Explaining Sectoral and Spatial Variations in Growth Pro-poorness in Nigeria

Adeniran, Adedeji and Uneze, Eberechukwu

University of the Witwatersrand and Center for the Study of Economies of Africa, Asset Management Cooperation of Nigeria (AMCON)

November 2015

Title: Explaining Sectoral and Spatial Variations in Growth Pro-poorness in Nigeria

Adedeji Adeniran
University of the Witwatersrand, WITS 2050, Johannesburg, South Africa,

And

Eberechukwu Uneze (PhD)
Asset Management Cooperation of Nigeria (AMCON), Maitma 900271, Abuja, Nigeria.

Corresponding Author: Adedeji Adeniran: School of Economics and Business, University of the Witwatersrand, WITS 2050, Johannesburg, South Africa; adedejimgt@gmail.com.

Abstract

This paper examines the sectoral and spatial variations in growth pro-poorness in Nigeria, using the Shapley decomposition, the Ravallion-Huppi decomposition and the Oaxaca-Blinder decomposition. The results show that spatial and sectoral variations in pro-poor growth are a result of inequality and shift in population, human capital (spatial variation only) and structural factors (sectoral variation only). In addition, the paper finds that the zones and sectors with moderate growth have high poverty-growth elasticity, while zones and sectors with high growth have low poverty-growth elasticity. Thus, spatial and sectoral variations in growth pro-poorness result in weak response of poverty to growth in Nigeria.

Keywords: pro-poor growth; poverty reduction; spatial variation; sectoral variation; Nigeria

JEL Classifications: I32, P36, D63, R12, O55

1. Introduction

The link between poverty reduction and growth has for sometime been the focus of numerous empirical studies on growth. Recent studies show that the responsiveness of poverty to economic growth varies significantly both within and between countries and that growth alone is not sufficient for poverty reduction. For example, Klasen and Misselhorn (2008) found that a one-percent increase in economic growth will cause headcount poverty to reduce by 16.7 percent in Slovakia, 6.5 percent in Latvia, 2.1 percent in Brazil, 0.54 percent in Zambia and in China, 2.8 percent in urban sector and 1.44 percent in rural sector. There is a renewed effort to understand the intervening factors between poverty and growth given the recent strong growth witnessed in several countries. This effort is particularly more pronounced in sub-Saharan Africa where growth and poverty have almost kept pace with each other.

This paper contributes to the literature by examining the drivers of growth pro-poorness in Nigeria. The average real GDP growth rate between 2004 and 2010 was 6.6 percent, but was accompanied by 9 percentage point increase in poverty headcount. This is in contrast to the widely held view that growth is negatively correlated with poverty (Dollar and Kraay, 2002; Kraay, 2004). While a number of factors could be responsible for this negative poverty-growth relationship, the focus of this paper is on the impact of sectoral and spatial variations in growth pro-poorness.

There are several ways sectoral and spatial patterns of poverty and growth can influence aggregate growth pro-poorness. One important way is the economic structure. In many developing countries, the economic structure is dual in nature and is usually partitioned along agricultural versus industrial sectors, and urban versus rural areas. With this feature, the degree of linkages between these sectors and regions is a key condition for pro-poor growth to take place. Also, in cases where the poor are concentrated within a particular sector and region, the extent to which growth supports the sectors and regions is fundamental to achieving pro-poor growth.

The objective of this paper is achieved in two steps. First, we estimate the poverty and growth trends as well as the poverty-growth elasticity across zones and sectors[i]. This is done in order to assess the degree of spatial and sectoral variations in growth pro-poorness. Second, we examine the factors that could explain the observed variations. We focus on four important factors that have been suggested in the literature, namely: inequality, population shift, human capital and structural differences. We use three separate decomposition methods that quantify

the contribution of each of these factors. The decomposition methods include; (i) Shapley decomposition for the inequality effect, (ii) Ravallion-Huppi (sectoral) decomposition for the population shift effect and (iii) Oaxaca-Blinder decomposition for human capital and structural factors. The main advantage of this approach is that it can be applied to both short-term and long-term analyses of drivers of growth pro-poorness in different countries.

An alternative approach is the regression-based decomposition used in similar country-specific studies conducted by Ravallion and Datt (2001) and Besley *et al.* (2005) for India. Under the regression-based approach, the poverty-growth elasticity function is estimated and the derived coefficients are used to quantify the contribution of the explanatory variables to the differences in growth pro-poorness. However, the approach is more suitable for long-term analysis of growth pro-poorness, thus cannot be replicated for Nigeria due to absence of long-term surveys.

The contributions of this study are two-fold: First, it updates the previous studies in Nigeria to the most recent household survey – 2010. Second, it identifies the drivers of the sectoral and spatial differences in growth pro-poorness as well as examines the contributions of these factors to the rising incidence of poverty.

The rest of the paper is organized as follows. Section 2 provides a review of recent literature on the determinants of pro-poor growth. Section 3 lays out the methodology and sources of data. Section 4 presents the empirical results, while section 5 discusses the policy implications of the findings.

2. Literature Review

This section provides a brief review of recent empirical evidence on growth pro-poorness. It focuses on the drivers of cross-country and within-country differences in growth pro-poorness and the channels through which the linkages occur. Our main motivation is to draw on the existing literature in order to determine the potential factors that could be relevant in the Nigeria context, which could be explored further in the empirical section.

