

Sectoral choices and wage differences among Nigerian public, private and self-employees

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Abstract

Purpose – How does wage employment differ from self-employment in Nigeria? The purpose of this paper is to explore the determinants of participation and the resulting wage differentials with respect to individual employees in self-employment, public-wage employment and private-wage employment in the Nigerian labour market.

Design/methodology/approach – Using the most recent cross-sectional data from the general household survey (GHS) panel for 2012/2013 wave (Nigeria National Bureau of Statistics (NBS), 2012), this paper applies the multinomial logit estimation for the sectoral choice and selectivity-corrected wage equation where appropriate.

Findings – Consistent with other studies in Africa, the findings confirm that the Nigerian labour market is heterogeneous. Factors affecting sectoral choices differ greatly across the analysed sectors. Education, age and geopolitical zones are observed to be the major determinants of sectoral participation. On the basis of BFG estimates, the authors find evidence of downward bias only in the public sector wages that is due to the (Bourguignon, Fournier & Gurgand) allocation of individuals with better unobservable characteristics out of the public employment into the self-employment. Consequently, the human capital variables become no longer significant in the public wage equation after correcting for selectivity bias. However, education and gender are found to be significant determinants of wages in the private and self-employment sectors. The magnitude of the gender coefficient is more negative in self-employment, which may imply a possible gender wage gap in that sector. While the North-East, North-West and South-South zones are highly statistically significantly different from zero in the public sector, only the South-South and South-West zones appear to be significant in self-employment. Hence, such zonal variables are a reflection of differences in economic incentives in Nigeria.

Research limitations/implications – Given the unregulated and precarious nature of employment in self-employment, adequate policies that address gender bias orientations are suggested.

Originality/value – This paper is one of the first that addresses sectoral choices and wage differentials among public, private and self-employment using the most recent GHS data for Nigeria.

Keywords Wage differentials, Nigeria, Self-employment, Labour market heterogeneity, Sectoral choice and selectivity bias, Wage employment

Paper type Research paper

1. Introduction

Labour markets are heterogeneous in terms of labour supply and labour demand (Aminu, 2010; Fields, 2007, 2011; Glick and Sahn, 1998; Gindling, 1991). Thus, the welfare impact of the labour market on individuals differs according to their human capital endowments (productivities) and the firm productivity that they work in. Firm productivity varies by regions and economic sectors. Besides, labour and firm productivity studies on earning differences show that employment modes (being in paid or self-employment) also matters in understanding the differences in welfare impact of the labour market. In the developing countries, one striking feature of the labour markets is the coexistence of a highly regulated public- and private-wage-employment sectors and the less regulated self-employment sector (Gindling, 1991). This feature, further leads to a possible firm heterogeneity across these employment options where factors affecting employment choices and wage determinants differ across regions, occupations, places of residence and so on.



In the presence of the firm, heterogeneity also lies the issue of differences in sectors, which have social and economic implications for workers. Economic perspectives include possible wage differences not only associated with individual characteristics but also equally due to institutional policies and limited mobility to high-paying jobs (Garibaldi and Taddei, 2013). Fields (2007) holds that jobs in the wage and self-employments differ in terms of quality and type, and thus most labour market participants would go for jobs of higher quality; however, such jobs are available to a limited group of the workforce based on their skills. This then implies that those who do not meet requirements may opt for alternative employment choices, such as self-employment, or remain unemployed.

It has been argued that such differences across sectors invariably translate into different vulnerabilities and poverty shocks – especially for households in the disadvantaged path of the market. Thus, this can be interpreted to imply that higher levels of poverty in developing countries would lead to negative impacts on the most vulnerable groups. In most developing countries, a significant number of people live under the poverty line. For instance, about 46 per cent of the Nigerian population lived on less than \$1.90 PPP (based on the 2011 PPP) per day in 1986, and this figure increased to 61 per cent in 2010 (Nigeria National Bureau of Statistics (NBS), 2010).

Consistent with the persistence of heterogeneity in the developing countries, the Nigerian labour market is often characterised by wage differences between the wage-employment sector (private-public sector) and self-employment (see Ogwumike *et al.*, 2006). Self-employed persons accounted for 55 per cent while salaried workers in both the private and public sectors were about 39 per cent of employment (National Manpower Board (NMB), 1998). A dominant view exists that neoliberal policies and the rationalisation of employment led to the burgeoning of self-employment (Moghadam, 1999; Pisani, 2006). While wage employment in the private and public sectors promises conducive and better working opportunities, the self-employed have limited opportunities, with low and unsustainable earnings. To better understand sectoral heterogeneity and wage differentials across sectors, it becomes paramount to account for not only differences in employment categories but also differences in human capital, occupations and demographic attributes, which also very much depend on the socio-economic attributes of the workforce. Hence, the labour market is instrumental in poverty analyses in developing countries (Fields, 2011), although empirical studies with this aim are still very few.

Some studies on the heterogeneity of the labour market in Africa include Glick and Sahn (1997) for Guinea; Glewwe (1990) for Ghana; Vijverberg (1993) and Appleton *et al.* (1990) for Cote d'Ivoire; Kabubo-Mariara (2003) for Kenya; Falco *et al.* (2011) for Ghana and Tanzania and, Kerr and Teal (2015) for South-Africa. These studies find that the African labour market is heterogeneous in terms of employment sectors and differences in participation in various employment categories. Studies on labour market analysis in Nigeria include Temesgen (2008), Ogwumike *et al.* (2006), Jonah and Yousuo (2013), Aminu (2010), Okuwa (2004), Aromolaran (2006); Aderemi (2015) and Nwaka *et al.* (2016).

More specifically, the studies on wage determination across the private and public employments include Aminu (2010) and Ogwumike *et al.* (2006). Aminu (2010) uses the Nigerian general household survey (GHS) cross-sectional data of 1998 and 1999 to study the effects of government wage review policy on public and private wage differentials for only urban male and female employees without a mention of heterogeneity of labour demand through geopolitical and occupational differences. His findings supported wage differences across public and private sectors and that wage review policy had no impact on the private wages while it improved the public sector wages. Ogwumike *et al.* (2006) studied participation and earnings inequality in the Nigerian paid and self-employment using the 1999 GHS cross-sectional data. Ogwumike *et al.*'s (2006) study applied several inequality measures such as Gini Coefficients

while also estimating least squares and Heckman selection techniques across the employments. Their findings show a higher incidence of inequality in the paid employment than the self-employments. The most recent of these studies, Nwaka *et al.* (2016) investigated the effects of household specialisation on gender employment and wage differences across broadly defined employment types – paid-employment and self-employments. Their findings also observed marriage premium for the paid and self-employed men and women but also found incidences of motherhood and fatherhood penalty in the paid-employment. Even though Nwaka *et al.* (2016) included the geopolitical differences in their analysis; they, however, concentrated more on the supply side heterogeneity arising from household specialisation and gender.

However, the limitations of these studies arise in the following ways: first, relates to the heterogeneity of the labour demand, through regional differences in terms of economic incentives. Certain regions have unique economic incentives that effect firm's productivity. While the cosmopolitan city of Lagos in the South West provides plenty of commercial and business opportunities, the oil-rich South-South provides several other types of economic opportunities due to the spillover effects of the large companies in the region. Hence, controlling for these geopolitical attributes will bring novelty in labour market studies for Nigeria. Second, studies on the heterogeneity of labour market in Nigeria are quite old and may not present recent developments in the Nigerian labour market.

Third, several of the sectoral wage differences in Nigeria have not considered the full range of employment alternatives, especially the impacts of the burgeoning role of self-employment as an alternative source of employment due to structural changes in the economy, including the policy implications of labour market earnings towards addressing poverty in Nigeria. Hence, by using the the second wave of the 2012/2013 cross-sectional GHS panel data conducted by the (Nigeria National Bureau of Statistics (NBS), 2012). This study aims to explore the sources of wage differences in the three employment categories of self-employment, wage employment in the public sector and wage employment in the private sector for the Nigerian labour market. This arises by employment type, differences in human capital endowments, and the location of residence, economic sectors or gender. Hereafter, this study raises the following question:

RQ1. What constitutes the major determinants of participation and wages across these sectors?

