

# **Heterogeneity in the Nigerian Labour Market: Exploring the Wage Gap.**

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## **ABSTRACT**

How does paid employment (public and private wage employments) differ from self-employment in Nigeria? Using the Nigerian cross-sectional General Household Survey (GHS) panel data of 2012, this doctoral thesis investigates the wage differences in the Nigerian public, private paid and self-employments.

The Multinomial Logit Model (MLM); Bouguignon, Fourier and Gurgand (BFG) (2001) and Lee's (1983) models are used for estimating wage equations in order to investigate the determinants of wage differences within employment modes and among gender.

The study evidences that human capital endowments are important determinants of wages in both employment modes; paid and self-employment. However within the paid employment (public and private) there appears to be no common wage determinants. While in public employment only geopolitical zones have a significant effect, in private employment, human capital endowments, marital status, gender, household size and urban rural division matters. On the other hand, in comparison to paid employment in private sector and self-employment they have more common determinants such as human capital characteristics and gender. Furthermore, the wage structure of the self-employed individuals differs by sector and occupation they are engaged in.

These findings are in support of the findings of the recent studies on wage determinants as marital status and gender are significant determinants of wages in

both, private paid employment and self-employment modes. Thus the analysis is extended to capture the impacts of gender and family attributes on wages. In this respect wage equations are estimated separately for males and females in both self and paid employment modes.

The evidences suggest that marital status (being married) for both gender and employment modes increase the probability of having higher wages. On the other hand having more than three children decreases the log of odds ratio (the probability of having higher wages) relative to non-participation. The interaction term of being married and having children is negatively associated with female wages in SE. Findings therefore offer some policy inputs but also suggest the need for further research into the causes of the gender pay gap in self and paid employment.

**Keywords:** Heterogeneity, Sectoral allocation, wage difference, self-employment, wage employment, Nigeria.

## ÖZ

Nijerya’da ücretli çalışan (kamu ve özel sektör) ve kendi hesabına/işveren olarak çalışanların ücretleri hangi açılardan farklılık göstermektedir? Mevcut çalışma Nijerya’nın kesitsel Genel Hanehalkı Anketi (GHS) 2012 panel verilerini kullanarak , Nijerya’da kamu ve özel sektörde ücretli çalışanlar ile kendi hesabına/işveren olarak çalışanların maaş farklılıklarını incelemektedir.

Farklı istihdam biçimleri arasındaki ücret farklılıklarını incelenmesinde Multinomial Logit Modeli (MLM); Bouguignon, Fourier and Gurgand (BFG) (2001) Lee (1983) yöntemleri kullanılmıştır.

Elde edilen bulgular, her iki istihdam biçiminde (kamu-özel ücretli ve kendi hesabına/işveren olarak çalışanlar) bireylerin beşeri sermaye birikimlerinin ücreti belirleyen önemli etkenler biri olduğunu ortaya koymuştur. Ancak, kamu ve özel sektör çalışanları arasında ücret belirleyenlerinin farklılaştığı gözlemlenmiştir. Kamu sektöründe yalnızca jeopolitik bölgeler itibariyle ücret farklılıkları anlamlı bulunurken, özel sektörde beşeri sermaye birikimi, cinsiyet, medeni durumu (kişinin evli olup olmadığı), hanede kaç kişinin yaşadığı ve kırsal-kentsel ayrımı ücret belirleyenleri arasında yer almıştır. özel sektörde ücretli çalışanlarla kendi hesabına/işveren olarak çalışanlar kıyaslandığında, beşeri sermaye birikimi, cinsiyet gibi ücret belirleyenleri bakımından daha çok benzeştiğini göstermiştir. Ayrıca, kendi hesabına/ işveren olarak çalışanların ücret yapılarının çalıştıkları sektör ve meslek gurupları itibariyle de farklılaştığı elde edilen bulgular arasında yer almaktadır.

Çalışmanın özel sektör ve kendi hesabına/işveren olarak çalışanların ücret farklılıkları ile ilgili ortaya koymuş olduğu sonuçlar, çalışanın medeni durumu, cinsiyet olmak üzere son zamanlarda yapılan çalışmaların bulguları ile de örtüşmektedir. Bu nedenle, çalışmada cinsiyet ve aile ile ilgili özelliklerin ücretler üzerindeki etkisi ayrıca irdelenmiştir. Bunun için, hem ücretli çalışanlar, hem de kendi hesabına/işveren olarak çalışan kadın ve erkekler için ayrı ücret fonksiyonu tahmin edilmiştir.

Regresyon sonuçları, medeni durumun hem maaşlı hem kendi hesabına/işveren olarak çalışanlar için her iki cinsiyet bakımından daha yüksek maaş alma olasılığında etken olduğunu ortaya koymuştur. Diğer taraftan üç çocuktan daha fazla çocuk sahibi olmanın daha yüksek maaş alma olasılığını azalttığı görülmüştür. Ayrıca, evli ve çocuklu olmanın kendi hesabına/işveren olarak çalışan kadınların kazançları üzerinde negatif bir etki yaptığı bulunmuştur . Bu sonuçlar, iş gücüne katılmayanların baz kategori olarak alındığı sonuçlardır. Tüm bulgular ışığında çalışma, ortaya çıkan bazı politika önerilerinin yanısıra, Nijerya kapsamında, kadın-erkek ücret farklılıklarının daha yakından analizini gerekli görmektedir.

**Anahtar sözcükler:** ücret farkı, kendi hesabına çalışma, işveren, meslek, ücretli çalışma, toplumsal cinsiyet, Nijerya.

To

***The Everlasting and Gracious God Almighty.***

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## LIST OF ABBREVIATION

BFG	Bourguignon, Furier and Gurgand
CPI	Consumer Price Index
EAs	Enumeration Areas
FCT	Federal Capital Territory
GHS	General Household Survey
GNI	Gross National Income
HDI	Human Development Index
ILO	International Labour Organization
IIA	Independence of Irrelevant Alternatives
ISCO	International Standard Classification of Occupations
LSMS	Living Standard Measurement Study
MLM	Multinomial Logit Model
NBS	Nigerian Bureau of Statistics
NMB	Nigerian Manpower Board
NLS	Nigerian Labour Survey
NC	North-Central
NE	North-East
NW	North-West
OLS	Ordinary Least Squares
PE	Paid-Employment
PPP	Purchasing Power Parity
PSUs	Primary Sampling Units
SAP	Structural Adjustment Programme
SE	Self-Employment

SE	South-East
SS	South-South
SW	South-West
UNDP	United Nations Development Programme
UN	United Nations
WB	World Bank
WDI	World Development Indicators

# Chapter 1

## INTRODUCTION

### 1.1 Background and Motivation

#### 1.1.1 Research Background

Labour markets are heterogeneous in terms of labour supply and labour demand (Aminu 2010; Fields 2007; Fields 2011; Glick & 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, labour productivity has been described as one of the important assets to the welfare of poor households (Fields 2013). As a result, labour market comprises of individuals who supply their labour services to a given employment or those selling their labour services to themselves in form of self-employment. According to ILO (1993), self-employment (SE-hereafter) is defined to capture individuals who work for monetary profits or family benefits. Workers in this category include employers, own account workers and workers in the household owned enterprises. Resting on the ILO (1993)'s definitions, paid employment (PE) is

also defined to imply jobs by which an explicit written or oral contract is evident and where salary or wage payments is not dependent on employment revenues.

According to Moghadam (1999), structural reforms and shifts of development policies from internal oriented to external oriented growth strategies resulted in the expansion of SE<sup>1</sup> and informal sector—defined to comprise of private unincorporated employments where regulations are minimal (ILO 2000). Hence, two contending issues regarding the growth of SE have been seen through the “pull” and the “push” arguments. Hence, a growing taste of flexibility, innovative and entrepreneurial culture may pull some workers out of the PE into SE; structural reforms and downsizing effects, on the other hand, may involuntarily push other workers into it (Hughes 2003; Gindling and Newhouse 2013). This push effect might lead to undesirable labour market outcomes in SE, compared to PE. Instances have been made regarding the precarious and unregulated nature of SE to the absence of social security systems—with adverse welfare effects in the developing countries (UNDP), 2014). The research of Gindling and Newhouse (2013) found that about 53% of workers in the developing regions of the world are self-employed as compared to around 10% in the developed regions (Fields, 2013; Aguilar et al 2013). However, SE commands limited opportunities such as absence of job security and income uncertainty with low and unsustainable earnings compared to PE (especially in the public paid employment) with wage stability, job security and other employment fringe-benefits. For instance, Gindling and Newhouse (2013)’s findings

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<sup>1</sup> The categorization of self-employment is diverse; the definition used in this research SE refers to the standard World Bank definition to reflect individuals working on their own accounts or employees within the self-employment.

for 74 developing countries observed that salaried employees presented a better and stable job quality than the own-account workers. Lechman & Schnabel (2012) however, posited that SE translates to independence and flexibility in contributing to household production such as child care as compared to the superior paid employment (see Moore 1983).

Previous studies argue that the experiences of male and female self-employed also differ considerably in terms of earnings, type and status of employment (see Millan et al 2012). Specifically within the gendered pattern of labour supply decisions, marriage and children may present wage premium or penalty for women that may be attracted to self-employment due to the flexibility of working hours (Hundley, 2000; Budig 2006; Reynolds & Johnson 2012; Marshall & Flaig 2013; Simon & Way 2015). It may be different for men who may voluntarily perceive SE as a form of rewards through entrepreneurial culture (Scherer et al 1990; Blanchflower & Oswald 1998; Brush 1992; Hundley 2000; Marshall & Flaig 2014).

This feature, other than productivity features, will increase labour heterogeneity with its given economic implications. Economic perspectives include possible earnings differences not only associated with individual human capital endowment but also equally due to other demographic, family related or job related attributes and limited mobility to high-paying jobs (Garibaldi & Taddei 2013). According to Fields (2008), the realistic assumption is that because jobs differ greatly in quality and type, all labour market participants would go for jobs with higher pay or greater opportunities for advancement; 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 be pushed into the alternative employment choices, such as SE, or remain unemployed. Hence, reconciling the differences arising from male and female differences in employment outcomes and the nature of such employment remains contentious in the literature.

### **1.1.2 Motivation**

Key issues in development economics rely on various approaches to addressing economic and social inequality - poverty. It's often been argued that one medium through which poverty can be analyzed is through the labour market. The *Decent Work Agenda* of International Labour Organization (ILO) is premised on finding means of ensuring decent and sustainable high paying jobs. According to Fields (2011), poverty prevalence in the developing countries is an employment rather than unemployment problem. Poverty prevalence is therefore connected to quality of employment and level of wage rate in such employment. Hence, one striking feature of the labour markets in developing countries is the coexistence of a highly regulated PE (public- and private-wage-employment sector) and the less regulated SE sector (Gindling 1991).

Since quite a substantial number of workers in developing countries are in SE, it has been argued that such employment invariably translates into different vulnerabilities and poverty shocks—especially for households in the disadvantaged path of the market (Fields, 2006; ILO, 2006). Thus, this can be interpreted to imply that higher levels of poverty in developing countries would also mean persistent rates of worker's involvement in low paying jobs with its attended negative impacts within the most vulnerable groups. In most developing countries, a significant number of people live under the poverty line. For instance, about 46% 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% in 2010 (NBS 2010).

Going by the National Manpower Board (1998), the Nigerian labour market is classified into seven categories such as employers, self-employed farmer, self-employed trader, self-employed others, salary and wage employees in the private employment, salary and wage employees in the public employment and the paid apprentice. Employers include persons operating their own enterprises and hires workers under its venture. Own account workers also represents individuals working on their own venture who does not hire workers into its venture. For the purpose of this research, the definition of SE is based on the aggregation of employers and own-account workers such as self-employed in agriculture, self-employed trader, and other self-employment types<sup>2</sup>. Similarly, total PE is aggregated to capture salaried and wage employees in the public and private employments respectively. These definitions also fit in well with the World Bank's standard definitions of self-employment as presented in the Living Standard Measurement Study (LSMS) definition. The Nigerian labour market is often characterized by earnings differences between the PE (private-public paid employments) and SE (see Ogwumike et al., 2006). Self-employed persons accounted for 55% of employment, while salaried workers in both the private and public sectors account for about 39% (NMB 1998). In recent time, SE alone commands about 83% of employments leaving about 8% and 9% for the private and public employments respectively. In Nigeria, while PE in the private and public sectors promises conducive and better working opportunities,

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<sup>2</sup> Other self-employment types include technicians, crafts, small scale manufacturers amongst others.

the self-employed have limited opportunities, with low and unsustainable earnings. To better understand sectoral heterogeneity and earnings 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 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 in those countries.

According to the Nigerian 2011/2012 weighted<sup>3</sup> General Household Survey (GHS)-Panel data for Nigeria, paid employed persons make up about 20% while self-employment commands about 80% of the labour market (GHS<sup>4</sup>-panel 2011/2012). According to the GHS data, wage as used in this research refers to the hourly, daily, weekly or monthly income received by individuals in their primary employments such as the public, private and self-employments. It therefore excludes any in-kind payments, allowances, bonuses or other incomes from any secondary employments. Hence, for ease of comparability in terms of differences between the characteristics of PE and SE, this study uses the term “wage”—converted into hourly equivalent to describe such incomes received as mentioned. Accordingly, the real median hourly earnings in the public paid, private paid and SE is 303Naira, 125 Naira and 100 Naira respectively. In the PE (public and private employments), the median earnings was

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<sup>3</sup> Calculated by the author by using survey weights in order to reach complete representation of the entire national population.

<sup>4</sup> 1<sup>st</sup> and 2<sup>nd</sup> waves of the General Household Survey (GHS) panel data as obtained from National Bureau of Statistics (NBS 2015).

187 Naira (\$1.87<sup>5</sup>) and an unadjusted 87% earning difference compared with the SE. Considering median monthly earning in 2012, the male and female PE earn 35,000 Naira (\$350) and 25,000 Naira (\$250) respectively while those in the SE earn 15,000 (\$150) and 5,000 Naira (\$50) respectively—below the minimum wage (18,000 Naira). Such low earnings especially in the SE have a profound implication on the possibility of falling into the poverty trap with its adverse economic and socio-economic consequences. It can also be due to various types of heterogeneity (Aminu 2010; Fields 2007; Fields 2011; Glick & Sahn 1998; Gindling 1991). It has been argued that heterogeneity invariably translates into different vulnerabilities and poverty shocks, especially for households in the disadvantaged path of the market (Fields, 2006; ILO, 2006). Therefore, this can be interpreted as to imply that higher levels of poverty rate in developing countries may exert a negative impact within the most vulnerable groups. These discussions are the motivations that led to this research.

## **1.2 Research Objectives**

The main objective of this study is to explore sources of wage differences in the Nigerian labour market. This arises by employment type, differences in human capital endowments, location of residence, economic sectors, gender or family attributes. Studies on the effects of family attributes and other characteristics on earnings within PE and/or SE are numerous for developed countries (Moore 1983, Hundley 2000, Simon & Way 2015, Marshall & Flaig 2013 Millan et al 2010). However such research is limited for developing countries. For instance, studies for

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<sup>5</sup> The reported median wage is based on 2010 real effective exchange rate for Nigeria. Hence, 2010=100 (1USD=100naira)

developing countries in Africa include Glick & Sahn (1997) for Guinea; Glewwe (1991) for Ghana; Vijverberg (1993) and Appleton et al. (1990) for Cote d'Ivoire; Kabubo-Mariara (2003) for Kenya; and Al-Samarrai & Reilly (2005) for Tanzania. The overall findings of these studies show that human capital variables such as education and experience are major determinants of wages across various employments. Glick and Sahn (1997)'s study of gender and education impact on earnings show that education and experience have a greater positive impact on earnings in the private and public employments—especially when compared to the magnitude of the same variables in the self-employment. Glewwe (1993), and Appleton et al (1990)'s finding is similar to Glick and Sahn's (1997) where education commands a positive significant impacts on wages. By correcting for selectivity in the wage equation, Vijverberg (1993) studied educational investment and returns to wages for the wage and non-farm self-employments in Cote d'Ivoire. Findings from this research show that the return to education was higher for males than females especially in the wage employment. Similarly, Kabubo-Mariara (2003) estimated the gender wage gap in the private and public employments in Kenya. After checking for selectivity bias in the wage equation, findings show that other than education, marriage and age constitutes a positive significant determinant of wage for men only. For women however, marriage was found to impact negatively on wages across the employments. Al-Samarrai & Reilly (2005) studied determinants of wages for the self-employed and wage employed Tanzanian workers. Their finding also showed tertiary education was found to be a major determinant of wage in the wage employment, where its impact on the self-employment in Tanzania is minimal.

Studies for Nigeria include Ogundari and Aromalaran (2014), Temesgen (2008), Ogwumike (2006), , Aminu (2010), Okuwa (2004), Bennel (1983), Aromalaran (2004, 2006), Ugochukwu and Chijioke (2011), Aderemi (2015) and Nwaka et al (2015). Reflecting on the impact of education on wages, Ogundari and Aromalaran (2014), Okuwa (2004) and Aromalaran (2004, 2006) used the human capital model to investigate the returns to education in Nigeria. Findings therefore show that the university level of education had the most contribution in wage determination in Nigeria as compared to other educational levels. These studies however, did not consider the several employments nor did they reflect the geopolitical and occupational attributes into their analysis. Studies on wage determination across the private and public employments include Aminu (2010) and Ogwumike et al (2006). While 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, Ogwumike et al (2006) studied participation and earning inequality in the Nigerian paid and self-employment using 1999 GHS cross-sectional data. Their study (Ogwumike et al 2006) applied several inequality measures such as Gini Coefficients while also estimating Least squares and Heckman selection techniques across the employments. Findings show a higher incidence of inequality in the PE than the SE. For gender, inequality was found to be higher among the female paid employees than their male counterparts. Aminu (2010) concentrated on only sample of urban male and female workers without reflecting the relative impacts of the family attributes, geopolitical differences or occupational into his study. Eventhough Ogwumike et al (2006) included the salaried and self-employees in their analysis, the

family attributes and explicit mention of the characteristics of such employment were not concisely defined. Also, other household labour market studies for Nigeria include Aderemi (2015) who uses the 2004 cross-section household survey to analyze the wage curve in Nigeria. Though Aderemi (2015) studied the wage curve for the regions, it still neglected the gender dimension or the relevance of other employments in his analysis.

The overall limitations of these studies arise in the following ways: first, these studies did not consider the full range of employment alternatives such as SE and PE categories and they did not include the effects of family related attributes such as marriage and family sizes on these employment categories; second, there could be heterogeneity of labour demand due to differences in geopolitical attributes in terms of economic opportunities. Certain regions have unique economic opportunities that attract workers in several employment modes. 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 companies in the region. Hence, controlling for these geopolitical attributes will bring novelty in labour market studies for Nigeria; third, the data coverage of these studies is quite old and may not present recent developments in the Nigerian labour market. Fourth, 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 SE as an alternative source of employment due to structural changes in the economy. Additionally, the extent of wage differences across the three employment choices explains the relative wages of a Nigerian employee and a possible poverty incidence. Hence, by using the most

recent 2012 cross-sectional data drawn from GHS survey, this study aims to explore wage differences across the three employment categories of wage employments (PE) in the public- private sectors and SE for the Nigerian labour market.

This research raises the following questions: (1) what are the associated determinants of wages across the employments modes? (2) Does being married and having children further increase the wage gap between men and women in the SE and PE?

Thus, the study employs the Multinomial Logit Model (MLM) based on Lee (1983) Model and that of the Bourguignon, Fourier and Gurgand (2001) by using the Nigerian cross sectional General Household Survey data for 2011-2012.

To the best of our knowledge, no study has analyzed wage differentials within the various employment alternatives in Nigeria while applying this model. From the foregoing, this study contributes to the existing literature in a number of ways: first, it provides empirical evidence as to how the differing economic opportunities of geopolitical zones affect wages and wage structures. Second the study documents the influences of marriage, and number children on wage differences in an African country, Nigeria.

The rest of this study is organized as follows: Chapter two presents a brief review of the developments in the Nigerian economy especially within the framework of macroeconomic and labour market performances while chapter three presents the detailed theoretical and empirical framework of the study. Chapter four will present the issues related to the selection biased problem and the econometric methodology

used as well as the data summary. Chapter five shall be the empirical findings. Finally, Chapter six is reserved for conclusions and policy recommendations.

## **Chapter 2**

### **THE NIGERIAN ECONOMY AND LABOUR MARKET**

#### **2.1 Economic and Socio-Economic Analysis of Nigerian Economy**

The growth rate of the Nigerian economy has taken several dimensions over the years. According to the available statistics obtained from the World Development Indicators (WDI) of the World Bank (WB 2015) (as summarized in Table 2.1) the Nigerian economy grew at an average of 4.54% between 1961 to 1965. The growth rate of real GDP further improved especially from 1966 to 1975 at about 6%. Even though Nigeria experienced a civil war between 1967 to 1970, the growth performance over the said period could be attributed to the oil boom era of the 1970s. However, from 1981 to 1985, the economy recorded a negative average growth rate of about 3%. These periods are associated with the spillover effects of the global financial crises of 1983 and the structural adjustment programme (SAP) of 1986. Excluding 1991 and 1995 with a minimal economic growth rate of 0.9%, other years following these periods have shown an impressive economic growth. Especially, between 2001 and 2005, the growth performance of the economy was 11% which coincides with the post military era including the adoption of several macroeconomic policies that helped to stimulate growth. Such policies include the National Economic Empowerment and Development Strategy (NEEDS). Such growth performance however declined to 7.22% from 2006 to 2010, which may also be due to the global financial crisis of 2008. Further abysmal growth rate of the economy

between 2010 and 2015 could be associated with several economic distortions and drastic fall in world oil prices—which commands a significant source of revenue to the Nigerian government.

The growth rate of GDP per capita also features in Table 2.1 measuring the growth rate of income of an individual over time. Thus, average income growth from 2.36% (1960 to 1965) and 3.19% (1971 to 1975) is an indication of an improvement of living standard over these periods. Conversely, a negative per capita income growth rate of 1981 through 1995 could be a reflection of the negative effects of the structural adjustment programs and military dictatorship in the country over those years. Post democratic era of 2001 to 2005 is also noteworthy where the per capita income growth is 8% (Table 2.1).

Table 2.1: Nigeria’s Macroeconomic Performance between 1960 - 2015

<b>Years</b>	<b>GDP Growth Rate (%)</b>	<b>GDP per Capita Growth Rate (%)</b>	<b>Inflation Rate (%)</b>
1960 – 1965	4.54	2.36	3.21
1966 – 1970	5.59	3.27	5.88
1971 – 1975	5.79	3.19	14.30
1976 – 1980	4.05	1.02	16.56
1981 – 1985	-2.59	-5.08	15.40
1986 – 1990	1.45	-1.16	25.87
1991 – 1995	0.50	-1.99	48.93
1996 – 2000	3.26	0.71	12.27
2001 – 2005	11.15	8.34	15.73
2006 – 2010	7.22	4.41	10.09
2010 – 2015	4.70	1.95	9.72
Overall average	4.15	1.56	16

Source: Self-computed using World Development Indicator (WDI) of the World Bank (WB 2015)

Within 54 years after Nigeria’s independence (1961-2015), the average annual inflation rate (CPI) is 16% (Table 2.1). Most of this high value is however influenced by years of 1986 to 1995<sup>6</sup> respectively. While the inflation rate rose over the years, the unemployment rate has also followed the same trend. According to the National Bureau of Statistics (2010), the unemployment rate in Nigeria has been on double digits since 1999. For instance as presented in Figure 2.1, between years 2001 to 2006, the total unemployment rate was 13% which however rose to 16% over 2007 to 2009. The year 2011 recorded the highest unemployment rate at 24% over the 56 years of independence. Nwaka et al (2015) holds that such rises in unemployment is associated with the large turnover of job seekers after schooling—which does to equate to the labour demand by employers. This feature is been argued to have led to mass increase in SE.

