DEMOGRAPHIC DIVIDEND IN NIGERIA: Evidence from Country and Sub-Country Application of National Transfer Accounts (NTA) Approach

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ABSTRACT

Nigeria is the most populous country in Africa. However, variations exist in the size and structure of the country's population across the 36 sub-nationals and the Federal Capital Territory. These disparities have implications for harnessing the potential benefits of a large population, as it necessitates the implementation of context-specific policies. This study profiles demographic dividend at the country and sub-country levels for Nigeria. It takes case studies of the nation (Nigeria) and sub-nationals – Lagos and Kaduna states, two of the largest states by population but distinct in terms of fertility rate. Specifically, the study applies the National Transfer Accounts (NTA) methodology in estimating economic lifecycle patterns across Nigeria, Lagos and Kaduna states. Findings from sub-national estimates demonstrate substantial variations between Lagos and Kaduna states. Children start earning labour income as early as age 3 in Kaduna, compared with age 10 in Lagos, suggesting the prevalence of child labour. An average Lagos State

resident is found to earn and spend more than his or her counterpart in Kaduna State or Nigeria. Although length of lifecycle surplus is shortest in Lagos, total surplus is substantially higher than Kaduna or Nigeria. Support ratio is highest in Lagos and the state entered the period of first demographic dividend in 1978, while this dividend did not begin until 1995 and 2000 for Kaduna and Nigeria respectively. Lagos State also reached the peak of its dividend earlier and higher than Kaduna State or Nigeria. These findings agree that demographic transition can be very critical to the creation of demographic dividend but differences in fertility rates within a country can lead to substantial differences in the creation of demographic dividend across states or regions in a country. Policy implications are derived.

Keywords: Demographic dividend, Nigeria, National Transfer Account, Subnational, labour income

JEL classification: D13, D31, I1, I2, J1

1. Introduction

Demographic pattern across the globe suggests that the age structure of population continues to change across the countries of the world due to demographic transition, as well as post-World War II baby booms and busts, the emergence of very low fertility, and continuing improvements in life expectancy (Mason et al., 2016). In Africa, the population continues to grow as projections indicate that the region will account for a good proportion of the global increase in youthful and working age population in a few decades (ADB, 2018). Nigeria accounts for more than 15% of the total population of Africa, and represents the most populous black nation in the world. This shows that the ability of Nigeria to harness the potentials of its youthful population is critical for the achievement of Africa's Agenda 2063.

Heavy concentration of the population in the productive ages where many are engaged in decent jobs, will result in a high number of effective producers. However, the existence of a large unemployed youthful population will produce low surplus due to very little labour income earned. Effective producer is computed as the proportion of the population that earns labour income at any age while effective consumer is considered as the entire population (Mason et al., 2017). A falling number of effective producers in

the face of large effective consumers leads to low support ratio, which refers to the ratio of effective producers to the effective consumers. Increasing support ratio over time creates the first demographic dividend, the economic growth potential resulting from favourable shifts in the age distribution of the population (Mason and Lee, 2015; Bloom et al, 2013). This dividend is largely influenced by the nature of demographic transition as age structure shifts following adjustments in mortality and fertility rates.

Nigeria presents a special case — a large population with substantial differences in fertility rates within the country. This suggests a high tendency for demographic dividend to vary across states within the country. For instance, fertility rate, which is as low as 3.26 in Cross River State and 3.28 in Lagos State, is also as high as 7.39 in Katsina State (NBS, 2023). Since the creation and harnessing of demographic dividend depends on the proportion of youth in employment relative to dependents in a typical economy, analysis of subnational economies may be a key to national progress.

Lagos and Kaduna states have distinct demographic characteristics, though both are among the top five states with the largest populations in Nigeria (out of 36 states and the Federal Capital Territory). Lagos State is the economic hub of Nigeria, with countless opportunities. In 2020, the GDP of the state represented about 21% of the total output of the country. The population of the state in the same year was 25 million, a value projected to double to almost 50 million by 2050 (United Nations, Population Division, World Population Prospect, 2024). In relation to its composition, children below age 15 comprise 31% of this total population, while youths and young adults between the ages of 15 and 44 make up about 47% of this population. Only 8% are elderly, aged 60 and above. The total fertility rate of the state declined from 4.1 live births per woman in 2013 to 3.28 live births per woman in 2022 (NBS, 2023). There is also a noticeable decline in the death rate of children in the state, as the infant mortality rate reduced from 87.2 to 74.5 deaths per thousand children between 2015 and 2022.