One very peculiar issue for an analysis of such issues by estimation of a wage equation is that workers' allocation across these sectors is often non-random (Glick and Sahn, 1997). Therefore, an empirical work that ignores the sectoral choice of employment and participation often leads to biased estimates[1]. Thus, the employment/sectoral choice model will be applied in the first part of the estimation, while wage equation (equation of outcome) will be estimated in the second stage of the model. To the best of our knowledge, no study has analysed wage differentials between workers in the wage and self-employment sectors of Nigeria using the most recent data. Consistent with other studies in Africa (Vijverberg, 1993; Glick and Sahn, 1997), our findings indeed confirm that the analysed sectors differ greatly with respect to factors affecting sectoral participation, implying labour demand and supply heterogeneity of the Nigerian labour market through differences in education, geopolitical zones or age. Workers residing in the North-East and oil-rich South-Southern geopolitical zones have a higher likelihood of being public employees than do comparable worker residents in the North-Central zone. Furthermore, we find insignificant coefficients of the sector selection terms in the wage equation for private and self-employment categories. However, a negative significant self-employment Inverse Mill's ratio in the public sector equation indicates a downward bias of wages in the public sector. This bias arises due to the allocation of individuals with better unobservable characteristics out of the public employment into the self-employment.

From the foregoing, this study contributes to the existing literature in a number of ways: first, we document and compare the determinants of participation and wages for three different employment modes in a typical African country, such as Nigeria. Second, this study provides an empirical evidence as to how the differing economic opportunities of geopolitical zones affect wages and wage structures. Third, it provides a thorough understanding of sectoral wage differences as a channel for the implementation of poverty-targeted policies in Nigeria. The remaining part of this work is organised as follows: section 2 presents a descriptive review of the Nigerian labour market. Sections 3 and 4 present the econometric models employed and summarise the data used in the analysis. Sections 5 and 6 look into the empirical findings and conclusions, respectively.

2. The Nigerian labour market: employment allocation

Issues regarding the allocation (sectoral choices) of workers into various employments have often been observed through two contending issues the “pull” and the “push” arguments. For instance, flexibility and innovative choices may pull workers out of the public employment into the self-employment; structural changes, on the other hand, may involuntarily push other workers into it (Hughes, 2003; Gindling and Newhouse, 2014). Considering the push arguments, Moghadam (1999) holds that changes associated with structural reforms led to the self-employment choices as the only viable employment option in the developing countries. One of the underlining philosophies of the neoliberal agenda is the privatisation and promotion of private enterprises. However, despite several praises acclaimed to have been the economic miracles of the Bretton Woods-financed neoliberal ideology, its disastrous effects on the labour market of developing countries have been visible. Such structural reforms in Nigeria include the structural adjustment programme (SAP) of 1986 (Philips, 1987; Nwaka *et al.*, 2015). Since the political independence in October 1960, the public sector controlled the major employment of labour – 62 per cent of the total employment. However, the policy framework led to a fall in wage employment and the burgeoning of the self-employment by the end of 1989 (Ekanade, 2014).

Also, the promotion of outward-oriented trade policies had negative implications for households whose sources of livelihood were subsistence farming. Table I presents the fraction of the population who are poor – specifically those who are under the international poverty line (\$1.90 based on the 2011 PPP).

Following the economic crisis of the 1980s, poverty indices kept increasing even after the implementation (1986) of SAP. It reached its highest level in 1996 and since then, decreased significantly by almost 10 per cent. However, the poverty indices are still high because more

Years	1980	1985	1992	1996	2003	2009
<i>Head-count ratio (poverty indices)</i>						
\$1.90 based on 2011 PPP						
Total	27.1 ^a	46.0	57.1	63.5	53.5	53.5
Female-headed families ^a	29.1	38.6	39.9	59.9	–	–
Male-headed families ^a	26.9	47.4	43.1	62.7	–	–
Income share held by lowest 10%	–	2.5	1.3	1.3	2.2	2.0
Income share held by highest 10%	–	28.2	31.4	40.7	29.8	32.7
rich/poor ratio (highest %10/lowest %10)	–	11.3	24.2	31.3	13.5	16.4

Note: ^aAnyanwu (2010)

Source: World Bank (2015)

Table I.
Poverty indices
by years

than half of the population (53.5 per cent) live with daily incomes of less than \$1.90. Except for in 1980, the ratio of poor families has been higher among male-headed families. Considering the income shares of the lowest and highest 10 per cent, one can conclude that the share of the lowest 10 per cent worsened until 1996, and the gap between rich and poor also widened till this period.

The employment rates by gender, region, zones and employment modes are reported in Table II. The employment rate is the highest in the rural areas which are usually agricultural based. Regarding the geopolitical zones, South-West generates more jobs than any other zone in the country – even more than the often-called oil-rich zone (South-South). Across various employment types, the overall employment rates are highest in the self-employment where female dominance is observed. The public and private employments appear to be more male dominated (21 per cent) when compared to the female's (14 per cent). Overall, a large share of the workforce is trapped in the self-employment.

As also observed in Table III, a significant percentage of occupations in public-wage employment comprise professionals and associate professionals which are far more than the share of employment in the three sectors. This is attributed to the formal

	Males (%)	Females (%)	Both Gender (%)
<i>Regions</i>			
Urban	39	35	37
Rural	61	65	63
<i>Geopolitical zones</i>			
North-Central	14	15	15
North-East	16	14	15
North-West	26	14	21
South-East	11	16	13
South-South	13	16	14
South-West	20	25	22
<i>Employment modes</i>			
Public	10	7	9
Private	11	7	10
Self-employment	78	86	81

Table II. Employment rates by gender, region, zones and employment modes (2012)

Sources: 2nd Wave GHS-Panel Data (NBS, 2012) and own calculations

Table III. Occupational distribution of workers across broad occupational categories in (%), for 2012

Occupations	Public wage	Private wage	Self-employment	Share of all employments
Senior officials and managers	5.96	3.17	1.47	1.79
Professionals	39.81	13.33	0.92	4.32
Technicians and assoc. professionals	29.40	9.00	15.54	14.07
Clerks	6.52	3.00	0.04	0.64
Service workers	0.97	9.83	8.43	6.79
Skilled agriculture and fishery	3.19	17.83	52.65	52.80
Crafts and trade	2.50	17.84	12.58	10.32
Plant and machine operators	4.16	14.83	3.38	3.49
Elementary occupations	7.49	11.17	4.99	5.79

Source: Self-computed from the GHS-Panel (Wave 2 of 2012) (NBS, 2012)

nature of the public employment that requires cognitive and other professional skills to execute. Skilled agriculture and crafts occupations in the private employment make up about 36 per cent when compared to other occupations. This contrasts with the self-employment category where skilled agriculture alone dominates the occupations. Similarly, Table III further presents the agrarian nature of employment where agriculture occupation is significantly contributing to a larger share of 53 per cent to all employments.

Figure 1 presents average hourly real wages by occupation across the three employment choices. Hence, while managerial occupations earn the highest in the self-employment category, associate professionals earn the highest in both the private- and public-wage employment categories. Also, agricultural earnings in the self-employment are the lowest which is an indication of lower productivity in such establishments. One key observation from Tables II and III and this figure is that 82 per cent of the workforce is trapped in the self-employment where most of these workers are working in the agricultural employments and yet earn lower than other occupations in other sectors. This might be informative to the fact that despite a large number of self-employments, quality of such employments is associated with lower earnings and productivity.

Additionally, it is observed that rural workers engaged in economic activities such as agriculture, buying and selling and personal services (such as self-employment) are the lowest-earning categories compared to rural miners (Figure 2). For urban workers, employees in the mining, finance and real estate and health sectors earn far more, while workers in manufacturing, buying and selling or agriculture earn almost similar amounts on average. Hence, in both urban and rural Nigeria, agricultural workers receive almost the same amount of money, about 200 nairas (N) per hour.

Overall, these are indicative evidences of the dimensions of labour market heterogeneity – the heterogeneity of labour demand and supply in Nigeria. However, more robust nature of such heterogeneous characteristics will be the subject of the subsequent sections.

