

Aromolaran, Adebayo B.

Working Paper

Private Wage Returns to Schooling in Nigeria: 1996-1999

Center Discussion Paper, No. 849

Provided in Cooperation with:

Yale University, Economic Growth Center (EGC)

Suggested Citation: Aromolaran, Adebayo B. (2002) : Private Wage Returns to Schooling in Nigeria: 1996-1999, Center Discussion Paper, No. 849, Yale University, Economic Growth Center, New Haven, CT

This Version is available at:

<https://hdl.handle.net/10419/98278>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

ECONOMIC GROWTH CENTER

YALE UNIVERSITY

P.O. Box 208269
New Haven, CT 06520-8269
<http://www.econ.yale.edu/~egcenter/>

CENTER DISCUSSION PAPER NO. 849

**PRIVATE WAGE RETURNS TO SCHOOLING IN
NIGERIA: 1996-1999**

Adebayo B. Aromolaran
Yale University

October 2002

Notes: Center Discussion Papers are preliminary materials circulated to stimulate discussions and critical comments.

I thank the Economic Growth Center, Yale University and the Rockefeller Foundation Grant for Postdoctoral Research on the Economics of the Family in Low Income Countries for providing the technical and financial support for this study. I am especially grateful to T. Paul Schultz, whose advice and comments on previous drafts of the paper are invaluable. I am also thankful for the comments I received at Yale Economics Department Development Lunch meeting. Finally I wish to thank the Federal Office of Statistics in Lagos, Nigeria for giving me access to the General Household Survey Data which were used for the analysis in this paper. I am responsible for any errors that remain.

This paper can be downloaded without charge from the Social Science Research Network electronic library at http://ssrn.com/abstract_id=345981

An index to papers in the Economic Growth Center Discussion Paper Series is located at:
<http://www.econ.yale.edu/~egcenter/research.htm>

ABSTRACT

In the last two decades, primary and secondary school enrollment rates have declined in Nigeria while enrollment rates in post-secondary school have increased. This paper estimates from the General Household Survey for Nigeria the private returns to schooling associated with levels of educational attainment for wage and self-employed workers. The estimates for both men and women are small at primary and secondary levels, 2 to 4 percent, but are substantial at post-secondary education level, 10-15 percent. These schooling return estimates may account for the recent trends in enrollments. Thus, increasing public investment to encourage increased attendance in basic education is not justifiable on grounds of private efficiency, unless investments to increase school quality have higher private returns. With high private returns to post-secondary schooling, students at this level should pay tuition, to recoup more of the public costs of schooling, which may be redistributed to poor families through scholarships.

Key words: Schooling Investment; Private Wage Returns; Efficiency; Equity; Nigeria

JEL Classifications: O15, I12, J24

1. INTRODUCTION

Over the past three decades, Nigeria has made large public investments in educational infrastructures, scholarship awards, grants, tuition payments and teachers salaries.¹ In the 1970s the Universal Primary Education program (UPE) was introduced in Nigeria. Public expenditure was increased on primary education and this resulted in sharp increases in primary school enrollments.² Gross primary school enrollment, which was 44% in 1970, rose to 109 percent in 1980.³ Secondary school and post secondary school enrollment also increased from 5.2 percent and 0.5 percent, respectively, in 1970 to 18 percent and 2.7 percent respectively in 1980.⁴ However, primary school enrollment ratio declined from 109 % in 1980 to 82% in 1996/98, while secondary school enrollment ratio, remained at the 34 percent level it attained in 1985.⁵ Between 1980 and 1994, enrollment rates in post secondary schools rose from 2.7 percent to 4.3 percent (Table 1), and has since been increasing.⁶ This suggests that private investment in years of primary and secondary education has been declining while private investment in years of higher education has been increasing. Given the greater direct and opportunity costs of higher education relative to primary and secondary education, the economic value of the investment in education has been redistributed towards higher education.

¹ Public spending on education was 12% of government expenditure in 1985/87 and 11.5% in 1995/97

² Table 1 shows that government spending on education as share of gross national income rose from 1.9 percent in 1965 to 6.4 percent in 1980.

³ This is an indication that either some underage or overage children were enrolled, or both.

⁴ This is associated with a rise in real GDP per capita from \$264 in 1970 to \$314 in 1980 (see Table 1).

⁵ This observed decline is associated with decline in the real GDP per capita from \$314 in 1980 to \$250 in 1999, as well as a decline in public spending on education from \$4950 million in 1980 to \$151.5 million in 1995. In addition, public spending on education as a share of gross national income declined from 6.38 percent in 1980 to 0.7 percent in 1995 (see Table 1)

⁶ See Odusola (1998)

The question explored by this paper is whether the existing pattern of private market returns to schooling can provide an explanation for the observed patterns in primary, secondary and post-secondary school enrollment rates. The need to understand the pattern of private returns to schooling is further necessitated by the new education policy of the Nigerian government. The policy is directed at government funding of 6 years of primary education and 3 years of junior secondary education, and accommodates a reduction in funding of post secondary education. This policy is expected to reduce the private cost of primary and secondary education, while increasing the private cost of higher education.⁷ The paper will provide estimates of private returns to different levels of education across gender and age categories.

Even though, there is a wide and growing literature on the empirical estimation of returns to schooling in both developing and advanced countries (Sumner, 1981; Angrist and Krueger, 1991; Lam and Schoeni, 1993; Mwabu and Schultz, 2000), estimates for Nigeria are rare. Psacharopoulos (1973), reported estimates of private returns to primary, secondary and tertiary education from a 1966 pre-tax survey data from western Nigeria to be 30 percent, 14 percent and 34 percent, respectively. Akangbou (1977) used data from Mid-western Nigeria to estimate private rates of return on education of 13.4 percent for lower secondary school, 11.9 percent for secondary-technical, 11.2 percent for upper secondary school and 17.2% for university levels. Okedara (1978) analyzed a 3-year experimental adult literacy program of the

⁷ The Academic Staff Union of Nigerian Universities (ASUU) is currently engaged in a battle with the federal government of Nigeria on the issue of allocation of funds budgeted for the educational sector. ASUU is in favor of government full funding of education at all levels and increased share of funding to higher education while the government plans to reallocate funding away from the higher education towards the first 9 years of education.

University of Ibadan to estimate private returns associated with formal primary education of 10.6%. However, there appear to be no national estimates of private market returns to schooling in Nigeria, and none for the last several decades even for regions.

The rest of this paper is organized as follows. The second section presents the theoretical framework of analysis, while section three describes the data. Section four specifies the econometric model and section five presents the results. Section six concludes the paper.

2. FRAMEWORK

This paper adopts the model of human capital investment, in which an individual is assumed to make a human capital investment decision in such a manner as to maximize the discounted present value of future earnings, given the opportunity cost of time and goods spent acquiring such capital, and the rate of interest. (Becker, 1964).⁸

Assume that an individual is confronted with a lifetime decision on whether to go to school or not before entering into the labor market. The number of years she chooses to spend in school is denoted by S . Her total life endowment of time is T . Assume that with zero years of schooling, the labor market will offer her a wage rate at time t of W_{0t} and with S years of schooling, W_{st} . The differential between the wage to educated labor and uneducated labor over the time period $t= 1, \dots, T-S+1$ is represented by $W_{st} - W_{0t}$. The individual can represent the present capital value, PV, of going to school over her remaining lifetime, T , upon reaching school starting age at $t = 0$, given the discount rate, r :

⁸ According to Rosen (1977), Becker organized emerging literature on human capital development (such as in Schultz 1961, 1962, Becker 1962) into a coherent theoretical structure. His work turned the attention of

$$PV = \sum_{t=S+1}^T (W_{st} - W_{ot}) (1+r)^{-t} - \sum_{t=1}^S W_{ot} (1+r)^{-t} \quad (1)$$

Here, the first term on the right hand side is the discounted value of the gains in lifetime earnings due to completing S years of schooling, and the second term is the discounted value of the opportunity cost of going to school for S years and not working. The individual will choose the level of schooling S such that the internal rate of return from investment in schooling just exceeds the borrowing cost of capital.⁹ Thus, the individual is inclined to invest in more schooling until the present value of human capital falls to zero.

The labor market earnings function (Mincer, 1974) is derived from expression (1), and is assumed to be a positive, strictly quasi-concave function of schooling. This implies the existence of diminishing returns to schooling and ensures the demand curve for schooling slopes downwards. The definition of returns here abstracts from private direct costs of education as well as social expenditures and benefits. It includes only market labor earnings and excludes all market non-labor earnings (such as fringe benefits and working conditions). Also excluded from this definition are all social spillovers, such as fertility reduction, health improvements, knowledge production, crime reduction, social cohesion, income distribution, technological change and charitable giving etc.¹⁰

researchers from current to lifetime earnings as the empirical construct of primary interest in many problems confronting labor economics.