The dividends of the two states are compared to the national estimates. The overriding contribution of this study to the body of knowledge is the application of the National Transfer Accounts (NTA) approach to estimate

demographic dividend at the sub-country level. Most of the existing studies assume that the drivers of population and demographic transition are homogenous within a country, neglecting the large variations that can occur, especially in economies with large population like Nigeria. Accounting for these variations can be very critical in understanding the differences in the rate of progress in harnessing demographic dividend across countries. This is because progress in one part of a country can be dragged by slow age structure adjustments in other parts of the country.

Hence, the objective of this paper is to analyse demographic dividend at the sub-country level in Nigeria with specific case study of Kaduna and Lagos states applying the National Transfer Accounts (NTA) methodology in estimating economic lifecycle patterns. Further, the paper compares the support ratios and timing of the onset of the first demographic dividend across Nigeria, Lagos and Kaduna states.

The rest of the paper is as follows: section 2 reviews the relevant literature; section 3 discusses the NTA methodology; section 4 presents the results and section 5 is the conclusion.

2. Literature Review

The dynamics of birth rates and death rates across the world have impacted the population structure and the dependency ratio of countries in diverse ways. Though natural phenomena, these demographic changes could potentially increase output per person as the support ratio[1] increases (Baerlocher et al., 2019; Olaniyan et al., 2021). A second demographic dividend is also obtainable as demographic transition could influence investments in physical and human capital and further impact the trajectory of economic growth and the living standards of people (Mason et al., 2016). As nations and even regions within nations sometimes undergo varying structural changes in their population, several studies have sought to measure potential demographic dividends in order to inform policies towards harnessing opportunities to promote economic and sustainable development.

[1] The support ratio is the ratio of the effective labour force (those supporting the economy productively by working) to the entire population.

As demographic dividend captures the advantages to an economy of increases in the share and productivity of the working population, there are theoretical underpinnings as well as empirical validations of the connections between demographic changes and economic outcomes. The lifecycle model of consumption and saving hypothesizes variations in the saving rate over the lifecycle; the adult population can increase their savings for retirement as they work more and as their incomes peak, unlike the older population (Modigliani and Brumberg, 2005). The difference in the saving rate across age brackets thus impacts the growth rate of output as well as other indices.

In estimating the impact, determinants, and extent of demographic dividend across countries and regions, several methodologies have been employed. For instance, Lee (2013) employed the multivariate ordinary least squares technique and argued that demographic changes impacted investment decisions after finding evidence that the older population had a preference for consumption, hence, their preference for high dividend-yield paying stocks over stocks with capital gains. Analysing the 10-year returns to dividend-yielding strategies and changes in the old-to-population ratio, Lee opined that changes in the share of the older population could influence dividend premiums.

In addition, an early study by Bloom and Williamson (1998), which employed the ordinary least squares and instrumental variables techniques to estimate the impact of demographic variables on economic growth, found that higher increases in the working-age population over the dependent population significantly contributed to the rapid economic growth witnessed in East Asia between 1965 and 1990. Their findings, nonetheless, affirmed that demographic transition would not have stimulated economic growth in the absence of sound policies and strong institutions to harness the demographic dividend. In consonance with the Bloom and Williamson (1998) hypothesis about the growth miracle in East Asia, Ha and Lee (2016) found that larger support ratios have contributed to other countries' convergence towards the US per capita output, especially for Asian countries that have exploited their population structure advantages.

Building on the overlapping generations model (Samuelson, 1958), the National Transfer Accounts (NTA) was developed, and it has been widely adopted in estimating the demographic dividend and its predictors. The NTA achieves this by disaggregating the component of the national accounts by age and other demographic characteristics; showing the linkages across age brackets or generations such that the impact of changing age structures could be comprehensively measured. Adopting the NTA approach, Oosthuizen (2024) opined that while the first demographic dividend window for the South African economy is closing, education could reverse the tide. As education is expected to improve the productivity of the working-age population, the study found that educational attainment explained the differentials in labour income and consumption over the lifecycle. Increasing access to education was thus recommended since the positive effect of investments in education adequately offsets the negative effects of the decline in the nation's support ratio over the next fifty to sixty years.