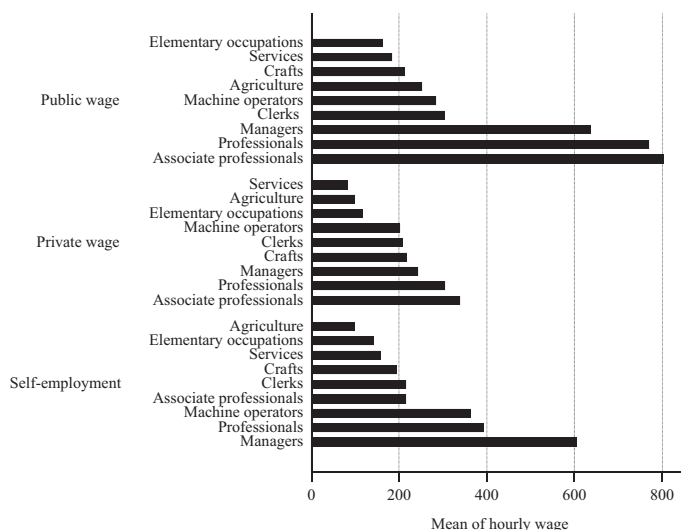


Figure 1.
Average hourly real wages by occupational categories (in Naira)

Sources: 2012 Cross-Sectional GHS Panel data; (NBS, 2012)

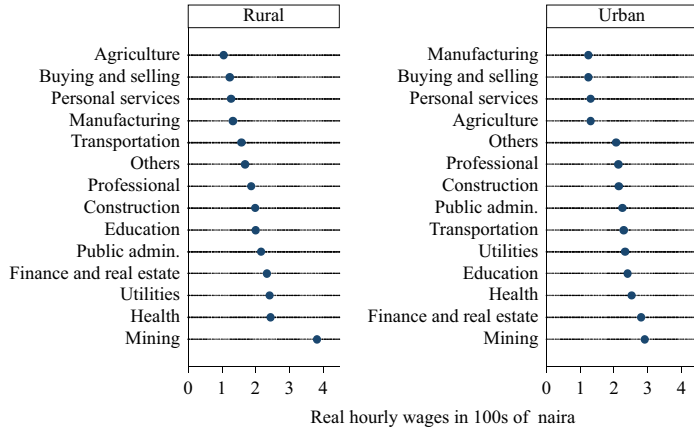


Figure 2. Real hourly wages of workers by economic activity (2010-2012) in Naira

Source: Self-computed from GHS-Panel data (2010 and 2012) (NBS, 2012)

3. Empirical model

Consistent with the research objectives of this study, the model employed basically estimates the determinants of participation (or sectoral choice) and wages for individuals in each of the three employment categories, public-wage employment, private-wage employment and self-employment as compared to non-participation which is used as the base category. Since there are more than two discrete choices for sector selection, an appropriate econometric model is the multinomial logit model (MLM). The wage equation is described as:

$$\ln W_{ij} = \beta_j X_i + e_{ij} \quad (1)$$

where $\ln W_{ij}$ is the natural logarithm of hourly wages of individual i in sector j , say public wage employment; X is a vector of variables describing an individual's productivity-related attributes as presented in Table IV; β is a vector of parameters to be estimated, while e is the random disturbance term with zero mean. One feature of the model is that wages of an individual i in sector j is observed only if sector j is chosen. An individual i is allocated in sector j given a larger propensity and utility derived from being in such a sector, then:

$$S_i = \text{Max} K_{ij} \quad (2)$$

where K_{ij} is the individual's indirect utility derived from sectoral choice, and S_i represents sectoral values and benefits for the individual. Thus, Equation (2) implies that sectoral values depend on the maximum utility derived from participating in that sector. Hence, the utility obtained from participating in a sector further derives from wage rates, job benefits, social security and others (McFadden, 1984). Based on the assumption of the model, the indirect utility is expressed as a linear function of an individual's observed characteristics and unobserved heterogeneity among workers:

$$K_{ij} = \gamma_j Z_i + \eta_{ij} \quad (3)$$

where γ_j is the parameter in vector form, Z_i the variable affecting an individual's sectoral preferences as mentioned above and η_{ij} the random disturbance term having a zero mean conditional on Z_i . Also, given that an individual is observed in only one sector, our wage equation becomes:

$$\ln W = \ln W_j, \text{ for } S = j \quad (4)$$

Variables	Descriptions
<i>Sectoral choice model (Z, s)</i>	
Education ^a	Primary school (base category) Secondary school College University
Age	15-25 (base category) 26-35 36-45 46-55 56-64
Geopolitical zones ^a	North Central (NC)-base category North East (NE) North West (NW) South East (SE) South South (SS) South West (SW)
Female ^a	1 if female; 0 otherwise
Homeowners	1 if homeowner; 0 otherwise
Marital status	1 if married; 0 otherwise
Household status	1 if head; 0 otherwise
Resident areas ^a	1 if urban; 0 otherwise
Christian	1 if Christian; 0 otherwise
Household size (HH size) ^a	
<i>Wage equations (the X's)</i>	
Health expenditure ^a	Total weekly expenditure on health
Sectors	1 if agriculture Industries (base category) 1 if services Labour market experience (years) 1 if senior official manager 1 if professional worker 1 if technician and associate professional 1 if clerk 1 if service and market worker 1 if skilled agricultural and fishery worker 1 if craft 1 if plant and machine operator Base category
Experience	
Managers	
Professionals	
Associate professionals	
Clerks	
Service workers	
Skilled agriculture	
Crafts	
Machine operators	
Elementary workers	
Note: ^a Also included in the wage equations	

Table IV.
Explanatory variables used in sectoral choice and wage equations

Substituting (4) in (1) and taking expected values conditional on S yields:

$$E(\ln W_j | S = j) = \beta_j X_i + E(e_j | S = j) \quad (5)$$

If $E(e_j | S = j) \neq 0$, then selectivity bias is observed meaning that individuals are not randomly allocated to a given sector. In such cases, the ordinary least squares (OLS) estimates of the wage equations will be inconsistent. Assume an individual chooses a sector, say f , for which the utility in j is superior; the given probability such that an individual's choice for sector j is:

$$P_{ij} = \Pr(K_j > K_f), \forall j \neq f \quad (6)$$

Thus, (3) becomes:

$$P_{ij} = \Pr(\gamma_j Z_i + \eta_{ij} > \gamma_f Z_i + \eta_{if}) \quad (7)$$

$$P_{ij} = \Pr(\gamma_j Z_i - \gamma_f Z_i > \eta_{ij} - \eta_{if}) \quad (8)$$

where η'_{ij} s' are distributed independently and identically (i.i.d.) and are also independent of Z_i . Hence, their differences $(\eta_{ij} - \eta_{if})$ follow the logistic distribution leading to the MLM in estimating the probabilities as shown by McFadden. As the non-labour market participants make up the base category in the MLM, then the estimated γ_j is interpreted as the effects of Z on the utility of working in sector j , say public wage employment, relative to the utility obtained from non-participation. Given that the participation of workers in any of the sectors will likely be non-random, and given a potential selection bias due to unobserved heterogeneity, Lee (1983) adopts a two-stage least squares to control for this. Thus, in (5):

$$E(e_j | S = j) = \frac{\tau_{ij\theta} (\Theta^{-1}[P_{ij}])}{P_{ij}} = \tau_j \lambda_{ij} \quad (9)$$

where θ is the standard univariate normal density, Θ the distribution functions. Similarly, P_{ij} the predicted probabilities of individual i in sector j . Hence, (5) now becomes:

$$\ln W_{ij} = \beta_j X_i + \tau_j \lambda_{ij} + \varepsilon_{ij} \quad (10)$$

where λ_{ij} is the selectivity term otherwise called the inverse Mills ratio[2], and ε_{ij} the random element with zero mean. However, as documented in the literature, the Lee model rests on the assumption that the independent, irrelevant, alternatives (IIA) hypothesis hold. Thus, we test this hypothesis using the Hausman (1978) and Small-Hsiao (1985) tests as reported in Table AII. However given that both tests presented mixed results, the analysis, however, also employs the most recent Bourguignon *et al.*'s (2001) (BFG) and Dubin McFadden's (1984) BFG model in order to check for the robustness of the estimates. The BFG model performs well when the IIA assumption is violated.

Additionally, in the case when no selection bias is detected, OLS estimates of the wage equations will provide consistent estimates (see, Puhani, 2000). If the selectivity term is found significant, then the correction is best performed by the BFG model for two reasons; it does not depend on the violation of the IIA hypothesis; it gives both the direction and the source of the bias – such as the employment from which the bias stems from (Dimova and Gang, 2007).