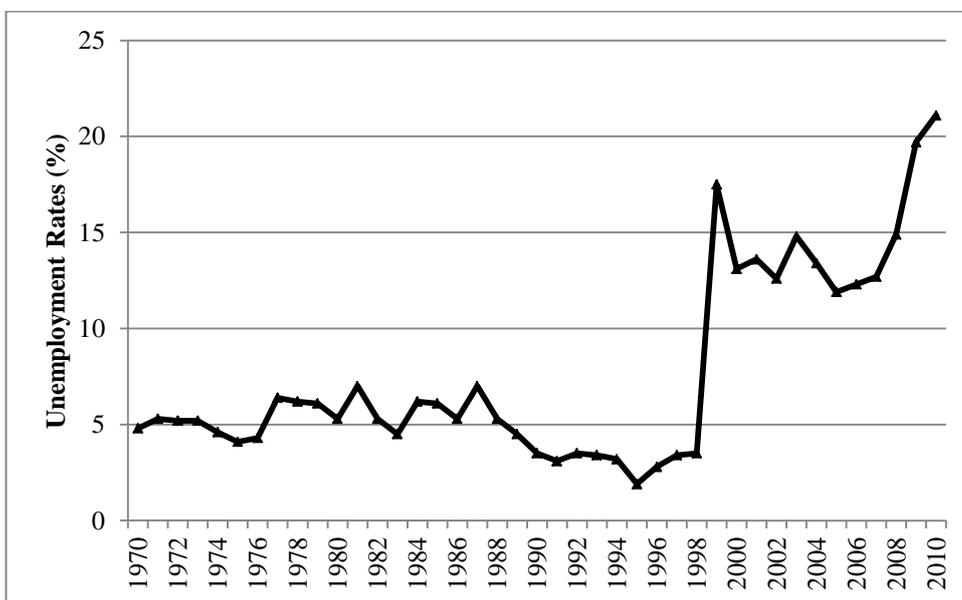


Figure 2.1: Unemployment Rate (1970–2010).  
 Source: Plotted from the data provided by NBS (2011)

<sup>6</sup> 54%, 57% and 72% inflation rates recorded in 1988, 1994 and 1995 respectively

Nigeria practices a federal system of government that includes other thirty-six states with their respective sub-national governments. These states are located within regions called the geopolitical zones such as: North Central (7 states such as Niger, Kogi, Benue, Plateau, Nassarawa, Kwara and FCT), North East (7 states Adamawa, Bauchi, Borno, Gombe Taraba, and Yobe), North West (7 states Kaduna, Kebbi, Katsina, Kano and Jigawa, Sokoto, Zamfara), South East (5 states Abia, Anambra, Ebonyi, Enugu, and Imo), South-South (6 states such as Akwa Ibom, Bayelsa Edo, Cross River, Delta and Rivers) and the South-West (6 states such as, Ekiti, Lagos , Ogun, Ondo, Osun and Oyo) (NLS, 2010). Most recent statistics according to the CIA (2014) has recorded Nigeria as the most populous and largest economy in Africa. With a population of over 177 million people in 2014 and a heterogeneous and diverse ethnic orientation, the country prides itself with over 250 ethnic groups, 36 states of the federation and 6 geographic regions/geopolitical zones. Amongst these, Hausa (and Fulani), Yoruba and Igbo represents about 29%, 21% and 18% of the total national population. Across the religious lines, about 50%, 40% and 10% of the national populations are the Muslims, Christians and other indigenous beliefs respectively. Having a population growth rate of 4%, and over 51% of population living in the urban areas (CIA (2014), Nigeria is been is been described as the fastest urbanizing country in Africa.

The Human Development Reports of the UNDP (2014) further give some insights on the multi-dimensional level of both human and economic wellbeing of the Nigerian population when compared with 5 other largest economies in Africa in terms of GDP sizes. According to the World bank's (2015) rankings of countries' GDP base, Nigeria was ranked the 23<sup>rd</sup> largest economy in the World and with a GDP of

USD481,066 million; which is also followed by Egypt (31<sup>st</sup> with a GDP of USD330,779 million) , South-Africa (32<sup>nd</sup> with a GDP of USD312,798 million), Algeria (55<sup>th</sup> with a GDP of USD166,839 million), Angola (59<sup>th</sup> with a GDP of USD102,643 million) and Morocco (61<sup>st</sup> with a GDP of USD100,360). These countries are therefore the 6 top economies in Africa based on their GDP values. Disaggregating the Human Development Index (HDI) across gender will provide a clearer picture for the socio-economic feature of the country. This was ably captured by the Gender-Related Development Index as reported in table 2.2 below. For Nigeria, the table 2.2 shows that life expectancy at birth is higher for females when compared to the males. This therefore translates to a longer longevity of about one year amongst the females as compared to the males. However in comparable instances with Egypt, Algeria and Morocco, life expectancy among the females is about 20years more in these countries when compared to that of Nigeria (52.8 years) or about 16 years more to those of South-Africa and Angola. In all countries, the average year of formal education is limited among the females when compared to the male which is lowest in Morocco (3.2 and 5.3 years for females and males respectively) and highest in South-Africa (9.7 and 10.2 years for females and males respectively). When a comparison is made about the standard of living in terms of Gross National Income (GNI) per capita at 2011 Purchasing Power Parity (PPP), average income was found to be more in Algeria (USD22,008.6 for the males) and South-Africa (USD8713.1 for the females) which might imply a higher standard of living for both countries. However, calculating the GNI per-capita gap<sup>7</sup> by gender show that the

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<sup>7</sup> The income Gap calculated as the GNI per-capita for Males minus the GNI per-capita for Females.

gender income gap is lowest in Nigeria (USD2, 532.7) and actually highest in Algeria (USD18, 110.1).

Overall, life expectancy at birth is slightly higher for the females than males which may be due to the biological differences. However other than that, females are quite at a disadvantage position in terms equal opportunities in the access to education and productive resources. Even though the gender gap in human capital is lowest in Nigeria, the magnitude of female income in other countries is relatively smaller than the males. Also, Nigeria (but compares well with Angola) is the worst in providing equal opportunities in the access to the health services since the difference between male and female life expectancy is negligible (0,6 years) compared to the differences in selected countries (it is 4.4 years, 4.7 years, 3 years and 1.8 years for Egypt, South Africa, Algeria and Morocco respectively).

Table 2.2: Some Gender Development Indicators in 2014.

	Male	Female
<b>NIGERIA</b>		
Life Expectancy at Birth	52.2	52.8
Mean years of schooling	7.1	4.9
GNI per-Capita at 2011 PPP	6584.8	4052.1
<b>EGYPT</b>		
Life Expectancy at Birth	69	73.4
Mean years of schooling	7.7	5.4
GNI per-Capita at 2011 PPP	1,6048.8	4,927.8
<b>SOUTH AFRICA</b>		
Life Expectancy at Birth	55.5	57.1
Mean years of schooling	10.2	9.7
GNI per-Capita at 2011 PPP	15,737	8,713.1
<b>ALGERIA</b>		
Life Expectancy at Birth (years)	72.5	77.2
Mean years of schooling	7.8	4.8
GNI per-Capita at 2011 PPP (	22,008.6	3,898.5
<b>ANGOLA</b>		
Life Expectancy at Birth (years)	50.8	53.8
Mean years of schooling	-	-
GNI per-Capita at 2011 PPP (USD)	8,168.9	5,496.8

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<b>MOROCCO</b>		
Life Expectancy at Birth (years)	73.3	75.1
Mean years of schooling	5.3	3.2
GNI per-Capita at 2011 PPP (USD)	10,572.8	3,221.9

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Source: UNDP (2014)

## **2.2 Nigerian Labour Market**

A peculiar characteristic of the labour market in developing countries is high labour heterogeneity. Hence the Nigerian labour market has its own share of large scale labour heterogeneity (Aminu 2010). These heterogeneous characteristics lead significant differences in employment modes as formal and informal sectors, private, public or self-employment sectors or across urban and rural areas, (also see Ogwumike et al, (2006), Okigbo, 1991 and Okoroafor, 1990). According to Onwuioduokit et al, (2009), the Nigerian labour market is remarkably divided into three distinct sectors, such as: the rural sector, informal urban sector and formal urban sector. The rural sector mainly consists of self-employed and unpaid family workers. The informal urban sector on its own consists of small scale private businesses, artisans and other street vendors. As for the formal urban sector, it is made up of large scale private and public enterprises that require some degree of regulatory and other stringent control rules. Federal Office of Statistics (FOS) (2001) categorized the Nigerian labour market into five different categories, namely: employers, employees in private companies, employees in public companies, employees in civil service and parastatals and finally the informal employment (see Ogwumike, et al (2006), Ugo & Evoh (2011).

From these categories, SE and salary workers dominate the general labour market stance in Nigeria. Statistics shows that self-employed persons accounted for 55% of the employment while wage and salaried workers both in private and public sectors accounts for about 39% (NMB, 1998). Also Aminu (2010) reports that the Nigerian labour market is a composite one. By implications therefore, it encompasses and reflects the institutional market model that allows unions, governments and employers determine the wages rather than the traditional market forces. Aminu (2010) also further argues that while the formal sectoral wages is greatly influenced by administrative decisions and unionized decisions, the informal sector rather has its wage structure ably determined by market forces and received limited influence from the public and private formal sectors.

Being a member of the ILO, Nigeria is a signatory to the several ILO's treaties regarding the overall efficiency and operation of the labour market (Okoronkwo 2008; Folawewo 2016). Hence the standard operations of the labour market are often dictated through labour laws in the form of decrees (military regimes) and Act of Parliament (in the democratic period). The federal government wage commission determines the level of formal sectorial wages in Nigeria. Its origin is traced back to 1941 with the Bridges Committee of Inquiry. Subsequent commissions, numbering about 13 have come up to evaluate and determine wage rates. In terms of minimum wages, the Wages and Board Act of 1955, Act of Parliament 2000 fix the sectoral minimum wages that has passed through periods of adjustments alongside the dynamic realities of economic situations according to occupational types (see Aminu, 2011). It is observed that one major impact of minimum wage increase is on its transmission mechanism to other levels-private formal sector in particular. This is

because the wages paid at the public sector, very much determines the rate in the private formal enterprises. As of 1998 through 2011, monthly wage minimum wage of government workers ranged from N3000 (about 35USD then) to N18, 000 (118USD), but has often been directed to the formal private sector.

According to Folawewo (2016), it has been observed that the implementation of labour laws in Nigeria is inefficient. The law and the regulations do not apply efficiently to the entire labour market, especially the large number of the self-employed. Laws are often misguided and biased with regards to compliance in both the formal public and private employments. Several factors have been accounted for such inefficiency some of which include corruption and weak institutional arrangements.

### **2.2.1 Labour Market Indicators**

Statistics for this section of the study is adopted from the NBS (2012) General Household Survey panel data (2nd wave). The data reported are weighted to reflect the entire population of the country. Hence, the statistics reported are good representative of the population as at when the survey was conducted. Table 2.3 below shows the age distribution of the entire population by gender geopolitical zones and regions in 2012. Hence, the reported population dynamics for the males and females in the urban and rural areas show that both genders are equally represented in the urban and rural areas-however, the proportion of females in both regions appear to be more. Considering the distribution of people across geopolitical zones, males' concentrations are high especially in the North-West geopolitical zone. The presence of commercial activities may be some of the reasons for such a high

distribution. Similarly, females are equally distributed in the South-West which also houses one of the Worlds’ most urbanizing cities such as Lagos.

Table 2.3: Distribution of entire population by Gender, Geopolitical Zones and Region in 2012.

	Males		Females		Overall	
	No. (Millions)	%	No. (Millions)	%	No. (Millions)	%
<b>Regions</b>						
Urban	35.566	38	37.00	39	72.570	38
Rural	58.566	62	58.45	61	116.812	62
<b>Geopolitical Zones</b>						
North-Central	12.966	14	13.017	14	25.984	14
North-East	12.219	13	12.213	13	24.438	13
North-West	22.589	24	21.460	22	43.835	23
South-East	10.222	11	11.457	12	21.680	11
South-South	15.191	16	15.519	16	30.711	16
South-West	20.742	22	21.997	23	42.739	23

Source: 2nd Wave GHS-Panel Data (NBS 2012) and own calculations.

Table 2.4 also reports the distribution of the population by gender, age-groups and levels of education. The distribution shows that more males of ages “0 – 14” and above 65 years are categorized as the dependent group compared to the females. Hence while the percentage of males who are dependent is 54%, that of the females are 47%—less than the overall average of 51%. This therefore presents a male dependency ratio of 117% and female dependency ratio of 87% and an overall dependency ratio is 104%. For the distribution of the population by gender and levels of education shows that while a large number of males is of the secondary educational level, primary education dominates the female’s. Hence, both primary and secondary levels of schooling has the highest representation maybe partly be due

to high youth dependency ratio—since individuals are still of school age (0 – 14 years). Individuals with university degree are the least in in the distribution.

Table 2.4: Distribution of entire population by Gender, Age groups and Education in 2012, (Weighted)

	Male		Female		Both Gender	
	No. (Millions)	%	No. (Millions)	%	No. (Millions)	%
<b>Age categories</b>						
Below 14	35.914	38	32.535	34	68.449	36
15 – 25	18.029	19	16.451	17	34.480	18
26 – 35	7.694	8	12.337	13	20.032	11
36 – 45	7.117	8	8.561	9	15.680	8
46 – 55	5.737	6	6.206	7	11.944	6
56 – 64	4.566	5	4.199	4	8.766	5
Above 64	14.872	16	15.160	15	30.032	15
<b>Education</b>						
Primary	25.360	42	23.633	44	48.993	43
Secondary	25.331	42	20.781	39	46.112	40
College* <sup>8</sup>	3.471	6	3.160	6	6.631	6
University	3.020	5	2.032	4	5.052	4
Others <sup>9</sup>	3.590	6	3.606	7	7.196	6

Source: 2nd Wave GHS-Panel Data (NBS 2012) and own calculations;

Table 2.5: Labour Force Participation Rates (LFPR) of Working Age Population (15+) by Gender, region and zones in (2012).

	Males		Females		Both Gender	
	Labour Force (Millions)	LFPR	Labour Force (Millions)	LFPR	Labour Force (Millions)	LFPR
<b>Regions</b>						
Urban	9.343	56	9.772	53	19.116	54
Rural	15.894	60	15.281	52	31.175	56
<b>Geopolitical Zones</b>						
North-Central	3.735	63	4.273	63	8.008	63

<sup>8</sup> College here refers to individual with higher levels of education after high school such as School of Nursing Schools, Teacher's Training Schools—less than 3 years of schooling.

<sup>9</sup> \*Other as used here are the educational categories such as the Quaranic schools, adult education

North-East	3.362	59	2.367	38	5.729	48
North-West	6.661	66	3.930	34	10.591	53
South-East	2.655	54	3.760	58	6.415	56
South-South	7.753	104	4.140	54	11.893	79
South-West	5.071	58	6.314	62	11.385	60
<b>Education</b>						
Primary	5.551	71	6.246	70	11.797	71
Secondary	9.091	45	6.913	41	15.931	43
College	1.800	60	1.460	53	3.250	57
University	1.678	66	0.889	50	2.566	60

Source: 2nd Wave GHS-Panel Data (NBS 2012) and own calculations.

The labour force participation for the working age population of 15 years and above is presented in table 2.5 by gender, region, geopolitical zones and levels of education. The distribution can therefore be inferred to be a rural labour force where majority of the workers of 15 years and above are concentrated—highest for males with a labour force participation rate of 60% compared to the females of 52%. Most of this distribution may be influenced by the prevalence of agricultural employments in the rural areas. The table also observes some geopolitical differences in labour force participation across gender. For instance, highest concentration of the male labour force is in the South-South geopolitical zone which also has the highest labour force participation rate. South-South geopolitical zone is oil-rich in nature which indeed may be a reflection of employment opportunities for males. For the females, the case is slightly different where the highest concentration of the female labour force is in the South-West—although the labour force participation rate is seen most in the North-Central zone. North-Central geopolitical zone houses “Abuja” the Federal Capital Territory (FCT). Hence there is a possible spill-over effect of opportunities in the zone to other neighboring cities. Even though, secondary education has the most concentration of the working age, the labour force participation appear to be slightly

different for males (71%) and females (70%) with primary education. Based on the table, it may also imply that there are no major gender differences in labour force participation rates for those with primary education. However, comparing the labour force of males and females with university degree, the table shows that participation rate is quite higher among the males than the females. A general visualization the labour force participation rate is reported in Appendix A.

Table 2.6: Employment Rates by Gender, Region, zones and Age-groups (2012)

	<b>Males (%)</b>	<b>Females (%)</b>	<b>Both Gender (%)</b>
<b>Regions</b>			
Urban	39	35	37
Rural	61	65	63
<b>Geopolitical Zones</b>			
North-Central	14	15	14
North-East	16	14	15
North-West	27	14	21
South-East	11	16	13
South-South	13	16	14
South-West	20	25	22
<b>Age categories</b>			
15 – 25	21	17	19
26 – 35	20	28	24
36 – 45	24	24	24
46 – 55	20	18	19
56 – 64	14	12	13
<b>Education</b>			
Primary	32	40	35
Secondary	50	45	47
College	10	10	10
University	9	6	7
<b>Employment Modes</b>			
Public	10	7	9
Private	11	7	10
Self-employment	78	86	82

Source: 2nd Wave GHS-Panel Data (NBS 2012) and own calculations.

The employment rates by gender, region, zones and Age-groups are reported in Table 2.6. It is therefore seen that the employment rates is highest in the rural areas

which may also be agricultural based as stated earlier. For 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). There is a gender difference in employment rate by age across age categories. The employment rate is highest for males and females of 36 – 45 and 26 – 35 years respectively. As often observed, employment outcomes are mainly advantageous for female younger workers which may partly be due to the differences in employment regulations regarding age profile of workers. For both males and females, the employment rate is highest among individuals of 26 – 45 years (active labour force). Similarly, employment rate across educational levels also reveal high employment rate among individuals of secondary educational groups. Also, included in table 2.6 is the employment rate by gender and employment modes. The employment rates are highest in the self-employment where female dominance is observed. The PE (public and private) appear to be more male dominated (21%) when compared to the female's (14%).

Table 2.7 presents a summary of the distribution and employment of men and women across 9 broad occupational groups in 2012. Female occupational choices seem to be limited, compared with those of males. Except for clerical, agricultural and elementary occupations in which males and females were equally represented, the others were either heavily male or female dominated<sup>10</sup>. Two occupational categories, associate professionals and service workers, had more female

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<sup>10</sup> The occupational dominance calculations are being inspired by Hakim (1996) preference theory as follows: share of women in overall employment is 49.9%. Hence, 64.9% (49.9+15) and above represents female dominance while 34.9% (49.9-15) and below is male dominated.

representation of 70% and 76% respectively. The remaining four had a higher concentration of males.

Table 2.7: Employment by occupational groups and gender, 2012.

	Total		Female		Male		Dominance*
	Thousand	%	Thousand	%	Thousand	%	
Managers	466,875	1.8	105,051	22.5	361,824	77.5	Male
Professionals	2,899,041	11.2	1259,45	43.4	1,639,591	56.6	Male
Associate Professionals	6,963,867	26.9	4895,739	70.3	2,068,128	29.7	Female
Clerks	708,809	2.7	369,31	52.1	339,499	47.9	Mixed
Service workers	3,069,429	11.9	2331,183	75.9	738,246	24.1	Female
Agricultural workers	3,736,981	14.5	1660,438	44.4	2,076,544	55.6	Mixed
Crafts	4,337,694	16.8	1386,456	32.0	2,951,149	68.0	Male
Machine operators	1,874,487	7.3	216,732	11.6	1,657,755	88.4	Male
Elementary occupations	1,789,976	6.9	721,974	40.3	1,068,002	59.7	Mixed
Total	25,847,159	100	11,317,573	49.9	12,900,738	50.1	Mixed

Source: Computed from cross-sectional GHS- panel data (NBS, 2012)

\* Occupations categorized as female/male dominated occupations represent those occupations that the share of women/men in an occupation is 15% percent more than the share of women/men in the total employment (Hakim, 1993). The share of women in total employment is 49,9% and 50,1% for men.

The 2010 unemployment statistics of working age population (15 to 64 years) by geo-political zones and gender is reported on table 2.8 below. As seen, the South-West geo-political zone has the lowest unemployment rate which is partly due to the high concentration of the population as seen in table 2.3. Given a high rate of industrial and commercial activities in this region, such high population concentration can guarantee ready supply of labour to the enterprises in the region, thereby reducing unemployment rate. The North-West has the highest unemployment rate across the zones of about 27%. This is due to the limited industries offering jobs to individuals. Stratifying these statistics according to gender, can obviously confirm that unemployment rate of women is the highest in North-West (41%). Very keenly

observed from the table that unemployment rate is higher in the rural parts of Nigeria and having most females unemployed in the rural sector than the males. This is an evidence of inefficiency of the Nigerian labour market where high unemployment undermines productivity and welfare. To further see the rate of unemployment by urban and rural division, table 2.9 reports the unemployment rate by region, educational levels. The data for table 2.9 was obtained from the Annual Socio-economic Report of the NBS (2011).

Table 2.8: Unemployment Rate by Zones and Gender (2010)

<b>Zone</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
North-Central (7States)	15.5	24.4	17.6
North-East (6 states)	21.5	33.5	26.7
North-West (7 states)	18.9	40.6	27.3
South-East (5 States)	20.1	22.9	21.6
South-South (6 States)	22.1	22.3	22.2
South-West (6 States)	11.5	12.4	11.9
<b>Sector</b>			
Urban	13.3	17.1	15.2
Rural	19.9	29.2	24.3
<b>Total</b>	<b>17.7</b>	<b>24.9</b>	<b>21.1</b>

Source: NBS 2010 and own calculations.

Table 2.9: Unemployment Rate by Educational Level, Age-group, and Sector (2011)

<b>Educational Level</b>	<b>Urban</b>	<b>Rural</b>	<b>Total</b>
Never Attended	19	22.8	22.4
Primary School	15.5	22.7	21.5
Junior Secondary School	16.6	36.9	33.4
Senior Secondary School	13.9	22.5	20.1
*NCE/OND/Nursing	17.2	22.5	20.2
BA/B.SC/*HND	16.8	23.8	20.2
Tech/Professional	5	27.9	20.6
Masters	3.2	8.3	5.1
Doctorate	11.1	7.7	9.1
Others*	31.3	36.1	35.5
<b>Age Categories</b>			
15-24	33.5	38.2	37.7
25-44	16.3	24.1	22.4
25-59	12.5	19.6	18
60-64	17.8	22.1	21.4

Source: Annual Socio-economic Report, NBS (2011). Note: \*NCE means National Certificate in Education, \*OND- Ordinary National Diploma; \*HND- Higher National Diploma; Others\* includes a list of other educational categories such as Quranic schools or adult education.

Generally seen is that total unemployment rates are higher in the rural areas and for those with lower education level. As education level increases unemployment rates decreases. However, when urban-rural division considered, it is seen that this is not true for rural areas. It can be argued that education do not matters in rural areas since unemployment rate do not decrease as education level increases except those with master or doctorate degree. On the other hand, in rural areas as education level increases unemployment level decreases in particular for those with technical/professional<sup>11</sup>, master and doctorate degree. Main economic activities in rural areas are agriculture and service based jobs which may not require the other lower educational levels to be filled. However, unemployment rate is lowest in rural areas for those individuals with a doctorate degree. However the unemployment rate amongst master degree holders is lower in urban and rural areas as compared to those with the doctorate degree. This may be due to the effect of over-education where employments in these regions may not require doctoral degrees as employment conditions but would rather learn towards masters trained graduates.

Table 2.10: Median Earnings by Gender, Region, Zones and Education in Naira (₦.), 2012

	<b>Males</b>	<b>Females</b>	<b>Both Gender</b>
<b>Regions</b>			

<sup>11</sup> Technical and professional as used here individuals with vocational trainings outside the formal educational levels.