A major factor in explaining the variations in the impact of growth on poverty is income inequality. In fact, many studies have shown that poverty tends to respond slowly to growth in countries where inequality is high. For example, Ravallion (1997) found that a country with a Gini index of 0.25 can expect poverty-growth elasticity of around 3.3, while a country with a Gini index of 0.60, the expected elasticity is 1.8. A related study by Chhibber and Nayyar (2007) for low and middle-income countries reached similar conclusion. Specifically, Chhibber

and Nayyar found that a one percent reduction in income inequality was associated with a 0.93 percent increase in poverty-growth elasticity.

An important channel through which income inequality affects growth pro-poorness is the credit-constraint. As Aghion *et al.* (1999) would argue, if the condition holds that (i) there are diminishing returns to individual capital investment, and (ii) that there is capital imperfection such that individual investment is positively related to initial endowment; then high income inequality would weaken the response of poverty response to growth. This is because growth and investment will be concentrated among the non-poor with low marginal return to investment, while limited opportunities will be available for the poor due to credit constraint. This position is supported by Winter-Nelson and Temu (2005) study on the effect of credit constraint on pro-poor growth in Tanzania. The study found that an increase in access to finance by credit constrained-households generate pro-poor growth through expansion of profitable investment.

Another important channel through which income inequality affects growth pro-poorness is fertility, Barro (2000). This is based on the bi-directional relationship between income inequality and fertility. Barro noted that low income inequality reduces fertility, which in turn increases income accruing to the poor by accelerating growth and increasing their per capita income. This effect is implied in the negative relationship observed between income inequality and inter-generational earning mobility (Corak, 2013). In the case of high income inequality, households tend to self-reproduce themselves, such that the children from poor households become future poor adults. Essentially, high inequality limits the opportunity for the poor to participate in growth promoting economic activities, and in the absence of effective policy intervention, poverty will increase with high economic growth.

Apart from income inequality, other dimensions of inequality such as in human capital also affect growth pro-poorness. Both country-level and cross-country studies have demonstrated that poverty is more responsive to growth in regions and countries with high human capital endowment. Examples of the former include; Besley *et al.* (2005) and Ravallion and Datt (2001) while examples of the later include Chhibber and Nayyar (2007) and Duclos and Verdier-Chouchene (2010). It is widely believed that education is a prerequisite for the poor to participate in skill-demanding non-farm economic activities and even in mechanized aspects of agriculture. As argued by Hall and Jones (1999) and Corak (2013), human capital

endowment is also a key driver of economic growth as well as a key driver of the high and increasing income inequality.

Another potential driver of variations in growth pro-poorness within country is the disparity in access to public goods, especially infrastructure. Infrastructure is a catalyst for economic growth and provides the initial condition for poverty reduction. In this case, growth will be concentrated within sectors and regions that have the enabling infrastructure. This promotes pro-poor growth, if the resulting growth takes place in sectors and regions where the poor work and reside. However, in most developing countries, infrastructural facilities have been found to be concentrated in the urban sector rather than the rural sector (Willoughby, 2002). According to Fau (2004), urban bias in the provision of infrastructure contributes significantly to the disparity in non-farm economic activities between rural and urban sectors in many developing countries. The reason is that concentration of public infrastructure in urban sector provides direct and indirect employment, attracts private investment and reduces the operating cost of businesses, thereby spurring industrial growth.

This positive link between infrastructure and pro-poor growth has received considerable attention in the empirical literature. For example, in a study for rural China, Jalan and Ravallion (2002) found that for every one percent increase in kilometers of roads per capita, household consumption increased by 0.08 percent. A similar study for India by Fan *et al.* (2000) found that additional government expenditure on roads have large impacts on poverty reduction and productivity growth.

However, in situations where growth is concentrated within a sector or region, the ease of migration to that sector or region will be crucial in achieving pro-poor growth. This explains the population shift effect. The importance of occupation and geographical migration in diffusing the proceeds from growth has long been recognized in the literature, at least, since the dual sector model was developed by Arthur Lewis in 1954. In Lewis' model, economic development takes place through the transfer of surplus labour in the agricultural sector to the industrial sector. Though the model is silent on the barriers to entry into the industrial sector in terms of cost of migration and human capital, the process helps to spread the gains of growth across sectors and factors of production. Generally, the population shift effect will reduce poverty in the sector and region where migration is taking place. However, the effect on the

receiving sector or region is ambiguous as it depends on the extent to which the poor can be absorbed and the effect of population shift on the equilibrium wage.

In this paper, we explore these factors for Nigeria. Nigeria has many features suitable for the analysis of differences in impact of growth on poverty. The country operates a federal system, comprising six geopolitical zones: South-South, South-East, South-West, North-Central, North-East and North-West. Also, there exists a dual economic structure separated along rural and urban sectors, which is typical of most developing countries. Notable differences in the patterns of growth and poverty can be observed between these zones and sectors. For example, the recent household survey shows that the poverty rate is 10 percent and 13 percent higher in the Northern zones and rural sector, respectively. Ichoku *et al.* (2012) also observed that there are differences in growth pattern and economic activities across the zones and sectors, with non-farm economic activities concentrated in the southern zones and the urban sector.

However, previous studies, for example, Aigbokan (2008) and Ichoku *et al.* (2012) that have explored the poverty-growth relation for Nigeria emphasized differences in growth and poverty pattern across zones and sectors, without explaining the drivers of the observed spatial and sectoral differences. This study is, therefore, an attempt to fill this gap.