Also providing empirical support to the second demographic dividend and the significance of education in the dynamics of labour income and consumption over the lifecycle, Choo and Gee (2024) used the NTA methodology in their analysis of the Singaporean economy between 1970 and 2020. Their study decomposed changes in the support ratio into those resulting from the age structure of the population and the educational attainment. As Oosthuizen (2024) found for South Africa, Choo and Gee (2024) posit that higher human capital through educational attainment could promote the demographic dividend in Singapore despite an ageing population. Across heterogeneous regions in Brazil, Baerlocher et al. (2019) used the system generalized method of moments approach to assess the significance of improvement in human capital — the second demographic dividend — to economic growth in the country. Their study highlighted that increased labour productivity due to education was a more dominant driver of Brazil's economic growth than the natural and first demographic dividend due to increases in the support ratio between 1970 and 2000.

Olaniyan et al. (2021) also adopted the National Transfer Accounts approach to investigating West Africa's demographic dividend. The study analysed the consumption and labour income patterns across 11 West African countries, including Nigeria; aggregating the countries based on the West

African Monetary Zone and the West African Economic and Monetary Union. While they found that West Africa's first demographic dividend began in 1999, variation in fertility rates would account for the difference in when the demographic dividend peaks across the two monetary zones.

As validated across these studies, demographic dividend exists and could significantly promote global prosperity, especially when accommodating policies are adopted to exploit the opportunities from a changing population structure. The Nigerian economy is one with untapped potential and yet diverse population structures among its states. Building on Olaniyan et al. (2021), this study discusses the findings from both country and sub-country analyses of the demographic dividend in Nigeria. This should help inform the types of context-specific policies the federal and state governments should undertake to maximize opportunities while the window of the first demographic dividend is still open.

3. Methodology

3.1 The National Transfer Accounts approach

The National Transfer Accounts (NTA) approach is employed for this study. This follows its sound theoretical foundation in generational economy and strength in accounting for not only the working-age population but the effective producers within an economy. The approach computes effective producer using the estimated labour income profile to account for hours worked, unemployment, age variation in labour force participation and productivity (United Nations, 2013). It provides a comprehensive analysis of economic flows across age groups, combining micro and macro data to produce profiles of consumption and labour income by age. Since economic behaviour over the lifecycle is often determined by consumption and production through labour at each age, lifecycle deficit subtracts mean labour income from mean consumption at each age.

Computing the support ratio is a critical process in the NTA approach. This is the ratio of the number of effective workers to the number of effective consumers (United Nations, 2013). This approach recognizes a large

proportion of out of labour population among young adults aged 16–30 years in Nigeria and most parts of the world. Also, unemployment and underemployment reflect the existence of large numbers of people not employed in decent jobs. This underscores the submission of Bloom et al. (2003) that a heavy concentration of the population in the working ages may not necessarily translate into a heavy concentration of those that are actually working. Thus, there is a focus on the balance between production and consumption. Moreover, economic support ratio allows analysis of the relation between changing age structure and economic growth (Mason and Lee, 2015; Mason et al., 2017).

Technically, NTA quantifies economic flows for single-year age cohorts, and inflows must equal outflows for any individual. In the NTA approach, inflows of economic resources consist of labour income (Y^I), asset income (Y^A) and transfers received (τ^+). Each of these goes out as consumption (C), transfers to others (τ^-) and savings (S). In line with Lee (1994), the NTA identity for each age cohort (x) is given as:

$$C(x) - Y^I(x) = \{Y^A(x) - S(x)\} + \{\tau^+(x) - \tau^-(x)\} \quad (1)$$

Lifecycle deficit is indicated by ($C(x) - Y^I(x)$), representing the sum of asset-based reallocations ($Y^A(x) - S(x)$) and net transfer inflows ($\tau^+(x) - \tau^-(x)$).

As population age structure shifts, the difference between the numbers of producers and the numbers of consumers adjusts. In this case, countries with very young and/or very old populations have few producers relative to the number of consumers. Conversely, countries with larger numbers of people in the working age population have more producers relative to the numbers of consumers. As a country moves between young and old populations such that heavy concentrations in the high-producing ages is created, the first demographic dividend occurs. These changes are analysed in this study using the support ratio, which accounts for both the population age structure and country-specific age patterns of production and consumption. It incorporates variations in labour income and consumption contributions of individuals across age. The NTA approach focuses on the concept of effective workers and effective consumers because labour income contributions by an

individual are affected by many factors influencing labour force participation, unemployment rates, hours worked, and labour productivity. In the same vein, consumption varies by age.

