Regional Disparities in Private Returns to Education: Evidence from Nigeria

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Abstract

This paper analyses a regional variation in returns to education in Nigeria. The paper draws on the latest national survey data in the country- the Nigeria Living Standards Measurement Survey (LSMS), to estimate the private returns to the different levels of education across the two regions i.e. the Northern and the Southern region of the country. The results confirm that not only the two regions differ in the level of educational attainment, but also the private returns to education varies sharply across the regions. The results demonstrate, in line with the theoretical literature, that education premium increases with level of education, and tertiary education gives the highest private returns to education in Nigeria. Private returns at all levels of education are lower in the Northern region. We interpret the regional heterogeneity in the education premium as the evidence of a malfunctioning labour market in the country.

Key words: Private return, educational attainment, inequality, regional disparity.

1. Introduction

In the economic literature, educational attainment has been recognised as one of the most important determinants of productivity and earnings particularly for individuals, and for the economy as a whole (Becker, 2009; Dziechciarz, 2011; Mendolicchio & Rhein, 2011; Psacharopoulos, 2007). Also, differences in the returns to education (premium) within an economy have often been postulated as an important factor affecting the dynamics of income distribution among individuals and across regions (Mendolicchio & Rhein, 2011; Whalley & Xing, 2010). In addition, some studies have recently considered the possibility that regional differences in the level of economic growth and development could be as a result of inequalities in the levels of educational attainment (Bronzini and Piselli, 2009; Di Liberto, 2008; López-Bazo and Moreno, 2008; Rodríguez-Pose and Vilalta-Bufí 2005). Thus, sufficient consideration has not been given to the regional heterogeneity in the returns to education in explaining the economic disparities observed across regions in a country. Appropriately, both ought to be considered in examining the regional economic disparities of a country.

Nigeria is the largest economy in the African continent. Yet, its two main regions (i.e. Northern region and Southern region) have very different levels of economic development despite the steady growth of its economy and the government efforts to address the challenge through budgetary allocations for social programs. There are vast regional disparities in socio-economic outcomes in Nigeria, with the North registering the highest levels of poverty and social deprivation compared to the South. The differences in regional poverty rates still remain a pressing issue in Nigeria due to the disparity between the Northern and Southern regions. Disparities in poverty rates were rising in Nigeria mainly because of the sharp variations in the economic performance among the regions. The Northern region had a poverty rate of 58% in 2004, and it increased to 66.2% in 2010, implying an increase in the poverty rate of 7.6 percentage points. This change is higher than the change in the national poverty rate (6.5 percentage points) as shown in Table 1. The poverty level is lower in the Southern region, so is the rate at which it changes over the same period (4.8 percentage points).

Table 1: Regional absolute poverty incidence in Nigeria %

year	National	Northern region	Southern region
2004	54.4	58.0	50.2
2010	60.9	66.2	55.0