3. Methodology

This paper draws on Shapley, Ravalion and Datt, and Blinder-Oaxaca decomposition methods to examine the effects of inequality, population shift, human capital and structural differences on spatial and sectoral variations in growth pro-poorness. These methods are discussed as follows:

3.1 Shapley Decomposition

This method[ii] decomposes changes in poverty over two periods into two components: growth and inequality. Essentially, it helps to determine the extent to which changes in inequality offset the impact of growth on poverty. The decomposition is given as follows:

$$P_{t_n} - P_{t_0} = G(t_0, t_n) + D(t_0, t_n) \quad (1)$$

where P is poverty measure, t_0 is initial period, t_n is final period, G is the growth component and measures change in mean income, D is change in poverty attributable to changes in the distribution curve, holding mean income constant. This approach is applied to decompose changes in poverty across zones and sectors.

3.2 Ravallion-Huppi (Sectoral) Decomposition

Sectoral decomposition assesses the effect of geographical or occupational migration on changes in poverty both within and between sectors. This helps to quantify the contribution of population shift between sectors to aggregate change in poverty. Thus, for an economy with K sectors and S_k share of population engaged in each sector, sectoral decomposition of changes in poverty is given as:

$$\underbrace{(P_{t_n} - P_{t_0})}_{\text{Change in poverty}} = \underbrace{\sum_k (S_{t_0 k})(P_{t_n k} - P_{t_0 k})}_{\text{Intra-sectoral Component}} + \underbrace{\sum_k (S_{t_n k} - S_{t_0 k}) P_{t_0 k}}_{\text{Inter-sectoral component}} + \underbrace{\sum_k (P_{t_n k} - P_{t_0 k})(S_{t_n k} - S_{t_0 k})}_{\text{Interaction component}} \qquad (2)$$

where $P_{t_n k}$ and $P_{t_0 k}$ are the poverty rates in sector K at times t_n and t_0, respectively. $S_{t_0 k}$ and $S_{t_n k}$ are the corresponding population shares of the sectors over the study period. The intra-sectoral component measures changes in poverty that would have occurred, if the population share in each sector did not change. The inter-sectoral (population shift) component, which is our main interest, measures changes in poverty due to households shifting from one sector or region to another. Lastly, the interaction component captures the possible correlation between population shift and intra-sectoral changes in poverty.

3.3 Oaxaca-Blinder decomposition

Oaxaca-Blinder decomposition analyzes the differences in the outcomes (such as income, poverty) between two groups. It decomposes the group differences in outcomes into characteristics and structural components. Characteristics component represents the proportion of the differences in outcomes between groups, resulting from differences in socioeconomic characteristics, when both groups receive equal treatment. Structural component, on the other hand, is the proportion attributed to differences in the returns on households' endowments, policies or institutions.

There are two steps in implementing the Oaxaca-Blinder decomposition. The first step entails estimating the relevant outcome function. In our case, the interest is on differences in poverty and growth across zones and sectors in Nigeria. Following Kang (2009), we specify the income function as follows:

$$Inc_{ijt} = \alpha_j + \beta_j X_{ijt} + D_j \gamma_j + \varepsilon_{ijt} \quad (3)$$

where Inc_{ijt} denotes log of per capita income for i[th] household of zone or sector j at time t, X_{ijt} is a vector of demographic characteristics of household, which includes age of household head, gender of household head, highest educational level of the household head, household size, sector or zone of the household, D_j are regional or sectoral dummy variables and ε_{ijt} is the error term.

The corresponding poverty function is given as:

$$P_{ij} = \phi_j + \beta_j X_{ij} \quad (4)$$

where P_{ij} represents the poverty measure, which is a binary choice variable, taking a value of one if household *i* in sector or zone *j* is poor and zero otherwise; and X_{ij} represents the vector of household characteristics including the regional dummies. Equation 3 is estimated using the ordinary least squares (OLS) regression, while the probit regression is used in estimating equation 4.

The second step involves the counter-factual decomposition of the estimated mean difference between groups into characteristics and structural components. As suggested by Yun (2004) and Kang (2009), we difference equations 3 and 4 at their respective first moments. The resulting functions are the Oaxaca-Blinder decomposition equations of poverty and income between the two groups, given as:

Source: Authors' calculation

$$\overline{Inc}_{i1} - \overline{Inc}_{i2} = \underbrace{\hat{\beta}_2(\overline{X}_1 + \overline{X}_2)}_{\text{Characteristic components}} + \underbrace{\overline{X}_2(\hat{\beta}_1 - \hat{\beta}_2)}_{\text{Structural component}} \quad (5)$$

$$\overline{P}_{i1} - \overline{P}_{i2} = \underbrace{\sum_{i=1}^{k} W_{\Delta X}^{i}[\overline{\phi}(\overline{\beta}_1 \overline{X}_1) - \overline{\phi}(\overline{\beta}_1 \overline{X}_2)]}_{\text{Characteristic components}} + \underbrace{\sum_{i=1}^{k} W_{\Delta \hat{\beta}}^{i}[\overline{\phi}(\overline{\beta}_1 \overline{X}_2) - \overline{\phi}(\overline{\beta}_2 \overline{X}_2)]}_{\text{Structural component}} \quad (6)$$

where $W_{\Delta X}^{i}$ and $W_{\Delta \hat{\beta}}^{i}$ are matrices of relative weights given to co-efficient of various regions or sectors and $\sum_{i=1}^{k} W_{\Delta X}^{i} = \sum_{i=1}^{k} W_{\Delta \beta}^{i} = 1$, and the other parameter is defined above (their mean value). Equations 5 and 6 give the contribution of structural differences to income and poverty gaps across the zones and sectors. To assess the contribution of human capital, both characteristics and structural components can be further decomposed into the contribution of each of the explanatory variables. Thus, we isolate the contribution of human capital which is proxied by education attainment or level. For our study, Oaxaca-Blinder decomposition is applied to the sectors and zones. Given that Oaxaca-Blinder decomposition is only applicable in analysing difference between two groups, the six geopolitical zones are regrouped into northern zone (North-East, North-Central and North-West) and southern zone (South-East, South-South and South-West).