Urban	20,000	8,000	12,000
Rural	2,000	7,000	12,000
<b>Geopolitical Zones</b>			
North-Central	25,000	8,000	20,000
North-East	25,000	6,000	15,000
North-West	18,000	2,400	7,000
South-East	12,000	6,000	8,000
South-South	29,000	20,000	20,000
South-West	20,000	7,000	10,000
<b>Education</b>			
Primary	13,000	6,000	10,000
Secondary	16,000	28,000	10,000
College	35,000	28,000	33,000
University	70,000	60,000	66,000

Source: 2nd Wave GHS-Panel Data (NBS 2012) and own calculations.

Table 2.10 is a representation of the median monthly earnings by gender, regions, geopolitical zones and educational level. Hence when the monthly earnings are ordered from the lowest to the highest, there appears to be a relatively no differences amongst males of urban and rural areas when compared to those of the females. Females in the rural localities therefore earn ₦1000 less than their urban counterparts. For both regions across gender, males earn far more than the females which is an indication of a possible gender wage gap across the regions. Additionally, comparing male and female median earnings by geopolitical zones, there is also geopolitical wage differences where males and females in the South-East and North-West earn the least respectively. On the other hand, both males and females in the South-South regions earn significantly more when compared to the other regions. This therefore presents a gender wage difference where males in all the geopolitical zones earn far more. These therefore present earnings differences in terms of gender and geopolitical zones. As educational levels increases, wages for both males and females also rises except for females with secondary and college education where their earnings are equal (₦28,000). Also for both gender, males

earn far more than females at all levels of education. For both gender, primary and secondary educational levels earn equal amounts.

Table 2.11: Median Earnings by Gender, Employment Modes and Occupations in (Naira, ₦) for 2012

	<b>Males</b>	<b>Females</b>	<b>Both Gender</b>
<b>Employment Modes</b>			
Public	45,000	42,000	45,000
Private	12,750	10,000	12,000
Self-employment	15,000	5,000	8,000
<b>Occupations</b>			
Managers	54,500	45,000	52,964
Professionals	45,000	40,000	42,500
Assoc. profession.	30,000	8,000	14,400
Clerks	36,000	25,000	30,000
Service workers	10,000	45,000	5,000
Skilled agriculture	20,000	8,000	12,000
Crafts and trade	10,000	4,500	6,000
Plant and machine operators	15,000	1,750	10,000
Elementary occupations	15,000	3,000	10,000

Source: 2nd Wave GHS-Panel Data (NBS 2012) and own calculations.

Reported in Table 2.11 are the median earnings by gender, employment modes and occupations. It is observed that the wages of both males and females are not the same across employment which may be due to differences in employment outcomes and regulation. While the public employed workers earn the most, the self-employed earn the least for both males and females. However, the magnitude of these earnings is far higher across all employments for males which may also present another source of heterogeneity by gender and employment modes. These earnings differences may also be due to occupations in which workers are engaged in. Hence, Table 2.11 also shows that male workers in the crafts and trade occupations earn the least—but higher than the females of the same occupation. Females employed in the plant and machine operation occupations are observed to earn the least when all the female

occupations are considered. It can be inferred that the machine operation occupation is a not a female oriented occupation as seen in Table 2.7 which could lead to such meager female earnings. On the other hand, females' oriented occupations earn the same amount with those in the managerial positions and even far more than males in the service oriented occupations. This is also in line with Table 2.7 where service jobs are female dominated which influences their earnings. Hence, males earn more for all occupations they dominate while females only receive higher earnings than the males in the service oriented occupations for which they dominate. For both gender, service oriented occupations presents the lowest earnings amongst all occupational categories.

To observe how the occupations and earnings differ across the geopolitical zones, Table 2.12 presents the median monthly earnings by these occupations and geopolitical zones. The median wages also varies across occupations and zones. Senior officials and managers earn the highest in almost all the geopolitical especially in the SE (₦80, 000). Even though agricultural occupations dominate employments in the NC and NE, this does not reflect on their wages where workers in these regions earn ₦21, 000 and ₦15, 000 respectively. In the SS, professionals, clerks and machine operators earn ₦60, 000, ₦37, 500 and ₦30, 000 respectively. It is worth mentioning that while the wages of machine operators are marginally smaller in other regions, it is however observed to be largest in the SS. This could be due to the prevalence of oil firms which requires technical know-how for the operation of the various industrial machines and gadgets.

Table 2.12: Median monthly wages (₦000) by broad occupational categories and geopolitical zones in Naira (₦) for (2012).

Occupations	North-Central		North-East		North-West		South-East		South-South		South-West	
	Median monthly wages	% of workers										
Senior officials & managers	36,500	2.82	36,800	4.08	79,000	0.53	80,000	0.83	70,000	0.47	48,500	1.39
Professionals	37,000	5.70	42,000	2.52	40,000	3.44	47,100	4.31	60,000	8.55	30,000	7.53
Technicians and assoc. profession.	22,000	8.70	20,000	9.52	4,000	15.84	27,000	8.31	25,000	26.20	8,000	33.16
Clerks	21,500	0.78	31,000	0.60	59,000	0.24	25,000	0.76	37,500	1.10	26,500	1.39
Service workers	2,000	12.24	3,500	2.32	2,000	1.90	5,000	16.02	15,000	6.51	5,000	9.44
Skilled agriculture and fishery	21,000	55.37	15,000	63.44	21,000	51.25	8,000	48.15	20,000	34.43	25,000	18.87
Crafts and trade	5,000	8.04	3,500	10.98	5,000	16.13	8,000	8.99	16,000	11.45	10,000	14.63
Plant and machine operators	5,000	3.90	21,000	1.36	2,600	0.20	8,000	5.37	30,000	5.02	10,000	7.36
Elementary occupations	8,000	2.40	9,000	5.19	8,000	7.47	5,000	7.26	12,000	6.27	15,000	6.23

Source: Self-computed using the Cross-Section GHS-Panel Data (2011/2012)

This section also uses the 2012 weighted cross sectional General Household Survey (GHS)-panel data of Nigeria to describe the nature of paid and self-employments of the Nigerian labour market.

Table 2.13: Employment by gender, region and geopolitical zones, 2012 (million)

	Total	%	Paid-employed	%	Self-employed	%
Urban	15,224	58.4	5,841	69.2	9,093	53.1
Rural	10,857	41.6	2,603	30.8	8,018	46.9
Total	26,081	100.0	8,445	100.0	17,111	100.0
<i>Geopolitical zones</i>						
North Central	1,916	7.4	1,125	13.3	741	4.3
North East	1,283	4.9	593	7.0	643	3.8
North West	2,708	10.4	842	10.0	1,819	10.6
South East	4,167	16.0	1,129	13.4	2,974	17.4
South South	5,353	20.5	2,029	24.0	3,128	18.3
South West	10,651	40.8	2,727	32.3	7,806	45.6
Total	26,078	100.0	8,445	100.0	17,111	100.0
<i>Gender</i>						
Male	13,076	50.1	5,377	63.7	7,410	43.3
Female	13,005	49.9	3,067	36.3	9,701	56.7
Total	26,081	100.0	8,444	100.0	17,111	100.0

Source: Source: Computed from cross-sectional GHS-panel data (NBS 2012)

Table 2.13 presents the employment of workers by region, geopolitical zones and gender in 2012. More PE workers reside in the urban than the rural areas. The case is different for SE workers, of whom 47% reside in rural areas. Also, there appear to be further differences in employment creation across the geopolitical zones. It is observe that 46% and 17% of self-employees are located in the South-West and South-East geopolitical zones respectively. In the PE sector, about 24% of workers are in the South-South zones. Overall, while the PE workforce is divided 64% to 36% between males and females, the SE workforce is female-dominated, being divided 43% to 57% between men and women. Given the asymmetric structure

across the two employments modes, occupational differences provide further insight in the degree of difference in labour market composition.

The median wages across employments are presented in table 2.14

Table 2.14: Median monthly remuneration by employment, gender and family characteristics (in Naira), 2012.

	<b>Overall</b>	<b>Paid- employed</b>	<b>Self-employed</b>
<b>Overall Median</b>	12,000	30,000	8,000
<b>Female</b>	8,000	25,500	5,000
<b>Male</b>	21,000	35,000	15,000
<b>Female/Male ratio (%)</b>	38	73	33
<b>Female</b>			
<b>Married with &lt;=3 children(M3)</b>	8,000	27,750	6,000
<b>Married with &gt; 3 children (M4)</b>	5,000	21,500	4,500
<b>M4/M3 ratio</b>	63	77	75
<b>Males</b>			
<b>Married with &lt;=3 children(M3)</b>	20,000	32,000	15000
<b>Married with &gt; 3 children (M4)</b>	23,000	37,000	15000
<b>M4/M3 ratio</b>	115	116	100

Source: Computed from cross-sectional GHS- panel data (NBS 2012); All values are the current median monthly earnings reported in Naira.

The median monthly wage was 30,000 Naira in the PE sector and 8,000 Naira in the SE sector in 2012— an overall inter-sectoral wage differential of 27% (table 2.15). Wages in Nigeria appeared quite divergent across gender and employment types. As illustrated in table 2.9, in the overall median hourly earnings of females (8,000 Naira/month was only 38% of the male median (21,000 Naira/month). In terms of the national minimum rate of 18,000 Naira, women earned almost 10,000 Naira less.

In the PE sector, median remuneration for females were approximately 25,500 Naira per month (\$250) against 35,000 Naira per month (\$350) for men, a gender wage gap in which women earned 73% of the male rate. SE women, however, earned about

5,000 Naira per month (\$50) compared with 15,000 Naira per month (\$150), just 33% of the male median. Considering the employment modes, wage distribution by employment type can be an indication of the limited opportunities and less regulated SE comprising of low earnings for both gender where workers earn far less than the minimum wage.

Lower part of Table 2.14 also includes information regarding earnings comparison of married men and women with children in employment types. While married males with more than three children earn more than those with fewer children in PE, the situation appears to worsen for females in both employments. For instance, married women with more than 3 children earn about 10,500 Naira and 15,000 Naira less than males in the in the SE and PE respectively. A further comparison of median wage differences by sectors, geopolitical zones and gender is reflected in Figure 2.2. As illustrated, while industrial male workers in the South-South and North-Central geopolitical zones earn the highest, South-East females in the agricultural sector earn the lowest. This fact clearly shows disparities by geopolitical zones, sectors and gender in Nigeria.

Table 2.15: Unadjusted Gender Wage Gap across age cohorts, wage quintile and employment modes (2012).

Age Group						Wage Quintile				Employment	
15+	15-25	26-35	36-45	46-55	56-64	Q10	Q25	Q50	Q90	PE	SE
35.6	92.36	100	-2.64	-74.62	194.75	26.56	62.5	112.5	200	582.5	135.79

Source: GHS 2012 data and own calculations

Table 2.15 is a brief summary of the hourly gender unadjusted wage gap across age cohorts, wage distributions and employment modes. The wage gap is calculated as

the male earnings minus the female earnings. Hence, a negative value indicates female earning advantage while a positive value is in favour of the males. The unadjusted wage differentials between males and females of 15 years and older is almost 36 naira/hour. However, within the 36-55 and 46-55 age groups there is a female earning advantage. Also along the wage quantile at higher wage quantiles the gap become larger which suggests a possible “glass ceiling” due to the underrepresentation of women in the higher employment positions. Similarly there is a gender wage disadvantage in the paid-employment compared to self-employment

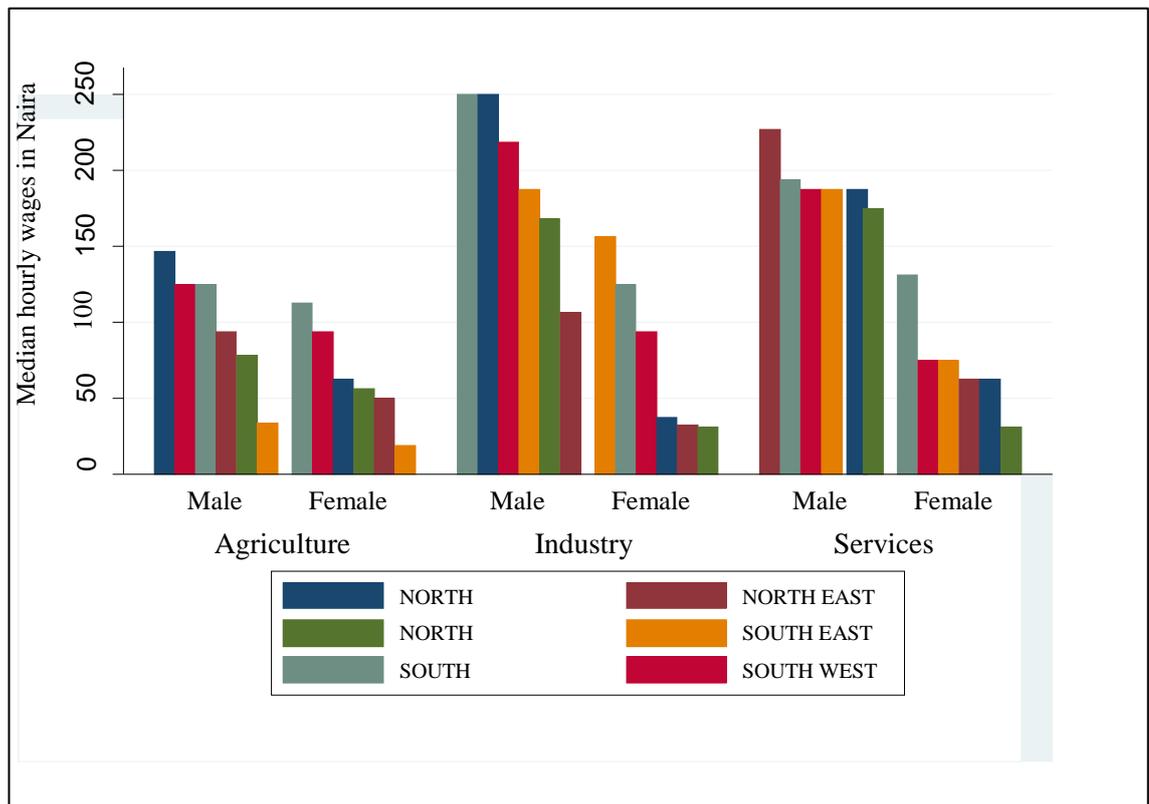


Figure 2.2: Median hourly wage by sector, gender and geopolitical zones, 2012  
Source: Self-computed from the Cross Section GHS-Panel data (NBS 2012)

As previously argued differences in distribution of workers across occupations and by geopolitical zones and wages is an indication of the heterogeneity of the Nigerian

labour market. As a consequence, factors affecting employment outcomes and wages may differ considerably across geopolitical zones and occupations. Chapter 5 of this work will further investigate such differences especially when differences in individual characteristics are accounted for.

### **2.3 Context: The Nature of the Self vs Paid Employments in Nigeria.**

The structure of the Nigerian labour market depicts the case of a developing country where the SE dominates the employment outcomes. The growth of SE is associated with low job generation in the PE and rises in unemployment. According to NBS (2013), about 174,326 and 232,327 number of jobs generated in Q1 of 2013 is observed in the formal and informal employments respectively. The informal sector is a dominant feature of the SE which employs about 68% of the labour force. The PE makes up of 11% of the informal employment while the SE comprises the other 60% respectively (NBS (2013), Aderemi (2015)). Hence, the Nigerian labour market has its own share of large scale heterogeneity (Aminu 2010). These heterogeneous characteristics are distinguished according to differences in employment participation, wages or other geopolitical attributes.

One of the underlining philosophies of the neoliberal agenda is the privatization 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. Wage inequality and the dismantling of organized labour unions as some of the ills of the policy are not questionable (DiNardo et al., 1996; Galbraith, 1998). Several factors accounting for the wage differentials across the public and private sectors and

self-employment include trade liberalisation policies, technological advancement, the weakening of labour unions and the persistent rise in unemployment (Nwaka et al, 2015).

As noted by Watson (2014), unemployment resulted from job losses associated with trade liberalization policy which also weakened the relevance of the labour unions towards bargaining for wage increases. With the adoption of the Structural Adjustment Programme (SAP) of 1986 in Nigeria, the country embraced the neoliberal projects towards opening its economy to international trade and economic stability. For a labour-abundant country<sup>12</sup> (UNDP, 2012), the thrust of the SAP's economic stance includes improvement in labour productivity, higher output, poverty reduction and a general transmission to reducing unemployment, which were induced by the economic crisis of the 1980s (Nwaka et al, 2015). Right from the political independence in October 1960, the public sector controlled the major employment of labour about 62% of the total employment. The policy framework towards a more private and profit oriented agenda gave way to some undesirable outcomes (Ekanade, 2014). Wage employment in Nigeria has fallen by about 30% over the years leading to the burgeoning of the self-employment as an alternative employment source. Furthermore, for almost four decades now, growth in the Nigerian labour market has not been persistent. According to Onwioduokit et al, (2009), during the oil boom era of 1970s, the average growth rate of the labour market was about 3.3%, which fell to 2.5% given the economic crisis of the 1980s. Sluggish growth was observed in the mid-1980s following the neoliberal policy framework. In 1987, the spark of political

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<sup>12</sup>Nigeria's population rose from 42 million people in 1960 to about 178.5 million in 2014.

and religious crisis in several parts of the country caused a substantial number of emigrations of skilled and unskilled workers and leading to about 0.8% drop in 1988. About 3% growth rate of the labour force is due to 1990s and early 2000. Across males and females, the labour force participation rates since 1990s till date have been uneven. As observed in Figure A1<sup>13</sup>, female labour force participation rate show a slight rise, but way below that of the men. Additionally, since most African societies as found in Nigeria were patriarchal<sup>14</sup> in nature (Aina, 1998), the systemic manner through which the gendered labour division of work in the family has led to vulnerabilities of women to greater external shocks (Lingam, 2005).

Also, the promotion of outward-oriented trade policies had negative implications for households whose sources of livelihood were subsistence farming. Table 2.16 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).

Table 2.16: Poverty Indices by Years (1980-2009)

<b>Years</b>	<b>1980</b>	<b>1985</b>	<b>1992</b>	<b>1996</b>	<b>2003</b>	<b>2009</b>
<b>Head-count ratio (poverty indices)</b>						
\$1.90 based on 2011 PPP						
Total	27,1*	46,0	57,1	63,5	53,5	53,5
Female-headed families*	29,1	38,6	39,9	59,9	-	-
Male-headed families*	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

Source: World Bank (2015). \*Anyanwu (2010)

<sup>13</sup> Appendix

<sup>14</sup> Patriarchy consists of a traditional belief and orientations which permits men to sway power and dominance over women due to several other social stratification and laws.

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, it has decreased significantly by almost 10%, but it is still so high because more than half of the population (53.5%) lives with daily incomes of less than \$1.90. Contrary to the expectations except for 1980, the ratio of poor families has been higher among male-headed families. Considering the income shares of the lowest and highest 10%, one can conclude that the share of the lowest 10% is worsening, and the gap between the rich and poor is widening.

Despite the Millennium Development Goals (MDGs) initiatives of enhancing living standard, the country is still plunged by severe economic and socio-economic hardships. Hence, it is estimated that about 71-80 million of the Nigerian population still live in extreme poverty. This value is relatively higher when compared to 17.1 million in 1980 and 67.1 million in 1996 (Agu and Evoh, 2011). Similarly, almost 70% of the population is judged to live in less than \$1 daily with over 91% living in less than \$2 per day (Worldbank 2010)

The descriptive analysis carried in this chapter provides a partial evidence of the varying factors affecting labour market outcomes in Nigeria. Gender differences in employment outcomes, regional and geopolitical attributes, occupational types or economic structure could account for the perceived heterogeneity of the Nigerian labour market. Further empirical investigation into these attributes will be further explored in chapter 5.

The next section shall—within the neoclassical framework review the literature on the determinants of earnings while further reviewing the effects of household responsibilities on earnings.

## Chapter 3

### THEORETICAL FRAMEWORK AND EMPIRICAL LITERATURE

#### 3.1 Labour Supply Decisions and Wage Determinants: Neoclassical Explanations.

According to Brožová (2015), the marginalist principles laid the foundations on which the neoclassical paradigm of labour and economic theory was built. The basic neoclassical concept in economics was put forward by Thorstein Veblen (1900) which is characterized by individual rationality, scarcity, resource allocation, utility maximization and general equilibrium (Dequench 2007; Colander 2000). Within the fulcrum of the labour market, neoclassical postulation of employment and wage determination is derived from the perfectly competitive functioning of the labour market in the form of demand and supply relationship. The demand for labour basically is evaluated from an employer's (firm's) motive of profit maximization of output and cost minimization of production. Supply of labour however, rests on utility maximization of individuals regarding the trade-offs between labour or non-labour supply decisions. Hence, from the Adam Smith's "invisible hand" doctrine, Alfred Marshall's 1890 "Principles of Economics" and to "The Theory of Wages" of Hicks (1932); the demand and supply relationship in wage determination have remained a focus of the neoclassists.

Implicit assumptions and conditions surrounding the neoclassical labour market theory include homogeneity of workers and job characteristics, utility maximization due to labour and non-labour supply hours, and worker's flexibility and adjustment to higher paying jobs due to increase in education and training (Wachtel 2013). From these assumptions however, most of the often quoted in the literature relies on the strict homogeneity principles where workers and firms are identical. In general parlance, homogeneous assumptions connotes equality in observed and unobserved human characteristics, such as education or IQ equality in employment conditions. Consequently, due to the lapses explaining possible causes of wage differences of workers of homogeneous group, other neoclassical thinkers (Stigler 1962; Becker 1976; Schultz 1964; Mincer 1962) began to explore other possible causes of wage differences across workers of identical characteristics. Wage differences within the neoclassical synthesis rests on three basic theories such as equalizing differences theories, human capital theory and the theory of efficiency wage. These theories therefore relaxed the strict homogeneity assumptions of the basic neoclassical labour market. The focus of the following section therefore relies on the exposition of the labour supply decisions and wage determination within the human capital theory only.

### **3.1.1 Labour Supply Decision**

One of the integral elements of labour economics is the factors determining the labour supply decisions of workers (Galasi 1994; Killingsworth 1983). Our discussion in this subsection therefore reviews the basic work-leisure choice model of workers. Hence, labour supply in this sense refers to time allocated to work and non-work activities including factors determining the time allocation between paid

and non-paid activities. For our review, work here is devoted to imply main jobs where income are earned while unpaid activities related to a wider concept to connote other non-labour market activities such as child-caring. By the neoclassical assumptions, individual's time allocation between paid and unpaid activities depends on the combination of hours devoted to such activities and utility maximized due to engagement in employment or non-employment.

From the forgoing, utility is maximized due to individual's subjective preferences between paid and non-paid work and objective labour market information concerning the quality of employment (such as paid-employment and self-employment as used in this research) and wage rate (McConnel et al 2003). Subjective preferences are more oriented towards individual's time constraint devoted to paid work or non-paid activity. Given the total hours available to an individual, a worker decides on the possible combination of labour supply hours or non-labour market activities so as to maximize utility (see McConnell 2003). Also, the objective preferences are the constraints faced by an employee such as the level of wages, non-labour income and employment quality.

Now, the basic question surrounding an employee is how to combine the work time between working and non-working when non-labour income or wage rate increases while maximizing utility? In applied labour market research, such question is answered using the basic income and substitution effects.

The income effect describes how the labour supply decision of workers' changes given increases in non-labour income when wage rate is fixed and non-labour

activity is a normal good. An increase in non-labour market income or other employment benefits raises the consumption of non-labour market activity which reduces the labour supply hours (Borjas 2013). For instance, an increase in child-support incentives may therefore lead to a higher preference for child-care responsibilities by parents which also imply less time devoted to the labour market. The substitution effect on the other hand assumes that the non-labour income is fixed while the wage rate increases. Within this context, the substitution effect considers how time devoted to the labour market increases when wage rate rises. Hence, an increase in wage rate therefore raises the opportunity cost of non-paid activity (non-labour activity is becoming expensive). Implicitly, the higher price of non-labour market activity (assume a normal good) and dedicates more labour hours to paid employment activities.