⁹ This is the interest rate at which the expression (1) equals zero. If for a particular value of S and r , expression (1) is greater than zero, then going to school for S number of years is a better decision than not going. According to Rosen (1977), the internal rate of return summarizes the whole life time earnings process in a single statistic, which is especially useful because capital values are not observable in the free labor market and there is no consensus on the appropriate market interest rate for computing capital values.

¹⁰ See Haveman and Wolfe (1984) for detailed treatment of non-market benefits of schooling.

We expect the estimates of private returns to different levels of schooling to reflect the increment to productivity of schooling at that level of education. It indicates the private market incentives, which the labor market offers to individuals and their families to invest in the different levels of education. For example, a higher estimated private return to post secondary schooling relative to primary schooling would suggest that the labor market reward more favorably additional years of post-secondary education relative to primary education.

How public resources should be allocated between competing layers of the educational system depends mainly on the mix of efficiency and equity goals of policy makers. Efficiency goals imply allocating resources to where social returns are highest, while equity goals imply allocating resources to disadvantaged families.¹¹ Thus, efficiency depends on social returns and not only private returns as estimated in this paper. A private return to schooling is only an incentive to influence the private allocation of resources to education. However because high private returns should motivate private demand even with increased private cost, social returns to education can be increased through appropriate public investment policies when private returns are commonly recognized to be substantial. Even when private returns are very low for a particular level of education, equity goals (that is, the distributional consequences of increased output) may still imply the desirability of increased allocation of public resources.¹² The positive

¹¹ Social returns can be estimated by adding public costs and revenue returns to schooling to private costs and wage returns. It is expected that the Mincer type private returns are higher than social returns with a large gap for higher education, especially in developing countries. (Schultz, 2001).

¹² It is believed in many quarters that equity goals can be best achieved by reallocating public resources away from higher education to primary and perhaps secondary education. Doing this is likely to increase the private benefit/cost ratio of the poor families, who face higher opportunity costs of schooling at such low levels of education relative to the wealthier families. The distributional consequences of increased public investment at the basic levels of education are expected to favor poor families.

social externalities education generates are potentially important justifications for public investment in education.

3. DATA

The data used for this analysis was obtained from the Nigerian General Household Survey (GHS) for 1996/97, 1997/98, 1998/99. The GHS is a national household data collection project carried out by the Federal Office of Statistics (FOS). The data are collected on quarterly basis. Refer to FOS (2000) for a description of the sampling procedure. The sample includes 24,889 households in 1996/97, 32,024 in 1997/98 and 27,649 1998/99¹³, for a total of 375,399 individuals, of whom 54.8% are of age 15 to 64 and considered of labor force age.¹⁴ To my knowledge this data set has not been widely analyzed. The income data reflects income from all jobs in the last month including allowances, while schooling data was obtained by level of education and highest grade attained. Monthly income was divided by the number of hours of work per month to derive values for hourly wage rate.

Table 2 presents the summary statistics for the entire sample of work age adults. Generally, males have attended school for longer periods than females at all three levels of education and in all three age groups, and mean years of schooling increases from older to

¹³ FOS could not provide the data for households surveyed in the first quarter of 1998/99.

¹⁴ 159,186 individuals with ages lower than 15 years and 10,445 with ages higher than 64 years were excluded from the sample. Out of the remaining sample of 205,135 work age individuals, 86,850 who reported zero work hours in the week preceding the surveys were dropped from the sample. Furthermore, 21,160 individuals (mainly cooperative producers) who reported some work hours but zero income were dropped and 1,541 individuals that were both working and going to school were dropped. Individuals who reported working more than 90 hours per week, were also excluded (941) and 405 individuals with inappropriate entries for years of schooling were also eliminated. In addition 917 observations (1%) with hourly wage rate of above 100 naira per hour were dropped. The working sample was thus reduced to 93,999 individuals, of which

younger generation for both males and females.¹⁵ This pattern is illustrated by the 5-year moving averages plotted in figures 1-4. The figures show a consistent and fairly smooth rise in the average level of schooling attained over the years. This result is not consistent with the published school enrollment rates, which more than doubled between 1970 and 1980, as shown in Table 1. The slope of the school attainment curve is thus expected to be steeper between the ages of 22 and 32 years in figure 2 and between the ages of 28 and 38 years in figure 3, than observed in the GHS.¹⁶ Two factors may account for this observed discrepancy between the patterns suggested by the government data on school enrollment rates and the national household survey data used for this analysis. First, government sources may have over-reported the increase in enrollment rates between 1970 and 1980.¹⁷ Second, which is more unlikely, the failure rate is high enough to offset the effect of the increasing enrollment rate as it determines average years of primary and secondary schooling completed.¹⁸

Figure 2 shows a consistent decline in the male-female gap in years of primary school completed for Nigerians born between 1973 and 1983. A decline in the male-female gap in years of secondary school completed is also observed, in figure 3, for Nigerians born between

9,065 are male wage earners, 3,135 are female wage earners, 55,135 are male self employed workers and 24,826 are female self-employed workers.

¹⁵ We expect marginal wage effects of schooling (not rate of returns to schooling) to be to be lower for age and gender categories with higher average level of education. This is a reflection of diminishing marginal returns to schooling

¹⁶ The age categories represent those that were of primary and secondary school enrollment age respectively during the period 1970-1980.

¹⁷ A probable motivation for over-reporting is that government may be eager to justify the increases in public expenditure on education during this period, due to programs such as universal primary education and the take over of private secondary schools by government (see Table 1).

¹⁸ This refers to the situation when students are forced to repeat a previous class as a result of inadequate performance.

1973 and 1978. This is an indication that average years of primary and secondary schooling has been growing more rapidly among females relative to males since the late 1970s.

The summary of the data on wage and self-employed workers in Tables 3 and 4 also present some interesting patterns. Mean ages are 39 for male wage earners, 34 for female wage earners, 41 for male self employed, and 39 for female self employed. Mean total years of education are highest for female wage earners, 10.4 years, followed by male wage earners 10.0 years, female self-employed 3.9 years and male self employed 3.1 years. Thus, self-employed workers are, on the average, older and less educated compared with wage earners. Female workers have more years of schooling compared with male workers in both wage and self-employment sectors. The mean years of post-secondary education are very low, 0.64, for male wage earners, 0.76 for female wage earners, 0.03 for male self-employed and 0.02 for female self employed.

Tables 3 and 4 further show that wage rate vary substantially across gender and age categories. For example, female wage earners receive 18.5 percent less than males.¹⁹ Substantial differences in log wages by levels of education and age, as shown in Tables 3 and 4, are an indication that wage rates increase with education level and with age. Thus, preliminary evidence from the data suggest that wage rate varies by gender, with education level within age groups, and with age within education levels.²⁰

¹⁹ If we assume that marginal effects of schooling on wage rate is same across gender, and the average wage rate is lower for females, then we expect the wage returns to schooling will be higher for the female workers, if men and women were perfect substitutes. Note that $d\log\text{wage}/dS = d\text{wage}/dS * 1/\text{wage}$

²⁰ Analysis of wage return to schooling that does not control for different levels of education and age groups assume that wage returns are the same at all levels of education and within all age groups.

4. EMPIRICAL MODEL SPECIFICATION AND ESTIMATION

The paper estimated three specifications of the earnings function.²¹ The first empirical specification, (2), assumes that the wage return is constant across different levels of education - primary, secondary, and post-secondary.²² The second specification, (3), relaxes this restrictive assumption and addresses the question whether returns to different levels of education differ within the Nigerian labor market.²³ The third specification, (4), relaxes the restriction that wage returns are constant across generations of workers, and permits wage-returns to schooling to differ across age groups, who were born and educated at different times.²⁴

$$l\text{wage}_{ij} = \alpha_{ij} + \beta_{ij}\text{yrsch}_{ij} + \delta_{1ij}\text{wkexp}_{ij} + \delta_{2ij}\text{wkexpsq}_{ij} + \lambda_1\text{dyr97} + \lambda_2\text{dyr98} + U \dots (2)$$

$$l\text{wage}_{ij} = \alpha_{ij} + \beta_{1ij}\text{yrprysch}_{ij} + \beta_{2ij}\text{yrsecsch}_{ij} + \beta_{3ij}\text{yrptsec}_{ij} + \delta_{1ij}\text{wkexp}_{ij} + \delta_{2ij}\text{wkexpsq}_{ij} + \lambda_1\text{dyr97} + \lambda_2\text{dyr98} + U \dots (3)$$

$$l\text{wage}_{ijk} = \alpha_{ijk} + \beta_{1ijk}\text{yrprysch}_{ijk} + \beta_{2ijk}\text{yrsecsch}_{ijk} + \beta_{3ijk}\text{yrptsec}_{ijk} + \delta_{1ijk}\text{wkexp}_{ijk} + \delta_{2ijk}\text{wkexpsq}_{ijk} + \lambda_1\text{dyr97} + \lambda_2\text{dyr98} + U \dots (4)$$

Where

$l\text{wage}$ is the natural logarithm of real hourly earnings²⁵

yrsch is the number of years of schooling (undifferentiated by levels, 0-17 years)

²¹ See Mincer (1958, 1974) and Heckman and Polachek (1974) for discussions on the appropriateness of this simple specification.