Source: NBS Press briefing on Nigeria Poverty Profile 2012 Report

The Northern region of Nigeria is a home to more than half of the county's population but produced only 34% of the national GDP in 2012 whereas the contribution of the Southern region is 66% with its lower population numbers. This fact is clearly illustrated in Figure 1. The survey report of 2012 by the country's office of statistics evidently elaborates the rising income inequality in the country as measured by the Gini-coefficient. By this measure, inequality rose from 0.429 in 2004 to 0.447 in 2010, showing more prominent wage disparity amid the period. Per capita income in the Northeast was 54% below the national average while the Southeast geopolitical zone was 36% above it. The poorest state, Sokoto, in the Northwest region, had the highest number of poor people in the country with 86.4% of its populace living in poverty. Thus the level of regional income inequality in Nigeria is high and future trends are not promising (NBS, 2012). Inequalities across regions within a country are potential problems to the economic as well as political progress of that country (Østby, Nordås, & Rød, 2009).
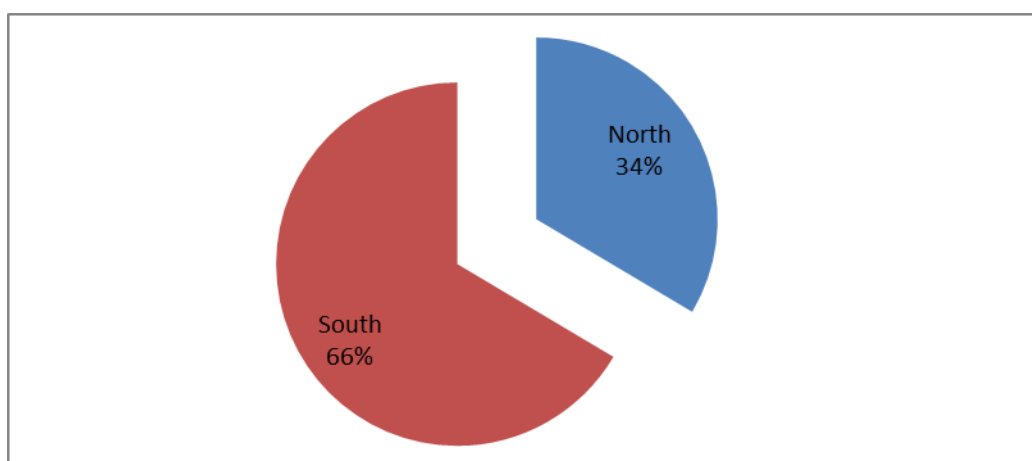

Figure 3: GDP Contribution by Regions in Nigeria

Regional inequality in returns to education within the country could imply the disparity in regional productivity and labour market performance. Similarly, disparity in returns to education across the regions can show the degree of markets integration in a country which implies that, firms and people are constantly uninformed of the distinctive opportunities accessible in the neighbouring regions. Earlier researches have concluded that regional disparity is a key contributor to overall economic disparity in the country (Gustafsson, Li Shi, Terry Sicular, & Yue Ximing, 2008). The literature has, however, neglected the fact that the relative wages of skilled and unskilled labour may be different across different regions. Given the considerable amount of effort devoted in previous literature in trying to estimate education premium, yet it has not been well established whether the imbalance economic status across regions in a country can lead to variation in returns to education. Thus an extension to include in the analysis, the regional disparity in the returns to education could give additional insight into the pattern and extent of regional economic disparity in the country. It seems well established in the literature that wage determination mechanisms could be different between different ownership types of industries or firms, with formal private sector companies sharing a high education than other sectors especially informal private sector (Zhang, & Kanbur, 2005). Meanwhile, in Nigeria, the regions had a different firm ownership mix. Thus, it implies that the two regions could have different education premium.

This paper revisits the returns to education estimates in the context of Nigeria using the appropriate econometric

technique. Our primary contribution to the historical evidence comes from a new data source which improves upon the quality of the data previously available for comparative analysis at regional level in Nigeria. This allows us to estimate the returns to education by region, to see if significant differences exist among the regions and if those differences are aligned with different levels of education. This is, to check whether the regions are also heterogeneous in the returns they get from human capital investment made by people at various levels of education. This has clear implications for evaluating policies expected to improve human capital accumulation so as to push up the development in the lagging regions as the effectiveness of such strategies, all things considered, depends upon the particular effect that human capital could have in every region. The following section provides a short discussion on the theoretical and empirical literature. Section 3 presents the data and econometric methodology applied in the study; Section 4 presents the details of our results while Section 5 concludes.

2. Theoretical and empirical considerations

As showed by the Theory of Human Capital, differentials in returns to education reflect inequality in the level education, and in its distribution among workers, or differences in other worker characteristics, such as experience, gender, race, and so forth. In line with human capital theory is a theoretical framework developed by Mincer (1958 and 1974), Becker (1964), and Becker and Chiswick (1966) that is commonly used to measure the returns to human capital and the differential in earnings by individuals. The idea is that individuals invest in education and on-the-job-training because they expect to increase future returns from their participation in the labour market. They invest in education only if the present value of the expected returns after education is greater than the present value of returns without education. Within this framework, for example, some empirical studies have shown that wage disparities can be attributed to the differences in gender, level of education and experience as well as other characteristics of the worker (Mendolicchio & Rhein, 2014; Arias, Yamada & Tejerina, 2004).