3.3 Data and Variables

The study uses the 2003/2004 National Living Standard Survey (NLSS) and 2009/2010 Harmonized Nigeria Living Standard Survey (HNLSS) conducted by the National Bureau of Statistics (NBS). These surveys provide comprehensive data on household expenditure, household size and other variables of interest. The sample sizes of the surveys are 19,158 and 34,769 for 2003/4 and 2009/10, respectively. These figures exclude outliers. In this study, outliers are households that reported per capita expenditure below 2 percentile or above 98 percentile of the overall income distribution. In line with the literature, economic growth is proxied by change in per capita expenditure (in national adult equivalent) and the dollar per day poverty line of NGN21608 and NGN54750 per annum were used as measures of poverty for 2003/2004 and 2009/2010, respectively. Sampling weights are applied to all computations. Household sizes are also used to weight the household observations, ensuring that all estimates are computed on the basis that individuals are the appropriate units of analysis.

4. Empirical Results

4.1 Trends in Poverty

Table 1 presents three different measures of poverty within the Foster, Greer and Thorbecke (FGT, 1984) class of poverty indices; namely: poverty headcount, poverty gap and squared poverty gap. This is to demonstrate the pattern, depth and severity of poverty in Nigeria and also across geopolitical zones and sectors. The result shows that, between 2004 and 2010, poverty level increased in Nigeria irrespective of the measure of poverty applied. Similar trends are observed across the sectors and zones, with the exception of South-West, which recorded a decline in squared poverty gap over the period. Comparatively, poverty level is on average higher in northern zone and the rural sector than in the southern zone and urban sector. Thus, while every part of the country is becoming increasingly poorer, poverty is more prevalent in some zones and sectors than in others.

(Table 1 here)

For simplicity, the remaining analysis focuses on poverty headcount. The poverty gap and squared poverty gap are sensitive to income distribution across households; thus they may not be suitable for analyzing the variations in growth pro-poorness arising from inequality.

4.1.1 Growth Trend and Poverty-Growth Elasticity

Table 2 presents the results for growth trend and poverty-growth elasticity. For the entire country, the per capita expenditure increased by 4.88 percent between 2004 and 2010, in spite of the effect of the recent financial crisis on the world economy. Also striking is the high growth rates recorded in the northern zone and the rural sector, which have the highest level of poverty. The convergence hypothesis of Barro (1986) which predicts that growth will be higher in less developed areas than in more developed could be at work here. Estimate of growth rate by quintiles equally highlights the pattern of pro-poor growth across the country. The income of households in the top 20 percent is found to have risen by 11.87 percent, compared with 0.78 percent for the bottom 20 percent and 0.75 percent for bottom 40 percent. Overall, income of households in the top 20 percent increased 3.7 percent more than the rest of the households in the entire country. In essence, economic growth benefited the top income earners than the poor.

Columns 3-5 in Table 2 show the degree of responsiveness of poverty to economic growth. Across the zones and sectors, the average poverty-growth elasticity is found to be negative,

implying that poverty rates declined with economic growth. However, the coefficient is less than one and shows that poverty-growth elasticity is inelastic. The northern zones and the rural sector have relatively lower poverty-growth elasticity compared to the southern zone and urban sector. This is despite the robust growth experienced in the northern zones and the rural sector. Specifically, a one percent increase in economic growth reduced poverty headcount by 0.79 percent in South-South, 0.79 percent in South-East, 0.82 percent in South-West, 0.57 percent in North-East, 0.61percent in North-West, 0.77 percent in North-Central, and in the urban sector 0.81 percent as against 0.65 percent in the rural sector.

(Table 2 here)

Based on the results presented in Tables 1 and 2, we can conclude that there are differences in the patterns of poverty and growth, as well as in the responsiveness of poverty to growth across zones and sectors in Nigeria. The results also show that poverty is less responsive to growth in zones and sectors with high poverty rates. One reason growth has not been pro-poor in Nigeria as demonstrated by these results could be because its impact has been weak in the sectors and zones with high incidence of poverty. At the same time, the zones and sectors with high poverty-growth elasticity have only experienced moderate growth.

4.2 Drivers of Pro-poor Growth

(1) Inequality effect

Table 3 presents the result of the Shapley decomposition. It examines the role of inequality in the observed variations in poverty and growth in Nigeria. For simplicity, we assume that poverty line is constant over the two periods; taking 2004 as the reference period. The results show that poverty rates declined over time. This is in contrast with results presented in Table 1 which clearly show an increase in poverty rate. However, this does not affect the interpretation of our results because our interest is mainly on the poverty dynamics and its drivers. The result indicates that change in poverty is primarily due to growth effect. This finding is consistent with cross-country and country-specific findings which show that the growth component tends to dominate the inequality component in poverty changes (Dollar and Kraay, 2003 and Ravallion, 2004).