4. Data description

This study utilised the second wave of the 2012/2013 cross-sectional GHS Panel[3] data conducted by the (Nigeria National Bureau of Statistics (NBS), 2012). This survey, therefore, consists of 5,000 households drawn from the states, geopolitical zones and local government areas of Nigeria. For the benefit of this study, we selected the working age of 15-64 years, which is the conventional age for labour force participation. For non-participation[4], data on individuals who are not presently in the labour market were abstracted from the survey. Non-participants include individuals of 15-64 years who are not earning and currently not employed in any of the employment options. Granted one of our major aims is to determine wage differences across the three sectors, our sample size was restricted to individuals with positive hourly wages between 6.25 Naira (about US\$0.06)[5] and 12,000 Naira (about US\$107.62). Hence, upon deleting missing observations and other outliers, our sample size consisted of 1,776 men, with a 52 per cent participation rate[6], and 1,702 women, with a 48 per cent participation rate. A summary of the variables used in our analysis are presented in Table AI. The comparison of proportions of individuals in each education level for each employment category indicates that the highest proportion of secondary education (about 63 per cent) is observed in the private wage employment.

However, the highest proportion of primary education, about 43 per cent, appears in the self-employment compared to those in the public wage and private wage employment which are 9.83 and 20.11 per cent respectively. Furthermore, the proportion of individuals with a college education (36 per cent) and university education (29.2 per cent) are the highest in the public wage employment relative to those in the private and self-employment sectors[7]. Also, a substantial number of younger workers are found in self-employment and private-wage employment as compared to public wage employment. Across the geopolitical zones, about 22 per cent of the public employees reside in the oil-rich South-South, whereas about 28 per cent of private employees reside in the South-West and about 24 per cent of the self-employees reside in the North-East regions. Mean hourly wages is the highest in the private wage sector as compared to other employments. This presents clear sectoral wage difference across employments.

The variables used in the MLM and the wage equations are summarised in Table IV. As qualification enhances an individual's labour market prospects and earnings and in line with the human capital theory, investment in education raises productivity which also has a positive impact on wages. Hence, a positive relationship between various educational levels on employment choices and wages is expected. Theoretical evidence holds that labour market participation is usually high at prime ages (Guvén-Lisaniler and Bhatti, 2005). Hence, it is expected that workers of 15-25, 26-35 and 36-45 years have a higher probability of participating in any of the sectoral options that yield a higher utility, which is also associated with higher wages. Furthermore, in Nigeria, geopolitical zones and residences affect the individual's sectoral choice participation and wages. For instance, due to the economic opportunity in the oil-rich South-South of Nigeria, potential workers are attracted to this region so as to benefit from any of the employment options there. Hence, regional heterogeneity could also matter in employment choices and wage determination in Nigeria. Urban areas similarly offer more opportunities in terms of job quality; as a result, residents in urban areas are more likely to choose a given sector of greater utility compared to residents in rural areas, which also affects wages positively.

The literature considers financial capital variable (household ownership) and marriage as variables that would not affect offered wages but would influence one's employment selection choice (Dimova and Gang, 2007). Therefore, household ownership and marriage are used as the exclusion restriction variables. Hence, these exclusion restriction variables will be included in the MLM but excluded from the Mincerian wage equation. Thus, variables entered into the sectoral choice models basically capture the possible effects of anticipated wage differences between sectors, differences in employee tastes and utility, and differences in employer preferences towards a given worker (see Gindling, 1991).

5. Estimation results and discussion

5.1 MLM estimates

Before any intuitive inference can be drawn from the multinomial logit estimates of Table V, a test for adequacy of the estimated models is needed as the Lee's (1983) logit model depends on the IIA assumption. We used both the Hausman and Small-Hsiao tests which are presented in Table AII. Also, the likelihood ratio test indicates that coefficients are jointly significantly different from zero at a 1 per cent level of significance. This implies that employees are assigned non-randomly to sectors based on the characteristics in Z . Similarly, the Wald test[8] of zero coefficients is rejected at all significance levels. However, in the case of private employment, the null hypothesis of the IIA assumption is rejected as a result of the Hausman test statistic. Also, in most cases, negative χ^2 test statistics are observed. Based on these mixed results, the study further needs to check for the robustness of the estimates of the MLM by Lee's (1983) approach since the estimates of Lee's model are sensitive to deviations from the IIA hypothesis. In this framework, the estimates

Table V.
Maximum likelihood estimates of multinomial logit sectoral choice model (estimated coefficients and marginal effects estimates) using non-labour market participants as the base category

Variables	Public employment		Private employment		Self-employment	
Education (relative to primary)	Est. Coeff.	ME	Est. Coeff.	ME	Est. Coeff.	ME
Secondary	1.431*** (0.210)	0.0389*** (0.00565)	0.498*** (0.178)	0.0162** (0.00813)	0.220** (0.107)	-0.0185 (0.0146)
College	3.489*** (0.270)	0.266*** (0.0194)	0.626** (0.260)	0.0102 (0.0123)	-0.0295 (0.171)	-0.231*** (0.0251)
University	3.803*** (0.312)	0.350*** (0.0248)	0.778** (0.304)	0.0205 (0.0157)	-0.453*** (0.229)	-0.338*** (0.0280)
<i>Age (relative to 15-25)</i>						
26-35	1.535*** (0.296)	0.0505*** (0.00824)	0.430** (0.219)	0.00741 (0.0128)	0.326** (0.139)	-0.00352 (0.0203)
36-45	2.051*** (0.452)	0.0758*** (0.0155)	0.568 (0.406)	0.00770 (0.0227)	0.462* (0.277)	-0.00674 (0.0360)
46-55	1.262** (0.629)	0.0707*** (0.0226)	-0.193 (0.594)	-0.00186 (0.0279)	-0.513 (0.416)	-0.109** (0.0463)
56-64	-2.199*** (0.790)	0.00425 (0.0161)	-3.182*** (0.756)	-0.0435** (0.0175)	-3.556*** (0.498)	-0.338*** (0.0324)
<i>Zones (relative to NC)</i>						
NE	1.339*** (0.199)	0.0273** (0.0112)	0.0917 (0.218)	-0.0377*** (0.00972)	1.208*** (0.120)	0.142*** (0.0172)
NW	-0.00525 (0.218)	0.00637 (0.0116)	-1.051*** (0.263)	-0.0475*** (0.00971)	-0.014 (0.130)	0.0226 (0.0182)
SE	-0.178 (0.207)	-0.0232** (0.00969)	-0.339* (0.191)	-0.0299*** (0.00965)	0.416*** (0.119)	0.0854*** (0.0166)
SS	-0.329* (0.192)	-0.00804 (0.00954)	-0.112 (0.171)	0.00414 (0.0106)	-0.257** (0.120)	-0.0252 (0.0161)
SW	-0.773*** (0.208)	-0.0477*** (0.00848)	0.233 (0.173)	0.0110 (0.0109)	0.296** (0.129)	0.0646*** (0.0174)
Own home	0.00552 (0.160)	0.00185 (0.00708)	-0.563*** (0.136)	-0.0397*** (0.00866)	0.0678 (0.109)	0.0313** (0.0143)
Married	0.985*** (0.158)	0.0186*** (0.00717)	0.192 (0.153)	-0.0283*** (0.00856)	0.908*** (0.103)	0.122*** (0.0159)
Urban	-0.051 (0.130)	0.0207*** (0.00623)	0.219* (0.124)	0.0340*** (0.00681)	-0.640*** (0.083)	-0.112*** (0.0112)
HH size	-0.091*** (0.017)	-0.00131 (0.000813)	-0.0683*** (0.0171)	-0.000744 (0.000908)	-0.082*** (0.010)	-0.00798*** (0.00145)
Experience	0.168*** (0.019)	0.00237*** (0.000856)	0.126*** (0.0181)	0.00141 (0.000903)	0.152*** (0.012)	0.0149*** (0.00155)
Christian (relative to Muslims)	0.000649 (0.160)	-0.00688 (0.00752)	0.333** (0.146)	0.0145** (0.00696)	0.128 (0.094)	0.0111 (0.0129)
Female	-0.760*** (0.121)	-0.00940* (0.00554)	-1.098*** (0.112)	-0.0371*** (0.00548)	-0.638*** (0.071)	-0.0424*** (0.00953)
Constant	-5.964*** (0.411)		-2.181*** (0.312)		-1.029*** (0.203)	
No. of observations	7,809	7,809	7,809	7,809	7,809	7,809
χ^2	5,810.80*** (0.000)					
Pseudo R^2	0.337					

Notes: Standard errors are shown in parentheses. NC, North Central; NE, North East; NW, North West; SE, South East; SS, South South; SW, South West; HH size, household size; ME, average marginal effects and Est. Coeff., Estimated Coefficients. ***, ***, ***, Significant at 0.1, 0.05 and 0.01 levels, respectively

of the BFG model which are robust to violation of the IIA assumption are also presented where appropriate.