The Theory of Segmentation and the Theory of Polarized Development give yet an alternate interpretation on the regional wage inequalities. According to this line of thought, imbalances are because of contrasts in the structure of production, institutional framework, and level of technology. The Theory of Human Capital allots no role for the demand for labour in deciding wages and dismisses any confinements to labour mobility existing in the different markets. Another line of clarification focuses on remunerating gaps (Nordhaus and Tobin 1972; Rosen 1986). As demonstrated by this understanding, provincial pay differentials are obliged to equalize monetary advantages and disadvantages of sectors and regions among labourers. Factors such as weather conditions, crime rates, and pollution are some of the non-pecuniary factors set forth to clarify territorial pay differentials.

In line with the synthesis of human capital theory that more education brings higher return, Prodromidis and Prodromidis (2008) utilizing three Greek surveys on households (1988, 1994, and 1999) analysed the pattern of returns to education over the period. They discovered substantial rate of returns to higher education, which are however increasing with time. This is consistent with the findings of Petrakis, (2008), that rates of returns to the different levels of education depict a U-shaped curve with the educational level in Greece. Primary and tertiary education levels yield the most significant returns, while secondary level graduates delight in lower return rates. In Europe, Psacharopoulos (2007) asserts that people with tertiary education earn nearly twice as much as those with lower secondary education. Similarly, in Turkey as reported by Tansel and Bircan (2010), the return to education increases with the levels of education so those highest returns are achieved at the university level. Aromolaran, (2006) on the wage return to education in Nigeria found a close link between educational attainment and wages. His estimates of private wage returns to schooling at different levels of schooling shows that the return at the primary level ranges between 2% to 3%; secondary level 4%; and post-secondary level 10 to 15%. Okuwa, (2004) estimated an earning function for the graduates of various levels of education in Nigeria with the aim of accounting for the variations in the rates of return to different levels of education. His findings suggest that the earnings of workers increase with more years of schooling. This was true for all categories of workers, irrespective of gender, or sector of employment.

In the developing world, there is some evidence that suggests some variation in the rate of returns to education for different groups and sectors. The literature shows that in some cases, there are differences in the rate of

returns to education among the sexes. These differences are context specific as the wage premium on education may be higher for males or females depending on the context. Kuepie, Nordman and Roubaud, (2006) found in a survey in Abidjan, Bamako, Cotonou, Dakar, Lomé, Niamey and Ouagadougou that with the exception of Abidjan (in Abidjan, return to schooling is equal for both males and females), returns on schooling are higher for males than females. Similarly, Fasih (2008) observed that in Ghana, earnings premium is not as high for women compared with men. Contrastively, in Pakistan, Fasih (2008) posits that the marginal returns on education are much lower for men than women. Like in Pakistan, in the Nigerian labour market, Aromolaran, (2006) observed that among wage earners, hourly wage rates increase by 10 per cent and 12 per cent per year of post-secondary schooling, for men and women respectively.

However, context-specific and unobserved factors may contribute to the variation in the wage returns on education. The impact of different levels of education may vary with environment and level of development attained. Many studies reported that the basic education attracts higher private return in developing countries than in developed economies, and higher education is more important in terms of private return in middle-income countries than it is in the higher income countries (Psacharopoulos & Patrinos, 2004). Similarly, a study by López-Bazo & Motellón, (2012) shows significant regional differences in the return to education and experience in Spain. Accordingly, wages may differ across the regions on the grounds that different regions may have distinctive levels of educational achievement and different qualities that are accepted to influence the labour compensation to individuals straightforwardly. Oyelere, (2008) inferred that labour market outcomes, in terms of return to education, are the same across the regions in Nigeria. A conceivable clarification to this finding is that, on average, returns to education could be similar across regions in Nigeria, but the returns to certain levels of education may differ across regions, as the regions may have different labour market mix in terms of supply and demand of skill manpower. Whereas traditional theories assume constant or concave marginal returns to education, which guarantee high profitability from the first years of schooling, the findings from West African data help bring to light non-linear returns to education in all sectors, including informal activity (Asafu-Adjaye, 2013; Kuepie, Nordman, & Roubaud, 2009). Such a finding, then, tosses questions on the suitability of evaluating average returns to education and calls for disaggregated appraisals at each level of education. Taking this evidence into consideration, our expectation is that not only the educational attainment level, but also the education premium can vary across regions and across levels of education, thus contributing to wage differentials, both directly and indirectly through the impact that individual's level of education has on the probability of employment.