Regarding the inequality component, the coefficient has positive sign across the sectors and zones examined. This implies that income inequality has worsened across the board. In terms

of magnitude, the inequality component is higher in the northern regions than in the southern regions. For example, absent inequality, poverty would have reduced by 63.3 percent in the northern zones as against 29.6 percent. In the southern zones, poverty will have reduced by 45.56 percent reduction as against 22.2 percent. Similarly, impact of inequality is more substantial in the rural sector. Rural poverty rate reduced by 28.7 percent compared with urban sector where poverty reduced by 30.3 percent. Rural poverty would have reduced by 63.4 percent and urban poverty by 41 percent had inequality not worsened. Therefore, poverty has been more responsive to growth in some zones and sectors than in others due to rising inequality. The main limitation of this analysis is that it does not indicate the channels (i.e. credit constraint or fertility effect) through which inequality affects growth pro-poorness across the zones and sectors.

(Table 3 here)

(2) Population shift effect

Economic growth benefits the poor when it occurs in sectors or regions where the poor are dominant and actively engaged in. This implies that growth must be strong in the rural sector and in the northern zones where poverty rates are high. Our initial results, however, indicate that rising inequality in these sectors and zones reduced the responsiveness of poverty to growth. We turn to another factor that makes growth more pro-poor in some sectors and zones than in others – population shift. Table 4 shows the results of the sectoral decomposition of poverty changes for population shift effect. As in the preceding analysis, the poverty line was held constant over the study period. For the entire country, the proportion of the population in the rural sector increased relative to those in the urban sector (55.8 percent vs 44.2 percent in 2004 against 66.1 percent vs 33.9 percent in 2010). As a result of population shift, rural poverty rate increased by 6.7 percent, while urban poverty rate reduced by 4.5 percent.

The zones, except for south-east, also experienced urban to rural migration. This is clearly reflected in the sign of the population shift coefficient, which is positive in the rural sector and negative in the urban sector. The effect of population shift effect is stronger in the northern zones than in the southern zones. The shift in population increased poverty rates by 15.1 percent, 4.3 percent and 2.5 percent in North-West, North-East and North-Central, respectively. Whereas, the same effect increased poverty rates by 0.4 percent in South-South and 0.1 in South-West, it reduced poverty rate by 0.8 percent in the South-East.

These results have two important implications. First is that population shift has been biased against the urban sector and contributes partly to the differences in poverty rates between rural and urban sectors. A plausible explanation for the rural bias in migration is that the poor in the urban sector are finding it increasingly difficult to cope, thereby sparking a reverse in migration. Second is that the population shift effect is negligible in the southern zones, but somewhat substantial in the northern zones. This means that population shift is a strong driver of spatial and sectoral variations in growth pro-poorness in Nigeria.

(Table 4 here)

(3) Effect due to human capital and structural differences

Tables 5 and 6 present the results for Oaxaca-Blinder decomposition between income and poverty gap across zones[iii]. The results show that in 2004, the overall difference in poverty and income was due to structural factors. By 2010, the structural component declined sharply, with the characteristics component accounting for 78 percent and 68 percent of the income and poverty gap, respectively. This change is caused by a rapid increase in the contribution of household size, an important factor in the characteristics component. In 2004, household size accounted for 18 percent and 15 percent of income and poverty gap, respectively. These numbers increased to 53 percent for income and 50 percent for poverty gap in 2010.

However, the aggregate structural component does not capture time-invariant factors such as public institution or policy, which are our variables of interest. This is, however, explained by the constant term. As presented in Table 5, 26percent of the differences in income in 2004 is explained by the constant term, but fell to 90percent in 2010. This implies that the time-invariant factors captured by the constant term are converging across the zones, thus bridging the income gap. In the case of poverty gap, the time-invariant factors are also converging as indicated in negative sign of the constant term. On the other hand, human capital is found to have a sizeable contribution to income and poverty gap across the zones. In particular, in 2004 and 2010, the contribution of human capital to income and poverty gap increased by 99 percentage points and 77 percentage points, respectively. Overall, the results indicate that with respect to spatial differences in income and poverty, differences in human capital between the zones is a major driver, while structural factors have no effect.

(Table 5 here)

(Table 6 here)

The results of the Oaxaca-Blinder decomposition for the sectors are in contrast with the results for the zones. The results, as presented in Tables 7 and 8, show that the difference in income and poverty is mainly due to the characteristics component, remaining unchanged between 2004 and 2010. Also, the constant term has a significant contribution to the sectoral differences in income and poverty. The percentage contribution of constant term to income and poverty gap increased dramatically to 81 percent in 2004 and 93 percent in 2010. In contrast, human capital which accounted for 147 percent and 106 percent of the income and poverty gap in 2004, reduced sharply to 25 percent and 39 percent, respectively, in 2010. Therefore, structural factors contribute significantly to sectoral growth and poverty gap in Nigeria, while the variations in human capital have no impact.

(Table 7 here)

(Table 8 here)

Conclusion

This paper has examined the drivers of the spatial and sectoral variations in growth impact on poverty in Nigeria, focusing on the contributions of inequality, population shift, human capital and structural differences to the spatial and sectoral variations in growth pro-poorness. Three different decomposition methods were applied. These include: Shapley decomposition, Ravallion and Huppi decomposition and Oaxaca-Blinder decomposition.