Essentially, the unweighted average per capita labour income for cohorts aged 30–49 years is equivalent to one effective worker. Those at each single year of age are counted as more or less than one effective worker or consumer depending on their labour income relative to the average for those 30-49 years. Demographic dividend therefore estimates the effective number of workers or consumers as the population at each age weighted by the labour income or consumption profile. Following Lee and Mason (2006), the effective number of producers (L) and the effective number of consumers (N) are defined as:

$$L(t) = \int \rho(x)\, P(x,t)dx \qquad \text{and}$$

$$N(t) = \int \phi(x)\, P(x,t)dx$$

where: $\rho(x)$ is the age-specific variation in productivity and $\phi(x)$ is the age-specific variation in consumption. The population of age *x* in year *t* is shown by $P(x,t)$. Income per effective consumer, defined as *Y*(*t*), is the product of two factors:

$$\frac{Y(t)}{N(t)} = \frac{L(t)}{N(t)} * \frac{Y(t)}{L(t)}$$

$$Y(t) = SR(t) * Y_I(t) \qquad (2)$$

The support ratio is given by $SR(t)$ while the mean income per worker is Y_I(t). Where changes in population structure raise the support ratio, a greater proportion of the population tends to concentrate in more productive cohorts, which increases the level of income per effective consumer. Growth in income per effective consumer is defined as the sum of growth in the support ratio and growth in income per worker as expressed below:

$$y(\dot{t}) = SR(\dot{t}) * y_I(\dot{t}) \qquad (3)$$

Similarly, growth in the support ratio is obtained as the difference between growth in the number of effective producers and growth in the number of effective consumers:

$$SR(\dot{t}) = L(\dot{t}) * N(\dot{t}) \quad (4)$$

Equation (4) represents the first demographic dividend. Where the growth of the support ratio is positive, the number of effective producers is taken to have grown faster than the number of effective consumers.

3.2 Data

The study combined three types of data to conduct the analyses. These include the micro (survey) data, macro controls (National Accounts) and population data. For the national analysis, the 2015/2016 General Household Survey (GHS), 2016 National Accounts data of the National Bureau of Statistics (NBS) and the 2016 World Population Prospects were utilized. For the Kaduna State analysis, the 2015/2016 GHS, 2017 state gross domestic product (GDP), and the proportion of the state in the national projection for 2017 were applied on the 2017 World Population Prospects to derive the State's population projection. In the case of Lagos State, the 2018/2019 National Living Standard Survey (NLSS) and 2020 state GDP were adopted. The proportion of the State in the national projection for 2020 was applied on the 2020 World Population Prospects. The population data used for all the analyses were the medium variant projection of the World Population Prospects of the United Nations. Given the data constraints, the analyses were conducted for Nigeria in 2016, Kaduna State in 2017 and Lagos State in 2020. To compare the three profiles, each estimate was normalized on the labour income of prime-age adults.[2]

[2] This is done by dividing each age by the average labour income of those who are between ages 30 and 49. The choice of the age range was mainly to minimize the influence of the ages of entry into and exit from the labour force (Lee and Mason 2011).

4. Analysis and Discussion of Results

4.1 National and sub-national age profile of consumption expenditure and labour income

An average child starts to earn income at age 4 in Nigeria, and age 3 in Kaduna State. In Lagos State, this begins at 10 years as shown in Figure 1. This suggests a higher rate of child labour in Kaduna and most parts of Nigeria than in Lagos, which is aggravated by the high number of out-of-school children. Moreover, the practice of *Almajiri* is high in Kaduna State and most parts of northern Nigeria. Per capita income is highest and rises fastest in Lagos State. An average resident in Lagos thereby reaches peak income at an earlier age of 43 years compared to their counterparts in Kaduna (50 years) and Nigeria (57 years). This reflects the massive commercial activities in Lagos, compared to Kaduna and Nigeria, with many booming private organizations providing employment opportunities for many young people.