3   Data and Methodology

3.1   Data set and variables

This paper uses the micro-data obtained from the Nigeria household Living Standards Measurement Survey (LSMS) for 2013, conducted by the country's National Bureau of Statistics with technical support from the World Bank and made available on the World Bank database. This survey covered 5000 households nationwide with a sample drawn using stratified two-stage random sampling procedure ensuring adequate representation of the regional dimensions of the country. The data set offers detailed information on the personal characteristics of the individuals, including the particularities of the household, as well as on the labour conditions of those employed. For the analysis of the private returns to education across the regions, we retain information on individuals, whose age is between 21 to 65 years. We keep only those who are over 21 years because, according to Nigeria's education system, people typically finish college education at the age of 22. The age threshold of 65 reflects current arrangements for retirement age. The rationale behind this is to exclude those who did not complete their study at the time of the survey. Doing this would help to minimize the measurement errors in constructing the education variable, since demographic patterns could vigorously influence the results.

The Average Years of Schooling (AYS) are used to obtain the educational attainment variable (EA) from the data set. This involves assigning some values to reflect years of schooling (YS) of each and every level of education attained by an individual, with each value somehow reflecting the level of formal schooling involved and its contribution to the total educational stock. This is somewhat similar to the International Standard Classification of Education (ISCED) developed by UNESCO but, in this study, with some modifications to capture partial

completion of a particular level of education (for example a person having primary 4 only, or JSS 3). In this case, no schooling could have a value of zero. In Nigeria, the duration of primary education is six years so also secondary education, therefore complete primary could have a value of six and lower if otherwise and the value, in such a case, will depend on the level one stops (e.g. primary 2 will have the value of 2; primary 3 will have the value of 3 and so on), complete lower secondary such as JSS 3 could have a value of nine, upper secondary could have a value of 12, and post-secondary (i.e. sub-degree qualifications such as diploma) could have a value of 14. Degree certificates and equivalent have the value of 16; Masters and Ph.D. could take the value of 18 and 21 respectively.

Table 2:

Official ISCED classification and the author's simplified version

ISCED CLASSIFICATIONS		NIGERIAN CLASSIFICATIONS		
Level	Stage of education	Level	Stage of education	Weight
1	Primary	1	Primary (P1-P6)	6
2	Lower secondary or second stage of basic education	2	Lower secondary (JS1-JS3)	9
3	Upper secondary	3	Upper Secondary (SS1-SS3)	12
4	Sub-Degree (e.g. Diploma)	4	Sub-degree	14
5	Degree	5	First degree	16
		6	masters	18
		7	PhD	21

Source: Authors' computation

There are issues related to the data utilized in the analysis that require further clarification and justifications, specifically on the measure of individual earning. In the data set, individuals' earnings are not reported but their total expenditure. Here, total expenditure is employed as a proxy for income. The expenditure is a good proxy for permanent income of an individual. For example, a low-income earner can withdraw his or her savings, or obtain a loan to spend in order to keep up his or her relative living standard. In contrast, a high-income but indebted worker will need to cut part of his or her income to pay off the obligation. Moreover, information on consumption is less hard to assemble than those on income, particularly in developing nations where self-employed people are hesitant to reveal their income unequivocally (Li & Xu, 2008; Balisacan, Pernia & Asra, 2003). Additionally, the use of expenditure has the advantage of capturing the taxes and social benefits that workers pay/receive over the life cycle which the like of the Mincerian approach could not capture using wages as dependent variable (Boarini & Strauss, 2010). Along these lines, in this study, as outstandingly used in the previous studies, total expenditure is used as an approximation for income.