The main findings are as follows. Across zones, inequality, population shift and human capital were found to contribute significantly to the disparity in growth pro-poorness. While across sectors, inequality, population shift and structural differences are the main causes of disparity in growth pro-poorness. The study also finds that the spatial and sectoral variations in growth pro-poorness contributed to the weak response of poverty to growth in Nigeria. Specifically, we found that the zones and sectors with high poverty-growth elasticity have only experienced moderate growth, while poverty-growth elasticity is low in zones and sectors with high growth and poverty.

These findings have important implications for designing poverty reduction policy in Nigeria. On one hand, if government's objective is to lower spatial variations in growth impact poverty, priority must be given to policies that target households' socio-economic attributes and income inequality in the disadvantaged zones and sectors. On the other hand, if the goal is to achieve even sectoral growth and poverty pattern, the policy will need to target inequality, structural factors and the underlining causes of urban-bias population shift effect. However, this study does not identify the key factor and channels through which the structural factors affect growth pro-poorness. Thus, further study will be required to shed light on the size and significance of the various sub-components of the structural factors and channels through which the identified factors work.

References

Aigbokhan, E. B., (2008). Growth, Inequality and Poverty in Nigeria. *Economic Commission for Africa ACGS/MPAMS Discussion Paper,* No. 3.

Barro, R. J., (2000). Inequality and Growth in a Panel of Countries. *Journal of Economic Growth, 5(1)*, pp. 5-32.

Besley, T., R. Burgess, and B. Esteve-Volart, (2005). Operationalizing Pro-poor Growth: A Country Case Study on India. Mimeographed, Department for International Development.

Blinder, A. S., (1973). Wage discrimination: reduced form and structural estimates. *Journal of Human resources*, 8(4), pp. 436-455.

Chhibber, A. and G. Nayyar, (2007). Pro-Poor Growth: Explaining the Cross-country Variation in the Growth Elasticity of Poverty. *Brooks World Poverty Institute Working Paper* 14.

Datt, G. and M. Ravallion, (1992). Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s. *Journal of Development Economics*, Vol. 38, pp. 275-295.

Dollar, D. and A. Kraay, (2002). Growth is Good for the Poor. *Journal of Economic Growth*, Vol. *7*3, 195-225.

Eastwood R. and M. Lipton, (2001). Pro-Poor Growth and Pro-growth Poverty Reduction: What Do they Means? What Does the Evidence Mean? What Can Policymakers Do?. *Asia and Pacific Forum on Poverty*.

Fan, S., (2004). Infrastructure and Pro-poor Growth," Organization for Economic Co-operation and Development's Assistance Committee (OECD-DAC) *POVNET Agriculture and Pro-poor Growth, Helsinki Workshop*.

Foster, J., J. Greer and E. Thorbecke, (1984). A Class of Decomposable Poverty Measures. *Econometrica*. 52(3), pp. 761–766.

Ichoku, E. H., C. Agu and E.J. Ataguba, (2012). What Do We Know about Pro-poor Growth and Regional Poverty in Nigeria?" *International Journal of Economic Sciences and Applied Research*, Vol. 53, pp. 147-172.

Kakwani, N., S. Khandker, and H. H. Son, (2003). Pro-Poor Growth: Concepts and Measurement with Country Case Studies. *United Nations Development Programme Working Paper,* No. 1.

Kakwani, N. and H. H. Son, (2006). Pro-poor Growth: The Asian Experience. *United Nations University-World Institute for Development Economic Research Paper*, No. 5.

Kang, W., (2009). Pro-poor growth, poverty, and Inequality in Rural Vietnam: Welfare Gap between the Ethnic Majority and Minority," University of Manchester Economic Discussion Paper Series EDP-0906.

Kappel, R., J. Lay, and S. Susan, (2005). Uganda: No More Pro-Poor Growth?" *Development Policy Review, 23(1)*, pp. 27-53.

Khan, H.A. and S.A. Azhar, (2003). Decomposition of Changes in Poverty Measures: Sectoral and Institutional Considerations for the Poverty Reduction Strategy Paper of Pakistan," *The Pakistan Development Review, 42(4)*, pp. 879-892.

Klasen, S. and M. Misselhorn, (2008). Determinants of the Growth Semi-Elasticity of Poverty Reduction. Ibero America Institute for Economic Research Discussion Papers.

Jalan, J., and M. Ravallion, (2002). Geographic Poverty Traps? A Micro Model of Consumption Growth in Rural China. *Journal of Applied Econometrics,* Vol. 174, pp. 329-46.

Oaxaca, R., (1973). Male-female Wage Differentials in Urban Labor Markets. *International Economic Review*, Vol. 143, pp. 693-709.

Ravallion M. and S. Chen, (2003). Measuring Pro-Poor Growth. *Economic Letters,* Vol. 78, pp. 93-99.

Ravallion, M and G. Datt, (2001). Why has Economic Growth been more Pro-poor in some States of India than others?. *Journal of Development Economics*, Vol. 68, pp. 381-400.

Ravallion, M. and M. Hippi, (1991). Measuring Changes in Poverty: A Methodological Case Study of Indonesia during an Adjustment Period. *World Bank Economic Review*, 5(1), pp. 57-82.

Ravallion, M., (2004). Pro-Poor Growth: A Primer," The World Bank, Policy Research Working Paper, No. 3242.

Saad-Filho, A., (2010). From Washington Consensus to Inclusive Growth: The Continuing Relevance of Pro-poor Policy Alternatives," *Background Paper for the World Economic and Social Survey*.

Shorrocks, A. F., (2013). Decomposition Procedures for Distributional Analysis: A Unified Framework Based on the Shapley Value. *Journal of Economic Inequality*, 11(1), pp. 99-126.