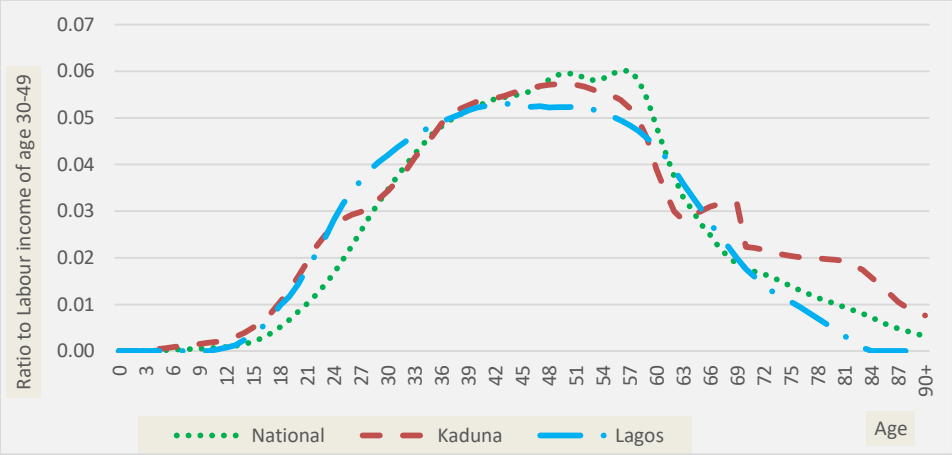

Figure 1: Per Capita Age Profile of Normalised Labour Income for Lagos, Kaduna and Nigeria
Source: Authors' computation.

Generally, per capita income declines at older ages as people withdraw from the labour force, suffer higher unemployment, reduce the hours worked, or earn less per hour than younger workers (United Nations Department of Economic and Social Affairs, 2017). Labour income in Kaduna is slightly above that of Lagos and Nigeria from age 0 to 12, after which Lagos shows a sharp departure. Per capita labour income in Kaduna rises above the Nigerian average till age 18 before remaining below it for much of the lifecycle.

Generally, consumption is lower at the early age both at the national and sub-national levels, implying that adults' material needs outweigh children's. However, as observed in Figure 2, per capita consumption is highest in Lagos than in Kaduna and Nigeria, while it is least in Kaduna. Per capita consumption expenditure peaks at early and late 20 years in Lagos, which translates to different peaks driven by education spending. This consumption peaks at 21 in Nigeria but at 27 in Kaduna. Across both states and Nigeria, it relatively flattens for most of the rest of the years. Generally, reduction in consumption, particularly for the elderly population group is attributed to declining income, which would make people reduce their consumption level. Moreover, it is observed that per capita consumption falls with age at the state and national levels.

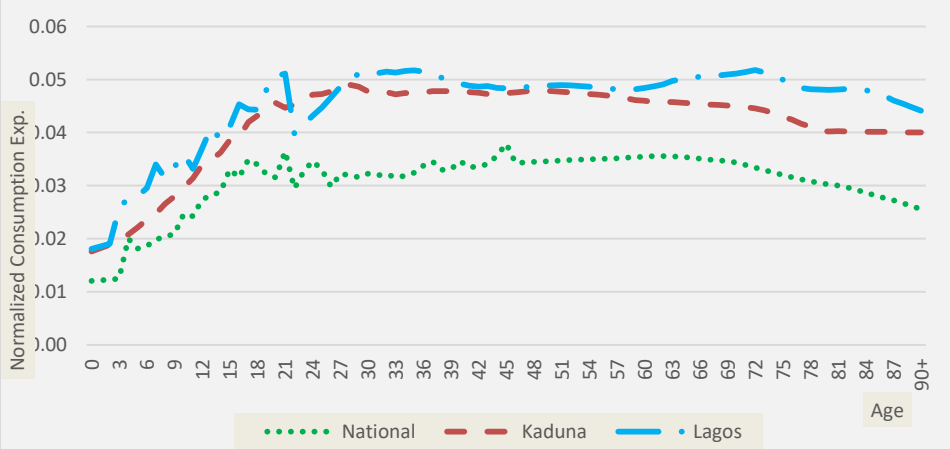

Figure 2: Per Capita Age Profile of Normalized Consumption in Lagos, Kaduna and Nigeria
Source: Authors' computation.

Economic lifecycle deficit (LCD) measures the age-specific difference between consumption and labour income. An individual records a deficit where his or her consumption is greater than labour income, and obtains a surplus if labour income exceeds consumption. Economic lifecycle deficit varies substantially at the national and sub-national levels. For Nigeria (see Figure 3), per capita consumption expenditures are greater than per capita labour income at ages 0 – 28 years (youth dependency) and at ages above 62 years (old age dependents). This indicates a surplus that can only be enjoyed between ages 29 and 62 years, culminating in a lifecycle surplus length period of 34 years.