The discussion held above highlights the effects of wage rate or non-labour income changes on labour market participation of workers. Particularly, the discussion is extended further by Becker (1965)'s work on "A Theory of Allocation of Time". Thus, the fundamental changes in the previous model (basic neoclassical model) relies on the primacy of household (or individuals within the households) as the main decision making unit and the complex use of time for other purposes other than the traditional "work-leisure" division (McConnell et al 2003; Blau et al 2006). Within the next section, the research therefore considers Becker's extended model (Becker 1965) by reviewing the impacts of marriage and children on labour force participation and sectoral choices between different employments.

### **3.1.2 Marriage and Children in employment choice and wages.**

Family related issues due to marriage and the presence of children in the household are also sources of employment choices and wage differences across gender. Given that the SE reflects one possible employment category, the effects of gender on SE are often analyzed within the context of employment choices. Following Hundley (2000), this study's proposition is that the SE is distinguished from the PE in several forms:

1. PE is relatively more regulated and is constrained downward by an accepted hourly productivity levels of which a worker must dedicate to duties. This implies that the PE complies with the minimum wage rules where wages are determined according to worker's productivity levels.
2. PE complies with a standard minimum weekly labour supply hours so as to ensure employment coordination and efficiency.
3. There are restrictions regarding the maximum hours an individual can supply to the market and a standardized earning per hour (monthly) based on worker's productivity.
4. Over-time shifts and work hours are compensated for including the availability of other job related fringe benefits such as child support incentives.

The above mentioned constraints are at variance with employment conditions in the SE where work arrangements are more flexible. Therefore, the given constraints further implies that workers with relatively low or high capacity to cope with such constraints are likely to be SE. Hundley (2000) further holds that such preference of employment choices does not explain gender wage gap across employments since

their productivity levels (men and women) are not accounted for. However, combinations of these constraints with gender division of labour and non-labour in the household have direct implications on male and female sectoral choices and wage gap (Becker 1985, Brayant 1990, Becker 1991).

Hence, the relationship between marriage and household sizes on employment modes and wages are better examined within the gender context as explained in Becker's (1991) household specialization model. Accordingly, married couples tend to maximize their joint utility function based on specializing in the production of goods of comparative advantage (see Simon and Way, 2015). This issue has also been emphasized by Schafgans and Stelcner (2006). Therefore, since men are more inclined to earn more through rises in productivity, women may then specialize in child support and other family productions which lower labour market participation and working hours—a possible “mother-hood earning penalty<sup>15</sup>” effect (Hundley 2000; Budig and England, 2001; Budig 2006; Molina and Montuenga 2009; Marshall and Flaig 2014). However, the impacts of marriage and household production vary across PE and SE. Budig (2006) holds that several reasons have been accounted for the gender earning differences between SE and PE. Females may benefit from SE in any of the following ways. First, SE choice may not be subject to discrimination which implies that women earn an equal amount as men of similar attributes and characteristics. Second, when compared to paid employees, self-employees enjoy a great deal of flexibility and control of labour work hours especially for married

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<sup>15</sup> Explains the effects of children on mother's wages due to trade-offs associated with household productions

women. Hundley (2000) argues that PE faces more limited constraints than SE in time allocation between non-labour and labour market productions. For instance, a SE expectant or nursing mother can easily adjust her labour hours so as to contribute to the family responsibilities like child care and others. However, this chapter argues that in Nigeria such arrangements are systematic by law in PE compared to SE. Therefore, gender differences in non-labour and labour market productions are expected to make a more significant impact on gender wage gap in SE than PE. Given the flexibility scenarios, SE women may balance the labour and non-labour responsibilities accordingly which however will not wholly be the case of the SE men. If this is the case, most of the gender wage differences will be attributed to the relative gender roles in household specialization. In this framework, presence of children and higher family sizes would affect earnings negatively due to substitution effects of balancing work time. Other reasons documented for a possible prevalence of earnings disadvantage of the self-employed women compared to men are as follows: first is a case of labour market gender discrimination from consumers and other creditors that restrains the women from obtaining loans for capital intensive industries. Second, SE females might concentrate more on certain activities compared to men thus leading to crowding out effect.

Furthermore, labour market research has shown that experiences of men and women differ considerably in terms of earnings, type and status of employment. In addition, Oaxaca (1973), Altonji and Blank (1999), Lechmann & Schnabel (2012) attribute the difference to gender gap in human capital, caring responsibilities or economic characteristics such as access to financial capital. After these differences are

accounted for, the unexplained part of gender wage difference may be seen as a reflection of labour market gender discrimination. Accordingly, Lechmann and Schnabel (2012) posit that being SE also translates to being independent where discrimination may be less compared to PE (see Moore 1983). Hence, considering the “pull” approach, even if paid employers contribute more to the unexplained earning differences, it is expected that such differences should reasonably be lower for SE workers. Quite puzzling, empirical evidence suggests the exact opposite case where raw and unexplained gender wage gap appears to be higher amongst the self-employees as compared to the paid employees (Eastough and Miller 2004). That might be an indication that increasing SE share is mostly due to the “push” effect—a necessary employment option conditioned by economic reforms and policies.

Despite all that has been discussed, the nexus between marriage and labour market outcomes can equally be causal. Given an individual with accumulated human capital, the anticipation of higher wages therefore makes working more attractive – depending on the income and substitution effect. Hence, accumulation of human capital through education or additional work experience can lead to less marriage or increase in divorce rate by attracting the unmarried (marriage break-ups) into the labour market. Conversely, marriage can equally induce more labour supply time due to its sustenance and stability between married couples. The causal effects of marriage on wages is a function of the labour supply decisions due to marriage stability, opportunity cost of marriage due to accumulation of human capital in the form of income and substitution effects. High wage rate could lead to a substitution effect between marriage and labour supply. Hence, workers’ willingness to trade-off marriage for work leads to higher earnings. However, increase in earnings can also

lead to higher marriages due to income effects. For the purpose of this study, the effects of marriage and children on wages are rather seen from the correlation perspective only and not any associated reverse causal effects. Hence, estimated coefficients of marriage and children are rather a reflection of the effects of the household responsibilities on wage outcomes across employments.

### **3.2 Wage Determination – Human Capital Framework**

Human capital connects an individual's expected life-time labour hours and trainings received. This training hence determines a worker's earning potential. Accordingly, expectation of future work history reflects the motivating factors in achieving increased earnings. This is because human capital acquisition requires costs and benefits. The costs are in form of direct investment in schooling such as tuition fees while the benefits are associated with the potential life-long earnings. Several other intangible benefits can distort the labour supply decision of individuals (Michael 1973). Furthermore, the more the years of work life, the greater the incentive to earn more. Therefore, dropping out of the labour market due to family responsibilities decreases one's work-life which has negative implications on productivity. Given the fact that women do supply less labour hours due to family responsibilities, it affects employment choices and human capital endowments.

Within the broader concept, human capital is categorized as the stock of endowments, knowledge or other characteristics of a given worker which aids in explaining differences in wages due that determine a worker's productivity (Hyclak et al 2005). Several researchers use human capital synthesis, for instance Becker (1962), Gardener (1983) and Schultz/Nelson-Phelps (1964; Nelson and Phelps 1966).

From the Becker's (1962) perspective, human capital is seen in one-dimensional way through knowledge and skill acquisition which directly raises worker's productivity. From this view, education, skills and trainings are the sole determinants of a worker's productivity in the labour market. From the Gardener's view however, human capital is seen from a more multidimensional perspective. Gardener (1966) holds that other than education, skill is diverse in several forms which include IQ, mental stability, talents which induce productivity. An instance is given where investment in health and mental stability can be translated to be a form of human capital since sound mind are less prone to illness which also translates to raising productivity of the said worker. Finally, Schultz (1964), Nelson and Phelps (1966) visualize human capital as the ability to adapt to innovations and technology in the production process. These are seen to be reflecting adaptive capabilities to changing production process.

One of the advantages of the human capital model over the basic neoclassical theory is its emphasis on the heterogeneity of the labour market (worker and employer). Individuals' endowment may be heterogeneous in several ways through differences in educational backgrounds, age, years of job experience, ability, IQ, and family responsibilities. Besides these, jobs may equally differ according to its characteristics such as job type, job quality, and employment location. Thus, differences in human capital can be due to heterogeneous influences in both worker and employment characteristics. Hence, variation in wages of a worker is a byproduct of differences in worker's productivity, or employer's valuation of a worker based on the marginal productivity (Hyclak et al 2005; Borjas 2013).

The relevance of human capital accumulation in wage determination dominated the economic thinking of the 20<sup>th</sup> century. According to the human capital theory proponents (Mincer 1958, 1974; Becker 1964), education and skills are quoted to be one of the contributory components of productivity increase through knowledge and skill accumulation. Such knowledge and skill acquisition through education has been attributed to impact positively on the earnings of a worker. Hence, increases in education or skill further reflect improvement in productivity of a worker which is rewarded through an increase in earnings. From the forgoing, the pioneering econometric specification reflecting the relevance of the human capital variables on wages is traced to Mincer (1974) in his book titled “Schooling, Experience and Earnings” which is often regarded as the Mincerian wage equation<sup>16</sup>.

Mincer’s (1958; 1974) original model is therefore inspired to two theoretical concepts; the Compensating Differential and the Account Identity Model (Heckman and Lochner 1998). The compensating differential model therefore explains reasons why individual with differing years of schooling receive varying wage rates over the life-time. Since its assumptions rely on homogeneity of workers, individuals will therefore require to be compensated to work in those employments requiring longer training span. On the accounting identity model of Mincer (1974) further identifies the relationships between observed earnings, formal years of schooling and on-the job training<sup>17</sup>. Therefore, earnings are specified to be a function of human capital variables—education and experience as follows:

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<sup>16</sup> For more see Chiswic (2003) on the Mincerian wage equation

<sup>17</sup> See Heckman et al (2008).

$$\ln W_i = \beta_0 + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp_i^2 + \epsilon_i \quad 3.1$$

where  $\ln W_i$  is the natural logarithm of wages of an individual,  $S_i$  is the measure of an individual's level of education (schooling in years),  $Exp_i$  is a measure of an individual's level of experience as measured in years while  $Exp_i^2$  reflects the diminishing returns effects due to experience while  $\epsilon_i$  is the disturbance term. A brief description of these variables is the focus of the following section.

### **3.2.1 Schooling as a measure of human capital investment**

Just as the input factors are the major determinants of production on the side of the physical capital, investment in education is one of the essential determinants of human capital which is acquired through trainings. Ben-Porath (1967) holds that an individual's accumulation of investment in education maximizes their net present value of earnings within employments. Therefore, a worker's preference of an additional year of education also involves both implicit cost of forgone earnings and the explicit cost of school attendance. Accordingly, individual's expected earnings are determined by the educational achievement often seen from the supply-side, demand-side or market equilibrium considerations. Within the supply side factors, individual's attraction or decision to attain a given higher level of education accrues an expectation of a higher reward upon completion of schooling. This implies that the decision to forego work for education is compensated by a higher life time earnings. From the demand-side perspective, employer's decision to raise wage of a worker is a function of the worker's level of education or marginal productivity of that individual. Finally, the equilibrium perspective is built on the long-run equilibrium relationship where a worker maintains the same level of education to equilibrate the market wage rate.

In the standard Mincerian wage equation, years of schooling has often been used to capture worker's level of capital accumulation through education (Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2000). According to the literature, the use 'years of schooling' suffers from some potential measurement problem. This is because 'years of schooling' are missing in most household surveys and hence is often computed from information relating to the highest level of educational qualification attained by a worker—thereby causing a downward bias in the estimates (Pham and Reilly 2007, Duraisamy, 2002). Categorical educational variables are used to control for such potential measurement error related to education and wage relationship.

### **3.2.2 On - the Job Training-Experience**

According to Mincer (1974) human capital is also accumulated through job formal and informal trainings (Becker 1962, Mincer 1962). Consequently, human capital can be acquired through job experience. This means that years of an individual's active involvement in the job is the acquired experience in form of human capital. Higher level of experience is an indication of knowledge diffusion either "learning-by-doing" or through formal job trainings which indirectly raises productivity of a worker and indeed wages. Several proxies used to capture labour market experience in the literature include the actual number of years a worker spent working in an establishment, age or potential experience. Actually labour market work experience presents the best the proxy for the level a worker's human capital endowment, however, most labour market surveys do not report the actual work experience. Hence several researches have made use of the age of an individual to compute the potential experience as proxied by age minus years of schooling minus the actual enrolment age in school. The use of age as measure of experience is not a reflective

of an individual's actual labour market experience which is even more problematic when dealing with gender discrimination (Wright and Ermisch 1991) due to the implicit assumption that individual's employment is not disrupted over the work life. Especially for women, such assumption may be marred by inconsistencies and interruptions arising from family responsibilities such as child-care and others.

### 3.3 Extended Mincerian Wage Equation

Given that workers command a variety of characteristics which differ considerably in several aspects Mincerian wage equation was extended to include such characteristics. For instance, differences in labour market outcomes due to gender, places of residence, type of occupation, family attributes are considered to be sources of heterogeneity in the labour market which affect productivity and wages. Moreover, most of these characteristics are quite diverse and akin to job characteristics and employment types that also determine worker's productivity and earnings (Grossman 2013). Due to some of these heterogeneous influences, researchers have extended the basic Mincerian wage equation by including several other socio-economic, demographic or family related variables apart from education and experience (Mincer and Polachek 1974). This is presented as follows:

$$\ln W_i = \beta_0 + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp_i^2 + \beta_4 Others_i + \mu_i \quad 3.2$$

where 'Others' includes other explanatory variables affecting wages such as socio-economic, demographic or family related variables in the wage equation. For the purpose of this study, 3.2 can compactly be represented as follows:

$$y_{ij} = \beta_j X_{ij} + \mu_{ij} \quad 3.3$$

where  $Y_{ij}$  is the log of wage/earnings of a worker  $i$  in a given employment  $j$  such as the public wage, private wage or the self-employment categories respectively.  $X_{ij}$  is a vector of individual characteristics in a given employment which comprises both human capital, demographic attributes or other socio-economic attributes. The  $\beta_j$  is a vector of parameters in a given employment type while  $\mu_{ij}$  is a vector of the disturbance terms of individuals in the given employment. Detailed description of this model and methodologies used for its estimation will be presented in Chapter 4.

### **3.4 Empirical Literature on the Wage Determinants**

In the literature extended Mincerian wage equation has been applied to investigate wage gaps across employments, regions, countries or gender. (i.e Smith, 1976; Glick and Sahn; 1997; Gindling, 1997; Aminu, 2010 and 2011). Compared to the developed countries, empirical literature on studies applying the extended Mincerian wage equation in labour market research for countries are not extensive. Studies for the developing countries' labour market include Iwuji (1980) for 6 English speaking African countries, Glick and Sahn (1997) for Guinea, Kabubo-Mariara (2003) for Kenya, Appleton et al (1990) and Vijverberg (1993) for Cote d'Ivoire, Glewwe (1990) for Ghana, Gindling (1991) for Costa Rica, Tansel (1999) for Turkey, Al-Samarrai and Reilly (2005) for Tanzania, Falco et al (2011) for Ghana and Tanzania, Kerr and Teal (2015) for South-Africa. A significant number of these studies focused on the wage differences between the public and private wage employment while a few others included the self-employment as the third. For instance in the former case, Appleton et al (1990) used a microdata to analyze gender wage across public and private employments in Cote d'Ivoire. Findings show a significant earning advantage for the public employee and an overall male advantage in both employments.

In investigating the segmentation and wage differences in public, private and informal sectors, Gindling (1991) found a clear evidence of non-random allocation of workers across the employments and cases of heterogeneity and segmentation in the Costa-Rican labour market. This translates to differences in sectoral choices and wages across the employments. Similarly, Glick and Sahn (1997) studied the determinant of male/female participation and earnings differences for the public, private and self-employments in urban Guinea. The study employed the multinomial logit model and the selectivity corrected wage equation to control for gender differences in labour market participation and wages respectively. Their overall findings show sectoral differences in labour market participation which also reflects heterogeneity and non-random allocation of workers across the three employments. They also find earning disadvantage of the self-employed males and females when compared to other employment types.

In controlling for unobserved heterogeneous effects, Felco et al (2011) used a panel data for Ghana and Tanzania to address the causes of wage differences in their respective urban labour markets. Hence, findings show that unobserved heterogeneous factors such as skills have the most significant impact in the wage differences. After controlling for individual heterogeneous effects, about 50% wage gap was observed between the private and public employments. Also applying a panel data analysis for South-Africa, Kerr and Teal (2015) analyzed the determinants of earning inequalities while also controlling for individual unobserved heterogeneous effects. Results show that most of the earning differences in the

private sector is explained by the variations in human capital measures compared to the public sector.

Labour market studies conducted for Nigeria are limited. Few studies include Aminu (2010 and 2011), Temesgen (2008), Ogwumike (2006), Jona and Yousuo (2013), Aromolaran (2007), Oyelere (2007), Okuwa (2004), Aderemi (2015). Aminu (2010) explored the determinants of participation and wages for male and female public and private employees using the 1998/1999 and 2007/2008 cross section GHS data. On the methodological part, Aminu (2010) used the probit and the multinomial logit model for the labour market participation and OLS regression for the wage estimation. Results from the participation equation show that factors affecting participation in each employment are not the same due to several factors like public labour market reforms. Also, education, experience and urban areas are the most influential determinants of wages for males and females. In a separate research, Aminu (2011) uses a sample of urban male employees to analyze the effects of government wage review policy on public private wage differences. Results show a 6.78% wage disadvantage for public employees—before the wage review implementation—and 35.07% wage advantage after the wage review.

Oyelere (2007) investigated the impacts of geopolitical influences on labour market outcomes in Nigeria using the 1996/1997, 1997/1998, 1998/1999 cross sectional GHS data. By applying the Mincerian wage equation (Mincer, 1974), Oyelere (2007) found no significant disparities in labour incomes across the geopolitical zones. Also, Aromolaran (2007) used the same methodology to estimate the labour market returns to education for the wage and self-employed men and women. While obtaining data

from the GHS cross-sectional survey (1996-1999), Aromolaran (2007) found an earning advantage for workers with higher years of schooling especially in the wage employment. This work however does not emphasize on the welfare implications of the lower returns to schooling in the self-employment while also omitting other important explanatory variables such as geopolitical zones and occupations. Moreover, the author used years of primary, secondary and post-secondary schooling as major independent variables.

Aderemi (2015) tests for a possible prevalence of the wage curve in Nigeria using the 2004 GHS cross section household survey. He found positive relationship between unemployment and real wage in Nigeria.

In the developed countries, there are significant number of studies that used the extended Mincerian wage model to investigate the effects of marriage and children on gender wage gap in different employment types. Such studies include Moore (1983), Hundley (2000), Simon and Way (2015), Marshall and Flaig (2013), Millan et al (2010). These studies all argue that family sizes and marriage do matter and are important determinants of wages. For instance, Hundley's (2000) findings show that family attributes such as marriage and children limit the earnings of the self-employed and organizationally employed women compared to men. Unfortunately as summarized above studies are limited for developing countries (Glick and Sahn 1997, Georgellis and Wall 2005) and indeed for Nigeria. To the author's best knowledge, there is no study for Nigeria investigating this relationship. Few available studies are nested in several employments as discussed above. The only

paper on gender wage gap is that of Aminu (2010) as also mentioned above. Furthermore, the rest of the studies on wage differences in Nigeria have not considered the full range of employment alternatives nor did they include the effects of family related attributes such as marriage and family sizes on the wages.

The theoretical model of the study is based on the assumption that household members make choices about their consumption on home goods, market goods and leisure; extended form of basic labour supply model (Becker's model) and also the assumption that marital status, family sizes, availability of financial capital are determinants of participation decision and employment mode choices besides human capital endowments, occupations, geopolitical zones and industry of employment. Furthermore, this study fills the gap by not only investigating the sources of heterogeneity in the Nigerian labour market, but also contributing to the research that is focused on the broad overlap between gender, family and self/paid employment.

### **3.5 Conceptual Characterization of the Self-employment**

The literatures on the conceptual characterization of the self-employment in the developing countries have been mixed. Some researchers characterize the self-employment as entrepreneurship (Djankov et al (2006), De Mel et al (2008), Parker (2004), Baumol and Schelling (2008)), informal employees (Meloney (2004), Bosch and Melony (2007), Chermes (2012)), or employers and own-account workers (Fields (2013), Demirguc-Kunt et al (2007)). Accordingly, Djankov et al (2006) characterized the self-employed entrepreneurs as individuals with established businesses or family related establishment operating on profit motives while the non-entrepreneurs regarded as the wage earners. However, this definition according to Fields (2013) is misleading which does not ably capture the trend in the developing

countries. Fields (2013) therefore holds that the goal of an average self-employee in the region is of short term—to earn for a short period of time until a higher paying job in the paid employment is found. Hence, most workers in this employment have no patient to undertake in the entrepreneurial risk since they engage in such ventures reluctantly and temporally.

Characterizing self-employment as informal employment has also been debunked by Field (2013). Explaining further, Fields (2013) holds that using informal economy to refer to self-employment is misguided and biases the argument. This is because the informal economy is not consistently defined in the literature and hence may not appropriately capture the characteristics of self-employment. Even though the informal sector is defined as an unregulated sector; it is difficult to transform this concept into data especially on the number of self-employed who are also informal workers. Hence due to differences in definitions and heterogeneity in self-employment, this study uses the World Bank's Living Standard Measurement Survey (LSMS) definitions of the self-employment as individual reported "self-employed" which comprises of own account workers or employers within the said self-employment only.

Further characteristic of the self-employment in the developing world has been described to feature prominently in the developing countries' labour market. Although, SE commands limited opportunities and income uncertainty compared to PE, its existence (SE) has been described as precarious in the disadvantaged parts of the world. According to *Human Development Reports* (2014), such precarious and

less regulated nature constitutes one of the poverty inducing factors in the region (UNDP, 2014). Again, inequality in developing countries is due to a high level of structural heterogeneity, the poor functionality of the labour market and low pay. Hence, one striking feature of the labour markets in developing countries is the coexistence of a highly regulated public- and private-wage-employment sector and the less regulated self-employment sector (Gindling 1991). Structural or sectoral heterogeneity further leads to a possible heterogeneity across the mentioned employments where factors affecting employment choices and wage determinants differ across demographic or family groups including by education, occupations, or industry of employment. Sectoral heterogeneity also has social and economic implications on 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). According to Fields (2008), the realistic assumption is that because jobs differ greatly in quality and type, all labour market participants would go for jobs with higher pay or greater opportunities for advancement; 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.

As mentioned in 3.6, opinions differ on the causes of growth in self-employment over the years. Some see self-employment as a necessary employment option conditioned by economic reforms and policies - the “push” argument, while others consider it as a voluntary option - the “pull” argument (See Hughes, 2003; Lin et al,

1999, Meloney, 2004, Bennet and Estrin, 2007, Fields, 1975). According to Hughes (2003), authors in line with the “push” argument conceive that SE emanated from several neoliberal policies including the government’s rationing and downsizing in the PE. These push effects force the affected workers into involuntary SE as an alternative means of survival. The other argument, the “pull” effects argue that workers in the PE are voluntarily motivated into SE to gain independence, job satisfaction and prospects for higher earnings. These are referred to as motivated self-entrepreneurs (Dawson et al, 2009; Hughes, 2003; Bennett & Estrin, 2007).

From the structural policy perspective, one of the underlining philosophies of the neoliberal agenda is the privatization and promotion of private enterprises. However, these reforms may have presented winners and losers especially within the labour markets of the developing countries. Wage inequality and the dismantling of organized labour unions as some of the ills of the policy have been documented (DiNardo et al., 1996; Galbraith, 1998). As noted by Watson (2014), unemployment resulted from job losses associated with trade liberalization policy which also weakened the relevance of the labour unions towards bargaining for wage increases. Hence the alternative employment option from the vulnerable group is the self-employment.

