion would be this 'Mincerian' specification where, as is well known, log earnings (Y) is posited to be a linear function of years of completed schooling (S), labour market experience (EXP) and its square. In the present context, however, it would be convenient to suppress the experience terms; then, the shortened.[9] Mincerian earnings function can be written as follows:

$$Y = \alpha + \beta_1 S \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

The important point regarding (1) is that the rate of return to schooling, $\partial Y/\partial S = \beta_1$, is constant. In effect, this implies that all years of schooling are 'created equal' in terms of their marginal impact on log earnings. In particular, there is no 'premium' or 'bonus' rate of return if the marginal year of schooling marks the completion of a degree/diploma.[10]

In order to test for the possibility that the returns to education increase discontinuously in diploma years (i.e., the sheepskin effect exists), we take the following approaches:

(a) We generalize the human capital log-linear specification (1) to allow for discontinuities at values of S, which correspond to award of degrees; and

(b) We specify Y to be a step function of S with a separate step for each year of completed schooling. Then the 'step size' for diploma years is compared with that of the years of schooling leading up to the diploma.

[9]Incidentally, this corresponds to what [Mincer (1974), pp. 9–11] calls 'The Schooling Model', which he uses to set the stage for his analysis of the effects of experience on individual earnings.

[10]For the sake of completeness, it should be noted that in some versions of his empirical earnings function, [Mincer (1974), p. 53] does allow for non-linear effects of schooling by adding a quadratic S term to (1). However, since these non-linearities are not specifically linked to 'completion of diploma' years, the comment in the text would still be valid.

In the discussion that follows, Models I and II correspond to approach (a) while Model III corresponds to approach (b) above. In order to further elaborate these approaches, let us discuss them in turn.

First, in order to elaborate approach (a), let us suppose that there are only two diploma years corresponding, respectively, to ten and twelve years of completed schooling. Define $D10$ and $D12$ as two dichotomous (0, 1) variables such that $D10 = 1$ if $S \geq 10$ and $D12 = 1$ if $S \geq 12$.

Model I: "Dummies for Degrees"

In this case, the relevant discontinuities are allowed for by simply adding the dummy variables $D10$ and $D12$ to the traditional human capital function. The following Equation represents Model I.

$$Y = \alpha + \beta_1 S + \beta_2 D10 + \beta_3 D12 \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Then, significantly positive regression estimates of $D10$ and $D12$ would imply sheepskin effects.

Also note that for every n diploma years, the graph of $\partial Y/\partial S$ gets divided into $(n + 1)$ 'segments' over the domain of S. In the case of Equation (2), the three relevant regimes defined over the domain of S are given by $0 < S < 10$, $10 < S < 12$ and $12 < S < \infty$ (See Figure 1 (a')). The relevant marginal rate of return, r, over the domain of S are given in the table below:

Years of Completed Schooling (S)	Marginal Rate of Return (r)
$S < 10$	β_1
$S = 10$	$\beta_1 + \beta_2$
$10 < S < 12$	β_1
$S = 12$	$\beta_1 + \beta_3$
$S > 12$	β_1

Model II: Discontinuous Spline Function

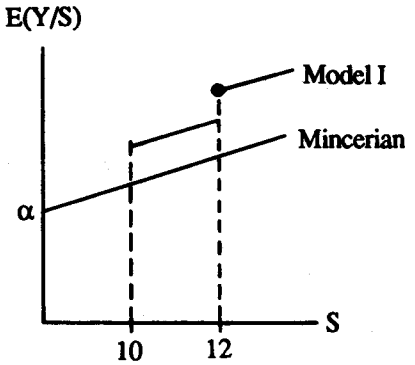
Model II posits the relationship between log earnings and schooling to be a 'discontinuous' spline function with discontinuities at diploma years.[11] This model is

[11]For a general introduction to the concept of spline functions, see [Johnston (1984), pp. 392–396]. For a specific application of this methodology see Hungerford and Solon (1987) which uses U. S. data.