²² This restriction will be statistically tested in this paper

²³ The second equation replaces the aggregate or total year of schooling variable in the first equation with a 3-segment spline of years of schooling.

²⁴ One problem with aggregating data over age groups is that we have to assume schooling and labor market conditions are constant across generations. For empirical estimation, the smaller the class interval of an age grouping, the more homogenous is the group in terms of the market and schooling conditions they face. Analysis using of birth cohorts is therefore preferable if data are available. In the US, empirical evidence showed that younger workers enjoyed higher wage returns compared with older workers. (See Card and Lemieux, 2001).

²⁵ Nominal hourly earnings from the data were deflated by the consumer price index using 1995 as base year (World Development Indicator, 2001).

wkexp is the number of years of working experience (potential)²⁶

wkexp² is the quadratic term of years of working experience * 10⁻²

yrprysch is the number of years of primary schooling (0-6 years)

yrsecsch is the number of years of secondary schooling (0-6 years)

yrptsec is the number of years of post secondary schooling (0-5 years)

d97 is the dummy variable for year 1997/98

d98 is the dummy variable for year 1998/99

U represents the effect of omitted explanatory variables and errors of functional form and measurement, and is assumed to be independent and identically distributed.

i refer to ith sex (male or female), j to jth employment type (wage or self-employment)²⁷, and k to kth age group (age groups 25-34, 35-44, 45-64 years)

The empirical models specified above were estimated by ordinary least squares. As a result, the estimates of private wage returns reported in this paper may be subject to some biases.²⁸ However, the results presented in this paper are a first approximation of the private returns to schooling in Nigeria, based on the Nigerian General Household Survey data of 1996-1999, which the author plans to analyze in a subsequent study using alternative methods.

The estimates of private returns to schooling for self-employed workers must be interpreted with added caution. The hourly earnings reported by self-employed workers in the survey did not exclude earnings attributable to physical capital or return for bearing risk as an

²⁶ Potential work experience was calculated as (Age- years of schooling – 6) for those with 9 or more years of schooling and (for those with less than 9 years of schooling Age-15)

²⁷ The definition of self-employed in this paper includes only own-account workers and excludes employers.

²⁸ See Griliches (1977), Heckman (1979), Angrist and Krueger (1995), Card (1999), and Card (2001), for the treatment of these potential sources of bias.

entrepreneur. Consequently, the estimated returns to schooling may include some elements of return to physical capital. Also it is possible that individuals may not exclude from their own reported self-employment income, the implicit labor returns due to family unpaid labor, such as children.

5. RESULTS

5.1 Analysis of Returns to Schooling at Different Levels of Education

Table 5 shows the estimated private returns to an average year of schooling²⁹ as 4.6 percent and 5.3 percent for male and female wage earners, and 3.6 percent and 2.8 percent for male and female self-employed earners, respectively.³⁰ Female wage earners are proportionately better compensated for additional years of schooling compared with male wage earners. Schultz (1988, 1993) explained that any observed differences in private internal rates of returns to schooling are usually in favor of women in populations, where in the past, women are on the average less educated than men.³¹ The results also support the observation by Schultz (2001) that even when the private internal rates of return to schooling are higher for women than for men, the overall level of wages tends to be lower for women than men.³² For example, in our sample, male wage earners, between the ages of 25 and 64, earn between 11-13 percent more than females (see Table 3), and female self-employed workers earn between 24 and 33 percent less than males (see Table 4).

²⁹ The result also shows that the labor market rewards formal education more than experience gained through years of potential experience after a regular school leaving age.

³⁰ According to Schulz (1993, pp717), estimates of returns to primary and secondary education range between 5 and 40% per year in many countries.

³¹ Evidence that this is true for the Nigerian data is shown in figure1.

When the schooling variable is broken down into a three segment spline - primary, secondary and post-secondary - more insight is gained into the incentives which the labor market provides for investing in schooling in Nigeria. The hypothesis of constant wage returns at all three levels of education was rejected in favor of the less restricted specification of the wage function with 3-segment spline for years of schooling.³³ This suggests that the 3-segment spline specification is a better empirical approximation of the earnings function.

Table 6 shows that among the wage earners, return to schooling at the primary school level is 2.5 percent for men and 2.4 percent for women. Returns to one additional year of secondary education is estimated to be 3.9 percent for men and 4.4 percent for women, while returns to an additional year of post-secondary education is 10.4 percent for men and 12.2 percent for women. Among the self-employed, returns to schooling at the primary school level are 3.2 percent for men and 1.9 percent for women. Returns to one additional year of secondary education is 3.7 percent for men and 3.8 percent for women, while returns to an additional year of post-secondary education is 13.7 percent for men and 15.4 percent for women.³⁴

Thus, the private returns to primary and secondary education in Nigeria are low and have fallen substantially from the 1966 estimate reported by Psacharopoulos (1973, 1985).³⁵ Also, the private returns to additional year of schooling for both men and women increase as the

³² See Tables 3 and 4.

³³ The F-test on R^2 values resulted in the rejection of the hypothesis of equality of returns between the restricted and unrestricted models of the earnings function.

³⁴ The percentage private wage return estimates reported in section 5 are obtained by multiplying by 100 the estimated coefficients of the log wage function, β , which are in log points. These reported percentage returns understate slightly the true percentage returns, which are defined as $r = 100 (e^\beta - 1)$.

level of education increases.³⁶ Schultz (2001) also observed this pattern with Ghanaian data³⁷, which according to Schultz (1988) is attributable to the fact that in many low-income countries, serious bottleneck to education occurs at the secondary and post-secondary school level.

We observe, from Table 6 that estimated private returns to post-secondary education are about 3 percentage points higher for self-employed workers than they are for wage earners. The differences were less than 1 percentage point in the primary and secondary school levels. This may be an indication that returns to physical capital captured within the estimate of private returns to schooling for the self employed is higher for workers who have had some post secondary education.³⁸

5.2 Analysis of Private Returns to Schooling by Education Level and Age

According to the results presented in Tables 7 and 8, the pattern of wage returns across age groups differs between wage employment and self-employment. For wage earners of both sexes, wage returns to additional year of post secondary education are significantly higher for younger workers (age group 25-34 years) than for the older workers (45-64 years). Table 7 shows the wage returns to post-secondary education as 12.7 percent for the younger male

³⁵Psacharopoulos (1985) private returns estimate for Africa was 45%, 26%, and 33% for primary, secondary and university education. He also reported 31%, 15%, and 18% for Asia as well as 32%, 23% and 23% for Latin America.

³⁶ This result is contrary to the theoretical expectation that returns to schooling falls as students extend their years of schooling into higher educational levels (Becker 1964, Psacharopoulos and Woodhall, 1985, Schultz, 2002).

³⁷ Schultz (2001) reports estimates of returns to schooling using the Ghana Living standard survey (GLSS) for 1987/88, 1988/89, 1991/92 and 1998/99 as averaging around 4%, 10% and 16% for primary, secondary and post-secondary schooling respectively.

³⁸ Mincer (1958) argued that a positive association exists between property income and level of formal training and this magnifies income differences in such a way that accentuates empirical estimates implied by formal training factor alone.

wage earners and 9.5 percent for the older male workers.³⁹ While, younger female wage earners receive a wage return to post secondary schooling of 13.8 percent, their older counterparts receive 10 percent. Following Schultz (2001), one possible way of explaining this result is that the supply of post-secondary educated wage earners relative to the derived demand for post-secondary educated wage earners in the Nigerian economy is smaller now than it was in the previous generation.⁴⁰ The adequate testing of this inference will however, require the availability of repeated cross sectional surveys as analyzed by Card and Lemieux (2001) in the United States.⁴¹

In contrast, Table 8 show that private returns to female post-secondary schooling is significantly lower for the younger female self employed workers, 8.1 percent, compared with older workers, 21.4%. So, unlike in the wage sector, supply of younger female workers relative to derived demand may be higher than the supply of older workers relative to demand in the self-employment sector. We must, however, be careful in adopting this interpretation for the pattern we observe with the female self-employed workers. The observed pattern may be the consequence of a strong positive correlation between age, capital acquisition and self-selection into self-employment. Older workers are likely to have greater access to productive capital, which may inform their decision to go into self-employment. The estimate for male self-employed workers did not follow a consistent pattern. For male self-employed workers, private return increases significantly from age 25-34 to age 35-44 and then declines with age 45-64.