From the forgoing therefore, the proceeding chapter will therefore further describe the econometric model and detailed data used in investigating the determinants of sectoral choices and wages across employments and by gender.

## Chapter 4

### ECONOMETRIC METHODOLOGY AND DATA

The first part of this chapter will present the general framework for estimating a wage equation formulated as a latent variable model. A summary of the problem of selectivity bias and some methodologies proposed in the literature for its solution will be helpful at the modeling stage of the analysis and for the robustness checks of the estimates. The remaining part of the chapter will provide information on the survey data as well as definitions of variables used in the analysis.

#### 4.1 Description of the General Model and the Selectivity Bias Problem

The extended classical Mincerian wage equation (Mincer, 1974) described by equation (3.3) in Chapter 3 is an observed binary outcome: an individual's wage,  $y_i$ , in a specific sector  $j$  is observed only when the individual is employed in that sector. In other words, the observed outcome is only a subset of the population. If this subset is randomly selected, there would arise no selectivity bias problem at the estimation stage of the equation of interest. (Bushway et al, 2007). However, in practice, non-random selection may occur in various ways which, therefore, requires the researcher to model this selection process.

Within the context of the wage equation, which is the equation of interest (the outcome equation), the selection equation is formulated to capture the influences of variables that lead an individual being employed in a specific employment sector,  $j$

among others. Thus,  $y_j^*$  in the selection equation is a discrete choice variable showing the sector of employment of an individual. In this framework, the literature considers the following model to estimate a wage equation as follows;

$$y_1 = \beta_1 X + \mu_1 \quad 4.1a$$

$$y_j^* = \gamma_j Z + \eta_j \quad j = 1, \dots, M \quad 4.1b$$

where equation (4.1a) is the wage (outcome) equation with wages,  $y_1$ , observed in sector 1, and (4.1b) is the selection equation with M selection choices. The X and Z are vectors of explanatory variables that affect wages and the choices of employment of individuals respectively. The disturbance term  $\mu_1$  satisfies the  $E(\mu_1|X, Z) = 0$  and  $V(\mu_1|X, Z) = \sigma^2$  while  $\eta_j$  is the disturbance term in equation (4.1b). Also, the model is assumed to be identified by excluding some variables from vector of X that are present in Z vector (Bourguignon et al, 2007).

One important feature of this model is that for an individual, the outcome variable,  $y_1$  is observed only if category 1 is chosen. Category 1 is chosen based on maximum “utility”  $y_j^*$  from being in that sector when:

$$y_1^* > \max (y_j^*) ; j \neq 1 \quad 4.1c$$

Given the model described by equations (4.1a) to (4.1c), the estimation method has to account for this link between the primary outcome and the selection equations where the observed variable in the selection equation is incidentally truncated. Thus,

in cases when there are unobserved factors that affect an individuals' both choice of employment and wages, the error terms  $\mu_1$  and  $\eta_j$  will be correlated. Therefore, the estimate of  $\beta_1$  in equation (4.1a) by ordinary least squares (OLS) method will be inconsistent as the selected sample will not be representative of the population (see in *Econometric Analysis*, Prentice Hall, 5<sup>th</sup> ed. 2003, p.761 by W. Greene). The problem of sample selection is first addressed by Heckman's (1979) proposal to correct for the selectivity bias in the case of two selection choices: wages observed for those individuals who are employed and not for those who are not employed. Thus, equation (4.1c) can now be written as  $y_1 = y_1^*$  if  $y_j^* > 0$  and  $y_1 = 0$  otherwise. Assuming that errors in the outcome and the selection equations follow the bivariate normal distribution with zero means and correlation  $\rho$ , Heckman (1979) proposed the maximization of the loglikelihood in two steps (Limited Information Maximization Likelihood, LIML). The first step is to estimate the selection equation by a probit model using ML to obtain,  $\gamma$ , the parameters of Z in equation (4.1b) and calculate the inverse Mills ratio for each sector of employment. Second step involves estimating the wage equation by OLS with the inclusion of the calculated inverse Mills ratio (see *Econometric Analysis* by W. Greene (2003), 5<sup>th</sup> ed. P. 781 – 784). The other traditional bias correction model is by Lee (1983) which extends the Heckman's (1979) bivariate probit model allowing for multiple exclusive choices in the logit regression of the selection equation that leads to the multinomial logit model. Hence, he also relaxes the assumption of normality in Heckman (1979) model. He argues that if disturbances are erroneously assumed to be normal, the presence of selectivity bias may not be detected (Lee, 1982). The multinomial probit model with polychotomous choices was proposed by Catsiapis and Robinson (1982).

However, as noted in Lee (1983) although the model has attractive theoretical features, it becomes computationally complex leading to convergence problems.

The empirical part of this study considers the use of Lee's (1983) approach that has become popular in applied work due to its simplicity. The analysis, however, also employs the most recent Bourguignon, Fourier and Gurgand (2001)'s Dubin McFadden (1984) (BFG) model in order to check for the robustness of the estimates. Therefore, this section will suffice with a short description of the general sample selection model and the Heckman's (1979) approach for its correction. Rather, the next two sections will focus on the presentation of the Multinomial Logit model of Lee (1983) and the BFG (2001) model.

#### **4.2 Multinomial Logit Model (MLM)**

In applied work, it has become conventional to implement selectivity bias correction models for estimating an outcome equation involving incidental truncation. In cases when the selection equation involves several choices, Multinomial Logit Model (MLM) becomes more convenient than the Multinomial Probit Model due to its computational simplicity (Bourguignon et al 2007). The wage equation which is the equation of interest of this study involves estimating wages for the Nigerian public, private and self-employment in Chapter 5. Thus the selection equation is modeled to capture the factors that affect individuals to be employed in one of the three employments relative to non-participation. Section 5.1.2 extends the selection equation by inclusion of marriage and children for PE and SE relative to non-participants.

#### 4.2.1 Lee's Model (1983)

Equations (4.1a) – (4.1c) describe the general setting of a mixed model of continuous wage equation with discrete choice equation. In this setting, the problem is to obtain a consistent estimate of  $\beta_1$  in equation (4.1a) when  $\mu_1$  and  $\eta_j$  are correlated (see section 4.1). In Lee (1983) distribution of  $\eta_j$  in equation (4.1b) follows the standard logistic distribution leading to MLM. Although, probit and logit models yield similar estimates, the selectivity bias terms for different probability models differ (Lee, 1982) depending on the restrictions imposed on the residuals which may be related with error covariance matrix and the linearity assumptions (Bourguignon et al, 2007).

In the model described by equations (4.1a) – (4.1c), the condition stated by equation (4.1c) is equivalent to  $\varepsilon_1 < 0$  where  $\varepsilon_1 = \max(y_j^* - y_1^*); j \neq 1$ .

Then the MLM shown by McFadden (1973) is given as

$$P(\varepsilon_1 < 0|Z) = \frac{\exp(Z\gamma_1)}{\sum \exp(Z\gamma_j)} \quad 4.1e$$

under the assumptions that  $(\eta_j)$ s are independent and identically distributed. This leads to the Independent Irrelevant Alternatives (IIA) hypothesis which means that odds ratios in the multinomial logit model are independent of the other alternatives i.e  $\frac{P_j}{p_m}$  is independent of the remaining probabilities (see Greene, 2008, Page 847).

Thus, the joint distribution of  $\mu_1$  and  $\varepsilon_1$  depends on all  $Z\gamma$ 's that are involved in the bias correction term,  $\lambda(Z\gamma)$ . As explained by Bourguignon et al (2007), the Lee's model imposes highly restrictive assumptions in  $\lambda(Z\gamma)$  which include both linearity assumption and that the,  $cov(\mu_1\eta_j)$  to be identical for all j. Therefore, Lee's (1983)

two-step estimation involves estimating parameters,  $(\gamma_j)$  in (4.1b) to form  $\lambda(Z\gamma)$  and estimate wage equation as such:

$$y_1 = X_1\beta_1 - \sigma\rho_1\lambda(Z\gamma) + \omega_1 \quad (4.1f)$$

in which  $\beta_1$  and  $\sigma\rho_1$  are estimated by least squares where  $\rho_1$  is the correlation between  $\mu_1$  and cumulative transformation of  $J_\varepsilon$ . Here  $\gamma$  is calculated as where

$$\lambda_{ij} = \phi \frac{(\Theta^{-1}[P_{ij}])}{P_{ij}},$$

is the selectivity term—otherwise called the inverse Mills ratio.

$\phi(\cdot)$  and  $\Theta(\cdot)$  are the standard normal density and cumulative density functions,  $P_{ij}$  are the predicted probabilities from the multinomial logit model,  $\eta_{si}$  is the random element with zero mean.

Based on Monte Carlo experiments on Lee's model versus Dubin and McFadden (1984) and their proposed model (a variant of Dubin and McFadden (1984)), they note the following results about the Lee's model; the Lee's model is simple to estimate, but it requires restrictive assumptions on residual covariances. However, it provides fairly good results in small samples. Secondly, residual correlations are assumed to have same sign (Schmertmann 1994) which are accepted to be strongly restrictive in applied work. In this respect, Bourguignon, Fourier and Gurgand (2001) (BFG) proposes a different variant of Dubin and McFadden (1983) MLM basic features of which will be summarized in the next section.

#### **4.2.2 Bourguignon, Fourier and Gurgand (2001) (BFG) Model**

Bourguignon, Fourier and Gurgand (2007) argue that Lee (1983) imposes strong assumptions on the error correlations in addition to linearity the assumption. Although it avoids the multicollinearity problem between  $\lambda$  and  $X$  in the outcome

equation, their Monte Carlo experiments show that Lee's model performs fairly well in small samples only. Dubin and McFadden (1984) introduces another model in which they make no assumption between the error terms of the two equations but make a specific linearity assumption between errors in which correlations sum up to zero. His model however cannot avoid multicollinearity problem. Thus, Bourguignon et al. (2001) propose another variant of the Dubin and McFadden's model. As shown Bourguignon et al (2007) in the correlation between when  $\mu_1$  and  $\eta_j$  is modeled in a linear form such that:

$$\mu_1 = \sigma \sum \rho_j^* \eta_j^* + \omega \quad 4.2a$$

where  $\rho_j^*$  is the correlation between  $\mu_1$  and  $\eta_j^*$  and the residual  $\omega$  is orthogonal to all  $\eta_j$ , meaning that Independence of Irrelevant Alternatives (IIA) hypothesis holds (Dimova and Gang, 2007). Bourguignon et al (2007) has shown that after taking the conditional expectations of the disturbance terms of the latent equation conditional on outcome  $S = 1$  observed and incorporating into the wage equation yields the bias-corrected wage equation as:

$$y_1 = \beta_1 X + \sigma_1 \left[ \rho_1^* m(P_1) + \sum \rho_j^* m(P_j) \frac{P_j}{(P_j - 1)} \right] + \omega_1 \quad 4.2b$$

where  $P_j$  is the probability of selecting category j.

Bourguignon et al (2007) also notes that his proposed model imposes no assumption on the correlation of the errors and that it is not appropriate to impose strong restrictions on the residuals since selectivity bias is itself a problem of residual correlation. Here, the number of bias correction terms is same as the number of

multinomial logit equations. Therefore, this methodology is useful in determining not only the sign of the bias for individuals allocated in a specific sector but also the choice from which the bias is originating from. Another important feature of this methodology is related with the violation of the IIA hypothesis and when the real choice model is actually normal with several choices. The estimates of  $\beta$  by BFG model are consistent but inefficient. Thus, the standard errors are adjusted by 500 replications.

As also underlined in the introduction section of this chapter, in the literature the MLM had gained popularity over the multinomial probit model due to its simplicity. However, the IIA hypothesis may not always hold in practice in which case the multinomial probit formulation may seem more attractive. Bourguignon et al (2007) address these issues in conducting Monte-Carlo experiments on several MLM with various error assumptions. They conclude that their proposed model performs well when IIA assumption is violated. They also report that when the interest of the researcher is to estimate the outcome equation rather than selection equation, it is more reasonable to use selection bias correction model based on the multinomial logit rather than the multinomial probit model even when the IIA assumption does not hold. Additionally, in the case when no selection bias is detected, OLS estimates of the outcome equation will provide consistent estimates (see among others Bourguignon et al (2007), Puhani (2000)). Based on this literature, the estimation procedure followed is to report both Lee (1983) and BFG (2001) model when selectivity bias,  $\lambda$ , is found significant. A negative significant coefficient of the selectivity term across any of the employment alternatives in the wage equation

would imply a downward bias. For instance, if the coefficient of the self-employment selectivity correction term is negative in the public employment, this would mean lower wages for individuals randomly selected due to the allocation of individuals with better unobservable characteristics from the public employment into the self-employment. Similarly, a positive significant self-employment coefficient of the selectivity term is an indication of an upward bias in the wage equation. This also implies higher earnings for the randomly selected individuals due to the allocation workers with worse unobservable characteristics from the public employment into the self-employment. In the case of no significant coefficient of the inverse Mills ratio in any of the models, then OLS estimates will be reported.

### **4.3 Data**

This study, utilized the second wave of the 2012/2013 cross-sectional General Household Survey (GHS Panel<sup>18</sup>) data conducted by the National Bureau of Statistics of Nigeria (NBS) with support from World Bank. The survey is the second round of data collection on household and individual characteristics such as working conditions, agricultural activities, household consumption and expenditure behavior, health and education. The survey included two visits comprising the post-planting visit (administered between September – November 2012) and post-harvest visit (administered between February – April 2013). The survey is well designed to be a good representative at the national and zonal levels. Hence, sample therefore consists of a two-stage probability sampling method as follows: in the first stage, the Primary Sampling Units (PSUs) are the Enumeration Areas (EAs) found in each state of the

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<sup>18</sup> The NBS started collecting household panel data in 2010, marking the launch of the very first wave of microdata collection in Nigeria.

federation and the Federal Capital Territory (FCT) – Abuja. Hence, from the PSUs, 500 EAs were chosen for each state and FCT (NBS 2012). For the second stage, a systematic selection of ten (10) households in each EAs was performed to allow for robust estimates. From all these, a total of 5,000 households were being interviewed according to the states or zonal population sizes out of which 4916 responses from the households were granted. By this, the 2012/2013 Cross-Sectional GHS-Panel covered about 27,165 individuals across all age categories. To ensure comparability of the sample to the national population, the study used weights to convert all data to ensure comparability with the national population.

For the benefit of the study, a selection of the working age of 15 to 64 years who are currently employed in any of the employments at the time the survey was administered. For instance, the study chose individuals who answered yes to be working for an enterprise, government, on own businesses and household enterprise. A follow up question to this was “Who is the employer in this job?” Hence an individual is said to be in the public employment if such is currently employed in any of the public employments (Federal, State, Local Governments and Parastatal). Private employed workers are those who are affirmative to be working in the private sector while self-employed workers are those reported to be working in the self-employment<sup>19</sup> category from the survey. Given that the survey is not explicit on the nature of the self-employment, all individuals reported to be self-employed are regarded in self-employment. Consequently, workers who are not presently working

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<sup>19</sup> Note: Our definition of SE refers to the standard World Bank definition to reflect individuals working on their own accounts or employees within the self-employment.

in any of the three (3) employment categories are considered non-participants<sup>20</sup> (individuals reported as working in an NGO, co-operatives, international organizations and religious workers are deleted from the sample). The variables included in the MLM and those of the wage equation are summarized and presented in Appendix B. A summary of the variables used in the analysis are presented in Tables B1 to B3 (Appendix section) while a detailed explanation of all variables used in the analyses of the subject matter are the topic of the following sections.

#### **4.3.1 Dependent Variable**

Since one major aim of this study is to determine wage differences across the three sectors, the sample size was restricted to individuals with positive hourly wages<sup>21</sup> between 6.25 Naira (about 0.03USD) and 12,000 Naira (about 60.30USD). The wages used in this study are generated from the survey, reflecting the remunerations an identical worker receives in hourly, monthly, weekly, bi-monthly or yearly from the primary job assignments. Since we are basically interested in incomes received from a worker's primary job assignments only, the study did not include other payments received such as income from the second job wages, or other incomes from several other sources—hence our decision to retain the use of “wage” throughout the text. It should be noted that there was no uniformity in duration of earning payments. For instance, some individual's earnings are reported on hourly basis, while some others reported monthly, weekly or bi-annual payments. To guarantee uniformity, the

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<sup>20</sup> From the survey, about 3982 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)

<sup>21</sup> Natural logarithm of the wages was used in the wage estimations.

study converted all earnings to its hourly equivalent based on the actual labour supply hours from the survey.

Upon deletion of missing observations and based on the wage earners from each of the employments in the survey, the sample therefore consists of 723 and 611 and 7,240 individual wage earners in private, public and self-employment categories respectively. The descriptive statistics of variables of the means and standard deviation of the variables used is presented in Table 4.1 below.

Table 4.1: Descriptive Statistics for the variables used in the estimations

Variables	Public Employment		Private Employment		Self-Employment	
	Mean	SD	Mean	SD	Mean	SD
InWage	5.635	0.960	4.784	1.043	4.446	1.176
Exper	23.48	10.62	15.66	13.36	21.86	14.36
Hhsize	7.062	3.391	6.854	3.053	7.438	3.386
<b>Education</b>						
Primary	0.0983	0.298	0.201	0.401	0.430	0.495
Secondary	0.249	0.433	0.624	0.485	0.496	0.500
College	0.360	0.480	0.104	0.306	0.0553	0.229
University	0.292	0.455	0.0705	0.256	0.0189	0.136
<b>Age categories</b>						
15 – 25	0.0346	0.183	0.342	0.475	0.221	0.415
26 – 35	0.220	0.414	0.285	0.452	0.234	0.423
36 – 45	0.324	0.468	0.177	0.382	0.233	0.423
46 – 55	0.307	0.462	0.126	0.332	0.183	0.387
56 – 64	0.115	0.319	0.0704	0.256	0.129	0.336
<b>Zones</b>						
North-Central	0.212	0.409	0.188	0.391	0.162	0.368
North-East	0.170	0.376	0.0884	0.284	0.241	0.428
North-West	0.131	0.338	0.0573	0.233	0.204	0.403
South-East	0.148	0.355	0.133	0.339	0.153	0.360
South-West	0.217	0.413	0.255	0.436	0.121	0.326
South-South	0.122	0.327	0.278	0.448	0.120	0.325
<b>Region</b>						
Urban	0.485	0.500	0.445	0.497	0.779	0.415
Rural	0.515	0.500	0.555	0.497	0.221	0.415
<b>Financial Resource</b>						
Home Owner	0.197	0.398	0.304	0.460	0.0934	0.291
None-owner	0.803	0.398	0.696	0.460	0.907	0.291
<b>Gender</b>						
Male	0.642	0.480	0.620	0.486	0.487	0.500

Female	0.358	0.480	0.380	0.486	0.513	0.500
<b>Occupations</b>						
Managers	0.0596	0.237	0.0317	0.175	0.0147	0.120
Professionals	0.398	0.490	0.133	0.340	0.00917	0.0953
Assoc. Prof.	0.294	0.456	0.0900	0.286	0.155	0.362
Clerks	0.0652	0.247	0.0300	0.171	0.000417	0.0204
Services	0.00971	0.0981	0.0983	0.298	0.0843	0.278
Skilled Agric.	0.0319	0.176	0.178	0.383	0.527	0.499
Crafts and trade	0.0250	0.156	0.178	0.383	0.126	0.332
Machine Operators	0.0416	0.200	0.148	0.356	0.0338	0.181
Elem. Occupations	0.0749	0.263	0.112	0.315	0.0499	0.218
<b>Sectors</b>						
Industries	0.0969	0.296	0.266	0.442	0.103	0.303
Agriculture	0.0881	0.284	0.217	0.413	0.572	0.495
Services	0.815	0.389	0.517	0.500	0.325	0.468
	<b>Total Sample</b>		<b>Total Sample</b>		<b>Total Sample</b>	
Observations	723		611		7240	

Source: Self-Computed from the Cross-Sectional GHS-Panel Data 2012; SD= Standard Deviation

The male and female sample sizes consists of 4,369 (with a 51% shares in the total employment<sup>22</sup>) and 4,205 (with a 49% shares in total employment) respectively.

### 4.3.2 Independent Variables

#### 4.3.2.1 Human Capital Characteristics

The human capital characteristics include categorical educational levels and years of potential labour market experience.

- *Education*

Within the Mincerian wage model framework, Mincer (1974), education and potential level of experience (and its squared) are used to control for human capital endowments. This study relied on questions related to worker's level of education as at when the survey was conducted. Due to measurement errors associated with

<sup>22</sup> According to the World Development Indicators (World Bank), labour force participation rate of women as of 2010 was estimated at 48%, hence; this study streamlined the data to capture the actual representation as reported by the World Bank and ILO.

computing the years of schooling, the study uses categorical variables representing the various levels of education such as primary, secondary, college and university degrees. The educational categories are based on the report of the individual rather than the years of education, thus taking care of any potential measurement error (see Pham and Reilly, 2007).

Primary educational category represents those workers with the basic primary school certificate (first six years of education). In both the MLM and the wage equation, primary education is used as the base category in the estimation. Hence, all interpretations to the coefficients of the models are referred to this category. Secondary education represents those with secondary school qualification (another six years of education) while college education in this study is used to group workers with associate degrees, Higher National Diploma (HND) (four years of education), Ordinary National Diploma (OND) (about two years of education), teacher's training certificates and nursing school certificates. (about two to four years of education). This is different from university education since workers with university degree attained the official university degrees (Bachelors, Masters or Doctorate degrees) (between four years—for bachelors degree to ten years—doctoral degree of education).

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. As reported in the Appendix (Table B2 and B3), individuals with a secondary level of

education are most represented in both private- and public-wage employment, while those of primary education are mostly in the self-employment category. Such a scenario is often the case in developing countries, where the precarious nature of participation in self-employment requires limited skills and training compared to the standardized participation rate obtainable in wage employment. However, such representations vary in the public-employment sector, where workers are highly educated (36% for a college degree and 29% for a university degree)<sup>23</sup>.

- *Potential Experience and Experience squared*

In most cases, a direct measure of work experience is usually not available on labour market surveys; hence, studies have relied on the use of potential experience as one of the measures of human capital (Aromolaran 2004; Aminu 2010; Glick and Sahn 1997). Potential work experience is measured by age minus years of schooling minus 6. Thus, experience variable provides an alternative measure of human capital accumulation other than the academic oriented knowledge. It is expected that year of experience adds to productivity which is expected to have a positive impact on sectoral allocation and wages. This further implies that individuals with higher years of experience accumulate job specific human capital which is rewarded accordingly. To capture the diminishing effects of experience on wages, the study also uses the squared of potential experience to capture such trend. Due to the diminishing returns and reduction, labour market experience in the long-run has a declining effect on productivity, consequently a negative impact on wages. As seen in Table B2 and B3,

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<sup>23</sup> College education includes all of the educational levels completed after the basic primary school certificate but not the university degree.

higher years of experience are observed in the private and self-employment categories compared to that public wage employment

#### **4.3.2.2 Demographic characteristics**

The demographic characteristics used here include a categorical variable of geopolitical zones, a dummy variable of urban/rural residence and another categorical variable reflecting different age cohorts. Therefore, the demographic variables capture the effects of an individual's age, and place of residence on employment choices and wages.

- *Geopolitical Zones*

To control for heterogeneous characteristics of labour demand, we have included categorical variables - geopolitical zones - that represent the various regions in Nigeria. These zones include North-Central (base category), North-East, North-West, South-East, South-South and South-West geopolitical zones. For instance, certain regions have unique economic opportunities that attract workers in several employment modes. Some parts of South-West provide lots of commercial and business opportunities while the oil-rich South-South similarly provides several other economic opportunities due to the spill-over effects of the companies in the region. The magnitude of the effects of these geopolitical differences on the employment outcomes and wage differences would likely be contingent on the unique opportunities prevalent in a given geopolitical zone. Across the geopolitical zones (Table B2) while about 22% of public wage employees reside in the oil-rich South South, 28% and 24% of private-wage employees and self-employed reside in the South West and North East, respectively.