Figure 1

PANEL A

Model I: 'Dummies for Degrees'



PANEL B

Model II: Discontinuous Spline Function (DSF)

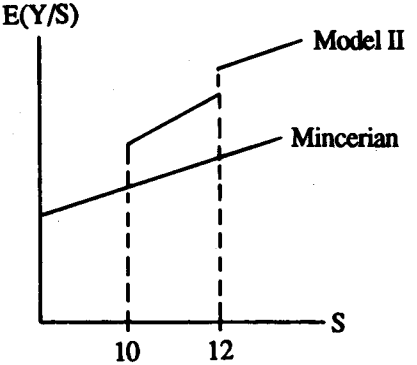


Figure 1(a)

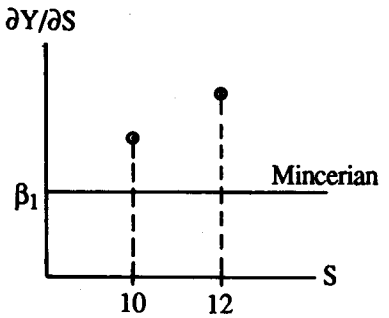


Figure 1 (a′)

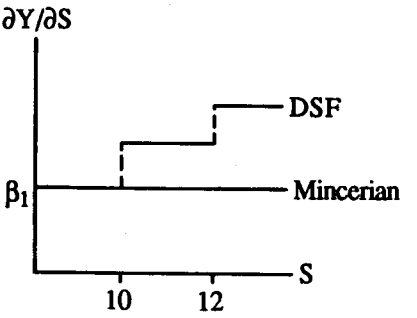


Figure 1(b′)

represented by the following equation.

$$Y = \alpha + \beta_1 S + \beta_2 D10 + \beta'_2 (D10)(S-10) + \beta_3 D12 + \beta'_3 (D12)(S-12) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Like Model I, here too the dummy variables $D10$ and $D12$ allow for the sheepskin effects which would be implied by positive and significant regression coefficients for these variables. However,[12] Model II differs from Model I since the former allows for $\partial Y/\partial S$ to vary across the different regimes defined over the domain of S, but note that within any given regime, $\partial Y/\partial S$ is still presumed to be constant. (Figure 1 (b′)).

Again, the marginal rate of return, r, across the domain of S can be calculated in terms of the parameters of Model II. The appropriate r is given below.

Years of Completed Schooling (S)	Marginal Rate of Return (r)
$S < 10$	β_1
$S = 10$	$\beta_1 + \beta_2$
$10 < S < 12$	$\beta_1 + \beta'_2$
$S = 12$	$\beta_1 + \beta'_2 + \beta_3$
$S > 12$	$\beta_1 + \beta'_2 + \beta'_3$

Model III: Step Function

For purposes of exploring the relationship between shooling and earnings for possible diploma effects, the final specification of interest is the so-called 'step function'. In this case, no restrictions are imposed on the earnings-schooling profile – the log of an individual's earnings is treated as a 'step function' of years of completed schooling with a separate step for each year.[13] For K years of completed schooling, such a specification can be represented by Equation (5), which is given below.

$$Y = \alpha + \sum_{i-1}^{K} \beta_i D_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

[12]In fact, since setting $\beta'_2\ \beta'_3 = 0$ in Model II gives Model I, the latter can be considered as a special discontinuous spline function. However, Model I is generally more easily recognizable as simply a case of introducing dummy variables to the standard human capital specification.

[13]For an application to the U.S. data, see [Hungerford and Solon (1987), p. 177].

Here each D_i is a (0, 1) dichotomous variables where $D_i = 1$ if $S = i$.

The estimated regression coefficients β_i can be used to calculate the implied step size in terms of the 'marginal' rate of return to an additional year of schooling. Thus, in order to evaluate the potential sheepskin effects, the step size for the year conferring a particular diploma can be compared with the step size corresponding to each of the years leading up to that diploma.