³⁹ See appendix 2 for the results of the F-test for equality of age-education level interaction coefficients.

⁴⁰ Table 3 shows that among wage earners, the average years of post secondary schooling are higher for the older age groups relative to the younger. The table also shows that log wages are higher for older age groups. Both patterns would suggest a higher wage return to post secondary schooling among the young relative to the old as shown by the estimates in this paper.

6 CONCLUSION

With a decline in public investment in education in Nigeria, and the lack of growth in the overall Nigerian economy, this paper sought to find explanations for observed trends in school enrollments over the past decades by estimating the private returns to schooling. The new Nigerian education policy, which is aimed at reallocating public funds from higher education to lower levels of education, can then also be appraised from the perspective of private efficiency returns.⁴²

If the government is to increase public funding on primary education and the first three years of secondary education in Nigeria, as proposed in the present policy on education, then this objective should be pursued because of its equitable distribution of benefits.⁴³ My estimates of private wage returns at the primary, and even secondary, school levels in Nigeria do not appear to be large in 1996-1999, 2-4 percent per year. When public expenditures required to produce these schooling services are included in the estimation of the social returns; these social returns may be quite modest, other things equal. It is difficult to justify, on such efficiency grounds, a further expansion at these levels of schooling currently. These returns could change in the future if the Nigerian economy grows at a faster rate, expanding the demands for better-

⁴¹ Such a series is not yet available for the GHS data analyzed in this paper

⁴² Haveman and Wolfe (1984) argued that estimates of private returns to schooling as we have in this paper may not be the best guide to policy because it usually reflects only increments to market earnings associated with schooling and excludes non-wage market as well as non-market benefits of schooling. However it can be argued that if these excluded benefits of increased schooling are captured by private agents, then the traditional estimates of returns to schooling will still guide resource allocation in the right direction.

⁴³ Many studies have found a positive linkage between mother's primary education and child development outcomes such as education and health. It is believed that primary and secondary education creates a

educated and literate workers. Alternatively, improved operation of the primary school system with better-motivated teachers might improve the quality of education and enhance the private returns to primary school in a reorganized system.⁴⁴ But if the current macro economic stagnation continues, and such efficiency-enhancing reforms of the schools are not accomplished, a shift of more public resources to encourage higher attendance rates in primary and secondary schools could be justified only as a means of redistributing the benefits of public expenditures to the poor, who may not be economically motivated to go to school. It is also possible that benefits from broader participation in the education system accrue to others than the students and their families, and such social benefits of schooling which are not captured by students and their families could justify these proposed additional public subsidies for basic education.

With the sizeable estimate of private wage returns to post-secondary education in Nigeria in 1996-1997, 10-15 percent per year, it appears that the Nigerian government can recover some of the public costs of schooling at the post secondary level of education if students pay tuition. This action will increase social returns relative to private returns to post secondary education. This may be a way to finance the expansion of higher education for which the high private wage returns should motivate private demand, even at a somewhat higher price.⁴⁵ This tuition will also relieve the government budget to expand and improve basic

literate population, which enhances the people's participation in political processes by which they are governed.

⁴⁴ Johnson and Stafford (1973) analyzing a US sample survey found a significant effect of schooling quality on earnings.

⁴⁵ In Nigeria, as in most developing countries, public revenue returns from the very high levels of public investment in higher education are low due to low level of personal income taxes. As a result the social returns to post-secondary education is likely to be lower than private returns, if efforts are not stepped up at increasing public revenue from public investment in post-secondary education.

educational services and monitor the provision of those services by standardized examinations and incentive-based pay for teachers. To improve equity, bursary awards, targeted subsidies, scholarship awards, and education loans to able and motivated students from low-income families would also be justifiable approaches to financing higher education.⁴⁶

Finally, the higher estimate of returns to post secondary education 13 –14 percent among younger wage earners, compared to older wage earners, 9-10 percent, may be a wage market premium for increasing the supply of higher quality post secondary school educated workers. Thus, increased public funding should not only be aimed at increasing the enrollment rate in poorly equipped post-secondary institutions, but at improving the quality of education so that graduates of these institutions will be more productive in the labor force.

The findings in this paper raise a number of questions, which we might want to further explore to better understand the Nigerian labor market. First, who is a wage earner and who is a self employed? That is, what characteristics determine the selection of an individual into wage or non-wage employment? Second, are changing supply/demand conditions in the labor market responsible for the observed patterns in wage returns to post-secondary education? Specifically, does changing supply of more educated workers explain the relative wages received by different education groups in Nigeria? Third, how does the relative supply of men and women substitute for each other as we study more and less educated labor? Finally, are the observed low returns to primary and secondary education an evidence of a decline in the quality of basic education in Nigeria?

⁴⁶ Becker (1960) argues that imperfection in the capital market may be responsible for why a higher proportion of able youngsters from low-income families do not go to college.

REFERENCES

- Akangbou S.D., (1977), "The Allocation and Utilization of Resources in Education: A Case Study of Mid-western Nigeria", Unpublished PhD Thesis, University of York, Cited in Odusola A.F. (1998)
- Angrist, Joshua D., and Alan B. Krueger, (1995), "Does Compulsory Schooling Attendance Affect Schooling and Earnings", Quarterly Journal of Economics, 106 (4): 979-1014.
- Becker, G.S., (1960). "Under-investment in College Education", American Economic Review 50 (2): 346-354.
- Becker, G.S., (1962), "Reflections on Investment in Man ", Journal of Political Economy 70 (5): 9-49.
- Becker, G.S., (1964), Human Capital, Columbia University Press, New York`.
- Becker, G.S., (1981), A Treatise on the Family, Harvard University Press, Cambridge, Massachusetts.
- Card, David, (1999), "The Causal Effect of Education on Learning", Ashenfetter, O. and D. Card (eds), Handbook of Labor Economics, 3: 1801-1861
- Card, David, (2001), "Estimating the Return to Schooling: Progress on some Persistent Econometric Problems", Econometrica, 69 (5): 1127-1160.
- Card, David and Lemieux Thomas, (2001), "Can Falling Supply Explain the Rising Return to College for Younger Men? A Cohort Analysis." Quarterly Journal of Economics 116 (2): 705-746.

- Federal Office of Statistics, Nigeria, (2000), 1996/97 General Household Survey National Report, Federal Office of Statistics, Lagos, Nigeria.
- Haveman, Robert H., and Barbara L. Wolfe, (1984), "Schooling and Economic Well-being: The Role of Non- market Effects", Journals of Human Resources 19 (3): 377-407.
- Heckman J. J., (1979), "Sample Selection Bias as a Specification Error", Econometrica, 47 (1): 153-162.
- Heckman, James and Solomon Polachek, (1974), "Empirical Evidence on the Functional Form of the Earnings-Schooling Relationship", Journal of American Statistical Association 69 (346): 350-354.
- Johnson, G. E., and Frank P. Stafford, (1973), "Social Returns to Quantity and Quality of Schooling", Journals of Human Resources 8 (2): 139-155.
- Lam, David, and Robert F. Schoeni, (1993), "Effects of Family Background on Earnings and Returns to Schooling: Evidence from Brazil", Journal of Political Economy 101 (4): 710-740.
- Mincer Jacob (1958), "Investment in human Capital and Personal Income Distribution", Journal of Political Economy 66 (4): 281 - 302
- Mincer, Jacob (1974), Schooling Experience and Earnings, Columbia University Press, New York
- Mwabu, G. and T.P. Schultz, (2000), "Wage Premia for the Education and Location of Workers in South Africa, by Gender and Race," Economic Development and Cultural Change, 60 (1): 126-142.

- Odusola, A.F (1998), “Human Capital Investment and the Empirics of Economic Growth in Nigeria”, in Aigbokan B.E (ed), Rekindling Investment for Economic Development in Nigeria, Nigerian Economic Society, Ibadan, Nigeria, pp 257-272.
- Okedara, J.T. (1985), “Cost and Benefit Analysis of Formal and Non-formal Education: A Case Study”, The Nigerian Journal of Economics and Social Studies 20 (1): 89-110.
- Psacharopoulos George (1973), Returns to Education: An International Comparison. Elsevier, London
- Psacharopoulos, George (1985), “Returns to Education: Further International Updates and Implications”, Journal of Human Resources 20 (4): 583-604
- Psacharopoulos, G., and M. Woodhall, (1985), Education for Development, Oxford University Press, New York.
- Rosen, Sherwin (1977), “Human Capital: A Survey of Empirical Research”, in (ed) Ehrenberg, R.G., Research in Labor Economics, 1: 3-39
- Schultz, T.P. (1988), “Educational Investments and Returns”, in H. Chenery and T.N. Srinivasan, (eds), Handbook of Development Economics, Vol. 1, Chapter 13, Amsterdam: North Holland.
- Schultz, T.P. (1993), “Investments in Schooling and Health of Women and Men” Journal of Human Resources. 28 (3): 694-734
- Schultz, T.P. (2001), “ Higher Education in Africa: Monitoring Efficiency and Improving Equity”, Paper Presented at the Conference on International Higher Education and African Development” Yale Center for International Area Studies, October 18-21, 2001, Yale University, New Haven CT.