Table V reports the coefficients (logit estimates) and the marginal effects at the average from the MLM. However, since the aim of the analysis is not to be confined to the sub-population but rather to extend to the entire population from which the sample is selected (see Greene, 1993, p. 688), we shall therefore interpret the estimated coefficients as reported. As presented in Table V, the coefficients of educational levels for both public and private employment are highly significant with reference to non-participants while only the coefficient of a college education is not significant for self-employment. Comparatively, across the three employment choices, workers of higher educational levels are attracted more to the public sector considering the magnitudes of their coefficients. As the public sector is a regulated sector with other fringe employment benefits, education is an essential determinant of civil service participation. In self-employment, while university education reduces the probability that a given individual will participate in it, we observe the opposite case for individuals with secondary educational levels as compared to those with a primary level of education with reference to non-participants. This finding could explain the varying nature of self-employment, which requires limited skills for start-up. Similar African studies on sectoral participation confirm education as one of the major determinants of a worker's sectoral choice. For examples, see Glick and Sahn (1997) for Guinea; Vijverberg (1993) for Cote D'Ivoire; and Aminu (2010) for Nigeria. Our estimates also confirm the inverted U-shaped relationship between age and sector participation. For instance, younger workers between 26 and 45 years are more likely to be found in public-wage employment, compared to those of 15-25 years vs non-participants in other sectors, with the coefficients being highly significant for public employment. However, older workers of 56-64 years show a lower probability of participation in both the private and self-employment categories against non-participants. These ages further indicate that, just as expected, sectoral participation declines as one gets older. However, the coefficients of ages from 36-55 are not statistically significant for private employment and self-employment. Among exclusion restrictions, the estimates for marriage in public employment and self-employment vs non-participants are highly significant and positive, while home ownership is highly significant only in the private employment mode and is negative.

The sectoral choices of individuals could also be influenced by regional or zonal basis. The South-West is significant in public employment and self-employment, indicating a lower probability of being found in public employment compared to workers resident in the North-Central (base category) and relative to the base category. This probability, however, is positive for self-employment but is not significant for private-wage employment. The estimates also show that the North-East is highly significant and positive, while the South-South is only marginally significant, with a negative sign. For private employment, we observe that the North-West is highly significant but negative, which shows the importance of other political and economic constraints in private-employment choice in this region. In the self-employment category, only the North-Western zone is not significant. This then implies that worker residents in the North-East, South-East and South-West have a higher likelihood of being in self-employment vs non-participant categories compared to a comparable worker in the North-Central region[9]. The findings, thus, confirm evidence of regional heterogeneity in labour market participation in Nigeria. Also, workers with larger family sizes have a significantly lower likelihood of labour market participation in the three employment modes, while workers with higher levels of experience have a higher probability of participation, at a 1 per cent level of significance. The estimates also show that females have a lower probability of being in the three employment modes. Comparing the magnitude of the coefficient, the lowest participation rate for female workers is found in private employment, followed by public employment.

5.2 Wage estimates (OLS and BFG)

As explained above, the selectivity term basically confirms if the observed non-random allocation of workers into the three sectors has any significant impact on wages. The results of the various models based on Lee (1983) presented in Table AIII and BFG[10] (2001), presented in Table VI show that the coefficients in the selectivity correction terms are not significant at any significance levels in the private and self-employment categories which implies that there is no evidence of sample selection bias in these estimated models[11]. This may be due to the fact that alternative occupations for individuals in private and self-employment sectors are mainly agricultural, crafts and partly elementary occupations where unobserved characteristics are not correlated with the rewards in those markets. Furthermore, according to Gindling (1991), the employers in these sectors determine a worker's allocation based on their human capital endowments and sectoral participation is not based on an individual's own choice. By implication, the appropriate model for these employments is the OLS[12] which is reported in Table VI (columns 1-3). However, as explained earlier, the study also estimates the BFG model to check for the robustness of the estimates by Lee's model. Based on the BFG model, the inverse mills ratio related to the self-employment sector selection equation is highly significant and negative in the public sector wage equation. Thus, the study, therefore, reports the BFG model estimates for the public sector wages accordingly. The implication of the negative significant coefficient term connotes lower wages in the public wage employment than those randomly selected individuals due to the allocation of individuals with better unobservable characteristics out of the public employment into the self-employment.

After correcting for selectivity bias in the public wage equation, the human capital variables lose their significance (column 4[13] Table VI) when compared to the OLS estimates (column 1, Table VI). This may be due to the significance of the bias term where workers of better characteristics are observed in alternative employments. Within each employment and in accordance with the human capital theory, the variable experience is significant with the expected signs in the private and self-employment sectors. Squared experience has a negative sign, indicating diminishing returns, but is highly significant in the self-employment sector only. In addition, comparison of the coefficients regarding experience and returns to education across the private and self-employment wage regressions are performed by employing formal tests of cross-equation restrictions. Relying on the formal test results[14], the human capital variables (experience and education) are insignificant except for the university educational level. This therefore implies that the variables experience, secondary and college levels of education are identical across the private and self-employment categories. However, university education is significantly different across both employments at the 7 per cent level of significance.

Higher levels of education are associated with higher hourly wages in private and self-employments relative to the base category of primary education. Workers with college and university levels of education earn significantly more than do those with primary education, especially in the private sectors. Returns to secondary education are highest in the private-wage sector, at about 43 per cent[15], compared to about 30 per cent in self-employment. For the higher-education categories (college and university), the study finds their increasing point estimates in both employments, with the highest again being in the private employment. This presupposes the relevance of higher educational training and skill as one of the productivity-augmenting elements. However, this research also observes lower returns to education for self-employed workers at all educational levels. The self-employed working in the agricultural and service sectors earn about 106 and 55 per cent more, respectively, than do industrial workers. Also, female workers in the private and self-employment sectors receive lower wages than do their comparable male colleagues, but no effect of gender on wages in public-wage employment is observed.