3. DATA DESCRIPTION

The data set used in the present study has been put together by merging information from the Household Income and Expenditure Survey (HIES) and the Migration Survey, which were, in fact, two of the four separate 'modules' (i.e., questionnaires) of the 1979 Population, Labour Force and Migration (PLM) Survey. Conducted as a joint project of the Pakistan Institute of Development Economics (PIDE) and ILO-UNFPA, the PLM, a nationally representative survey, was based on a two-stage-stratified random sample of 11,288 households.[14]

The same households were asked to respond to four sets of questionnaires, two of which, i.e., HIES and Migration, are relevant here. These surveys were conducted during the last two quarters of 1979. Whereas HIES is a survey that is conducted with some regularity, the Migration Survey was a one-shot thing done only in 1979. However, by the time this survey was completed, it had spilled over into the first three or four months of 1980 as well.

HIES has information on some but not all the variables that are needed for testing the sheepskin hypothesis as outlined in this paper. More specifically, while HIES has the relevant data on monthly earnings, age, gender, and employment status of individuals, the information on their schooling is not available in an appropriate form. In this survey, the question regarding the individual's schooling is so designed that the possible responses are 1-digit codes, e.g., 'Primary but less than Middle' is assigned code 3; 'Middle but less than Matric' is assigned code 4, and so forth. Thus, it is not possible to distinguish those who complete a course and stop there from those who start the next level but drop out. This makes the HIES's schooling variable inappropriate for the present study since we need information on the exact number of years of completed schooling for each individuals.[15] Interestingly, in the Migration Survey, the question regarding schooling has been designed in a manner that is appropriate for providing the above information. Since the same households were targeted for both the surveys, I decided to match individuals across the two modules and pick up schooling information

[14]See Irfan (1981) for further details.

[15]Incidentally, the HIES for other years too have the same design regarding the question of schooling. In fact, extremely few micro level surveys for Pakistan have measured schooling as a continuous variable. One exception is the data set used in Sabot (1989). However, this sample is not national in character since it is based on a sample of 800 rural households.

from the Migration Survey.

Thus, the resultant data set which has been used in this study has schooling information from the Migration Survey while all other information is from HIES. This 'merge' enables us to obtain perhaps the only nationally representative sample for Pakistan where schooling is measured as a continuous variable measured in terms of the exact number of years completed.

As a result of restricting the observations to those for male earners (wage earners or salaried employees) for whom $0 < S < 16$ and $Y > 0$, a sample of size 1568 is obtained. In fact, Table 1 provides the details about the definitions of variables, their sample means, and standard deviations.

4. RESULTS

Tables 2 through 4 give the regression results for the various specifications that are relevant for testing the sheepskin effects in the return to education. The dependent variable in all the cases is the natural logarithm of an individual's monthly earnings (Y). Let us first look at Table 2, where column 1 presents the OLS estimates of the typical human capital earnings function due to Mincer (1974). This specification would serve as a 'reference' point. It treats the log earnings (Y) as a linear function of years of completed schooling (S), labour market experience (EXP) and its square. The results show that the coefficients for all these variables are significant at the 95 percent level of significance. In particular, the coefficient for S implies that the rate of return to an additional year of schooling is 9.7 percent.

Columns 2 and 3 of Table 2 give regression estimates that correspond to Model I, i.e., 'Dummies for Degrees' specification. (Column 3 differs from column 2 only in terms of having two additional certification levels). First, note that both these specifications (columns 2 and 3) turn out to be superior to the human capital specification (column 1). An F-test of the human capital specification relative to the alternatives in column 2 or column 3 rejects it at the .01 level of significance. In fact, it is noteworthy that in the correctly specified model, the schooling coefficient drops to half of what it was in column 1. Equally importantly, in both cases, the coefficient estimates for the dummy variables corresponding to the four important certification levels,[16] namely, Matric ($D10$),

[16]For comparison, the relevant Pakistani diplomas as well as their U.S. counterparts with their corresponding years of schooling are given below:

	Diplomas	
Years of Schooling	Pakistan	U.S.
5	Primary	
8	Middle	Elementary
10	Matric	
12	Intermediate (F.A./F.Sc.)	High School
14	Bachelor's (B.A./B.Sc.)	
16	Master's (M.A./M.Sc.)	College

Table 1

Description, Means (X) and Standard Deviations (S.D.) of Some Important Variables (N = 1568; Male Earners)