Experience is measured by the potential experience (exp.) of an individual which is computed as the age of the person minus six years minus years of formal schooling, where the six years represents the period from birth to the starting age of formal schooling. This approach has been used in other studies using a similar survey data (e.g. Ciccone, Cingano, Cipollone & Faini, 2004). The regression also includes dummies for gender (Male) to control for different wage levels between men and women; for industry to control for sector in the labour market; for urbanization (urban) to control for earning differentials between people in the urban and rural areas; and for location (region) as control variables. In order to capture the return to different levels of education in Nigeria, a specification that decomposes years of schooling into variables for primary, secondary and tertiary attainments is estimated (Eqn. 2). A description of the variables is provided in Appendix 1.

3.2 **Empirical specification and estimation**

The traditional Mincerian wage equation is estimated, in which the logarithm of individual income is to be explained by the variables suggested by the above theoretical explanations. Following the Theory of Human Capital framework, let Y_0 be the income of a person without any schooling; £ represents the income of a person

with s years of schooling; and r is the rate of return to schooling. Then, $Y_s = Y_0 e^{rs}$, and $logY_s = Y_0 + rS$. In addition, since the income distribution is log normal, the residuals present a log linear function, which makes the semi logarithm specification the most appropriate for a study of this nature. Therefore, if a linear specification had instead been chosen, the estimator would be inefficient (Azzoni & Servo, 2002). Two models are estimated:

$$Y_{ir} = X_{ir}\beta_r + \beta_2\, edu_{ir} + \pounds_{ir} \qquad\qquad (1)$$

$$Y_{ir} = X_{ir}\beta_r + \beta_2\, (edu\_dummy) + \pounds_{ir} \qquad\qquad (2)$$

Where Y_{ir} is the income of individual i in region r, edu_{ir} and X_{ir} denote level of education and the set of characteristics that affect the income of an individual in a direct way (such as experience, gender, industry and location) respectively. The β_r and β_2 are the vectors of returns associated with the characteristics and education levels respectively. Here, a dummy for each level of education is included to capture the private return associated with each educational level (i.e. Primary, Secondary and Tertiary levels). The quadratic term for experience is included to capture the concavity of the earning profile. To estimate the equations, we apply Chow test of structural difference. The test is used to determine whether, in our case, the wages in the South are determined differently from those in the Northern region (Adkins, 2012).

As acknowledged in the literature a problem of 'endogeneity' might arise; the education variable could be endogenous mostly due to unobserved variation in ability (ability bias). For example, if those who have extended education beyond compulsory schooling have greater ability than those who didn't, then the estimated return to education could be biased upwards since part of the income differential is due to ability or skills acquired outside the school. However, this theoretical expectation has not been consistent with the empirical literature measuring returns to education. Empirical evidences have shown that regressions that have taken care of endogeneity, such as Instrumental Variable (IV) estimates, report higher coefficient for education than the least square (OLS) estimates (see, for example, Uwaifo-Oyelere, 2008). Similarly, Aromolaran, (2006) contended that the extent of the OLS bias is often very small, and in most instances the OLS upward bias brought about by omitting a variable is usually offset by the downward attenuation bias due to measurement errors in generating the average years of schooling..

Because of data limitation (i.e. the LSMS data set does not capture any explicit measures of individual ability) finding a robust instrument would be impossible. Thus, this study has the limitation in dealing with the problem. However, studies using data from the sub-Saharan African countries and OECD countries have reported OLS estimates of returns to schooling that are not substantially different, even after correcting for the ability bias (e.g., Mwabu & Schultz, 2000; Kazianga, 2004; Aromolaran, 2006; Boarini & Strauss, 2010). Based on these evidences, we assume the ability bias to be small and argue that the results are a reasonable approximation of the average return to schooling and do not affect the validity of our conclusion on the regional-comparison estimates, even though they might slightly overestimate this average return if the schooling decision is endogenous to individual innate abilities.