- *Urban/Rural Areas*

Due to regional differences of opportunities in urban and rural settlements, the urban area is represented by a dummy variable that will capture such differences in these areas. Places of residence do matter in labour market participation and wage determination. Urban areas have diverse opportunities while the rural areas comprise of agricultural production where most self-employees reside. The variable “urban” is a dummy variable where Urban=1 and Rural=0 otherwise. As pointed out in the literature, self-employment is rural oriented while paid employments present a mixed dominance in each region. Hence, considerable differences in employment outcomes and wages are expected. The sign of the urban coefficient for the wage equation is therefore expected to be larger for urban dwellers than those in the rural for both employments. However, a higher likelihood of rural workers being a self-employee compared to those in urban is expected. As shown in Table B2 a significant number of paid-employees are urban residents while the other majority of self-employees are rural dwellers.

- *Age Categories*

Age categories are used to capture life-cycle employment trend. The age categories used include workers of 15-24 years (base category), 25-34 years, 35-44 years, 45-54 years, and 55-64 years. According to human capital paradigms, workers of younger ages participates more in the labour market since they are more productive as compared to older ones. Consequently, participation of workers across employments rises at younger ages and falls at older age. For women, participation decision in each employment is therefore expected to be relatively lower compared to those of men. According to Guven-Lisaniler and Bhatti (2005), theoretical evidence holds that labour market participation is usually high at prime ages. 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 yields a higher utility, which is also associated with higher wages.

As seen in Tables B2 to B3, clear sectoral differences in the representations across the three sectors could be evidence of sectoral heterogeneity. A substantial number of younger workers are found in self-employment and private-wage employment as compared to public wage employment.

#### **4.3.2.3 Family Characteristics**

The family characteristics used include the different number of children in each household which—such as 1 child, 2 children, 3 children and 4 children or more together with the family size. The family characteristics are therefore used in both the MLM and wage equation to show the effects of household responsibilities on employment choices and wage determination. These variables include different number of children of 0-9 years old in the household. Also, household sizes are equally used to capture the total number of individuals living in the household including adults. Marriage is a categorical variable of “Married, “Single” and divorced or separated (base category).

In the employment mode model, the sign of the coefficients of marriage and children on employment mode is mixed in the literature (Lin et al 2000, Anderson 2010). Furthermore, the hypothesis holds that household size is negatively related to labour market participation rate and earnings (Grosback and Israelsen 1994). Hence, while we expect a negative coefficient for females in both employment modes, that of the

males is expected to be positive. According to the literature, marriage and presence of children have different impacts on sectoral choices and wage of men and women. This is because while marriage or the presence of children weigh down on employment decisions and earnings for married women which is different for singles’.

#### **4.3.2.4 Job Characteristics**

The family characteristics used include the different number of children in each household which—such as 1 child, 2 children, 3 children and 4 children or more together with the family size. The family characteristics are therefore used in both the MLM and wage equation to show the effects of household responsibilities on employment choices and wage determination. These variables include different number of children of 0-9 years old in the household. Also, household sizes are equally used to capture the total number of individuals living in the household including adults. Marriage is a categorical variable of “Married, “Single” and divorced or separated (base category).

In the employment mode model, the sign of the coefficients of marriage and children on employment mode is mixed in the literature (Lin et al 2000, Anderson 2010). Furthermore, the hypothesis holds that household size is negatively related to labour market participation rate and earnings (Groesback and Israelsen 1994). Hence, while we expect a negative coefficient for females in both employment modes, that of the males is expected to be positive. According to the literature, marriage and presence of children have different impacts on sectoral choices and wage of men and women. The reason is marriage or the presence of children weigh down on employment

decisions and earnings for married women while the impact may be different for singles’.

#### **4.3.2.5 Financial Capital Characteristic**

Employment outcomes can also be influenced by several forms of household wealth, assets or inheritances. The literature has shown the availability of physical capital such as wealth, credit, access to finance and other assets (other than earned income) are important contributory factors influencing factors on the propensity to be “pulled” into the self-employment (Burke et al 2000; Blanchflower and Oswald 1998; Dimova and Gang 2007; Flaig and Marshal 2014). To measure such financial resource, Bernhardt (1994) used three measures of financial constraints such as: respondent’s wife’s income, home-ownership and other household investment income. For this study, home ownership is used as a proxy for access to financial capital—inspired by Flaig Marshall (2014). The home-ownership variable is a dummy of individuals who own-homes (= 1) vs those with none (= 0). It is therefore expected that the availability of financial resources through home-ownership would increase the propensity of self-employment.

Furthermore, from the technical point of view, the inclusion of the inverse Mills ratio ( $\lambda$ ) into the wage equation introduces multicollinearity problem. This necessitates to find some variables that are good predictors of  $y_j^*$  in the selection equation but not for the wages, thus to be included in vector of Z but not in the vector of X. Such variables are usually not easy to determine since most factors that affect employment selection also affect wages of individuals. In this respect, literature considers financial capital variables (spouses income, other income than earned income and

household ownership etc. as mentioned above) and number of children (especially for women's wage equation) and marriage as variables that would not affect offered wages but would influence one's employment selection choice, (Little and Rubin, 1987; Ewoudou, 2006; Dimova and Gang 2007). Therefore, household ownership and marriage are used as the exclusion restriction variables in the first part of the analysis that compares wage differences across public, private and self-employment modes. Hence, these exclusion restriction variables will be included in the MLM but excluded from the Mincerian wage equation. In the second part of wage equation extended to include marriage and children, the only variable excluded from vector of  $X$  is thus the variable of house ownership

It is important to note here that due to the feature of the sampled data used and thus the formulation of the model, the implicit assumption made here is that men and women's labor market participation decisions are independent. However, there is consensus in the literature that spouses' decisions should be considered as joint decisions which otherwise may lead to misleading results.<sup>24</sup> Thus, the interpretations of the results in the following sections should be taken with caution.

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<sup>24</sup> Among many others see Manser and Brown, 1980; Becker, 1981; Schafgans and Stelcner, 2006

## Chapter 5

### EMPIRICAL FINDINGS

#### 5.1 Multinomial Logit Model (MLM) for Public, Private and SE

The MLM based on Lee (1983) rests on the assumption that the IIA hypothesis holds. The test developed by Hausman and McFadden (1984) suggests that if a subset of the choice set is truly irrelevant, omitting it from the model will not change the parameter estimates systematically. However, if the remaining odds ratios are not truly independent from the alternatives, then parameter estimates obtained when such choices are excluded will be inconsistent ( Greene, 2008, P. 847). Thus, Hausman test statistics is based on the full and restricted set of choices which follows chi-square distribution with k degrees of freedom expressed as

$$\chi^2 = (\hat{\beta}_r - \hat{\beta}_f)' [\hat{V}_r - \hat{V}_f]^{-1} (\hat{\beta}_r - \hat{\beta}_f) \quad 5.1$$

where ‘r’ shows estimators of restricted subset and ‘f’ based on the full set of choices and ‘ $\hat{V}_r$ ’ and ‘ $\hat{V}_f$ ’ are the estimates of the corresponding covariance matrices respectively. Another test in the literature is the Small-Hsiao test. Results of the two tests are presented in tables 5.1 and 5.3. The two tests indicate mixed results. Also, in most cases negative chi-square test statistics are observed<sup>25</sup>. However, the Wald

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<sup>25</sup>In Long and Freese (2001) it is reported that such negative chi-square values are not uncommon in practice and that Hausman and McFadden (1984, 1226) emphasized on this possibility who concluded that a negative result is strong indication of non-violation of the IIA hypothesis

tests<sup>26</sup> (Tables 5.2 and 5.4) confirm the joint significance of given pair of outcomes against another at all significance levels. Based on these tests results, the study further needs to test for the robustness of the estimates of the MLM by Lee (1983) since the estimates of the Lee's model are sensitive to deviations from the IIA hypothesis. In this framework, the estimates of the BFG (2001) model which are robust to violation of the IIA assumption will also be presented where appropriate.

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<sup>26</sup> Using the `mlogtest`, `combine` option, the test was conducted in pairs of each sectoral assignment against the other, such as public employment versus private employment.

Table 5.1: Tests for Independence of Irrelevant Alternatives (IIA) for various employments

Employments	Hausman Tests				Small-Hsiao Tests				
	Chi2	DF	P>chi2	Evidence	lnL(full)	lnL(omit)	Chi2	DF	P>chi2
Public employment	-22.458	40	--	For H0	-2113.404	-5726.792	-7226.775	60	1.000
Private employment	66.514	40	0.005	Against H0	-2013.580	-2828.726	-1630.291	60	1.000
Self-employment	-7.839	40	--	For H0	-892.006	-2828.726	-3873.440	60	1.000

Note: H0: odds (outcome J vs outcome K) are independent of other alternatives.

Table 5.2: Wald tests for combining alternatives

Employments	Chi2	Df	P>chi2
Public & Private employments	349.695	19	0.000
Public & Self-employments	705.180	19	0.000
Private & self-employments	348.415	19	0.000

$H_0$ : All coefficients except intercept associated with given pair of outcomes are zero (i. e. categories can be collapsed)

Table 5.3: Tests for Independence of Irrelevant Alternatives (IIA) for various employments

Employments	Hausman Tests				Small-Hsiao Tests				
	Chi2	DF	P>chi2	Evidence	lnL(full)	lnL(omit)	Chi2	DF	P>chi2
Paid employments	20.589	19	0.360	For H0	-1301.874	-5308.504	-8013.261	38	1.000
Self-employment	14.423	19	0.758	For H0	-633.191	-2599.000	-3931.619	38	1.000

Note: H0: odds (outcome J vs outcome K) are independent of other alternatives.

Table 5.4: Wald tests for combining alternatives

<b>Employments</b>	<b>Chi2</b>	<b>Df</b>	<b>P&gt;chi2</b>
<b>PE &amp; SE</b>	891.299	18	0.000

### 5.1.1 Estimates of the Sectoral Choice Model for Public, Private and SE

The first step of the model is involved with estimation of multinomial logit equation with exclusive choices of public, private and self-employment relative to nonparticipation. The estimates reported in Table 5.5 are directly the  $\gamma$  coefficients rather than the marginal effects because 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.<sup>27</sup>

Table 5.5: Maximum Likelihood Estimates of Multinomial Logit Sectoral Choice Model (Base Category: Nonparticipation)

Variables	Public Employment	Private Employment	Self-Employment
Education (relative to primary)			
Secondary	1.431*** (0.210)	0.498*** (0.178)	0.220** (0.107)
College	3.489*** (0.270)	0.626** (0.260)	-0.0295 (0.171)
University	3.803*** (0.312)	0.778** (0.304)	-0.453** (0.229)
Age (relative to 15-25)			
26-35	1.535*** (0.296)	0.430** (0.219)	0.326** (0.139)
36-45	2.051*** (0.452)	0.568 (0.406)	0.462* (0.277)
46-55	1.262** (0.629)	-0.193 (0.594)	-0.513 (0.416)
56-64	-2.199*** (0.790)	-3.182*** (0.756)	-3.556*** (0.498)
Zones (relative to NC)			
NE	1.339*** (0.199)	0.092 (0.218)	1.208*** (0.120)
NW	-0.005 (0.218)	-1.051*** (0.263)	-0.014 (0.130)
SE	-0.178 (0.207)	-0.339* (0.191)	0.416*** (0.119)
SS	-0.329* (0.192)	-0.112 (0.171)	-0.257** (0.120)
SW	-0.773*** (0.208)	0.233 (0.173)	0.296** (0.129)
Own home	0.006 (0.160)	-0.563*** (0.136)	0.0678 (0.109)
Married	0.985*** (0.158)	0.192 (0.153)	0.908*** (0.103)
Urban	-0.051 (0.130)	0.219* (0.124)	-0.640*** (0.083)
HH size	-0.091*** (0.017)	-0.0683*** (0.017)	-0.082*** (0.010)
Experience	0.168*** (0.019)	0.126*** (0.018)	0.152*** (0.012)
Christian (relative to Muslims)	0.0006 (0.160)	0.333** (0.146)	0.128 (0.094)
Female	-0.760*** (0.121)	-1.098*** (0.112)	-0.638*** (0.071)
Constant	-5.964*** (0.411)	-2.181*** (0.312)	-1.029*** (0.203)
No. of observations	7809	7809	7809
Loglikelihood	-5726.79	-5726.79	-5726.79
$\chi^2$	5810.80*** (0.000)	5810.80*** (0.000)	5810.80*** (0.000)

<sup>27</sup> See Greene (1993), P. 688

<b>Variables</b>	<b>Public Employment</b>	<b>Private Employment</b>	<b>Self-Employment</b>
Pseudo $R^2$	0.337	0.337	0.337

Note: Standard errors in parentheses; \*\*\*, \*\* and \* indicate significance levels at 0.01, 0.05 and 0.1, respectively. NC= North Central, NE= North East, NW= North West, SE= South East, SS= South South and SW= South West, HH size= household size

As presented in table 5.5 the coefficients of educational levels for both public and private employment are highly significant with reference to non-participants while only the coefficient of college education is not significant for self-employment. This indicates that when compared to workers with primary level of education; secondary, college and university education increases the probability of private and public employment at all educational categories with reference to non-labour market participants. 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 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 versus non-participants in other sectors, with the coefficients being highly significant for public employment. However, older workers of 56 to 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. This therefore conforms to Table 2.6 in chapter where employment rates increases at younger ages and declines at older ages. Among exclusion restrictions, the estimates for marriage in public employment and self-employment versus non-participants are highly significant with odds ratio of 0.984 and 0.907, respectively, 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. For instance, a commercial center, such as Lagos in the South-Western part of Nigeria, has the potential to attract productive workers of all categories; the oil-rich South-Southern part similarly attracts workers of diverse backgrounds. 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 versus in nonparticipant categories compared to a comparable worker in the North-Central region<sup>28</sup>. 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% level of significance. Hence, having a larger family size is associated with lower labour market participation due to family responsibilities. 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 Estimates of Wages in Public, Private and SE Modes:**

This section focuses on the determinants of wages across the three employment modes especially after accounting for the effects of the selectivity terms in the wage equations in cases when they are statistically significant. Therefore, to ably capture the importance of selectivity bias correction in the estimations, this study further presents the different estimates based on the BFG (2001), Lee's (1983) and the OLS models accordingly.

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<sup>28</sup> The North Central houses the Nigerian Federal Capital Territory, Abuja.

As explained in Chapter 4, the selectivity term basically confirms if the observed nonrandom allocation of workers into the three sectors has any significant impact on wages. The results of the various models based on Lee (1983) and BFG<sup>29</sup> (2001), presented in Appendix D (Tables D1 and D2) show that the coefficients in the selectivity correction terms are not significant at any significance levels in the private and self-employments. The insignificance of the selectivity correction terms implies that there is no evidence of sample selection bias in these estimated models<sup>30</sup>. The insignificance of the inverse Mills ratio 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 in such activities unobserved characteristics are not correlated with the rewards by 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 which is reported in Table 5.6 below. However, as explained earlier, the study also estimates BFG model to check for the robustness of the estimate by the Lee's model. Based on the BFG model, the inverse mills ratio is highly significant and negative in the public sector. Thus, the study therefore reports both the BFG (2007), Lee's (1983) and OLS models for the public employment only as also shown in Table 5.6 below.

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<sup>29</sup> The research used Stata statistical software and the user written command "selmlog" to estimate the BFG model (Bourguignon et al 2001)

<sup>30</sup> See Lee (1983) for the interpretation of lambda.

However, the negative significant self-employment selectivity correction coefficient (inverse mills ratio) in the public sector wage equation (Table 5.6; Column 2) is an indication that wages in the public wage employment is downward biased. The implication of this connotes lower wages in the public wage employment than those randomly selected individuals due to allocation of individuals with better unobservable characteristics out of the public employment into the self-employment. Hence, the significance of the selectivity correction term in the public sector therefore implies that the better model for the public wage equation is the BFG model rather than the OLS.

Also, since the other models with the selectivity correction terms are insignificant in the private and self-employments respectively, this study therefore relies on the OLS model without the selectivity term as reported in Table 5.6 (Columns 3 and 4). For all sectors, the F-test confirms the adequacy of the models based on the joint significance of the coefficients. After correcting for selectivity in the public wage equation, the human capital variables loses its significance when compared to the OLS regression of column 1. This may be due to significance of the bias where workers of better characteristics into alternative employments as mentioned earlier. In accordance with the human capital theory, the variable experience is significant with the expected signs in the private and self-employments sectors. A significant effect of a year of experience with a positive impact on wages is lowest for private-wage employment, at about 2.6% (marginally) compared to 4.2% in self-employment. Squared experience has a negative sign, indicating diminishing returns, but is highly significant in the self-employment sector only.

Table 5.6: Ordinary Least Squares (OLS), Lee's and BFG Wage Estimates

Variables	1 Public Wage (OLS)	(2) Public Wage (BFG)	(3) Public Wage (Lee)	(4) Private Wage (OLS)	(5) Self- Employment (OLS)
Exper.	0.043*** (0.014)	0.029 (0.023)	0.046** (0.018)	0.026* (0.014)	0.042*** (0.008)
Exper2	-0.047* (0.026)	-0.033 (0.037)	-0.053* (0.031)	-0.014 (0.024)	-0.052*** (0.013)
Education (relative to primary)					
Secondary	0.237 (0.162)	-0.322 (0.330)	0.288 (0.199)	0.358** (0.166)	0.267*** (0.061)
College	0.893*** (0.180)	-0.888 (0.931)	0.994*** (0.354)	0.748*** (0.228)	0.487*** (0.118)
University	1.384*** (0.183)	-0.946 (1.129)	1.462*** (0.387)	1.234*** (0.230)	0.727*** (0.175)
Sector (relative to industrial sectors)					
Agriculture	-0.349 (0.240)	-0.289 (0.240)	0.261 (0.233)	0.351 (0.236)	0.725*** (0.157)
Services	-0.167 (0.194)	-0.160 (0.203)	0.109 (0.143)	-0.257 (0.231)	0.438*** (0.130)
Female	0.013 (0.083)	0.060 (0.111)	0.038 (0.081)	-0.267** (0.113)	-0.667*** (0.060)
Zones (relative to NC)					
NE	0.331*** (0.121)	0.441** (0.191)	0.300** (0.130)	0.208 (0.282)	0.112 (0.175)
NW	0.439*** (0.101)	0.467** (0.185)	0.421*** (0.100)	0.353 (0.326)	0.056 (0.160)
SE	0.229* (0.136)	0.581*** (0.220)	0.155 (0.146)	-0.050 (0.166)	-0.060 (0.139)
SS	0.526*** (0.101)	0.532*** (0.103)	0.503*** (0.099)	0.173 (0.138)	0.553*** (0.141)
SW	0.132 (0.154)	0.707** (0.319)	0.085 (0.187)	-0.183 (0.158)	0.369*** (0.138)
Urban	0.093 (0.077)	-0.370* (0.210)	0.082 (0.076)	0.312*** (0.105)	-0.001 (0.056)
HH size	-0.018 (0.012)	-0.021 (0.014)	-0.013 (0.013)	0.062*** (0.020)	0.016 (0.010)
Occupations (relative to Managerial occupations)					
Professionals	-0.474* (0.262)	-0.255 (0.201)	0.213 (0.172)	-0.140 (0.282)	-0.860*** (0.296)
Assoc. professionals	-0.269 (0.207)	-0.155 (0.219)	0.322* (0.171)	0.057 (0.300)	-1.297*** (0.267)
Clerks	-0.203 (0.223)	-0.236 (0.263)	0.192 (0.239)	0.058 (0.321)	-0.900 (0.791)

	1	(2)	(3)	(4)	(5)
Variables	Public Wage (OLS)	Public Wage (BFG)	Public Wage (Lee)	Private Wage (OLS)	Self-Employment (OLS)
Service workers	-0.276 (0.272)	-0.482 (0.390)	-0.019 (0.341)	-0.167 (0.296)	-1.201*** (0.265)
Skilled agriculture	-0.539 (0.383)	-0.417 (0.458)	0.021 (0.488)	-0.487 (0.380)	-1.551*** (0.292)
Crafts	-0.456 (0.464)	-0.217 (0.355)	0.259 (0.332)	-0.195 (0.331)	-1.327*** (0.261)
Machine operators	-0.140 (0.363)	-0.126 (0.254)	0.342* (0.193)	0.043 (0.327)	-1.031*** (0.317)
Elementary Occupations	-0.170 (0.261)	-0.462* (0.265)	0.495* (0.263)	-0.365 (0.357)	-1.319*** (0.288)
Mills_PE		0.093* (0.055)	-0.008 (0.030)		
Mills_PtE		0.013 (0.034)			
Mills_SE		-0.186** (0.080)			
Mills_Non_part		0.023 (0.017)			
Constant	4.304*** (0.359)	3.637*** (0.294)	3.435*** (0.716)	3.368*** (0.458)	4.670*** (0.299)
Observations	407	403	399	353	1,682
F-statistic	12.30	12.71	10.72	10.42	33.96
P-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.373	0.376	0.376	0.384	0.294

Note: Robust standard errors in parentheses; \*\*\*, \*\* and \* significant at 0.01, 0.05 and 0.1, respectively. NC= North-Central, NE=North-East, NW=North-West, SE=South-East, SS= South-South and SW= South-West. EO=Elementary Occupations.

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%<sup>31</sup>, compared to about 30% in self-employment. For the higher-education categories (college and university), the

<sup>31</sup> A semilogarithmic wage equation specifies percentage change in characteristics as  $100 * \{\exp(x) - 1\}$ , where x is the variable's coefficient.

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% more, respectively, than do industrial workers. None of the sectoral categorizations in public and private wage employment has any impact on wages, which implies that sector categories do not matter in PE wage determination in our analysis. 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. The magnitude of the gender coefficient is the lowest in self-employment, which may imply a possible higher gender wage gap in that sector.

Because Uwaifo (2007) finds no evidence of geopolitical disparity on returns to education in Nigeria, this study equally analyzes the effects of workers' geopolitical identities on earnings in each 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% 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% more.

However, no effects of the geopolitical zones on wages in the private-wage sector were found. Hence, while zonal differences and attributes matter in wage determination in the public and self-employment categories, it has no effects in private-wage employment. 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. This means that when compared to managerial occupations, all occupational types earn significantly lower. In public-wage employment, managerial occupations are marginally significant but have a positive effect on wages. Plant and machine dummies have a marginal positive effect on wages in all sectors. Comparing the magnitude of the coefficients, plant and machine operators in private-wage employment earn about 52% marginally more than do those in elementary occupations.

### 5.2.1 Comparison of Male and Female Wages in private/self-employments.

Table 5.7: Hourly Wage Equation for Males and Females in Private Wage and Self-Employment Categories.