Variable's Name	X	S.D.	Variable's Definition
Y	6.42	0.68	Natural logarithm of the person's monthly earnings which may consist of wages or salary.
S	8.59	3.46	Years of schooling completed.
AGE	33.03	12.10	Age in years.
EXP	18.44	12.46	Total years of labour market experience; (Age-*S*-6).
*D*5	0.87	0.34	Dichotomous, equals 1 if $S \geq 5$.
*D*8	0.65	0.48	Dichotomous, equals 1 if $S \geq 8$.
*D*10	0.49	0.50	Dichotomous, equals 1 if $S \geq 10$.
*D*12	0.21	0.41	Dichotomous, equals 1 if $S \geq 12$.
*D*14	0.11	0.32	Dichotomous, equals 1 if $S \geq 14$.
*D*16	0.03	0.17	Dichotomous, equals 1 if $S = 16$.
D5INTER	3.83	3.11	(*D*5) (*S*–5)
D8INTER	1.76	2.16	(*D*8) (*S*–8)
D10INTER	0.73	1.52	(*D*10) (*S*–10)
D12INTER	0.29	0.85	(*D*12) (*S*–12)
D14INTER	0.06	0.35	(*D*14) (*S*–14)
*S*1 – *S*16			Dichotomous = 1 if $Sn = n$ where $n = 1, \ldots, 16$.

Table 2

Model I: 'Dummies for Degrees'
(OLS; Dependent Variable = Y; Male Earners)

	1	2	3
Constant	4.872*	5.166*	5.155*
	(94.692)	(77.985)	(52.980)
S	0.097*	0.046*	0.045**
	(24.425)	(5.072)	(1.790)
EXP	0.1056*	0.056*	0.056*
	(16.270)	(16.649)	(16.537)
$(EXP)^2$	−.0006*	−.0006*	−.0006*
	(−8.931)	(−9.387)	(−9.300)
*D*5			0.0294
			(0.388)
*D*8			−.0224
			(−.278)
*D*10		0.149*	0.159*
		(3.049)	(2.627)
*D*12		0.209*	0.211*
		(4.115)	(3.052)
*D*14		0.187*	0.189*
		(2.959)	(2.398)
*D*16		0.249*	0.250*
		(2.734)	(2.436)
Adjusted R^2	0.40	0.42	0.42
N	1568	1568	1568

Note: Results for Model I are given in columns 2 and 3.

*Significant at 95 percent level; 2-tailed *t*-test (*t*-statistics are in the parentheses).

**Significant at 90 percent level for 2-tailed *t*-test yet significant at 95 percent level for 1-tailed *t*-test.

Intermediate ($D12$), Bachelor's ($D14$) and Master's ($D16$), are positive and significant at the 95 percent level. Thus, we find strong support for the sheepskin hypothesis. In order to further elaborate on the nature of these diploma effects,[17] let me concentrate on the results given in column 2.

Note that while the 'estimated effect on the log monthly earnings of an additional year of schooling' *(r)* is 0.046 for the 9th year, it more than quadruples to 0.195 (obtained by adding .046 and .149) for the 10th year (Matric). Again, there are equally spectacular jumps for the other three diploma years that have been considered here. For the 12th year (Intermediate) the r is .255 which is up from .046 for $S = 11$; again, r is .233 for $S = 14$ (Bachelor's) relative to .046 for $S = 13$ and finally, it is .295 for $S = 16$ (Master's). Thus, substantial and significant diploma effects in the returns to schooling are found at these four important certification levels. In fact, the null hypothesis of no sheepskin effects (i.e., all four dummy variables $D10, D12, D14$ and $D16$ are simultaneously equal to zero) is rejected at the 0.01 level (using F-statistic).

Again, column 2 of Table 3 presents regression estimates for a specification that tests for the sheepskin effects in a slightly different manner. Here, the interaction terms, i.e., $D10INTER$ and $D12INTER$ allow for "slope" changes in the intra-diploma years. In fact, this is the specification that we referred to as Model II (Equation 3) in the section on Methodology. The results show that the null hypothesis of no sheepskin effect (i.e., the coefficient estimates for $D10, D12$, and $D14$ are all simultaneously zero) is rejected at the .01 level. However, taken one by one, the estimated coefficients for $D10$ and $D12$ are positive and significant while the coefficient estimate for $D14$ is positive but not significant. Again, none of the coefficient estimates of the interaction variables is significant. This implies that slope changes corresponding to intra-diploma years may not be very pronounced. This would strengthen the case for the relatively simpler specification of Model I. However, it is important to note that the results for Model II are still supportive of the sheepskin hypothesis.