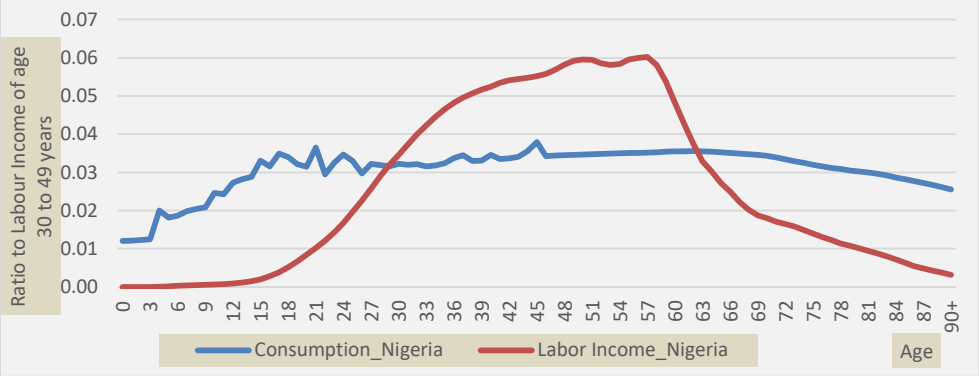

Figure 3: Age Profile of Per Capita Labour Income and Consumption in Nigeria, 2016

Source: Authors' computation.

In Kaduna State, the length of per capita life cycle surplus is 23 years, as per capital labour income exceeds per capita consumption between 36 and 58 years (Figure 4). This is lower than the average at the national level by as much as 10 years. Economic lifecycle surplus for Lagos State starts even at a later age of 39 years, and ends earlier than Kaduna and the national averages at age 56 (Figure 5). An average Lagos resident is therefore expected to enjoy lifecycle surplus for 18 years. This is a huge deviation compared to national estimates, where an average Nigerian enters surplus 10 years earlier than in Lagos State.

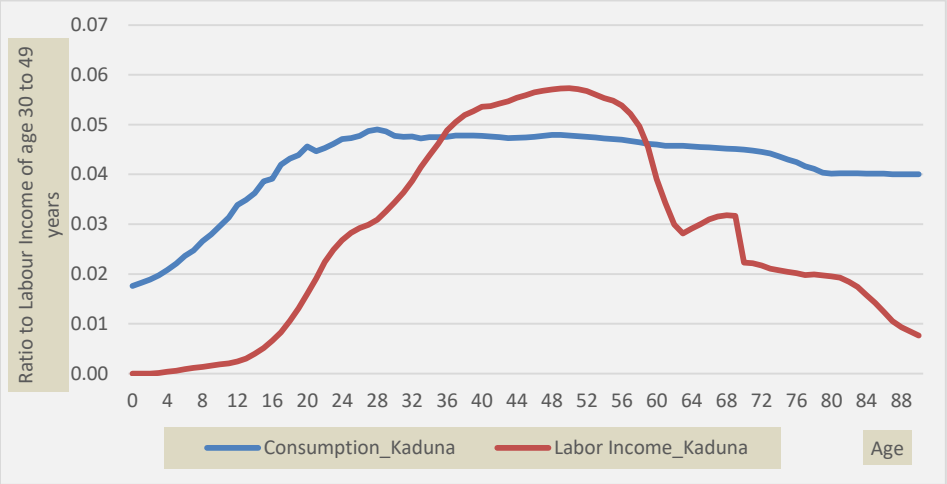

Figure 4: Age Profile of Per Capita Labour Income and Consumption in Kaduna State, 2017
Source: Authors' computation.