4   Empirical results

The Mincerian earning function described in chapter three (Equation 8) is estimated with robust standard errors in order to control for the presence of heteroskedasticity and influential observations. The first empirical specification assumes that the financial returns to education are constant across the different levels of education-primary, secondary and tertiary. This restriction is a common practice in the literature and has been tested statistically. Table 2 provides the summarized results of the estimated extended Mincer models using least squares. The results show a very significant relationship between each explanatory variable and the log of income as pointed out by their corresponding low p-values. The variables also have entered with the expected signs. As shown in Table 2, the level of experience is positive and significant at 1% ($\beta=0\ .037$; p-value=0.000) and its quadratic form is significant but with a negative sign ($\beta= -0.00042$; p-value=0.000). This affirms that the income of an individual is not a linear function of his experience profile. The turning point at which experience

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ceases to impact positively on income is 44 years, meaning that the effect of experience on income reaches maximum at that point and then becomes negative afterward.

Considering the Gender variable (Dummy_Male), it shows a positive and significant coefficient (β= 0.363; p-value=0. 000). This implies that, there exists a strong evidence of a gender pay gap in favour of men in Nigeria. On average, men earn more than women in Nigeria. Looking at the location variable with respect to urban centres (Dummy_sector), it can be observed that the estimate is positively significant at 1% (β= 0.199), meaning that those working in the urban centres earn more income than workers in the rural areas by about 20%. Finally, considering different sectors of employment in the economy and its associated returns, a dummy variable is used for agricultural industry (DummyIndustry) in order to compare the returns between industries. This is prompted by the fact that the sector has been the main employer of labour in the country and also the highest contributor to the country's Growth Domestic Product (NBS, 2013). The results show that working in the agricultural sector has lesser return as compared to other industries. The coefficient of the industry dummy is negative and highly significant (β= -0.159; p-value=0.000), meaning that the return to labour in the agricultural sector is lower by about 16% than in other sectors. As shown in table 2, the estimated elasticity of income with respect to average educational attainment is statistically significant (β=0.055; p-value=0.000). The private return to one additional year of schooling for Nigeria as a whole is 5.5% on average. This estimate is similar to the findings of previous researches on Nigeria (see, for example, Uwaifo- Oyelere, 2008; Aromolaran, 2006, among others).

In order to estimate the returns to the different levels of education in Nigeria, the restriction that assumes constant returns across levels of education is relaxed. This specification (Eqn. 2) replaces the aggregate or total years of schooling variable in the first Mincerian equation with three different dummy variables for the different levels of education- that is primary, secondary and tertiary levels. This is to allow the marginal return to schooling to vary with the levels of completed education, where different educational levels would have separate effects on income (earnings).

As shown in column two of table 2, the parameter estimates for the relative returns to the different educational attainment levels are statistically significant at the one percent level of significance and come out with the expected signs. The relative returns are highest for tertiary education at about (0.95), followed by secondary education level with 50%. Primary education has the lowest rates of 30%. This shows that the return to workers with tertiary level of education is 95% higher than workers with no education. Similarly, the workers with secondary education earn a higher income than those without education by about 50%, while the difference between those with primary education and those without education is only about 30%. The general pattern of the results is also very similar to those obtained and reported by previous researches conducted in the African continent (e.g. Keswell and Poswell, 2004; Siphambe, 2008; Uwaifo- Oyelere, 2008; Aromolaran, 2006). They all found the marginal rate of return to be very high for tertiary levels compared to the secondary and primary levels of education. Finally, considering the experience and the other control variables that are included in the estimation, no significant changes are observed from the baseline estimates.