Variables	OLS estimates		(3)		(4)		BFG estimates		(6)	
	Public employment	Private employment	Self-employment	Public employment	Private employment	Public employment	Private employment	Self-employment	Public employment	Private employment
Exper.	0.043*** (0.014)	0.026* (0.014)	0.042*** (0.008)	0.029 (0.023)	0.012 (0.034)		0.012 (0.034)	0.041** (0.016)		
Exper2	-0.047* (0.026)	-0.014 (0.024)	-0.052*** (0.013)	-0.033 (0.037)	-0.011 (0.050)		-0.011 (0.050)	-0.051** (0.023)		
<i>Education (relative to primary)</i>										
Secondary	0.237 (0.162)	0.358** (0.166)	0.267*** (0.061)	-0.322 (0.330)	0.247 (0.291)		0.247 (0.291)	0.362* (0.192)		
College	0.893*** (0.180)	0.748*** (0.228)	0.487*** (0.118)	-0.888 (0.931)	0.108 (0.829)		0.108 (0.829)	0.672 (0.553)		
University	1.384*** (0.183)	1.234*** (0.230)	0.727*** (0.175)	-0.946 (1.129)	0.494 (1.025)		0.494 (1.025)	0.969 (0.697)		
<i>Sector (relative to industrial sectors)</i>										
Agriculture	-0.349 (0.240)	0.351 (0.236)	0.725*** (0.157)	-0.289 (0.240)	0.386* (0.228)		0.386* (0.228)	0.725*** (0.165)		
Services	-0.167 (0.194)	-0.257 (0.231)	0.438*** (0.130)	-0.160 (0.203)	-0.167 (0.233)		-0.167 (0.233)	0.459*** (0.137)		
Female	0.013 (0.083)	-0.267** (0.113)	-0.667*** (0.060)	0.060 (0.111)	-0.294* (0.152)		-0.294* (0.152)	-0.707*** (0.080)		
<i>Zones (relative to NC)</i>										
NE	0.331*** (0.121)	0.208 (0.282)	0.112 (0.175)	0.441** (0.191)	-0.290 (0.308)		-0.290 (0.308)	0.021 (0.216)		
NW	0.439*** (0.101)	0.353 (0.326)	0.056 (0.160)	0.467** (0.185)	0.108 (0.416)		0.108 (0.416)	-0.001 (0.207)		
SE	0.229* (0.136)	-0.050 (0.166)	-0.060 (0.139)	0.581*** (0.220)	-0.105 (0.218)		-0.105 (0.218)	-0.079 (0.184)		
SS	0.526*** (0.101)	0.173 (0.138)	0.553*** (0.141)	0.532*** (0.103)	0.180 (0.140)		0.180 (0.140)	0.621*** (0.155)		
SW	0.132 (0.154)	-0.183 (0.158)	0.368*** (0.138)	0.707** (0.319)	-0.020 (0.284)		-0.020 (0.284)	0.364* (0.217)		
Urban	0.093 (0.077)	0.312*** (0.105)	-0.001 (0.056)	-0.370** (0.210)	0.343* (0.205)		0.343* (0.205)	0.077 (0.136)		
HH size	-0.018 (0.012)	0.062*** (0.020)	0.016 (0.010)	-0.021 (0.014)	0.061*** (0.022)		0.061*** (0.022)	0.025** (0.011)		
<i>Occupations (relative to Managers occupations)</i>										
Professionals	-0.474* (0.262)	-0.365 (0.357)	-1.319*** (0.288)	-0.462* (0.265)	-0.534 (0.386)		-0.534 (0.386)	-1.289*** (0.332)		
Assoc. professionals	-0.269 (0.207)	-0.140 (0.282)	-0.860*** (0.296)	-0.255 (0.201)	-0.483 (0.315)		-0.483 (0.315)	-0.775** (0.341)		
Clerks	-0.203 (0.223)	0.057 (0.300)	-1.297*** (0.267)	-0.155 (0.219)	-0.205 (0.335)		-0.205 (0.335)	-1.218*** (0.308)		
Service workers	-0.276 (0.272)	0.058 (0.321)	-0.900 (0.791)	-0.236 (0.263)	-0.180 (0.355)		-0.180 (0.355)	-0.891 (0.826)		
Skilled agriculture	-0.539 (0.383)	-0.167 (0.296)	-1.201*** (0.265)	-0.482 (0.390)	-0.456 (0.337)		-0.456 (0.337)	-1.160*** (0.307)		
Crafts	-0.456 (0.464)	-0.487 (0.380)	-1.551*** (0.292)	-0.417 (0.458)	-0.787* (0.414)		-0.787* (0.414)	-1.531*** (0.334)		
Machine operators	-0.140 (0.363)	-0.195 (0.331)	-1.327*** (0.261)	-0.217 (0.355)	-0.351 (0.360)		-0.351 (0.360)	-1.291*** (0.302)		
Elementary Occupations	-0.170 (0.261)	0.043 (0.300)	-1.031*** (0.278)	-0.126 (0.254)	-0.141 (0.327)		-0.141 (0.327)	-1.043*** (0.317)		
Mills_Public				0.093* (0.055)	0.042 (0.056)		0.042 (0.056)	-0.010 (0.031)		

(continued)

Sectoral choices and wage differences

Table VI.
Wage equation results for the OLS and BFG models – public, private and self-employments

Table VI.

Variables	OLS estimates			BFG estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
	Public employment	Private employment	Self-employment	Public employment	Private employment	Self-employment
Mills_Private				0.013 (0.034)	-0.057 (0.044)	-0.019 (0.025)
Mills_Self				-0.186** (0.080)	-0.053 (0.071)	0.018 (0.054)
Mills_Non_part				0.023 (0.017)	-0.022 (0.027)	-0.005 (0.011)
Constant	4.304*** (0.359)	3.368*** (0.458)	4.670*** (0.299)	6.123*** (1.088)	3.582*** (1.141)	4.141*** (0.734)
Observations	407	353	1,697	399	325	1,594
F-statistic	12.30	10.42	33.96	10.72	8.42	28.85
p-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R ²	0.373	0.384	0.294	0.383	0.395	0.310

Notes: Robust standard errors are shown in parentheses; NC, North-Central; NE, North-East; NW, North-West; SE, South-East; SS, South-South; SW, South-West. *, **, *** Significant at 0.1, 0.05 and 0.01 levels, respectively

The magnitude of the gender coefficient is the lowest in self-employment, which may imply a possible higher gender wage gap in that sector.

While all the geopolitical variables are statistically significantly different from zero in the public sector, only the South-South and South-West zones appear to be significant in self-employment. Hence, self-employed worker residents in the South-South and South-West earn almost 73 and 44 per cent more, respectively, than do those in the North-Central. In the same vein, public-wage employed worker residents in the agricultural North (North East, North West) or oil-rich South-South part of Nigeria earn significantly more than do those in the North-Central, where the South-South commands a highest of 70 per cent more. Additionally, urban private-wage workers earn significantly more than do those in rural areas, while the study finds no effects of workers' areas of residence on wages for public workers and the self-employed.

Larger family size has a positive effect on wages in private employment; findings show that it has an insignificant impact on other sectors. Wages are mainly negative and highly significant in self-employment for all occupations except clerks. In public-wage employment, managerial occupations are marginally significant but have a positive effect on wages. Plant and machine dummies have a marginally positive effect on wages in all sectors. Comparing the magnitude of the coefficients, plant and machine operators in private-wage employment earn about 52 per cent marginally more than do those in elementary occupations.

6. Conclusion

This study examined the determinants of sectoral choices and wage differentials among public-wage employment, private-wage employment, and self-employment for Nigerian employees. Using a sub-sample of the GHS panel data for 2012/2013 (second wave), we estimated a sectoral choice model to determine if participation/assignment to each sector was non-random as well as its determinants. Using the MLM, our findings confirm that workers were indeed assigned non-randomly into the three sectors, which is evidence of heterogeneity in the Nigerian labour market. Also, secondary education was the major determinant of employment in self-employment, while university education influences employees' relative sectoral allocation in public-wage employment compared to other educational levels. This finding is in support of Vijverberg (1993) and Kabubo-Mariara (2003). We equally found some evidence of geopolitical influences in labour market participation across all sectors. Also, the probability of a woman's participating in any of the employment choices is highest in self-employment and lowest in the private-employment categories.

An insignificant impact of the coefficient of selectivity term in the private and self-employment wage equation may suggest that an individual's decision to participate in any of the sectors depends on the employer's evaluation of the worker's attributes. Similarly, OLS estimates of the wage equation confirm that experience, education and geopolitical zones are some of the major determinants of wages in our model. Contrary to Uwaifo (2007), we find evidence of geopolitical inequality in terms of the determinants of participation and earnings in Nigeria.

Overall, the return of the personal productivity variables on wages is lowest in self-employment compared to private employment categories. Given the unregulated and precarious nature of employment in self-employment in Nigeria, two broad policy interventions directed towards poverty alleviation are needed. First, policies channelled towards economic empowerment through raising the returns of the self-employed in their current respective sectors are needed. Such measures include the provision of financial incentives and other specialised training to establish competitive small micro enterprises. The second policy priority could also be channelled to prioritising agricultural employment especially for those in the self-employment across the geopolitical zones. The introduction modern agricultural practice can contribute in making such employments sustainable and attractive.

One aspect of heterogeneity which this research work does not capture is the time-varying unobserved heterogeneous effects across individuals or households and within the gender dimension. Panel data analysis allows analysis of such effects. Furthermore, an exclusive focus on the causes of the burgeoning SE in Nigeria (push or pull arguments), can also present a novel research idea for Nigeria.

Notes

1. See among others Heckman (1979), Lee (1983), Bourguignon *et al.* (2001) on the issue of sample-selection bias analysis.
2. With some calculations from the estimates of (9) above for each worker in each sector, the inverse Mills ratio was included as an explanatory variable in (10).
3. The NBS started collecting household panel data in 2010, marking the launch of the very first wave of microdata collection in Nigeria.
4. From the survey, about 3,982 sample of men and women reported as non-participation. This was however used as our base category in the multinomial logit model only while the original respondents with positive hourly wages were used in our wage estimation (see Glick and Sahn, 1997).
5. Values are based on Real Effective Exchange using the 2012 values (2010 = 100).
6. According to the World Development Indicators (Worldbank), labour force participation rate of women as of 2010 was estimated at 48 per cent; hence, in order not to some influential observations; we have streamlined the data to capture the actual representation as reported by the Worldbank and ILO.
7. College education includes all of the educational levels completed after the basic primary school certificate but below the university degree.
8. Using the *mlogtest*, combine option, the test was conducted in pairs of each sectoral assignment against the other, such as public employment vs private employment.
9. The North Central houses the Nigerian Federal Capital Territory, Abuja.
10. The research used Stata statistical software and the user written command “*selmlog*” to estimate the BFG model (Bourguignon *et al.*, 2001).
11. See Lee (1983) for the interpretation of the selectivity term (inverse mills ratios).
12. See OLS equation 1 as explained at the empirical modelling section.
13. Obtained from Equation (10) of the empirical model section.
14. The χ^2 test statistic for the variable experience is -1.03 (p -value = 0.310), while secondary; college and university education categories are 0.28 (p -value = 0.597), 1.10 (p -value = 0.295), and 3.23 (p -values = 0.072), respectively.
15. A semilogarithmic wage equation specifies percentage change in characteristics as $100 \times \{\exp(x)-1\}$, where x is the coefficient of the variable.