Finally, Table 4 corresponds to Model III, i.e., the step function specification which provides an opportunity to look more directly at the data since no restrictions are imposed on an individual's schooling-earnings profile. Here the log of an individual's earnings is essentially treated as a step function of the years of completed schooling with a separate step for each year.

Positive step sizes are reported for all certification levels. While the step size estimates for $S = 5$ and $S = 14$ are not significant, large "upward" and significant step sizes are noticeable for $S = 8$, $S = 10$ and $S = 12$.

To conclude this section, the empirical results of this study are summarized below.

[17]The estimated coefficient for $D5$ as well as $D8$, the two additional certification levels in column 3, as compared to column 2 are insignificant while the rest of the results across the two columns are quite similar.

Table 3

Model II: Discontinuous Spline Function
(OLS; Dependent Variable = Y; Male Earners)

	1	2
Constant	5.135*	5.165*
	(78.558)	(77.888)
S	0.051*	0.046*
	(5.715)	(5.110)
EXP	0.056*	0.056*
	(16.698)	(16.525)
$(EXP)^2$	−.0006*	−0.0006*
	(−9.416)	(−9.319)
*D*10	0.128*	0.151*
	(2.657)	(3.089)
*D*10*INTER*		−.102
		(−.843)
*D*12	0.200*	0.408**
	(3.933)	(1.687)
*D*12*INTER*		0.131
		(0.495)
*D*14	0.238*	0.131
	(3.936)	(0.280)
*D*14*INTER*		0.095
		(0.339)
Adjusted R^2	0.42	0.42
N	1568	1568

Note: Result for Model II are given in column 2.

*Significant at 95 percent level; 2-tailed *t*-test (*t*-statistics are in the parentheses).

**Significant at 90 percent level for 2-tailed *t*-test yet significant at 95 percent level for 1-tailed *t*-test.

Table 4

Model III: Step Function
(OLS; Dependent Variable = Y; Male Earners)

	1	Step Size
Constant	6.699*	
	(80.288)	
EXP	0.055*	
	(16.268)	
$(EXP)^2$	−0.0006*	
	(−9.050)	
$S = 1$	−1.245*	−1.245*
	(−5.123)	(−5.123)
$= 2$	−1.559*	−0.314
	(−14.578)	(−1.295)
$= 3$	−1.401*	0.158
	(−13.485)	(1.572)
$= 4$	−1.314*	0.087
	(−13.980)	(0.998)
$= 5$	−1.305*	0.009
	(−15.360)	(0.139)
$= 6$	−1.128*	0.177*
	(−11.788)	(2.610)
$= 7$	−1.273*	−0.145
	(−12.332)	(−1.611)
$= 8$	−1.139*	0.134**
	(−13.242)	(1.688)
$= 9$	−1.209*	−0.07
	(−12.132)	(−0.944)
$= 10$	−0.916*	0.293*
	(−11.333)	(4.321)
$= 11$	−0.973*	−0.057
	(−6.894)	(−0.472)
$= 12$	−0.621*	0.352*
	(−7.110)	(2.809)
$= 13$	−0.549**	0.072
	(−2.249)	(0.306)
$= 14$	−0.341*	0.208
	(−3.826)	(0.883)
Adjusted R^2	0.42	
N	1568	

Note: Results for Model III are given in column 1.
*Significant at 95 percent level; 2-tailed t-test (t-statistics are in the parentheses).
**Significant at 90 percent level for 2-tailed t-test yet significant at 95 percent level for 1-tailed t-test.