Schultz, T.P. (2002), “ Why Governments Should Invest More To Educate Girls”, World Development 30 (2): 207-225.

Schultz, T.W. (1961), “Investment in Human Capital”, American Economic Review 51, (1): 1-17.

Schultz, T.W. (1962), “Reflections on Investment in Man ”, Journal of Political Economy 70 (5): 1-8

Sumner, A. Daniel (1981), “ Wage Functions and Occupational Selection in a Rural Less Developed Country Setting” The Review of Statistics and Economics 63 (4): 513-519.

World Bank (1990), World Development Report, 1990: Poverty, The World Bank, Washington DC.

World Bank (1990), World Development Indicators CD, 2001, The World Bank Washington DC.

Table 1: Nigeria: Gross School Enrollment Rates ^a, GDP Per Capita ^b, Expenditure on Education ^a, and Share of Income Spent on Education ^d

| Year | Gross School enrollment rates (%) | | | | | | | | | GDP /Capita (1995 Us \$) | Share of GNI spent on education (%) | Expenditure on education \$million |
|----------------------|-----------------------------------|--------|-------|------------------|--------|-------|-----------------------|--------|-------|---------------------------|-------------------------------------|------------------------------------|
| | Primary School | | | Secondary School | | | Post-Secondary School | | | | | |
| | Male | Female | Total | Male | Female | Total | Male | Female | Total | | | |
| 1965 ^d | 39.0 | 24.0 | 32.0 | 7.0 | 3.0 | 5.0 | N/A | N/A | N/A | 245 | 1.89 | N/A |
| 1970 | 55.3 | 32.2 | 43.7 | 7.2 | 3.1 | 5.2 | 0.9 | 0.1 | 0.5 | 264.4 | N/A | N/A |
| 1975 | 60.3 | 40.3 | 50.3 | 10.4 | 5.6 | 8.0 | 1.7 | 0.3 | 1.0 | 301.2 | N/A | N/A |
| 1980 | 122.6 | 95.0 | 108.8 | 24.0 | 12.0 | 18.0 | N/A | N/A | 2.7 | 314.2 | 6.38 | 4950.1 |
| 1985 | 115.4 | 91.8 | 103.6 | 40.1 | 27.9 | 34.0 | 5.2 | 1.9 | 3.5 | 230.3 | 1.17 | 814.8 |
| 1990 | 103.7 | 79.0 | 91.4 | 28.5 | 21.2 | 24.9 | 6.0 | 2.3 | 4.1 | 258.5 | 0.99 | 257.8 |
| 1994 | 109.4 | 86.6 | 98.0 | 36.2 | 30.3 | 33.2 | N/A | N/A | 4.3 | 253.9 | 0.92 | |
| 1995 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 253.0 | 0.70 | 151.5 |
| 1996-98 ^c | 89.0 | 74.0 | 82.0 | 37.0 | 27.0 | 34.0 | N/A | N/A | N/A | 255.0 | N/A | N/A |
| 1999 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 250.0 | N/A | N/A |

Total: represent both male and female

a: Source: UNESCO (2001) measured as the ratio of registered students at the particular level of schooling to the total population of the age group that should be enrolled at that level.

b : source: World Bank world development indicator (2001) and valued in foreign exchange

c: source :African Development Bank African Indicators (2002) – Selected Statistics on African Countries.

d: source: World Bank world development indicator (2001)

GNI is gross national income.

Table 2: Means and Standard Deviations (in parenthesis) for Work-Age Adults by Sex and Age

| | Male | | | | Female | | | |
|-----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 25-34 | 35-44 | 45-64 | 15-64 | 25-34 | 35-44 | 45-64 | 15-64 |
| Years of primary education | 3.55 (2.90) | 2.85 (2.95) | 2.16 (2.81) | 3.34 (2.92) | 2.32 (2.87) | 1.91 (2.73) | 1.27 (2.39) | 2.42 (2.89) |
| Secondary education | 2.07 (2.67) | 1.47 (2.44) | 0.84 (1.98) | 1.75 (2.45) | 1.04 (2.15) | 0.67 (1.79) | 0.35 (1.35) | 1.08 (2.09) |
| Post secondary education | 0.17 (0.71) | 0.15 (0.70) | 0.11 (0.60) | 0.12 (0.61) | 0.07 (0.47) | 0.06 (0.44) | 0.03 (0.34) | 0.053 (0.41) |
| Total Years of education | 5.75 (5.31) | 4.44 (5.15) | 3.07 (4.51) | 5.19 (5.07) | 3.41 (4.67) | 2.61 (4.15) | 1.65 (3.40) | 3.53 (4.62) |
| Years of working experience | 12.99 (3.20) | 22.95 (3.16) | 36.42 (5.77) | 18.3 (13.8) | 13.27 (2.98) | 23.17 (2.89) | 36.37 (5.53) | 16.4 (12.0) |
| Age (years) | 29.03 (2.69) | 38.72 (2.66) | 51.87 (5.50) | 34.03 (13.6) | 28.77 (2.64) | 38.51 (2.63) | 53.65 (3.40) | 31.8 (11.9) |
| 1997/98 dummy | 0.37 (0.48) | 0.37 (0.48) | 0.37 (0.48) | 0.37 (0.48) | 0.37 (0.48) | 0.37 (0.48) | 0.37 (0.48) | 0.37 (0.48) |
| 1998/99 dummy | 0.28 (0.45) | 0.28 (0.45) | 0.29 (0.45) | 0.28 (0.45) | 0.28 (0.45) | 0.28 (0.45) | 0.29 (0.45) | 0.28 (0.45) |
| No of observation | 21433 | 21819 | 27129 | 100872 | 31772 | 23040 | 17908 | 104864 |

Source: estimated from Nigeria General Household Survey Data (1996/97-1998/99)

Table 3: Means and Standard Deviations (in parenthesis) for Wage Workers by Sex and Age

| | Male | | | | Female | | | |
|-------------------------------|----------------|-----------------|----------------|-----------------|-----------------|-----------------|----------------|-----------------|
| | 25-34 | 35-44 | 45-64 | 15-64 | 25-34 | 35-44 | 45-64 | 15-64 |
| Years of primary education | 5.58 (1.48) | 5.50 (1.61) | 5.09 (2.07) | 5.38 (1.77) | 5.66 (1.30) | 5.41 (1.73) | 4.59 (2.47) | 5.40 (1.74) |
| Secondary education | 4.39 (2.38) | 4.16 (2.52) | 3.46 (2.78) | 3.98 (2.60) | 4.58 (2.27) | 4.31 (2.45) | 3.48 (2.82) | 4.29 (2.46) |
| Post secondary education | 0.52 (1.16) | 0.75 (1.41) | 0.70 (1.40) | 0.64 (1.32) | 0.74 (1.35) | 0.94 (1.47) | 0.81 (1.44) | 0.76 (1.37) |
| Average Years of education | 10.5 (3.87) | 10.42 (4.32) | 9.26 (5.00) | 10.00 (4.47) | 10.99 (3.79) | 10.66 (4.53) | 8.89 (5.68) | 10.44 (4.44) |
| Years of working experience | 12.2 (3.11) | 21.0 (3.55) | 32.9 (2.77) | 21.3 (9.65) | 11.4 (3.32) | 20.5 (3.57) | 32.5 (5.50) | 16.8 (9.05) |
| Age (year) | 29.7 (2.49) | 38.6 (2.66) | 50.2 (4.86) | 38.8 (9.35) | 29.2 (2.65) | 38.3 (2.64) | 50.0 (4.76) | 34.5 (8.81) |
| 1997/98 dummy | 0.36 (0.47) | 0.35 (0.48) | 0.35 (0.48) | 0.35 (0.48) | 0.36 (0.48) | 0.36 (0.48) | 0.34 (0.48) | 0.35 (0.48) |
| 1998/99 dummy | 0.28 (0.45) | 0.28 (0.45) | 0.29 (0.45) | 0.28 (0.45) | 0.29 (0.43) | 0.30 (0.46) | 0.33 (0.47) | 0.28 (0.45) |
| Natural log of hourly wage | | | | | | | | |
| Total | 2.62 (0.58) | 2.74 (0.58) | 2.76 (0.64) | 2.70 (0.61) | 2.50 (0.56) | 2.63 (0.56) | 2.64 (0.63) | 2.53 (0.58) |
| No Education | 1.43 (0.66) | 1.58 (0.58) | 1.48 (0.65) | 1.49 (0.63) | 1.22 (0.60) | 1.37 (0.63) | 1.34 (0.58) | 1.28 (0.60) |
| Some Primary Education | 1.51 (0.60) | 1.63 (0.51) | 1.69 (0.59) | 1.61 (0.57) | 1.23 (0.53) | 1.45 (0.51) | 1.61 (0.46) | 1.36 (0.52) |
| Some Secondary Education | 1.71 (0.52) | 1.84 (0.56) | 1.94 (0.58) | 1.81 (0.56) | 1.56 (0.50) | 1.67 (0.50) | 1.76 (0.56) | 1.58 (0.52) |
| Some Post Secondary Education | 2.01 (0.60) | 2.10 (0.55) | 2.21 (0.57) | 2.11 (0.57) | 1.92 (0.53) | 2.00 (0.52) | 2.10 (0.64) | 1.97 (0.54) |
| No of observation | 2657 | 3330 | 2710 | 9065** | 1273 | 1079 | 454 | 3135 |