Variables	Males		Females	
	(1) Private Wage	(2) Self- Employment	(3) Private Wage	(4) Self- Employment
Exper.	0.020 (0.018)	0.019* (0.011)	0.028 (0.019)	0.053*** (0.012)
Exper2	-0.020	-0.025	-0.015	-0.067***

Variables	Males		Females	
	(1) Private Wage (0.030)	(2) Self- Employment (0.018)	(3) Private Wage (0.037)	(4) Self- Employment (0.020)
Education(Relative to Primary)				
Secondary	0.352* (0.200)	0.190** (0.090)	0.497** (0.209)	0.331*** (0.084)
College	0.761*** (0.281)	0.457*** (0.135)	0.964*** (0.255)	0.662*** (0.191)
University	1.038*** (0.260)	0.742*** (0.191)	1.557*** (0.273)	0.776** (0.380)
Sector (Relative to Industrial sectors)				
Agriculture	-0.119 (0.232)	-0.779*** (0.094)	0.149 (0.288)	-0.741*** (0.095)
Services	0.523*** (0.128)	0.326*** (0.085)	0.482*** (0.167)	0.040 (0.171)
Zones (Relative to NC)				
NE	-0.324 (0.274)	-0.111 (0.211)	1.440** (0.701)	-0.073 (0.277)
NW	0.184 (0.297)	-0.195 (0.202)		0.031 (0.267)
SE	-0.130 (0.216)	-0.312* (0.177)	-0.064 (0.202)	-0.007 (0.229)
SS	0.171 (0.172)	0.059 (0.176)	0.203 (0.223)	0.733*** (0.230)
SW	-0.268 (0.209)	0.265 (0.172)	-0.099 (0.200)	0.255 (0.218)
Urban	0.354*** (0.131)	-0.049 (0.078)	0.407** (0.164)	0.044 (0.083)
HH-size	0.057** (0.027)	0.032** (0.014)	0.065** (0.026)	0.006 (0.015)
Constant	2.909*** (0.368)	4.165*** (0.241)	2.687*** (0.370)	3.116*** (0.294)
Observations	245	811	114	882
R-squared	0.343	0.239	0.512	0.213

Note: Robust standard errors in parentheses; \*\*\*, \*\* and \* significant at 0.01, 0.05 and 0.1, respectively. NC= North-Central, NE=North-East, NW=North-West, SE=South-East, SS= South-South and SW= South-West. EO=Elementary Occupations

Since the findings shows an insignificant effect of gender on wages in the public wage employment sector, the comparison is channeled to male and female wages in the other two sectors where gender variable was observed to be significant. Hence, table 5.7 reports wage equation for male and female workers in the private wage and

self-employment sectors. Also, since selectivity correction coefficients are found insignificant in these employments, we rely on the OLS estimation here. Hence, an additional year of experience increases wages of the female self-employed workers more than males in the private sector. The female university graduates employed in the private wage employment earn almost 374% (which is almost twice for males in the private wage sector) than those with primary education. The returns to all education categories for the female self-employed are far higher when compared to the self-employed males. Overall, private wage employees enjoy higher wage premiums than those of the self-employed where females are at greater advantage. Also, agricultural self-employed males and females earn significantly less than their industrial colleagues.

The Nigerian labour market is often characterized by differences in sectoral choices and wages between the PE (comprised of the private and public wage employments) and the SE (Ogwumike et al 2006). Reasons for such differences may be reflected on the degrees of formalization and employment contracts in the PE as compared to the SE. It might also be due to differences in gender roles in household specialization across these employments. Hence, to observe such differences, the next section exclusively considers other factors that may contribute to heterogeneity in employment and wages for the self-employed and paid-employed (public and private employments) men and women. It therefore further decomposes the gender coefficient into male and female while equally categorizing the employments into two paid and self-employments to account for such differences.

### 5.3 Multinomial logit for PE and SE by family characteristics

One possible cause of the gender differences in employments could be due to varying responsibilities in family roles, or differences in marital status or even possibly differences in employments. Nevertheless, a significant impact of gender on employment and wage determination may present other determinants of heterogeneity—besides the already mentioned characteristics. Lower female labour market participation and earnings may be an indication that women are more oriented to household production such as child care, marriage or may be inclined to considering SE due to flexibility in contributing to work and family responsibilities. This section therefore considers the effects of the gender family roles on sectoral choices and possible wage differences.

#### 5.3.1 Estimates of Sectoral Choice Model for PE and SE

Table 5.8: Maximum Likelihood Estimates of Multinomial Logit Sectoral Choice Model by Gender (Base Category: Nonparticipation)

Variables	Self-Employment		Paid Employment	
	(1) Male	(2) Female	(3) Male	(4) Female
Marriage	2.849*** (0.257)	1.329*** (0.115)	2.404*** (0.273)	0.841*** (0.160)
1 Child	-0.481*** (0.133)	-0.200 (0.138)	-0.218 (0.164)	-0.104 (0.185)
2 Children	-0.213*** (0.073)	0.007 (0.071)	-0.131 (0.090)	-0.038 (0.100)
3 Children	-0.189*** (0.049)	-0.074 (0.049)	-0.130** (0.061)	-0.130* (0.071)
> 3 Children	-0.088*** (0.023)	-0.076*** (0.025)	-0.082*** (0.031)	-0.072* (0.038)
Own Home	-0.077 (0.156)	-0.062 (0.137)	-0.450*** (0.168)	-0.404** (0.168)
<b>Age (15-25)</b>				
26-35	1.848*** (0.140)	1.434*** (0.118)	2.051*** (0.167)	1.392*** (0.179)
36-45	3.885*** (0.477)	2.775*** (0.181)	4.361*** (0.488)	2.979*** (0.235)
46-55	4.852***	3.124***	5.546***	3.462***

	(1.022)	(0.262)	(1.027)	(0.305)
56-64	1.048***	2.465***	1.513***	2.182***
	(0.303)	(0.272)	(0.339)	(0.360)
<b>GeoPol. Zones (NC)</b>				
NE	1.267***	0.651***	0.994***	-0.138
	(0.155)	(0.164)	(0.195)	(0.240)
NW	0.526***	-1.278***	0.385*	-2.234***
	(0.156)	(0.192)	(0.200)	(0.351)
SE	0.374**	0.588***	0.152	-0.667***
	(0.156)	(0.149)	(0.197)	(0.212)
SS	-0.387**	-0.046	0.029	-0.526***
	(0.159)	(0.149)	(0.184)	(0.193)
SW	0.016	0.534***	-0.166	-0.197
	(0.182)	(0.167)	(0.210)	(0.207)
Urban	-0.625***	-0.657***	0.129	-0.114
	(0.112)	(0.107)	(0.129)	(0.145)
<b>Education (Primary)</b>				
Secondary	-0.929***	-0.446***	-0.126	0.382**
	(0.124)	(0.112)	(0.166)	(0.180)
College	-1.932***	-1.192***	0.293	1.504***
	(0.209)	(0.196)	(0.226)	(0.222)
University	-2.542***	-2.245***	0.326	1.440***
	(0.283)	(0.303)	(0.276)	(0.276)
Constant	0.177	-0.672***	-1.919***	-2.186***
	(0.229)	(0.218)	(0.286)	(0.300)
Observations	4,485	3,933	4,485	3,933
LR Chi2	3104.35***	3104.35***	2344.05***	2344.05***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo $R^2$	0.338	0.338	0.308	0.308

Note: Standard errors in parentheses; \*\*\*, \*\* and \*significant at 0.01, 0.05 and 0.1 respectively. NC= North Central, NE= North East, NW=North West, SE=South East, SS= South South and SW= South West.

The estimates (table 5.8) reveal evidence of gender differences across employment categories. By implication, men and women are assigned or enter the self-employment or paid employment for different reasons based on individual characteristics. As compared to single men and women, marriage significantly increases the probability of self and PE for both genders relative to non-participants. However, the coefficient of marriage is lowest for the paid-employed women and

highest for self-employed men. Regarding the females, this suggests that self-employed married women have a higher probability of labour market participation compared to those in the PE. Across gender, married men have higher probability of participation in both employment categories. Contrary to the literature, the impact of fatherhood or motherhood is observed to have a decreasing effect on participation. While the presence of one or more children decreases the probability of SE for men, the presence of 3 or more children equally limits female SE. The same limiting effects of three or more children on employment choices are observed in the PE for males and females. Given the findings in developed countries where children limit female SE and increase male SE (Hundley, 2000; Marshall and Flaig, 2014; Simon and Way, 2015), our results partly support the hypothesis for the Nigerian women. The lower participation of men due to the presence of children may be related the supporting gender roles of men in child care and development.

In the PE, access to financial resources (home ownership) is negatively associated with sectoral employments for both men and women which may be due to the prevalence of such financial resources that restrains employment choices in the PE. This finding may also be influenced by the private employment factors found in the previous section. Studies for Bulgaria however find contrary results where financial resources aids in employment choices in the private and self-employments (Dimova and Gang 2007).

Most of the coefficients of the demographic characteristics of workers in both employment choices are highly significant. As expected, the inverted U-shaped

relationship between age and employment mode choice is observed. For instance, female younger and older workers between 26 to 35 and 56-64 years are more likely to be found in self-employment compared to younger workers of 15 – 25 years (base category). Similarly, middle-aged male workers (36-54) are concentrated in paid employment. Regarding the geopolitical attributes, the estimates show that women in North-East, South-East and South-West have a higher probability of being self-employed compared to women of the North-Central (base category). However, women in the North-West and South-South have a lower probability of being in the paid employment. Findings from the coefficients of geopolitical zones are intuitively meaningful. A predominant number of occupations in the North or South-East range from agriculture to commerce, hence a higher likelihood of men and women being self-employed in these zones are as expected. Due to some other economic opportunities such as the presence of larger and more institutionalized private companies offering jobs with high payment and relatively better working conditions or higher public jobs prevalent in the oil-rich South-South Nigeria, males are less likely to be self-employed compared to those in the North-Central zones. Also, female urban residents have a lower probability of being self-employed compared to male self-employees. This is not far from the characteristics of rural self-employment in the developing countries where agricultural workers' occupation dominates.

The coefficients of all the educational levels are highly significant and negative for both male/female self-employees. This implies that education decreases the probability of both female and male self-employment at all educational categories compared to primary education with smaller coefficients for secondary education

than that of university. When compared to workers with primary level of education, secondary, college and university educational categories are not determinants of employment choices in the PE. However, the study observes a positive probability of sectoral employment for educated female PE. This implies that when compared to an individual with a primary level of educations, secondary, college and university education increases the likelihood of being in the PE for the females relative to the non-labour market participants. Comparatively across the two employment modes, female workers of higher educational levels are attracted more to the paid employment. Being a regulated sector with other fringe employment benefits, education is an essential determinant of participation for women in paid-employment. This finding could explain the varying nature of self-employment based on various demographic and human capital characteristics. Similar African studies on sectoral participation confirm education to be one of the major determinants of worker's sectoral choice. For examples, see Glick and Sahn (1997) for Guinea; Vijverberg (1993) for Cote D'Ivoire and Aminu (2010) for Nigeria.

#### **5.4 Estimates of Wages for PE and SE: Marriage, Children and Gender Wage Differences.**

Table 5.9: Estimates of Hourly wages for Self-employed and Paid Employed by gender.

Variables	FEMALES		MALES	
	PE	SE	PE	SE
	1	2	3	4
Married (Base category:Others)	-0.389	0.531**	-0.281	1.203***
	(0.452)	(0.261)	(0.414)	(0.420)
Single	-0.315	-0.025	-1.014*	1.045**
	(0.526)	(0.389)	(0.519)	(0.475)

Variables	FEMALES		MALES	
	PE	SE	PE	SE
	1	2	3	4
1 Child	-0.138 (0.705)	0.651* (0.373)	-0.652** (0.310)	-0.215 (0.373)
2 Children	-0.228 (0.372)	0.395* (0.203)	-0.238 (0.174)	-0.067 (0.189)
3 Children	-0.101 (0.284)	0.327** (0.152)	-0.158 (0.136)	-0.090 (0.130)
4 Children and more	-0.134 (0.223)	0.305*** (0.106)	-0.101 (0.111)	-0.043 (0.085)
Married#Child(ren)	0.058 (0.180)	-0.271*** (0.079)	-0.055 (0.091)	-0.052 (0.064)
Family size	0.058* (0.033)	0.016 (0.024)	0.032 (0.026)	0.036 (0.026)
Exper	0.037 (0.026)	0.059*** (0.016)	0.021 (0.017)	0.044*** (0.016)
Exper2	-0.030 (0.053)	-0.074*** (0.026)	-0.017 (0.029)	-0.060** (0.025)
Education (Base Category:Primary)				
Secondary	0.469** (0.218)	0.287*** (0.095)	0.358** (0.177)	0.194* (0.103)
College	1.464*** (0.258)	0.321 (0.246)	0.862*** (0.211)	0.288* (0.156)
University	1.649*** (0.317)	0.540 (0.523)	1.450*** (0.213)	0.615*** (0.236)
GeoPol. Zones (Base category:NC)				
NE	0.707** (0.280)	-0.006 (0.274)	0.378*** (0.138)	-0.043 (0.269)
NW	0.926*** (0.315)	0.199 (0.234)	0.563*** (0.122)	-0.275 (0.217)
SE	0.349* (0.190)	0.108 (0.228)	0.164 (0.160)	-0.496** (0.196)
SS	0.420** (0.199)	0.934*** (0.227)	0.490*** (0.115)	0.021 (0.200)
SW	-0.077 (0.155)	0.383* (0.208)	0.012 (0.143)	0.184 (0.196)
Sectors (Base category:Industries)				
Agriculture	0.150 (0.407)	0.119 (0.327)	0.269 (0.196)	1.037*** (0.219)
Services	-0.012 (0.280)	-0.064 (0.265)	0.005 (0.178)	0.513*** (0.180)
Occupations(Base category:Managers )				
Professionals	0.164	-2.382***	-0.818***	-0.873**

Variables	FEMALES		MALES	
	PE	SE	PE	SE
	1	2	3	4
	(0.382)	(0.491)	(0.270)	(0.414)
Associate professionals	0.186	-1.341**	-0.460***	-0.799**
	(0.319)	(0.586)	(0.170)	(0.370)
Clerks	0.017	-2.265***	-0.120	-0.985**
	(0.347)	(0.454)	(0.195)	(0.390)
Service workers	-0.062	0.209	0.011	
	(0.392)	(0.483)	(0.270)	
Skilled agriculture	-0.001	-2.209***	-0.562*	-0.833**
	(0.376)	(0.454)	(0.320)	(0.389)
Crafts	-0.361	-3.115***	-0.017	-1.119***
	(0.521)	(0.528)	(0.367)	(0.404)
Machine operators	-0.121	-2.358***	-0.387	-1.076***
	(0.489)	(0.456)	(0.258)	(0.364)
Elementary Occup	-0.302	-3.037***	-0.239	-0.586
	(0.557)	(0.501)	(0.212)	(0.377)
Urban	0.339**	0.125	0.105	-0.005
	(0.152)	(0.096)	(0.086)	(0.094)
Constant	3.117***	4.329***	5.168***	3.710***
	(0.890)	(0.687)	(0.575)	(0.706)
Observations	189	675	387	623
R-squared	0.536	0.280	0.461	0.272
Wald test	102.89	8.36	9.22	7.79
(Pvalues)	(0.000)	(0.000)	(0.000)	(0.000)

Note: Robust standard errors in parentheses; \*\*\*, \*\* and \* significant at 0.01, 0.05 and 0.1, respectively. NC= North-Central, NE=North-East, NW=North-West, SE=South-East, SS= South-South and SW= South-West. EO=Elementary Occupations

Similarly, the selectivity corrections using the BFG (2007) and Lee's (1983) models therefore show that the selectivity correction terms are not significant for the male and female samples in any of the listed employments (PE and SE). Again, this study reports these estimates in the Appendix D2 while reported the OLS models in Table 5.9 accordingly. Estimates for male workers are reported in columns 3 and 4 of table 5.9 while the restricted model is presented in table D3 (Appendix D). Finding show that all human capital variables—education and years of experience are positively associated with wages across both employment modes. However, we find education to be more valued in the PE than in SE. Estimates of the demographic coefficients

are highly significant and positive for self-employed in SW and PE in NE, NW and SS. SE men in agricultural and services sectors earn lower than their industrial (base category) colleagues. Across the nine occupational categories, self-employed managers and crafts earn significantly more than the elementary occupations. Except for clerks and machine operators in the PE, all occupational categories have a significant positive impact on wages.

Consistent with studies on developed countries (Budig 2006, Marshal and Flaig 2014), marriage is positively associated with wages in SE but has no effects on PE. Hence, a married man in the SE category earns about 3 times more than those categorized as other marital status<sup>32</sup> which could also imply a marriage premium in the literature. Interestingly, single men in SE also have a higher coefficient than that of married men in SE. Even though the presence of children is negatively associated with the PE wages, children have no effect on wages in the SE.

Table D3 (Appendix D) of columns 1 and 2 present the estimates for the restricted model of female workers. The coefficients of experience and squared experience are highly significant with the expected signs in SE only. The negative sign for squared experience indicates diminishing returns. All levels of education are highly significant with positive return to wages in PE while only secondary education has a significant positive impact on wages in SE. This presupposes the relevance of higher trainings and skill as one of the productivity augmenting elements in the PE.

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<sup>32</sup> Other marital status categories (base category) include the divorced, separated or widowed individuals.

Considering the estimates in columns 1 and 2 of table 5.9, PE women in North-East, North-West, South-East and South-South earn significantly more than those in North-Central. However, only those in South-South region earn higher in SE mode. Hence, while the SE South-South women earns about 154% more than those in the NC zone, those in the PE of the same region earn 53% more than the base category. Occupations do not matter for female SE except for managers and crafts with positive and highly significant coefficients. However, in PE wage determination, associate professionals, services workers and crafts earn significantly higher than elementary occupations. Hence, female with access to finance earned more than those with none.

Finally, inclusion of marriage and children variables in columns 1 and 2, leads to significant changes on most of the variables. Against the literature of a negative relationship between marriage and SE wages, our results show a small marriage premium (0.531) for females compared with that of men (1.203). Also, the presence of children is positively associated with wages in SE. However, as the number of children increases, wages fall by 56%. The interaction term of being married and having children is negatively associated with female wages in SE. In PE however, there is no effect of number of children, yet marginal but negative effect of the marriage variable in PE. This could explain a motherhood earning penalty in the PE.

## **Chapter 6**

### **SUMMARY AND CONCLUSION.**

#### **6.1 Summary**

This doctoral thesis investigates the sources of heterogeneity in Nigeria labour market. Within this framework, the first part of the study focuses on the determinants of wage differences in the Nigerian public, private paid employment and self-employments. The second part rests on the determinants of wages by broad employment classifications paid employments (public and private employments) and the self-employments and gender. Similarly, within this framework, the study focused on the influences of household characteristics (presence of children and marriage) on male and female wage differences.

The study used the first wave of the 2012 cross-sectional panel data for Nigeria while also employing the multinomial logit model (MLM), Bourguignon, Fourier and Gurgand (BFG) (2001) and Lee's (1983) models to estimate wage equations investigating the determinants of wage differences within employment modes and among gender.

In unravelling incidences of heterogeneous characteristics of the Nigerian labour market, the overall findings posit that the Nigerian labour market is

heterogeneous where factors affecting employment participation and wages differ substantially within employment modes and by gender. Such heterogeneous influences are due to differences in human capital endowments, family characteristics, demographic characteristics, job characteristics and financial capital characteristics.

Findings confirm that workers were assigned non-randomly into the employments where secondary education was the major determinant of self-employment and university education for public employment and private employments respectively.

Results from the sectoral choice model (MLM) reveal evidence of gender differences across employment categories. By implication, men and women are assigned or enter the self-employment or paid employment for different reasons. Females are more inclined to self-employment compared to other employment modes. The determinants of employment mode choices vary across family roles, human capital investment, geopolitical zones, occupations and access to financial capital.

The study therefore found an insignificance of the selectivity correction terms in the private and self-employment which implies that there is no evidence of sample selection bias in these estimated models. An insignificant coefficient of inverse mills ratio also means that an individual's decision to participate in any of the sectors depends on the employer's valuation of the worker's attributes. However, using the Bourguignon, Fourier and Gurgand (2001) (BFG model) to

check for the robustness of the Lee's selectivity model, the study found a negative significant self-employment selectivity correction coefficient in the public employment. This is an indication that wages in the public wage employment is downward biased.

The return to personal productivity variables on wages is lowest in self-employment compared to private sector employment category. Also workers in agriculture earn more than the industrial workers in the self-employments. Differences in geopolitical zones matter in the public and self-employment only. Hence, variations regarding the impacts of education, industry, gender, geopolitical zones, regions, family sizes and occupations may be reflected on the effects of these heterogeneous characteristics on wages which has indirect implications on poverty. Since the returns to productivity characteristics is less in the SE compared to the private or public employments, those individuals with relatively lower wages are susceptible to falling into poverty. While workers; with secondary education and machine operators are the most vulnerable to falling into poverty in the SE, the case is different in the private employment where urban male workers are most vulnerable.

Considering the impacts of children and marriage in the wage equation, estimates show that marriage is associated with male and female marriage premium which partly supports the Becker's (1991) household specialization model in self-employment. These results do not agree with those for developed countries (Hundley 2001, Budig 2006, Marshal and Flaig 2014). Hence, in

terms of earning advantage, workers in paid-employment (PE) are better off than those in self-employment (SE). Furthermore, returns to productivity characteristics are lower in SE which may be reflected on precarious and less regulated nature of SE. Thus, findings suggest that the SE women are more vulnerable to poverty shocks.

## **6.2 Policy recommendation**

Given the less regulated nature of self-employment, two broad policy interventions directed towards poverty alleviation is needed. First, policies channeled towards economic empowerment through raising the returns of the self-employed in their current respective sectors are needed. Such measures include the provision of affordable financial incentives and other specialized training to establish competitive small microenterprises. The second policy priority could also be channeled to increase the mobility of workers between employments while eliminating horizontal and vertical segregation. Hence, labour market measures built on relaxing certain inhibiting factors (such as institutional laws) to wage employment can also guarantee a sustained earnings and some degree of poverty reduction.

Our findings also suggest some policy inputs on the welfare impacts of female earning disadvantage in the labour market. The significant impacts of education on SE labour market outcomes further calls for the re-enactment of the University Entrepreneurship Development Programme (UNEDEP) in the present democratic dispensation. This will help promote self-employment amongst the educated young adults in various universities across the country.

Also in the SE, the suggested significant strong negative relationship of the interaction term (married with children) and female wage provide an entry point that could help mothers balance marriage, child-care and work. Government regulations directed to influencing a universal policy on child-support programmes as an integral part of employment laws would allow SE females to be innovative with ample time channeled to high paying occupations, thereby decreasing the wage gap. Additionally, given the significant impact of financial accessibility on the women's earnings, the government's attention can be drawn to establishing a more flexible and functional micro finance banks that allows self-employed females access loans for their establishments.

In the PE, special programs that will allow women fast-track their ways up the career can be achieved through affirmative actions. To also address marriage penalty effect in the PE, a flexible employment policy that considers marriage as an essential phase of life should be put in place.

At the macro level, regional disparity can be addressed by encouraging investment in capital and physical goods, particularly for those geopolitical zones with relatively limited opportunities compared to others. Such investment options can stimulate employment by allowing institutions to thrive while equally encouraging productive employment opportunities especially the burgeoning SE. Additionally, a more embracing agricultural policy built on advances in technology can help to transform the nature of the SE in Nigeria.

### **6.3 Recommendation for future research**

One aspect of heterogeneity which this doctoral work does not capture is the time-invariant unobserved heterogeneous effects across individuals or households. Panel data analysis allows for the control of these characteristics while providing a more robust empirical outcome. The GHS panel data of the 2010/2011 wave (waves 1) and 2012/2013 waves (wave 2) can be used to offer a more robust labour market research in Nigeria. This study is more interested in cross section analysis, hence did not require a panel data. Studies on welfare impacts of the labour market can be channeled to the sources and characteristics of the self-employment earnings. In Nigeria, such analysis for each geopolitical zone will not only offer insights on the success or failures of the employment, but will also expose any geopolitical imbalances in terms of earnings and severity of any poverty incidence. 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.

However, it is noteworthy to draw attention to data constraints which limit the study to further analysis to temporal changes in the labor market structure and gender wage gap decomposition. Inter-temporal decomposition analysis requires household data covering several years which the present GHS data is deficient in providing. These issues together with spouses' joint decisions are topics that are called for further research in the future. This is based on the bargaining model where spouses negotiate on their collective decisions to supply more labour or non-labour hours.