References

- Aderemi, T.A. (2015), “Does the wage curve exist in Nigeria? Evidence from disaggregated labour market”, *Journal of Social and Economic Development*, Vol. 17 No. 2, pp. 184-199.
- Aminu, A. (2010), *Determinants of Participation and Earnings in Wage Employment in Nigeria*, African Economic Research Consortium (AERC), Nairobi.
- Anyanwu, J.C. (2010), “Poverty in Nigeria: a gendered analysis”, *The African Statistical Journal*, Vol. 11 No. 11, pp. 38-61.
- Appleton, S., Collier, P. and Horsnell, P. (1990), “Gender, education, and employment in Cote d'Ivoire”, *Social Dimensions of Adjustment Working Paper No. 8*, World Bank, Washington, DC.

- Aromolaran, A.B. (2006), "Estimates of Mincerian returns to schooling in Nigeria", *Oxford Development Studies*, Vol. 34 No. 2, pp. 265-292.
- Bourguignon, F., Fournier, M. and Gurgand, M. (2001), "Selection bias correction based on the multinomial logit model", Center for Research on Econometrics and Statistics, unpublished working paper, Paris, 27 December.
- Dimova, R. and Gang, I.N. (2007), "Self-selection and wages during volatile transition", *Journal of Comparative Economics*, Vol. 35 No. 3, pp. 612-629.
- Ekanade, O.V. (2014), "The dynamics of forced neoliberalism in Nigeria since the 1980s", *Journal of Retracing Africa*, Vol. 1 No. 1, pp. 1-24.
- Falco, P., Kerr, A., Rankin, N., Sandefur, J. and Teal, F. (2011), "The returns to formality and informality in urban Africa", *Labour Economics*, Vol. 18, pp. S23-S31.
- Fields, G.S. (2007), *Labor Market Policy in Developing Countries: A Selective Review of the Literature and Needs for the Future*, Vol. 4362, World Bank Publications.
- Fields, G.S. (2011), "Labor market analysis for developing countries", *Labour Economics*, Vol. 18, pp. S16-S22.
- Garibaldi, P. and Taddei, F. (2013), *Italy: A Dual Labour Market in Transition*, Employment Sector Employment Working Paper No. 144, International Labour Office, Geneva.
- Gindling, T.H. (1991), "Labor market segmentation and the determination of wages in the public, private-formal, and informal sectors in San Jose, Costa Rica", *Economic Development and Cultural Change*, Vol. 39 No. 3, pp. 585-605.
- Gindling, T.H. and Newhouse, D. (2014), "Self-employment in the developing world", *World Development*, Vol. 56 No. C, pp. 313-331.
- Glick, P. and Sahn, D.E. (1997), "Gender and Education Impacts on Employment and Earnings in West Africa: Evidence from Guinea", *Economic Development and Cultural Change*, Vol. 45 No. 4, pp. 793-823.
- Glick, P. and Sahn, D.E. (1998), "Health and productivity in a heterogeneous urban labour market", *Applied Economics*, Vol. 30 No. 2, pp. 203-216.
- Glewwe, P. (1990), "Schooling, skills, and the returns to education: an econometric exploring using data from Ghana", Living Standards Measurement Working Paper No. 76, World Bank, Washington, DC.
- Greene, W. (1993), *Econometric Analysis*, 2nd ed., Prentice Hall International Editions, NJ.
- Hausman, J.A. (1978), "Specification tests in econometrics", *Econometrica*, Vol. 46 No. 6, pp. 1251-1271.
- Heckman, J. (1979), "Sample selection bias as a specification error", *Econometrica*, Vol. 47 No. 3, pp. 153-161.
- Hughes, K.D. (2003), "Pushed or pulled? Women's entry into self-employment and small business ownership", *Gender, Work & Organization*, Vol. 10 No. 4, pp. 433-454.
- Jonah, A. and Yousuo, P.O.J. (2013), "The impact of wage differentials on labour turn over in Nigeria", *International Journal of Academic Research in Business and Social Sciences*, Vol. 3 No. 9, p. 552.
- Kabubo-Mariara, J. (2003), "Wage determination and the gender wage gap in Kenya: any evidence of gender discrimination?", Research Paper No. 132, African Economic Research Consortium, Nairobi.
- Kerr, A. and Teal, F. (2015), "The determinants of earnings inequalities: panel data evidence from KwaZulu-Natal, South Africa", *Journal of African Economies*, Vol. 24 No. 4, pp. 530-558.
- Lee, L. (1983), "Generalized econometric models with selectivity", *Econometrica*, Vol. 51 No. 2, pp. 502-512.
- Lisaniler, F.G. and Bhatti, F. (2005), "Determinants of female labour force participation: a study of North Cyprus", *Review of Social, Economic and Business Studies*, Vol. 5 No. 6, pp. 209-226.

- McFadden, D. (1984), "Econometric analysis of qualitative response models", in Griliches, Z. and Intriligator, M. (Eds), *Handbook of Econometrics*, Vol. 2, North Holland, New York, NY, pp. 1395-1457.
- Moghadam, V.M. (1999), "Gender and the global economy", in Ferree, M., Lorber, J. and Hess, B. (Eds), *Revisioning Gender*, Sage Publishing, Thousand Oaks, CA, pp. 128-160.
- National Manpower Board (NMB) (1998), "The study of the Nigerian labour market: selected metropolitan areas", Manpower Study No 33, NMB, Abuja.
- Nigeria National Bureau of Statistics (NBS) (2010), "General household survey, panel (GHS-panel) 2010-2011", Ref. DDI_NGA_2010_GHSP-W1_v01_M, Dataset, available at: www.microdata.worldbank.org (accessed 3 June 2014).
- Nigeria National Bureau of Statistics (NBS) (2012), "General household survey, panel (GHS-Panel) 2012-2013", Ref. DDI_NGA_2012_GHSP-W2_v01_M, Dataset, available at: www.microdata.worldbank.org (accessed 6 June 2014).
- Nwaka, I., Uma, K. and Tuna, G. (2015), "Trade openness and unemployment: empirical evidence for Nigeria", *The Economic and Labour Relations Review*, Vol. 26 No. 1, pp. 117-136.
- Nwaka, I.D., Guven-Lisaniler, F. and Tuna, G. (2016), "Gender wage differences in Nigerian self and paid employment: do marriage and children matter?", *The Economic and Labour Relations Review*, Vol. 27 No. 4, pp. 490-510.
- Ogwumike, F., Alaba, O., Alayande, B. *et al.* (2006), "Labour force participation, earnings and inequality in Nigeria", African Economic Research Consortium (AERC), Nairobi.
- Okuwa, O.B. (2004), "Private returns to higher education in Nigeria", Research Paper No. 139, African Economic Research Consortium (AERC), Nairobi.
- Philips, A. (1987), "A general overview of structural adjustment programme", in Philips, A. and Ndekwe, E.C. (Eds), *Structural Adjustment Programme in a Developing Economy: The Case of Nigeria*, NISER, Ibadan, pp. 1-12.
- Pisani, M.J. (2006), "Self-employed Nicaraguan women under neoliberalism: characteristics and determinants", *Latin American Business Review*, Vol. 7 No. 1, pp. 81-97.
- Puhani, P. (2000), "The Heckman correction for sample selection and its critique", *Journal of Economic Surveys*, Vol. 14 No. 1, pp. 53-68.
- Small, K.A. and Hsiao, C. (1985), "Multinomial logit specification tests", *International Economic Review*, Vol. 26 No. 3, pp. 619-627.
- Temesgen, T. (2008), "Effects of labor market institutions and establishment characteristics on gender wage inequality in Africa", *International Journal of Sociology and Social Policy*, Vol. 28 Nos 9/10, pp. 309-325.
- Uwaifo, O.R. (2007), "Disparities in labor market outcomes across geopolitical regions in Nigeria: fact or fantasy?", Discussion Paper No. 3082, IZA, available at: <http://ssrn.com/abstract=1027690> (accessed 9 September 2014).
- Vijverberg, W. (1993), "Educational investment and returns for women and men in Cote d'Ivoire", *Journal of Human Resources*, Vol. 28 No. 4, pp. 933-974.
- World Bank (2015), "World Bank development indicators", available at: <http://data.worldbank.org/data-catalog/world-development-indicators> (accessed 6 June 2011).