Source: estimated from Nigeria General Household Survey Data (1996/97-1998/99)

**This total is higher than the addition of the figures across the three age groups. The reason is that the age group 15-24 is included in this total even though it is excluded from the age group analysis. Majority of individuals in this age category is still in school or is waiting to go to school

Table 4: Means and Standard Deviations (in parenthesis) for Self Employed Workers by Sex and Age

| | Male | | | | Female | | | |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
| | 25-34 | 35-44 | 45-64 | 15-64 | 25-34 | 35-44 | 45-64 | 15-64 |
| Years of primary education | 2.95 (2.95) | 2.28 (2.85) | 1.73 (2.68) | 2.26 (2.85) | 4.25 (2.64) | 3.12 (2.90) | 1.55 (2.54) | 2.29 (2.91) |
| Years of secondary education | 1.37 (2.34) | 0.88 (1.99) | 0.44 (1.48) | 0.84 (1.95) | 1.71 (2.52) | 0.86 (1.97) | 0.32 (1.26) | 0.96 (2.06) |
| Years of post secondary education | 0.020 (0.29) | 0.026 (0.28) | 0.029 (0.31) | 0.026 (0.29) | 0.020 (0.28) | 0.020 (0.23) | 0.020 (0.21) | 0.020 (0.24) |
| Average Years of education | 4.34 (4.79) | 3.18 (4.39) | 2.20 (3.70) | 3.13 (4.33) | 5.99 (4.4) | 4.00 (4.20) | 1.88 (3.35) | 3.94 (4.35) |
| Years of working experience | 13.9 (2.84) | 23.4 (2.91) | 36.8 (5.63) | 25.8 (10.97) | 13.4 (3.07) | 23.4 (2.91) | 37.1 (5.62) | 24.2 (11.59) |
| Age (years) | 29.4 (2.59) | 38.8 (4.39) | 38.8 (2.66) | 41.2 (10.78) | 29.2 (2.7) | 38.7 (2.65) | 52.2 (5.52) | 39.57 (11.31) |
| 1997/98 dummy | 0.38 (0.48) | 0.37 (0.48) | 0.37 (0.48) | 0.35 (0.48) | 0.37 (0.48) | 0.36 (0.48) | 0.36 (0.48) | 0.35 (0.48) |
| 1998/99 dummy | 0.27 (0.45) | 0.28 (0.45) | 0.29 (0.45) | 0.28 (0.45) | 0.27 (0.45) | 0.29 (0.45) | 0.29 (0.45) | 0.28 (0.45) |
| Natural log of hourly wage | | | | | | | | |
| Total | 2.29 (0.62) | 2.36 (0.66) | 2.41 (0.66) | 2.36 (0.65) | 2.07 (0.56) | 2.14 (0.58) | 2.13 (0.60) | 2.11 (0.58) |
| No Education | 1.30 (0.59) | 1.36 (0.62) | 1.45 (0.65) | 1.39 (0.63) | 1.10 (0.59) | 1.18 (0.55) | 1.18 (0.57) | 1.16 (0.56) |
| Some Primary Education | 1.45 (0.60) | 1.57 (0.63) | 1.64 (0.62) | 1.56 (0.62) | 1.14 (0.53) | 1.26 (0.55) | 1.35 (0.59) | 1.23 (0.56) |
| Some Secondary Education | 1.59 (0.65) | 1.77 (0.65) | 1.86 (0.65) | 1.68 (0.66) | 1.31 (0.58) | 1.47 (0.62) | 1.65 (0.71) | 1.38 (0.62) |
| Some Post Secondary Education | 1.89 (0.61) | 2.13 (0.75) | 2.20 (0.68) | 2.10 (0.70) | 1.61 (0.72) | 1.71 (0.66) | 2.21 (0.77) | 1.83 (0.77) |
| No of observation | 13457 | 16911 | 22527 | 55135 | 6818 | 7251 | 8841 | 24826 |

Table 5: Estimates of Earnings Function in terms of Total Years of Schooling Completed.
(Ages 15-64 years)

| | Wage workers | | Self-employed workers | |
|--|------------------|------------------|-----------------------|------------------|
| | Male | Female | Male | Female |
| Years of schooling | 0.046 (33.2) | 0.053 (23.4) | 0.036 (56.1) | 0.028 (30.1) |
| Work experience | 0.024 (9.48) | 0.028 (7.75) | 0.022 (19.4) | 0.019 (13.8) |
| Quadratic term for Work experience * 10 ⁻² | -0.031 (5.90) | -0.033 (3.71) | -0.025 (12.2) | -0.024 (9.3) |
| 1997/1998 dummy | -0.025 (1.81) | -0.084 (3.69) | -0.042 (6.68) | -0.046 (5.44) |
| 1998/1999 dummy | 0.042 (2.83) | -0.098 (4.12) | -0.005 (0.74) | -0.034 (3.77) |
| Constant (1996) | 1.022 (32.4) | 0.805 (36.6) | 1.020 (68.5) | 0.866 (47.9) |
| Adjusted R-squared** | 0.121 | 0.173 | 0.068 | 0.040 |
| Prob>F | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Number of observation | 9065 | 3135 | 55135 | 24826 |

Source: estimated by author from Nigeria General Household Survey data (1996/97-1998/99)
Figures in parenthesis are absolute t-values

Table 6: Estimates of Earnings Function in terms of Spline of Years of Schooling Completed.
(Ages 15-64 years)

| | Wage workers | | Self-employed workers | |
|---|------------------|-------------------|-----------------------|-------------------|
| | Male | Female | Male | Female |
| Years of primary schooling | 0.025 (6.26) | 0.024 (3.46) | 0.032 (28.5) | 0.019 (12.8) |
| Years of secondary schooling | 0.039 (13.4) | 0.044 (8.43) | 0.037 (21.6) | 0.038 (18.4) |
| Years of post-secondary schooling | 0.104 (21.6) | 0.122 (16.5) | 0.137 (14.6) | 0.154 (10.2) |
| Work experience | 0.024 (9.76) | 0.029 (8.11) | 0.021 (19.2) | 0.020 (14.6) |
| Quadratic term for Work experience * 10 ⁻² | -0.033 (6.27) | -0.039 (4.44) | -0.025 (12.1) | -0.027 (10.3) |
| 1997/98 dummy | -0.023 (1.84) | -0.078 (3.49) | -0.042 (6.66) | -0.047 (5.49) |
| 1998/99 dummy | 0.038 (2.54) | -0.104 (4.42) | -0.005 (0.80) | -0.035 (3.91) |
| Constant (1996/97) | 1.129 (33.9) | 0.956 (20.5) | 1.029 (69.0) | 0.873 (48.3) |
| Adjusted R-squared ** | 0.138 | 0.201 | 0.064 | 0.044 |
| Prob>F | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Number of observation | 9065 | 3135 | 55513 | 24826 |

Source: estimated by author from Nigeria General Household Survey data (1996/97-1998/99)

Figures in parenthesis are absolute t-values

**A statistical test of significant difference in the explanatory power of the two different specifications of the earnings model in tables 5 and 6 resulted in the rejection of the null hypothesis of equality of the two specifications at 5% significance level.