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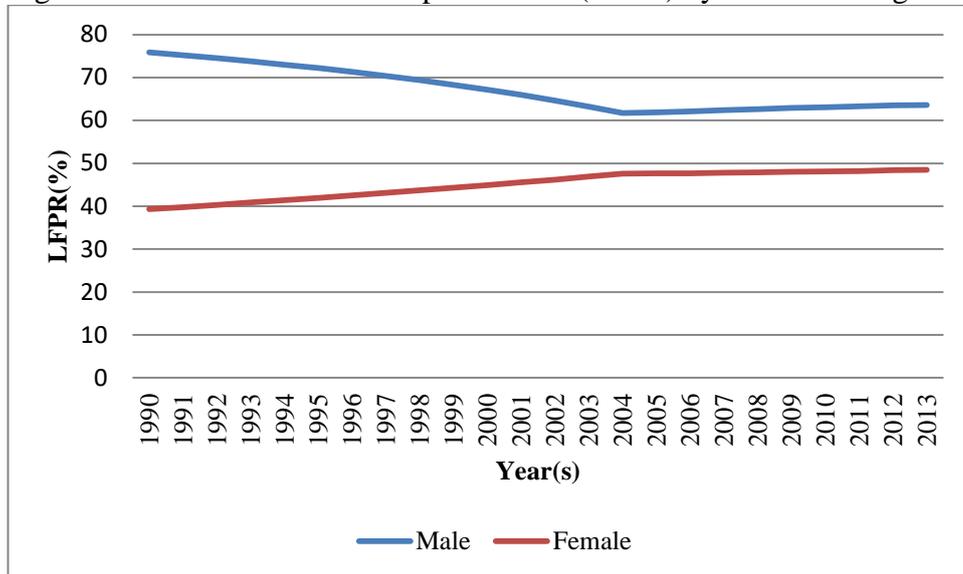
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## **APPENDICES**

## Appendix A: Labour Force Participation Rate (LFPR) for males and females in Nigeria.

Figure A1: Labour Force Participation Rate (LFPR) by Gender in Nigeria



Source: Data retrieved from Worldbank data base (2014)

## Appendix B: Descriptive Statistics of Variables Used (Multinomial Logit Model and Wage Estimation)

Table B1: Explanatory Variables Used in All Models (Multinomial Logit and OLS Models)

Variables	Descriptions
<b>Human Capital Characteristics</b>	
Education*	Primary school (base category) Secondary school College- Individuals with post-secondary diploma University-includes those with B.Sc and post-graduate
Experience*	Years of experience (Age – Educ— 6)
<b>Demographic Characteristics</b>	
Geopolitical zones*	North Central (NC)-base category North East (NE) North West (NW) South East (SE)
Resident areas*	1 if urban resident ; 0 otherwise
Age	15 – 25 (base category) 26 – 35 36 – 45 46 – 55 56 – 64
Female*	1 if female; 0 otherwise
<b>Job Characteristics*</b>	
Managers	Base Category
Professionals	1 if professional worker
Associate professionals	1 if technician and associate professional
Clerks	1 if clerk
Service workers	1 if service and market worker
Skilled agriculture	1 if skilled agricultural and fishery worker
Crafts	1 if in craft related occupation
Machine operators	1 if plant and machine operator
Elementary workers	1 if working in menial or elementary
<b>Sector</b>	
Agriculture	1 if agriculture
Industry	Industries (base category)
Services	1 if services
<b>Family Characteristics</b>	
Marriage*	
Single	1 if married ; 0 otherwise

<b>Variables</b>	<b>Descriptions</b>
Married	
Fam.size*	Total number in the household
1 Child*	Only one child in the family
2 Children*	Only two children in the family
3 Children*	Only three children in the family
>3 Children*	More than three children
<b>Financial Capital Characteristic</b>	
Homeowners	1 if homeowner; 0 otherwise

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Note: \* are also included in the wage equations.

Table B2: Descriptive Statistics of Variables Used (Multinomial Logit Model and Wage Estimation)

<b>Variables</b>	<b>Public Wage</b>	<b>Private Wage</b>	<b>Self Employed</b>	<b>Over-all</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
<b>Education</b>				
Primary	9.83	20.11	43.02	36.29
Secondary	24.93	62.83	49.56	47.71
College	36.04	10.41	5.53	10.01
University	29.20	7.05	1.89	5.99
<b>Age</b>				
15 – 25	3.46	34.21	22.09	21.38
26 – 35	21.99	28.48	23.38	23.63
36 – 45	32.37	17.68	23.30	23.66
46 – 55	30.71	12.60	18.30	18.94
56 – 64	11.48	7.04	12.93	12.39
<b>Marriage</b>				
Single=0	20.33	55.32	29.83	3.85
Married=1	79.67	44.68	70.17	69.15
<b>Geo. pol. Zones</b>				
North Central (NC)	21.16	18.82	16.16	16.77
North East (NE)	17.01	8.84	24.09	22.40
North West (NW)	13.14	5.73	20.39	18.73
South East (SE)	14.80	13.26	15.28	15.09
South South (SS)	21.72	25.53	12.13	13.89
South West (SW)	12.17	27.82	11.96	13.11
<b>Areas</b>				
Urban=1	51.45	44.52	22.14	73.01
Rural=0	48.55	44.52	77.86	26.99
<b>Assets</b>				
Homeowner	80.83	69.57	90.66	88.29
None-home owner	19.69	30.43	9.34	11.71
	Mean	Mean	Mean	Mean
Log wages	4.96	5.68	4.89	4.72
(standard dev.)	(1.07)	(0.91)	(1.08)	(1.21)
Experience	17.1	24.2	21.64	21.45
(standard Dev.)	(13.2)	(11)	(12.8)	(13.98)
HH size	6	7	7	7
	(3)	(4)	(3)	(3)
	Total	Total	Total	Total
No. of observations	723	611	7240	8574

Table B3: Variable definitions and descriptive statistics by gender and employment modes

<b>Variable</b>	<b>Paid Employed</b>	<b>Self-Employed</b>
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	Male (%)	Female (%)	Male (%)	Female (%)
<b>Demographic Characteristics</b>				
<b>Age Categories</b>				
15 – 25	17	19	23	19
26 – 35	23	28	19	27
36 – 45	26	26	22	24
46 – 55	23	20	19	17
56 – 64	11	7	14	12
<b>Geo. Pol. Zones</b>				
North Central (NC)	19	23	16	17
North East (NE)	15	10	25	23
North West (NW)	13	4	27	14
South East (SE)	13	15	12	18
South South (SS)	23	25	10	14
South West (SW)	17	23	10	14
<b>Place of residence</b>				
Urban=1	52	56	21	23
Rural=0	48	44	79	77
<b>Human/Financial Capital Characteristics</b>				
Primary*	14	16	39	48
Secondary	43	40	52	47
College	23	28	6	5
University	21	17	3	1
Home owners				
Experience (Standard Dev.)	21 (12.823)	18 (11.78)	22 (14.90)	22 (13.64)
<b>Family Characteristics</b>				
Marriage				
Single	35	38	33	26
Married	65	62	67	74
Fam.size				
1 Child	.185	.230	.149	.159
2 Children	.325	.346	.309	.330
3 Children	.559	.441	.522	.487
>3 Children	1.278	.914	1.860	1.743
<b>Job Characteristics</b>				
Agriculture	13	20	70	45
Industries	24	11	9	12
Services	62	69	21	43
<b>Occupations**</b>				
Managers	1.37	1.57	5.78	2.86
Professionals	1.23	0.62	25.03	32.45
Associate professionals	7.58	23.11	19.86	20.61
Clerks	0.03	0.05	3.97	6.53
Service workers	3.40	13.19	3.13	8.16
Skilled agriculture	64.89	41.08	7.46	13.88
Crafts	11.14	13.95	11.67	5.71
Machine Operators	5.17	1.68	13.36	1.63
<b>Dependent variable</b>				
Log Wages (Standard Dev.)	5.397 (1.040)	5.147 (1.120)	4.900 (1.081)	4.093 (1.12)

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<i>Sample Size</i>	843	491	3526	0) 3714
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Note: \*\* Occupations are classified according to International Standard Classifications of Occupations (ISCO-88).

## Appendix C: LR and Wald for independent variables (N=7809)

Table C1: LR and Wald for independent variables (N=7809)

Variables	LR Tests			Wald Tests		
	Chi2	DF	P>Chi2	Chi2	DF	P>Chi2
Primary	52.089	2	0.000	42.961	2	0.000
College	214.914	2	0.000	202.782	2	0.000
University	247.904	2	0.000	227.956	2	0.000
26-35	13.938	2	0.001	13.868	2	0.001
36-45	14.088	2	0.001	13.852	2	0.001
46-55	6.599	2	0.037	6.575	2	0.037
56-64	42.846	2	0.000	43.001	2	0.000
NE	97.818	2	0.000	95.073	2	0.000
NW	5.904	2	0.052	5.809	2	0.052
SE	29.022	2	0.000	28.821	2	0.000
SS	5.956	2	0.051	5.946	2	0.051
SW	17.897	2	0.000	17.857	2	0.000
Own home	18.462	2	0.000	18.798	2	0.000
Married	44.874	2	0.000	45.351	2	0.000
Urban	99.736	2	0.000	97.907	2	0.000
HH size	68.606	2	0.000	66.878	2	0.000
Experience	166.977	2	0.000	159.651	2	0.000
Religion	1.393	2	0.498	1.392	2	0.499
Female	63.165	2	0.000	61.086	2	0.000

Note: H0: Coefficients associated with the respective variable is 0

## Appendix D: Hourly Wage Equations with the Selectivity Term

Table D1: Hourly Wage Equations with the Selectivity Term (BFG and Lee's Models respectively)

Variables	BFG Model			Lee Model		
	(1) Public Wage	(2) Private Wage	(3) Self- Employment t	(4) Public Wage	(5) Private Wage	(6) Self- Employment
Exper.	0.029 (0.023)	0.012 (0.034)	0.041** (0.016)	0.046** (0.018)	0.044*** (0.017)	0.042*** (0.011)
Exper2	-0.033 (0.037)	-0.011 (0.050)	-0.051** (0.023)	-0.053 (0.031)	-0.052 (0.030)	-0.053*** (0.017)
Education (relative to primary)						
Secondary	-0.322 (0.330)	0.247 (0.291)	0.362 (0.192)	0.288 (0.199)	0.430** (0.179)	0.271*** (0.064)
College	-0.888 (0.931)	0.108 (0.829)	0.672 (0.553)	0.994*** (0.354)	0.776*** (0.247)	0.430*** (0.158)
University	-0.946 (1.129)	0.494 (1.025)	0.969 (0.697)	1.462*** (0.387)	1.346*** (0.249)	0.623** (0.264)
Sector (relative to industrial sectors)						
Agriculture	-0.289 (0.240)	0.386 (0.228)	0.725*** (0.165)	0.261 (0.233)	-0.378 (0.232)	-0.720*** (0.164)
Services	-0.160 (0.203)	-0.167 (0.233)	0.459*** (0.137)	0.109 (0.143)	-0.546*** (0.130)	-0.257*** (0.098)
Female	0.060 (0.111)	-0.294 (0.152)	-0.707*** (0.080)	0.038 (0.081)	-0.358** (0.153)	-0.680*** (0.059)
Zones (relative to NC)						
NE	0.441** (0.191)	-0.290 (0.308)	0.021 (0.216)	0.300** (0.130)	-0.220 (0.272)	0.112 (0.191)
NW	0.467** (0.185)	0.108 (0.416)	-0.001 (0.207)	0.421*** (0.100)	0.069 (0.363)	0.070 (0.171)
SE	0.581*** (0.220)	-0.105 (0.218)	-0.079 (0.184)	0.155 (0.146)	-0.201 (0.175)	0.013 (0.154)
SS	0.532*** (0.103)	0.180 (0.140)	0.621*** (0.155)	0.503*** (0.099)	0.151 (0.139)	0.605*** (0.149)
SW	0.707** (0.319)	-0.020 (0.284)	0.364 (0.217)	0.085 (0.187)	-0.217 (0.171)	0.425*** (0.152)
Urban	-0.370 (0.210)	0.343 (0.205)	0.077 (0.136)	0.082 (0.076)	0.448*** (0.136)	-0.022 (0.067)
Married	0.185 (0.166)	0.173 (0.190)	0.033 (0.098)	0.059 (0.119)	0.250 (0.155)	0.104 (0.079)
HH size	-0.021 (0.014)	0.061*** (0.022)	0.025** (0.011)	-0.013 (0.013)	0.049** (0.021)	0.023** (0.011)
Occupations (relative to Managers occupations)						
Professionals	-0.255 (0.201)	-0.483 (0.315)	-0.775** (0.341)	0.213 (0.172)	0.083 (0.245)	0.516** (0.227)
Assoc. professionals	-0.155	-0.205	-1.218***	0.322	0.407	0.071

Variables	BFG Model			Lee Model		
	(1) Public Wage	(2) Private Wage	(3) Self- Employment	(4) Public Wage	(5) Private Wage	(6) Self- Employment
	(0.219)	(0.335)	(0.308)	(0.171)	(0.290)	(0.135)
Clerks	-0.236 (0.263)	-0.180 (0.355)	-0.891 (0.826)	0.192 (0.239)	0.402 (0.257)	0.407 (0.779)
Service workers	-0.482 (0.390)	-0.456 (0.337)	-1.160*** (0.307)	-0.019 (0.341)	0.138 (0.260)	0.133 (0.145)
Skilled agriculture	-0.417 (0.458)	-0.787 (0.414)	-1.531*** (0.334)	0.021 (0.488)	-0.170 (0.300)	-0.244 (0.138)
Crafts	-0.217 (0.355)	-0.351 (0.360)	-1.291*** (0.302)	0.259 (0.332)	0.215 (0.245)	0.004 (0.148)
Machine operators	-0.126 (0.254)	-0.141 (0.327)	-1.043*** (0.317)	0.342 (0.193)	0.412 (0.226)	0.249 (0.163)
Elementary Occupations	-0.462 (0.265)	-0.534 (0.386)	-1.289*** (0.332)	0.495 (0.263)	0.418 (0.424)	1.287*** (0.332)
Mills_PE	0.093 (0.055)	0.042 (0.056)	-0.010 (0.031)	-0.008 (0.030)		
Mills_PrE	0.013 (0.034)	-0.057 (0.044)	-0.019 (0.025)		-0.052 (0.042)	
Mills_SE	-0.186** (0.080)	-0.053 (0.071)	0.018 (0.054)			-0.015 (0.033)
Mills_Non_part	0.023 (0.017)	-0.022 (0.027)	-0.005 (0.011)			
Constant	3.637*** (0.294)	3.184*** (0.327)	4.047*** (0.240)	3.435*** (0.716)	2.715*** (0.563)	3.834*** (0.336)
Observations	403	350	1,682	399	325	1,594
F-statistic	12.71	9.95	31.39	10.72	8.42	28.85
P-values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.376	0.395	0.294	0.376	0.395	0.311

Note: Robust standard errors in parentheses; \*\*\* and \*\* significant at 0.01, 0.05, respectively. NC= North Central, NE= North-East, NW= North-West, SE= South-East, SS= South-South and SW= South-West, EO=Elementary Occupations.

Table D2: Hourly Wage Equations with the Selectivity Term (BFG and Lee's Models respectively) by Gender

Variables	FEMALES				MALES			
	PE	SE	PE	SE	PE	SE	PE	SE
	BFG Model		Lee's Model		BFG Model		Lee's Model	
Married (Base category:Others)	-0.088	-0.674**	0.340	-0.593**	0.346	-1.206***	0.331	-1.208***
	(0.507)	(0.295)	(0.437)	(0.269)	(0.444)	(0.455)	(0.410)	(0.444)
Single	-0.248	-0.703**	-0.000	-0.637**	-0.659**	-0.167	-0.674**	-0.166
	(0.442)	(0.299)	(0.389)	(0.280)	(0.330)	(0.295)	(0.322)	(0.284)
1 Child	-0.303	0.585	-0.212	0.588	-0.693**	-0.210	-0.697**	-0.216
	(0.686)	(0.366)	(0.691)	(0.360)	(0.315)	(0.375)	(0.311)	(0.372)
2 Children	-0.249	0.366	-0.206	0.356	-0.265	-0.064	-0.266	-0.066
	(0.371)	(0.203)	(0.366)	(0.195)	(0.174)	(0.190)	(0.172)	(0.189)
3 Children	-0.110	0.296	-0.065	0.286**	-0.173	-0.087	-0.175	-0.088
	(0.288)	(0.153)	(0.280)	(0.144)	(0.137)	(0.130)	(0.135)	(0.129)
4 Children and more	-0.121	0.268**	-0.064	0.261***	-0.107	-0.044	-0.108	-0.045
	(0.232)	(0.107)	(0.219)	(0.101)	(0.111)	(0.086)	(0.110)	(0.085)
Married#Child(ren)	0.043	-0.245***	-0.028	-0.229***	-0.052	-0.050	-0.051	-0.050
	(0.190)	(0.084)	(0.173)	(0.079)	(0.091)	(0.063)	(0.091)	(0.063)
Family size	0.049	0.017	0.062	0.014	0.032	0.036	0.032	0.036
	(0.033)	(0.024)	(0.036)	(0.024)	(0.026)	(0.026)	(0.026)	(0.027)
Exper	0.049	0.082***	0.018	0.073***	0.008	0.044	0.010	0.043**
	(0.034)	(0.027)	(0.034)	(0.020)	(0.025)	(0.024)	(0.018)	(0.017)
Exper2	-0.033	-0.103***	0.001	-0.092***	0.005	-0.061	0.001	-0.060**
	(0.061)	(0.039)	(0.063)	(0.030)	(0.045)	(0.037)	(0.032)	(0.027)
Education (Base Category:Primary)								
Secondary	0.114	0.267	0.220	0.283***	0.299	0.187	0.287	0.170



Variables	FEMALES				MALES			
	PE	SE	PE	SE	PE	SE	PE	SE
	BFG Model		Lee's Model		BFG Model		Lee's Model	
Professionals	0.100 (0.408)	-2.407*** (0.462)	0.131 (0.412)	-2.372*** (0.471)	-0.789*** (0.265)	-0.862** (0.419)	-0.794*** (0.266)	-0.863** (0.415)
Associate professionals	0.154 (0.326)	-1.396** (0.564)	0.139 (0.330)	-1.370** (0.572)	-0.444*** (0.168)	-0.790** (0.375)	-0.446*** (0.167)	-0.791** (0.371)
Clerks	0.043 (0.354)	-2.303*** (0.424)	0.087 (0.354)	-2.271*** (0.434)	-0.083 (0.196)	-0.967** (0.397)	-0.083 (0.194)	-0.967** (0.392)
Service workers	-0.088 (0.462)	0.207 (0.451)	-0.197 (0.452)	0.220 (0.462)	0.017 (0.274)		0.018 (0.270)	
Skilled agriculture	-0.071 (0.388)	-2.248*** (0.421)	0.038 (0.400)	-2.218*** (0.432)	-0.529 (0.328)	-0.809** (0.394)	-0.529 (0.320)	-0.813** (0.388)
Crafts	-0.403 (0.568)	-3.148*** (0.499)	-0.316 (0.555)	-3.124*** (0.508)	-0.006 (0.362)	-1.115*** (0.408)	-0.004 (0.361)	-1.114*** (0.405)
Elementary Occupations	-0.256 (0.495)	-2.400*** (0.426)	-0.340 (0.497)	-2.366*** (0.437)	-0.368 (0.251)	-1.072*** (0.367)	-0.372 (0.253)	-1.074*** (0.365)
Machine operators	-0.453 (0.513)	-3.028*** (0.472)	-0.442 (0.470)	-3.023*** (0.481)	-0.207 (0.210)	-0.576 (0.382)	-0.211 (0.208)	-0.575 (0.379)
Urban	0.244** (0.112)	0.520*** (0.157)	0.318*** (0.112)	0.217 (0.119)	-0.026 (0.116)	0.334** (0.135)		
Mills_PE	0.145 (0.077)	0.010 (0.045)	0.115 (0.074)		0.044 (0.039)	-0.007 (0.041)	0.045 (0.039)	
Mills_SE	-0.129 (0.089)	-0.076 (0.061)		-0.086 (0.060)	0.001 (0.049)	-0.001 (0.052)		-0.001 (0.052)
Mills_Nonpart	0.060	0.027			-0.002	-0.001		

Variables	FEMALES				MALES			
	PE	SE	PE	SE	PE	SE	PE	SE
	BFG Model		Lee's Model		BFG Model		Lee's Model	
Constant	(0.049) 4.310*** (0.988)	(0.032) 4.755*** (0.802)	(0.049) 4.205*** (0.997)	(0.032) 4.559*** (0.662)	(0.015) 5.378*** (0.595)	(0.012) 4.835*** (0.759)	(0.015) 5.410*** (0.542)	(0.012) 4.920*** (0.600)
Observations	186	672	186	672	386	615	386	615
R-squared	0.553	0.281	0.542	0.281	0.462	0.274	0.462	0.274
Wald test (Pvalues)	7.99 (0.000)	8.36 (0.000)	9.06 (0.000)		7.56 (0.000)	8.47 (0.000)	7.95 (0.000)	9.02 (0.000)

Note: Robust standard errors in parentheses; \*\*\* and \*\* significant at 0.01 and 0.05, respectively. NC= North Central, NE= North-East, NW= North-West, SE= South-East, SS= South-South and SW= South-West, EO=Elementary Occupations.

### Appendix D3: Restricted Hourly Wage Estimates

Table D3: Estimates of wage determinants for Self- and Paid Employed (Restricted Model)

Variables	FEMALES		MALES	
	PE	SE	PE	SE
Family size	0.020 (0.021)	0.014 (0.014)	0.009 (0.013)	0.029* (0.015)
Exper	0.038** (0.016)	0.048*** (0.011)	0.060*** (0.011)	0.038*** (0.009)
Exper2	-0.011 (0.035)	-0.061*** (0.019)	-0.067*** (0.021)	-0.049*** (0.016)
Secondary	0.503*** (0.179)	0.294*** (0.083)	0.331** (0.144)	0.208** (0.088)
College	1.482*** (0.214)	0.425** (0.194)	0.760*** (0.182)	0.460*** (0.141)
University	1.768*** (0.209)	0.586 (0.387)	1.339*** (0.183)	0.780*** (0.202)
NE	0.740*** (0.239)	0.181 (0.264)	0.258** (0.129)	0.016 (0.226)
NW	0.747*** (0.181)	0.241 (0.243)	0.396*** (0.132)	-0.113 (0.202)
SE	0.236 (0.153)	0.252 (0.218)	-0.060 (0.144)	-0.289 (0.180)
SS	0.411*** (0.156)	1.000*** (0.213)	0.304*** (0.099)	0.142 (0.181)
SW	-0.008 (0.157)	0.493** (0.200)	-0.125 (0.127)	0.325* (0.177)
Agriculture	0.111 (0.290)	0.284 (0.297)	0.127 (0.198)	1.123*** (0.178)
Services	-0.088 (0.203)	0.213 (0.240)	-0.181 (0.181)	0.657*** (0.147)
Professionals	0.298 (0.301)	-1.059** (0.478)	-0.302* (0.170)	-0.964*** (0.325)
Associate professionals	0.165 (0.309)	-1.954*** (0.404)	-0.052 (0.192)	-1.066*** (0.332)
Clerks	0.203 (0.332)	-1.432 (1.302)	-0.182 (0.222)	-0.632* (0.322)
Service workers	0.039 (0.322)	-1.881*** (0.407)	-0.692** (0.269)	-1.024*** (0.331)
Skilled agriculture	-0.408 (0.512)	-2.494*** (0.476)	-0.416 (0.376)	-1.105*** (0.345)
Crafts	0.141 (0.447)	-1.889*** (0.406)	-0.336 (0.245)	-1.202*** (0.311)
Machine operators	-0.061	-1.947***	-0.215	-0.756**

Variables	FEMALES		MALES	
	PE	SE	PE	SE
	(0.429)	(0.578)	(0.217)	(0.326)
Elementary Occupations	0.097	-2.124***	-0.729***	-0.950***
Urban	0.265**	0.066	0.114	-0.032
	(0.120)	(0.082)	(0.079)	(0.077)
Constant	2.691***	4.583***	3.931***	4.480***
Observations	266	884	494	813
R-Squared	0.507	0.233	0.411	0.251

Note: Robust standard errors in parentheses; \*\*\*, \*\* and \* significant at 0.01, 0.05 and 0.1 respectively.