Son, H. H. and N. Kakwani, (2008). Global Estimates of Pro-poor Growth. *World Development*, Vol. 366, 1048-1066, 2008.

Willoughby, C., (2002). Infrastructure and Pro-poor Growth: Implications of Recent Research. Department for International Development (DFID) Commission Paper*, 2002*.

Yun, M., (2004). Decomposition Differences in the First Moment", *Economic Letters*, Vol. 82, pp. 275-280.

Appendix

Regression Results

(Table 9 here)

(Table 10 here)

(Table 11 here)

(Table 12 here)

Table 1: Changes in Various Poverty Measures

Unit	Poverty headcount[1] (PH)		Poverty gap (PG)		Squared poverty gap (PSG)		Annual % point change PH	Annual % point change in PH	Annual % point change in SP
	2004	2010	2004	2010	2004	2010			
Nigeria	56.0	73.4	24.1	37.3	13.4	22.8	2.9	2.2	1.6
Sector									
Urban	43.9	57.0	17.6	23.5	9.3	12.8	2.2	1.0	0.6
Rural	65.5	81.8	29.3	44.3	16.6	28.0	2.7	2.5	1.9
Geopolitical Zone									
South South	34.0	59.7	11.0	24.9	5.0	13.2	4.3	2.3	1.4
South East	25.9	61.4	08.0	25.6	3.7	13.7	5.9	2.9	1.7
South West	43.8	51.6	18.7	19.3	10.6	9.7	1.3	.01	-0.2
North Central	65.3	80.5	29.6	40.7	17.3	24.5	2.5	1.8	1.2
North East	73.6	87.6	32.7	50.6	18.1	33.1	2.3	3.0	2.5
North West	69.3	85.3	31.5	48.6	17.7	31.7	2.7	2.9	2.3

Source: Authors' computation

[1] Our estimates for headcount poverty are slightly different from the official poverty rate by NBS. A number of factors could be responsible for this. For instance, we exclude from the original dataset all households that reported per capita expenditure is below 20 percentile or above 98 percentile of the income distribution to rule out outliers. Also, we used the nationally deflated CPI, while NBS uses regionally deflated CPI.

Table 2: Growth Rate and Growth Elasticity of Poverty

Unit	**Growth rate**	**Poverty-growth elasticity**		
		2004	2010	Average
Nigeria	4.881	-0.868	-0.532	-0.7
Sector				
Urban	1.706	-0.859	-0.759	-0.809
Rural	7.816	-0.871	-0.433	-0.652
Geopolitical Zone				
South-South	1.466	-0.886	-0.696	-0.791
South–East	2.817	-0.929	-0.655	-0.792
South–West	1.794	-0.789	-0.861	-0.825
North-Central	6.074	-1.009	-0.536	-0.7725
North–East	13.753	-0.814	-0.324	-0.569
North–West	5.367	-0.852	-0.348	-0.6
Quintile				
1	0.78			
2	0.756			
3	0.802			
4	0.901			
5	11.870			

Source: Authors' calculation

Table 3: Poverty Decomposition into growth and inequality

Unit	Poverty change	Growth component	Inequality component
Nigeria	-0.270	-0.597	0.326
Sector			
Urban	-0.303	-0.410	0.107
Rural	-0.287	-0.634	0.347
Geopolitical Zone			
South-South	-0.199	-0.371	0.173
South-East	-0.123	-0.466	0.343
South-West	-0.345	-0.410	0.065
North-Central	-0.361	-0.658	0.297
North-East	-0.274	-0.632	0.358
North-West	-0.259	-0.601	0.342

Source: Authors' calculation

Table 4: Sectoral Decomposition of Changes in Poverty

Unit	population share in 2004	population share in 2010	Intra-sectoral effect	Population shift effect	Interaction effect	Poverty change
Nigeria	1	1	-0.294	0.022	0.002	-0.27
Sector						
urban	0.442	0.339	-0.134	-0.045	0.031	-0.148
rural	0.558	0.661	-0.16	0.067	-0.029	-0.122
Geopolitical zones						
South South	0.151	0.152	-0.2	0.004	-0.002	-0.198
urban	0.362	0.342	-0.044	-0.004	0.002	-0.046
rural	0.638	0.658	-0.156	0.008	-0.005	-0.153
South East	0.141	0.131	-0.114	-0.008	-0.001	-0.123
urban	0.255	0.307	-0.031	0.007	-0.006	-0.03
rural	0.745	0.307	-0.083	-0.016	0.006	-0.093
South West	0.159	0.176	-0.349	0.001	0.003	-0.345
urban	0.838	0.796	-0.304	-0.018	0.015	-0.307
rural	0.162	0.204	-0.045	0.019	-0.012	-0.038
North central	0.181	0.163	-0.383	0.025	-0.004	-0.362
urban	0.372	0.245	-0.136	-0.068	0.047	-0.157
rural	0.628	0.755	-0.247	0.093	-0.05	-0.204
North East	0.168	0.143	-0.305	0.043	-0.012	-0.274
urban	0.392	0.185	-0.106	-0.126	0.056	-0.176
rural	0.608	0.815	-0.199	0.169	-0.068	-0.098
North West	0.2	0.236	-0.209	0.151	-0.063	-0.121
urban	0.404	0.225	-0.093	-0.086	0.041	-0.138

rural	0.596	0.775	-0.209	0.151	-0.063	-0.121

Source: Authors' calculation

Table 5: Decomposition of difference in log income between Zones (as percentage of total income differential)