Table 7: Private Returns to Schooling by Sex and Age Group for Wage Workers

| | Male | | | Female | | |
|---|------------------|------------------|------------------|------------------|------------------|------------------|
| | 25-34 | 35-44 | 45-64 | 25-34 | 35-44 | 45-64 |
| Years of primary education | 0.016 (1.91) | 0.013 (1.90) | 0.041 (6.23) | 0.008 (0.63) | 0.021 (1.83) | 0.045 (2.91) |
| Years of secondary education | 0.040 (6.45) | 0.039 (7.56) | 0.042 (7.55) | 0.072 (8.38) | 0.031 (3.28) | 0.042 (2.73) |
| Years of post secondary education | 0.127 (12.0) | 0.120 (13.9) | 0.095 (9.85) | 0.138 (11.3) | 0.136 (9.60) | 0.100 (4.44) |
| Work experience | 0.058 (2.59) | 0.089 (3.17) | 0.067 (3.03) | -0.029 (1.13) | 0.120 (2.59) | 0.202 (3.60) |
| Quadratic term for Work experience * 10 ⁻² | -0.187 (2.04) | -0.159 (2.42) | -0.092 (2.94) | 0.260 (2.37) | -0.235 (2.10) | -0.279 (3.51) |
| 1997/98 dummy | -0.006 (0.26) | -0.031 (1.41) | -0.032 (1.2) | -0.032 (0.95) | -0.113 (3.00) | -0.138 (2.09) |
| 1998/99 dummy | 0.046 (1.73) | 0.050 (2.11) | 0.028 (1.01) | -0.010 (0.27) | -0.194 (4.91) | -0.174 (2.62) |
| Constant(1996/97) | 1.795 (12.6) | 1.194 (3.98) | 1.099 (2.83) | 1.928 (11.9) | 0.834 (1.73) | -1.302 (1.32) |
| Adjusted R ² | 0.104 | 0.114 | 0.147 | 0.194 | 0.154 | 0.197 |
| Prob>F | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| No of observations | 2657 | 3330 | 2710 | 1273 | 1079 | 454 |

*Figures in parenthesis are absolute t-values

* The coefficient of post-secondary education interacted with age cohort 45-64 was statistically different from that of interaction between age cohort 25-34 and post-secondary education at 5% level, for both males and females. Secondary and primary school interactions with age were not statistically significant at 5%. (See appendix 2 for test results)

Table 8: Private Returns to Schooling by Sex and Age Group for Self-employed Workers

| | Male | | | Female | | |
|---|------------------|------------------|------------------|------------------|------------------|------------------|
| | 25-34 | 35-44 | 45-64 | 25-34 | 35-44 | 45-64 |
| Years of primary education | 0.027 (12.1) | 0.038 (18.1) | 0.033 (17.7) | 0.007 (2.63) | 0.015 (5.73) | 0.034 (12.2) |
| Years of secondary education | 0.033 (11.0) | 0.040 (12.3) | 0.047 (13.1) | 0.038 (11.4) | 0.041 (9.84) | 0.052 (9.17) |
| Years of post secondary education | 0.125 (6.82) | 0.155 (8.55) | 0.120 (8.15) | 0.081 (3.33) | 0.098 (3.15) | 0.214 (6.95) |
| Work experience | 0.057 (3.70) | 0.042 (1.67) | 0.023 (2.05) | 0.024 (1.38) | -0.056 (1.61) | 0.194 (1.17) |
| Quadratic term for Work experience * 10 ⁻² | -0.163 (2.89) | -0.074 (1.36) | -0.025 (1.71) | -0.057 (0.89) | 0.133 (1.79) | -0.025 (1.13) |
| 1997/98 dummy | -0.061 (5.00) | -0.050 (4.38) | -0.027 (2.63) | -0.037 (2.39) | -0.068 (4.29) | -0.045 (3.07) |
| 1998/99 dummy | -0.042 (3.19) | -0.006 (0.45) | 0.015 (1.36) | -0.017 (1.02) | -0.061 (3.71) | -0.034 (2.20) |
| Constant (1996/97) | 1.663 (15.8) | 1.603 (5.42) | 1.768 (8.39) | 1.704 (14.4) | 2.610 (6.39) | 1.636 (5.21) |
| Adjusted R ² | 0.052 | 0.070 | 0.049 | 0.032 | 0.042 | 0.058 |
| Prob>F | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| No of observations | 13457 | 16911 | 22527 | 6818 | 7251 | 8841 |

*Figures in parenthesis are absolute t-values

* The coefficient of all education levels interacted with age cohort 45-64 was statistically different from that of interaction between age cohort 25-34 and all education levels at 5% level for female own account workers. In the case of males, statistically significant differences only occur at the secondary school level. (See Appendix 2 for test results)

Appendix 1: Percentage of Persons Reporting Main Activity by
Age Sex and Education Level

| | | Male | | | Female | | | All Ages (15-64) | |
|--------------------------------|---------------------|-------|-------|-------|--------|-------|-------|-------------------|--------|
| | | 25-34 | 35-44 | 45-64 | 25-34 | 35-44 | 45-64 | Male | female |
| No Education | Non-employed | 4.24 | 0.76 | 1.13 | 76.79 | 61.87 | 37.25 | 5.72 | 65.31 |
| | Full time Schooling | 0.68 | 0.31 | 0.36 | 0.31 | 0.24 | 0.34 | 0.86 | 0.49 |
| | employers | 0.63 | 0.44 | 0.49 | 0.03 | 0.08 | 0.18 | 0.45 | 0.07 |
| | wage | 1.96 | 2.32 | 2.19 | 0.31 | 0.62 | 0.74 | 1.99 | 0.47 |
| | Self employed | 81.21 | 94.42 | 95.30 | 9.90 | 22.07 | 47.43 | 80.60 | 20.27 |
| | Cooperative | 11.03 | 1.73 | .5 | 12.63 | 15.11 | 14.01 | 10.01 | 13.32 |
| | producers | | | | | | | | |
| | Unpaid family | 0.25 | 0.03 | .04 | 0.04 | 0.01 | 0.04 | 0.37 | 0.07 |
| workers | | | | | | | | | |
| Total | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Primary Education | Non-employed | 4.57 | 0.93 | 1.38 | 33.17 | 20.37 | 13.41 | 6.00 | 27.38 |
| | Full time Schooling | 5.23 | 1.67 | 1.61 | 3.24 | 1.98 | 2.22 | 13.64 | 10.55 |
| | employers | 0.64 | 0.89 | 0.73 | 0.17 | 0.19 | 0.27 | 0.56 | 0.17 |
| | wage | 8.16 | 11.8 | 10.82 | 2.25 | 2.65 | 2.63 | 8.06 | 1.95 |
| | Self employed | 73.05 | 83.5 | 84.99 | 44.21 | 59.48 | 68.78 | 63.03 | 43.05 |
| | Cooperative | 7.21 | 1.15 | 0.35 | 16.75 | 15.33 | 12.66 | 7.51 | 16.10 |
| | producers | | | | | | | | |
| | Unpaid family | 1.14 | 0.04 | 0.12 | 0.21 | 0.00 | 0.03 | 1.20 | 0.79 |
| workers | | | | | | | | | |
| Total | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Secondary Education | Non-employed | 8.81 | 0.99 | 3.33 | 29.58 | 19.06 | 17.56 | 7.78 | 19.54 |
| | Full time Schooling | 9.51 | 2.71 | 3.08 | 6.40 | 3.02 | 5.47 | 46.01 | 45.77 |
| | employers | 0.92 | 1.46 | 1.52 | 0.58 | 0.64 | 0.53 | 0.59 | 0.25 |
| | wage | 22.67 | 33.90 | 33.51 | 12.44 | 18.46 | 14.93 | 13.65 | 6.80 |
| | Self employed | 52.01 | 60.19 | 58.20 | 41.61 | 51.85 | 54.57 | 27.56 | 21.36 |
| | Cooperative | 5.09 | 0.53 | 0.25 | 8.62 | 6.85 | 6.94 | 3.59 | 5.42 |
| | producers | | | | | | | | |
| | Unpaid family | 0.99 | 0.21 | 0.10 | 0.76 | 0.13 | 0.00 | 0.82 | 0.87 |
| workers | | | | | | | | | |
| Total | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Post Secondary Education | Non-employed | 8.73 | 0.85 | 2.17 | 11.11 | 7.66 | 12.23 | 4.87 | 8.69 |
| | Full time Schooling | 37.19 | 3.61 | 2.34 | 33.23 | 2.70 | 1.08 | 29.64 | 37.03 |
| | employers | 1.27 | 3.82 | 2.92 | 1.21 | 3.60 | 1.80 | 2.12 | 1.62 |
| | wage | 40.61 | 74.66 | 66.44 | 44.65 | 74.02 | 60.79 | 48.67 | 42.98 |
| | Self employed | 11.45 | 16.63 | 26.04 | 8.79 | 11.26 | 22.66 | 14.20 | 8.92 |
| | Cooperative | 0.57 | 0.21 | 0.08 | 0.81 | 0.75 | 1.44 | 0.31 | 0.68 |
| | producers | | | | | | | | |
| | Unpaid family | 0.19 | 0.21 | 0.00 | 0.20 | 0.00 | 0.00 | 0.19 | 0.08 |
| workers | | | | | | | | | |
| Total | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Source: estimated from Nigeria General Household Survey Data (1996/97-1998/99)