To determine whether or not returns to the different levels of education vary across the regions in Nigeria, a Chow test of structural difference is used. The test can be used to detect whether the returns to education in one region are different from another region (Adkins, 2013). Now, if, for example, returns (wages) are determined differently in the south, then the slopes and intercept for southerners will be different from those of northerners. Hence, the null hypothesis of the test is that the coefficients of the two subsets (regions) are equal and the alternative is that they are not. The results of the analysis reveal a significant difference in the returns to education between the two regions. Both the p-values of the Chi-square and F-form associated with the test are very small (p-values=0.000), thus providing sufficient evidence that returns to different levels of education are not equal in the two regions. The details of the test are provided in (Appendix 2)

Table 2:

Private Earning Functions

VARIABLES	(1) model1	(2) model2	(3) model3
Edu	0.0551***	-----	-----
	(0.00253)		
Exp_sq	-0.000415***	-0.000414***	-----
	(3.73e-05)	(3.93e-05)	
gender	0.363***	0.370***	0.284***
	(0.0349)	(0.0351)	(0.0415)
Exp.	0.0370***	0.0360***	0.00186**
	(0.00305)	(0.00320)	(0.000910)
inddmy	-0.160***	-0.158***	-0.117***
	(0.0284)	(0.0283)	(0.0385)
sector	0.200***	0.216***	0.149***
	(0.0258)	(0.0256)	(0.0336)
primary		0.257***	0.418***
		(0.0304)	(0.0477)
second		0.487***	0.639***
		(0.0360)	(0.0522)
tertiary		0.952***	1.051***
		(0.0419)	(0.0629)
rgd1			0.0303
			(0.107)
r_pri			-0.108*
			(0.0644)
r_sec			-0.337***
			(0.0686)
r_tertiary			-0.236***
			(0.0821)
r_gender			0.188*
			(0.0975)
r_indtry_dumy			-0.0192
			(0.0572)
r_sector			0.185***
			(0.0540)
Constant	11.34***	11.39***	11.85***
	(0.0705)	(0.0726)	(0.0771)
Observations	4,979	4,979	4,979
R-squared	0.204	0.204	0.181

Note: Robust standard errors in parentheses;*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Column three of table 2 shows the results for the differences in private returns to the different levels of education for the two regions. It can be seen that both the return to tertiary education and the return to secondary education are statistically lower in the northern region than in the southern region as shown by the negative coefficients associated with the interactive effects of the two levels of education and regional dummy for the northern region. The coefficients are statistically significant at 1% with β-values of -0.218 for tertiary education and -0.312 for secondary education. This means that, for people with the same level of education, it is more rewarding to work in the southern region than in the northern regions. The results show no significant difference in returns to primary education across the regions, as indicated by the high probability value of the coefficient of the variable on primary education (β= -0.094; p-value=0.152). However, the regional gap in returns to education in Nigeria is greater with respect to secondary education than tertiary education. This may be connected with the fact that, compared to people with only secondary education, most of the people with higher educational attainment (tertiary) in both regions are employed in the formal sector (i.e. Public sector), which by law, there is little or no discrepancy in their earnings.

This finding contrasts with the conclusion of Uwaifo-Oyelere, (2008) which differences in regional returns to education do not exist in Nigeria. His findings are based on a simple t-test using aggregate years of schooling as education variable. This study has gone further to use more robust techniques (i.e. Chow test), and also decomposed the education variable into different levels: namely; Primary, Secondary and Tertiary. This result is robust to the influence of heteroskedasticity and influential observations as the conclusion is based on robust standard errors. The result is also robust to a specification test as the null hypothesis in the 'RESET' specification test could not be rejected. The detailed result of the test is shown in Appendix 3.