	2004		2010	
	Characteristics component	Structural component	Characteristics component	Structural component
Age of household head	1	33	1	17
Household size	18	-22	53	-19
Gender of household head	-1	-21	-1	8
Sector	2	38	4	2
Education	8	18	15	110
Constant	-	26	-	-90
Total	28	72	72	28

Source: Authors' Calculation

Table 6: Decomposition of Predicted Poverty between Zones (as percentage of poverty rate differential)

	2004		2010	
	Characteristics component	Structural component	Characteristics component	Structural component
Age of household head	1	29	1	14
House size	15	19	50	-27
Gender of household head	1	-17	0	11
Sector	3	35	3	15
Education	8	24	14	95
Constant	-	-17	-	-76
Total	27	73	68	32

Source: Authors' Calculation

Table 7: Decomposition of difference in log income between Sectors (as percentage of total income differential)

	2004		2010	
	Characteristics component	Structural component	Characteristics component	Structural component
Age of household head	0	19	0	-18

House size	10	16	32	-1
Gender of household head	0	8	-1	23
Zone	27	47	12	-3
Education	28	119	29	-54
Constant	0	-174	0	81
Total	64	36	72	28

Source: Authors' Calculation

Table 8: Decomposition of Predicted Poverty between Sectors (as percentage of poverty level differential)

	2004		2010	
	Characteristics component	Structural component	Characteristics component	Structural component
Age of household head	0	9	0	-29
House size	8	66	32	-5
Gender of household head	1	6	0	25
Zone	27	44	14	9
Education	24	82	29	-68
Constant	0	-166	0	93
Total	60	40	75	25

Source: Authors' calculation

Appendix

Regression Results

Table 9: Determinants of (log) Consumption

	2004		2010	
	North	South	North	South
Age of household head	-0.002***	0.003***	0.000	0.002***
Household size	-0.351***	-0.413***	-1.584***	-0.177***
Female	-0.161***	0.000	-0.001	-0.037**
Primary Education	0.248**	0.102***	0.099***	0.154***
Secondary Education	0.204***	0.188***	0.208***	0.256***
Tertiary Education	0.597***	0.518***	0.423***	0.560***
Urban Sector	-0.314***	0.031**	0.077***	0.0675***
_cons	10.91***	11.073***	11.293***	11.388***
R-squared	0.22	0.2	0.23	0.22
F-test	414.04	301.83	891.08	646.04
Prob>F	0.000	0.000	0.000	0.000

Source: Authors' calculation

Table 10: Determinants of (log) Consumption

	2004		2010	
	Urban	Rural	Urban	Rural
Age of household head	0.002**	0.000	0.001	0.002***
Household size	-0.3641***	-0.387***	-0.166***	-0.165***
Female	0.056*	-0.022	-0.070	0.004
Primary Education	0.118*	0.162***	0.111***	0.126***
Secondary Education	0.231***	0.180***	0.264***	0.201***
Tertiary Education	0.618***	0.485***	0.569***	0.402***
Southern region	0.24***	0.587***	0.112***	0.1109***
_cons	10.765***	10.602***	11.38***	11.279***
R-squared	0.21	0.36	0.26	0.25
F-test	179.01	1177.24	476.73	1224.57
Prob>F	0.000	0.000	0.000	0.000

Source: Authors' calculation

Table 11: Determinants of the likelihood of poverty

	2004		2010	
	North	South	North	South
Age of household head	-0.002**	0.006***	0.001*	0.002***
Household size	-0.567***	-0.56***	-0.227***	-0.239***
Female	-0.130	0.113	-0.001*	-0.044*
Primary Education	0.497***	0.13**6	0.165***	0.193***
Secondary Education	0.989***	0.264***	0.295***	0.347***
Tertiary Education	1.433***	0.616***	0.548***	0.858***
Urban Sector	-0.511***	0.021	0.162***	0.036*
_cons	1.433***	1.553***	0.468***	0.654
LR Chi2	809.66	1760	3352.70	2625.26
Prob>Chi2	0.000	0.000	0.000	0.000

Source: Authors' calculation

Table 12: Determinants of the likelihood of poverty

	2004		2010	
	Urban	Rural	Urban	Rural
Age of household head	0.002	0.001	-0.000	0.002***
Household size	-0.439***	-0.624***	-0.0226***	-0.234***
Female	0.123	0.069*	-0.086*	-0.002
Primary Education	0.237**	0.324***	0.153***	0.183***
Secondary Education	0.297***	0.324***	0.0.379***	0.279***
Tertiary Education	0.806***	0.807***	0.859***	0.557***
Southern region	0.439***	0.962***	0.133***	0.21***
_cons	0.948***	0.929***	0.621***	0.45*
LR Chi2	630.9	4363	1887.11	5207.13
Prob>Chi2	0.000	0.000	0.000	0.000

Source: Authors' calculation

[i] Nigeria is compose of six geopolitical zones: South-South, South-West, South-East, North-East, North-West and North-Central, while the sectors consist of rural and urban.

[ii] An alternative growth-inequality decomposition method used in the literature is the Datt-Ravallion decomposition. The main departure from the Shapley decomposition is the inclusion of a third component- the residual term. However, the residual term have found to arise due to the index number problem in sampling or miss-specified components (Kang, 2009). Thus, Shapley decomposition is an improvement on this alternative approach, by spreading the value of the residual over the other components.

[iii] The regression upon which the Blinder-Oaxaca decomposition is based is presented in the appendix, Table 9-12.