Appendix 2: F-test of Significant Difference between Estimated Age-Education Interaction Coefficients.

| Age Group | Wage workers | | Self-employed workers | |
|--------------------------|--------------|--------|-----------------------|--------|
| | Male | Female | Male | Female |
| Primary schooling | | | | |
| 25-34 versus 35-44 | 0.29 | 0.12 | 0.02 | 0.01 |
| 25-34 versus 45-64 | 0.17 | 0.24 | 0.11 | 0.00 |
| 35-44 versus 45-64 | 0.59 | 0.92 | 0.39 | 0.00 |
| Secondary schooling | | | | |
| 25-34 versus 35-44 | 0.13 | 0.00 | 0.04 | 0.32 |
| 25-34 versus 45-64 | 0.46 | 0.07 | 0.00 | 0.02 |
| 35-44 versus 45-64 | 0.46 | 0.81 | 0.15 | 0.15 |
| Post secondary schooling | | | | |
| 25-34 versus 35-44 | 0.06 | 0.13 | 0.20 | 0.31 |
| 25-34 versus 45-64 | 0.02 | 0.00 | 0.93 | 0.00 |
| 35-44 versus 45-64 | 0.12 | 0.09 | 0.16 | 0.02 |

* Figures represent the probability of rejecting the null hypothesis of equality of education coefficients, that is, the likelihood that the coefficient on the schooling variable does not differ between one age group and the other within the same education level. Based on regressions reported in tables 7 and 8.

Figure 1: Five-year Moving Averages of Years of Schooling by Age and Sex

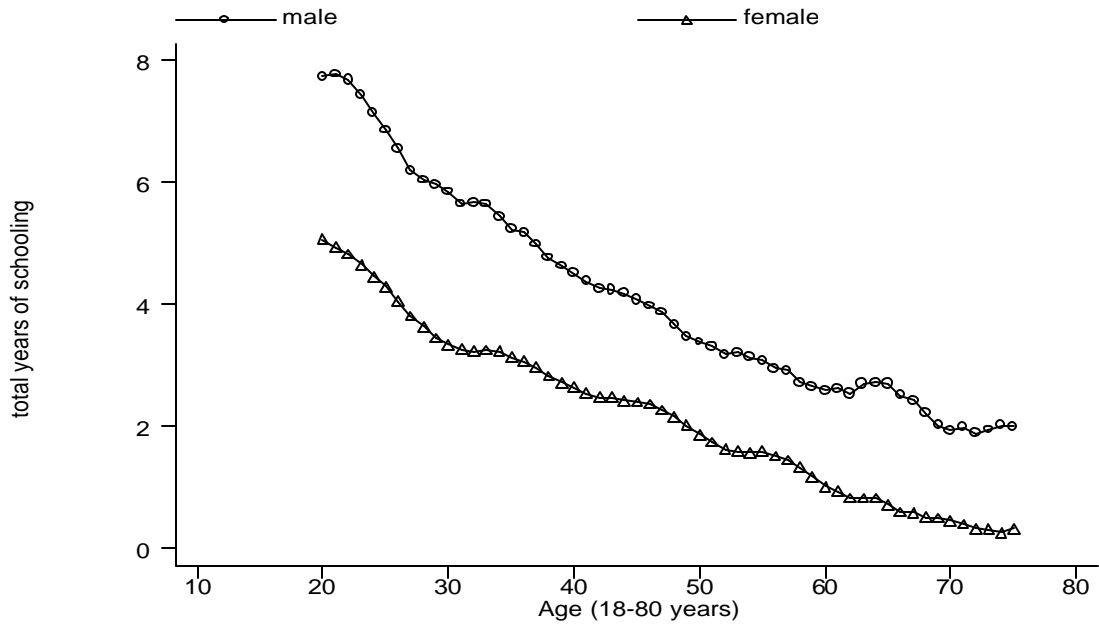


Figure 2: Five-year Moving Averages of Years of Primary Schooling by Age and Sex

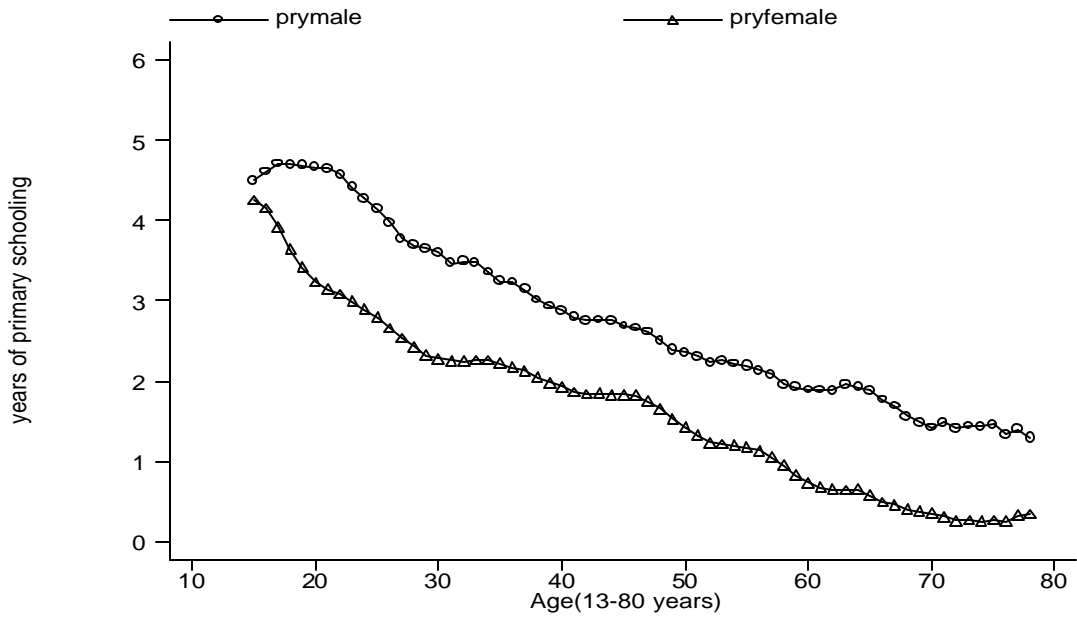


Figure 3: Five-year Moving Averages of Years of Secondary Schooling by Age and Sex

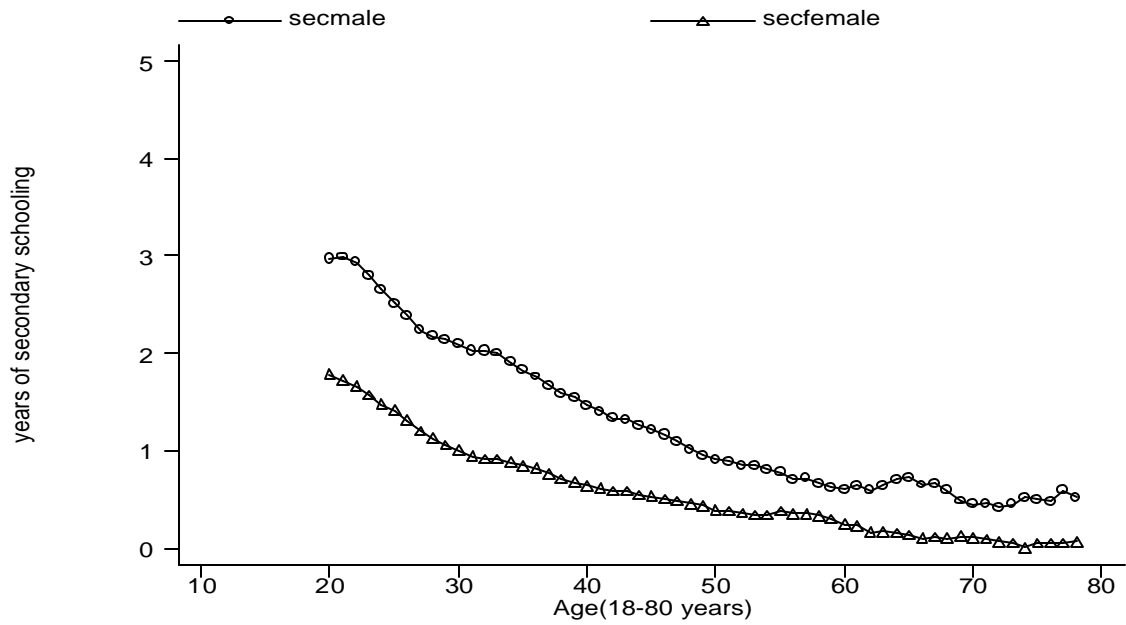


Figure 4: Five-year Moving Averages of Years of Post Secondary Schooling by Age and Sex