5. Conclusion

This paper provides the estimates of private return to the different levels of education across regions in Nigeria. Using econometric approach, Labour-market returns have been obtained by cross-sectional regressions based on micro data from a national survey, which allow controlling for a number of personal characteristics for estimating the effect of education on individual income. The study uncovers heterogeneous effects between gender groups and across regions in the country. The findings show the existence of a significant variation in the returns to the different levels of education across the regions. Returns to all levels of education are lower in the north than in the south. The heterogeneity in the returns to education can be seen as the evidence of a mal-functioning and discrepancy of the labour market in Nigeria. An immediate implication could be drawn from these findings. It creates the impression that policy meant to improve educational attainment is a good step towards enhancing workers' productivity and in bringing down the danger of being unemployed and non-participation in the labour market. The impact of these approaches is likely to be stronger in regions with lower levels of advancement. Accordingly, bringing up the level of educational attainment in these areas would help towards regional convergence in labour market outcomes.

The high rate of return for higher level of education demonstrates that the income gap between the most astounding and least educated labourers is noteworthy. Moreover, this may be one of the reasons why Nigeria is having such a great and expanding income disparity both between and within regions. The disparity might additionally work to keep the recorded economic growth away from being pro-poor or being capable of decreasing poverty. From a policy standpoint, however, the rising pattern of private rates of return to education by level of education proposes that there exists some space for private financing at a college level or university levels. A shift of some part of the cost burden from the government to the direct beneficiaries and their families is not likely to create a disincentive of investing in higher education given the high private rates of return at that level of education.

Appendix

Appendix 1a

Description of the essential continuous variables

Variable	Description	Unit	Mean	Std. Deviation
Exp	Potential experience	years	29.5	15.0(5.2)
Edu	Educational attainment from 0-21 (illiterate=0,….Doctorate=21)		5.87	5.73
Totexp	Total annual expenditure per person	'000	417782	408469
N=4979				

Note: Expenditure is measured in local currency (Naira).

Source: Authors' calculations using World Bank LSMS Data (2013)

Appendix 1b

Description of some discrete variables

Variable	Description	Frequency		Percentage
Sector	worker living in Rural or Urban areas (rural=0; urban=1)	0	3,365	68.0
		1	1,614	32.0
Industry	Whether a person is working in the agricultural sector or not (Agriculture=1; otherwise=0)	0	1,112	22.0
		1	3,867	78.0
Gender	Whether a worker is male or female (male=1; female=0)	0	740	15.0
		1	4,239	85.0
Number of observations	4979			

Source: Authors' calculations using World Bank LSMS Data (2013)

Appendix 2

Chow test of structural difference with respect to regions

VARIABLES	l_totexp
gender	0.283***
	(0.0415)
age	0.00102
	(0.00116)
inddmy	-0.113***
	(0.0387)
sector	0.149***
	(0.0336)
primary	0.409***
	(0.0482)
second	0.624***
	(0.0533)
tertiary	1.040***
	(0.0632)
rgd1	-0.0654
	(0.147)
r_pri	-0.0934
	(0.0651)
r_sec	-0.312***
	(0.0721)
r_tertiary	-0.218***
	(0.0826)
r_gender	0.194**
	(0.0980)
r_inddmy	-0.0271
	(0.0574)
r_sector	0.183***
	(0.0541)
r_age	0.00170
	(0.00183)
Constant	11.90***
	(0.0884)
Observations	4,979
R-squared	0.181
Chi-square(8)	46.23***
F-form:F(8, 4963)	5.779***

Note: Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Derived from the estimated regression equation.

Appendix 3

Auxiliary regression for RESET specification test, using observations 1-4979

Dependent variable: ln(totexp)

Variable	Coefficient	Std. Error	t-ratio	p-value
Constant	40.85	15.918	2.566	0.010
Gender	2.322	1.067	2.176	0.029
Exp	0.005	0.003	2.058	0.039
Industry_Dmy	-0.761	0.352	-2.159	0.030
Sector	1.305	0.602	2.167	0.030
Primary	1.738	0.799	2.176	0.029
Secondary	2.511	1.155	2.174	0.029
Tertiary	5.404	2.495	2.166	0.030
Yhat^2	-0.202	0.111	-1.815	0.070

*Test statistic: F = 3.293469, with p-value = P(F(1,4970) > 3.29347) = 0.0696

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