Using a nationally representative sample of male earners in Pakistan, we find strong evidence for the existence of sheepskin effects in the returns to education. While the details may differ across the various specifications that have been considered in this paper, the above result essentially holds true in all cases.[18] For instance, the results for Model I show positive and statistically significant diploma effects on the rates of return to schooling for four important certification levels, namely, Matric ($D10$), Intermediate ($D12$), Bachelor's ($D14$), and Master's ($D16$). In one of the specifications, where additional certification levels for the Primary and Secondary are included, results show that the coefficient estimates measuring these diploma effects are not statistically significant (Table 2, column 3). Some of the important implications of this observation may be noted here. First, in terms of the theoretical debate between credentialism and human capital explanations of the role of education, it seems that the relative dominance of a given explanation may depend on the level of schooling being considered. Thus the absence of the diploma effects at the pre-secondary relative to the secondary and the post-secondary levels implies that a case for human-capital-type productivity enhancing the role of schooling can most strongly be made for the former levels of schooling. At a practical level, this result implies support for a re-allocation of the available public funds and/or commitment of new funds to the relatively more basic rather than the tertiary/higher levels of education.

In any case, in order to complete the summary of the empirical results, let us further note that based on the model selection criteria involving F-statistic, the specifications allowing for sheepskin effects were found to be superior relative to the typical 'Mincerian' human capital earnings function. In fact, the true schooling coefficient is almost 50 percent smaller than the one obtained by using the misspecified human capital function (compare the coefficient estimate for the years of schooling (S) as give in column 2 to that in column 1, Table 2).

5. CONCLUSIONS/CAVEATS

The main conclusions of this study and their policy implications are as follows.

The finding that substantial and statistically significant sheepskin or diploma effects exist at four important certification levels in Pakistan, namely, Matric, Intermediate, Bachelor's, and Master's, is consistent with the screening rather than the convential human capital view of the role of education. It is evident that diplomas in their capacity as signals for completed courses of studies are important determinants of individual earnings and ignoring them would lead to a serious misspecification of the earnings function. However, it should be noted that while diplomas seem to matter, it

[18]In fact, as a practical matter as well as on the basis of the conventional selection criteria such as R^2, theoretical consistency, and statistical significance of the coefficient estimates, Model I may be the most preferred specification.

is not true that only diplomas matter; since even after controlling for diploma years, the schooling coefficient, albeit smaller than before, is still substantial. Again, regarding the diploma effects, another interesting finding is that such effects are not significant in case of the Primary and the Middle levels of schooling.

In terms of the policy implications of the above conclusions, it is clear that, in the case of Pakistan, education is an important and significant influence on the individual earnings. However, to the extent that the diploma effects are significant, the potential for education as a source of enhancing worker productivity is lessened, thus reducing the scope of an activist public policy in this regard. This is particularly true for the secondary and the post-secondary levels of education. In fact, the findings support a re-allocation of the available public funds away from the tertiary/higher education and towards the basic education, where the productivity-enhancing human capital effects are more apparent. It may be interesting to note that similar arguments, which characterize basic education as the relatively more effective social investment, are being made by others too.[19]

6. CAVEATS

In general, it is possible that our regression estimates showing the presence of sheepskin effects may be biased due to the omission of other factors, such as ability or family background, which are correlated with degree completion.[20] However, presently, there is little available evidence regarding the above issue, since the data on ability or family background is not readily available for Pakistan. However, Olneck (1979), after reviewing the results from a number of studies for the U. S., reports that the estimated positive sheepskin effects for college graduation prove to be robust when the variables to measure ability and family background are included.[21]

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[19][Behrman (1990), p. 90].

[20]A related argument is that of Chiswick (1973), who contends that dropouts are essentially those individuals who overestimated their ability to benefit from education. However, while Chiswick's hypothesis is consistent with education as being productivity-enhancing, it is not in the spirit of the standard Becker/ Mincerian human capital tradition. So, at the minimum, results showing strong diploma effects imply a need for reformulating the standard human capital argument. Again, a direct test of the Chiswick hypothesis would be possible only if the 'ability to benefit from education' data for all entrants to a programme are available. In fact, to the extent that the general measures of ability or family background correlate with the specific ability Chiswick has in mind, these general measures would provide a partial control for it.

[21]Table 6.3, pp. 178-9. The education variables are defined on page 161.

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