Further reading

- Busayo, A. and Olufunmilayo, S. (2013), "Determinants of gender income inequality in selected Sub-Saharan African countries", *Journal of Economics and Sustainable Development*, Vol. 4 No. 16, pp. 73-84.
- Cotton, J. (1988), "On the decomposition of wage differentials", *Review of Economics and Statistics*, Vol. 70 No. 2, pp. 236-243.
- Demir, F. and Erdem, N. (2010), "Labour market performance after structural adjustment in developing countries: the interesting but not so unique case of Turkey", in Valencia, L.K. and Hahn, B.J. (Eds), *Employment and Labor Issues: Unemployment, Youth Employment and Child Labor*, Chapter 1, Nova Science Publishers.

-
- DiNardo, J., Fortin, N. and Lemieux, T. (1996), "Labour market institutions and the distribution of wages, 1973-1992: a semiparametric approach", *Econometrica*, Vol. 64 No. 5, pp. 1001-1044.
- Hausmann, R., Tyson, L.D. and Zahidi, S. (2011), "The global gender gap report 2011", The World Economic Forum, Geneva.
- Human Development Report (2014), *Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience*, United Nations Development Program, New York, NY.
- Lingam, L. (2005), *Gender, Work and Structural Adjustment: A Selected Annotated Bibliography*, Center for the Education of Women, University of Michigan, Michigan.
- National Bureau of Statistics (NBS) (2010), "The Nigeria poverty profile 2010 report", National Bureau of Statistics, Abuja.
- Terrell, K. (1993), "Public-private wage differentials in Haiti do public servants earn a rent?", *Journal of Development Economics*, Vol. 42 No. 2, pp. 293-314.
- United Nations (2013), *World Economic Situation and Prospects 2013*, United Nations, New York, NY.
- Van der Gaag, J., Stelcner, M. and Vijverberg, W. (1989), "Wage differentials and moonlighting by civil servants: evidence from Cote d'ivoire and Peru", *The World Bank Economic Review*, Vol. 3 No. 1, pp. 67-95.
- Watson, M.W. (2014), "Inflation persistence, the NAIRU, and the great recession", *The American Economic Review*, Vol. 104 No. 5, pp. 31-36.
- Weichselbaumer, D. and Winter-Ebmer, R. (2005), "A meta-analysis of the international gender wage gap", *Journal of Economic Surveys*, Vol. 19 No. 3, pp. 479-511.

(The Appendix follows overleaf.)

22

Variables	Public employment (%)	Private employment (%)	Self-employment (%)
<i>Education</i>			
Primary	9.83	20.11	43.02
Secondary	24.93	62.83	49.56
College	36.04	10.01	5.53
University	29.20	7.05	1.89
<i>Age</i>			
15-25	3.46	34.21	22.09
26-35	21.99	28.48	23.38
36-45	32.37	17.68	23.30
46-55	30.71	12.60	18.30
56-64	11.48	7.04	12.93
<i>Marriage</i>			
Single = 0	20.33	55.32	29.83
Married = 1	79.67	44.68	70.17
<i>Geo. pol. Zones</i>			
North Central (NC)	21.16	18.82	16.16
North East (NE)	17.01	8.84	24.09
North West (NW)	13.14	5.73	20.39
South East (SE)	14.80	13.26	15.28
South South (SS)	21.72	25.53	12.13
South West (SW)	12.17	27.82	11.96
<i>Areas</i>			
Urban = 1	51.45	44.52	22.14
Rural = 0	48.55	44.52	77.86
<i>Assets</i>			
Homeowner	80.83	69.57	90.66
None	19.69	30.43	9.34
	Mean	Mean	Mean
Log wages (SD)	4.96 (1.07)	5.68 (0.91)	4.89 (1.08)
Experience (SD)	17.1 (13.2)	24.2 (11)	21.64 (12.8)
HH size	6.7 (3.02)	7.2 (3.6)	7.4 (3.3)
No. of observations	464	379	3526

Table AI.
Descriptive statistics
of variables used
(multinomial logit
model and wage
estimation)

Table AII.
Tests for
independence of
irrelevant alternatives
(IIA) for various
employments

	Hausman tests				Small-Hsiao tests				
	χ^2	DF	$P > \chi^2$	Evidence	lnL(full)	lnL(omit)	χ^2	DF	$P > \chi^2$
Employments				For H_0	-2,113.404	-5,726.792	-7,226.775	60	1.000
Public employment	-22.458	40	-	Against H_0	-2,013.580	-2,828.726	-1,630.291	60	1.000
Private employment	66.514	40	0.005	For H_0	-892.006	-2,828.726	-3,873.440	60	1.000
Self-employment	-7.839	40	-						
	χ^2			Likelihood ratio test					
				5,810.80***					
				(0.000)					

Note: H_0 odds (outcome J vs outcome K) are independent of other alternatives

Variables	(1) Public employment	(2) Private employment	(3) Self-employment
Exper.	0.046** (0.018)	0.044*** (0.017)	0.042*** (0.011)
Exper2	-0.053 (0.031)	-0.052 (0.030)	-0.053*** (0.017)
<i>Education (relative to primary)</i>			
Secondary	0.288 (0.199)	0.430** (0.179)	0.271*** (0.064)
College	0.994*** (0.354)	0.776*** (0.247)	0.430*** (0.158)
University	1.462*** (0.387)	1.346*** (0.249)	0.623** (0.264)
<i>Sector (relative to industrial sectors)</i>			
Agriculture	0.261 (0.233)	-0.378 (0.232)	-0.720*** (0.164)
Services	0.109 (0.143)	-0.546*** (0.130)	-0.257*** (0.098)
Female	0.038 (0.081)	-0.358** (0.153)	-0.680*** (0.059)
<i>Zones (relative to NC)</i>			
NE	0.300** (0.130)	-0.220 (0.272)	0.112 (0.191)
NW	0.421*** (0.100)	0.069 (0.363)	0.070 (0.171)
SE	0.155 (0.146)	-0.201 (0.175)	0.013 (0.154)
SS	0.503*** (0.099)	0.151 (0.139)	0.605*** (0.149)
SW	0.085 (0.187)	-0.217 (0.171)	0.425*** (0.152)
Urban	0.082 (0.076)	0.448*** (0.136)	-0.022 (0.067)
Married	0.059 (0.119)	0.250 (0.155)	0.104 (0.079)
HH size	-0.013 (0.013)	0.049** (0.021)	0.023** (0.011)
<i>Occupations (relative to Managers occupations)</i>			
Professionals	0.213 (0.172)	0.083 (0.245)	0.516** (0.227)
Assoc. professionals	0.322 (0.171)	0.407 (0.290)	0.071 (0.135)
Clerks	0.192 (0.239)	0.402 (0.257)	0.407 (0.779)
Service workers	-0.019 (0.341)	0.138 (0.260)	0.133 (0.145)
Skilled agriculture	0.021 (0.488)	-0.170 (0.300)	-0.244 (0.138)
Crafts	0.259 (0.332)	0.215 (0.245)	0.004 (0.148)
Machine operators	0.342 (0.193)	0.412 (0.226)	0.249 (0.163)
Elementary Occupations	0.495 (0.263)	0.418 (0.424)	1.287*** (0.332)
Mills_Public	-0.008 (0.030)		
Mills_Private		-0.052 (0.042)	
Mills_Self			-0.015 (0.033)
Mills_Non_part			
Constant	3.435*** (0.716)	2.715*** (0.563)	3.834*** (0.336)
Observations	399	325	1,594
F-statistic	10.72	8.42	28.85
p-values	(0.000)	(0.000)	(0.000)
R ²	0.376	0.395	0.311

Notes: Robust standard errors are shown in parentheses. NC, North Central; NE, North-East; NW, North-West; SE, South-East; SS, South-South; SW, South-West. Mills_PE, Mills_PrE and Mills_Non_part are these selectivity terms for each employment modes. **,***Significant at 0.05, 0.01 levels, respectively

Table AIII.
Hourly wage
equations with the
selectivity term
(Lee's model)

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