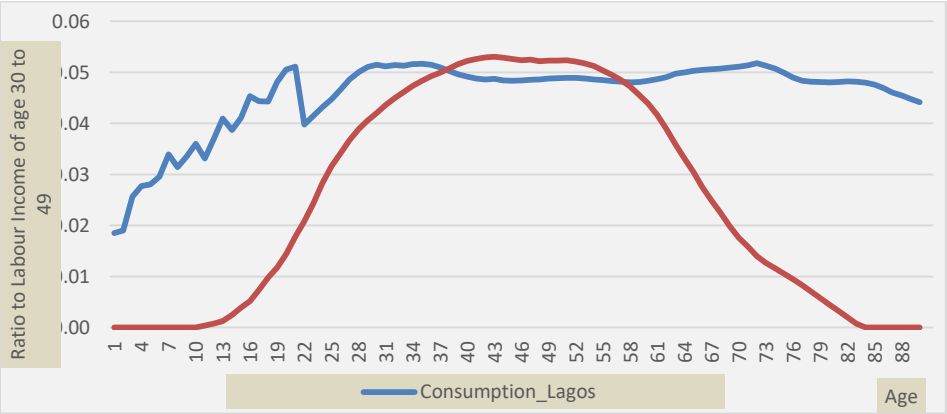

Figure 5: Age Profile of Per Capita Labour Income and Consumption in Lagos State, 2020
Source: Authors' computation.

The longer child dependency in Kaduna and Lagos states could be attributed to factors such as high rate of out-of-school children, which stands at 768,739 in Kaduna State and 2 million in Lagos State (Kaduna State Bureau of Statistics, 2023; Umeha, 2023) as well as late enrolment in schools, which ultimately delays school completion (Olaniyan et al., 2011). Moreover, high fertility rate, particularly in Kaduna State, and rising population in Lagos State (through migration) are issues further contributing to high child

dependency ratio in both states (National Population Commission, NPC, 2019; World Population Review, 2024a & b). These issues are capable of imposing more financial stress on working adults residing in both states and could limit the pace of reaping the benefits of the demographic dividend.

4.2 National and sub-national economic dependency and lifecycle deficit

Per capita and aggregate lifecycle deficit are presented in Figures 6 and 7 respectively. Per capital lifecycle deficit at age zero is larger in Lagos (₦496,989) than in Kaduna (₦161,216) and Nigeria (₦216,520). Indeed, the deficit is substantially higher in Lagos at all ages than in Kaduna and Nigeria, but the surplus is only slightly higher than what obtains in Kaduna. National estimates show the largest surplus. Per capita lifecycle deficit can be as high as ₦1.32 million at age 84 years in Lagos, far higher than old age peaks for Kaduna and Nigeria.

On the aggregate, total surplus is far larger at the national level and in Lagos than Kaduna while child deficit is lowest in Kaduna compared to Lagos and the national figure. The old age deficit for Lagos State is almost half of the national figure and far higher than Kaduna as evident in Table 1. Although labour income is high in Lagos, consumption expenditure is equally high, resulting in a small surplus relative to the national figure. This surplus is however still far higher than in Kaduna. Thus, as much as the state has the ability to generate high income, it is one of the most expensive cities in Nigeria.

Table 1: Comparison of Economic Lifecycle for selected indicators in Kaduna, Lagos and Nigeria

	Nigeria	Kaduna State	Lagos State
Age lifecycle surplus started	29	36	39
Age lifecycle surplus ended	62	58	56
Length of year for lifecycle surplus	33	22	18
Total Surplus (₦ billion)	13,700	72.21	1,300
Total Child Deficit (₦ billion)	43,930	1,405	26,040
Total Old Age Deficit (₦ billion)	1.63	42.9	3.0

Source: Generated by Authors (2025).

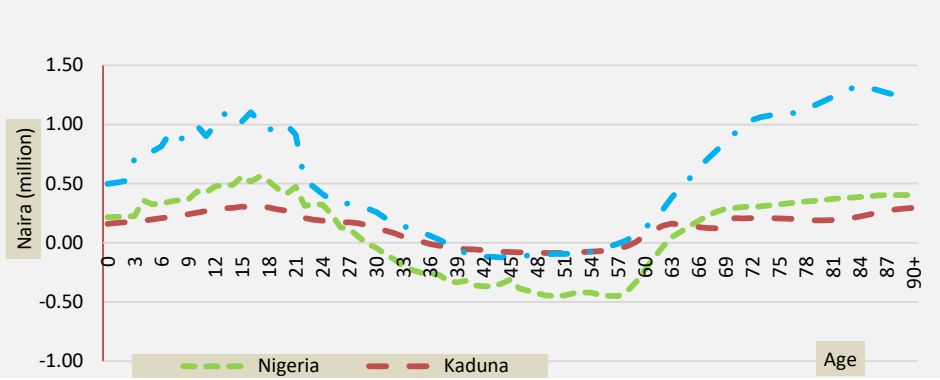

Figure 6: Per Capita Lifecycle Deficit in Lagos, Kaduna and Nigeria
Source: Authors' computation.

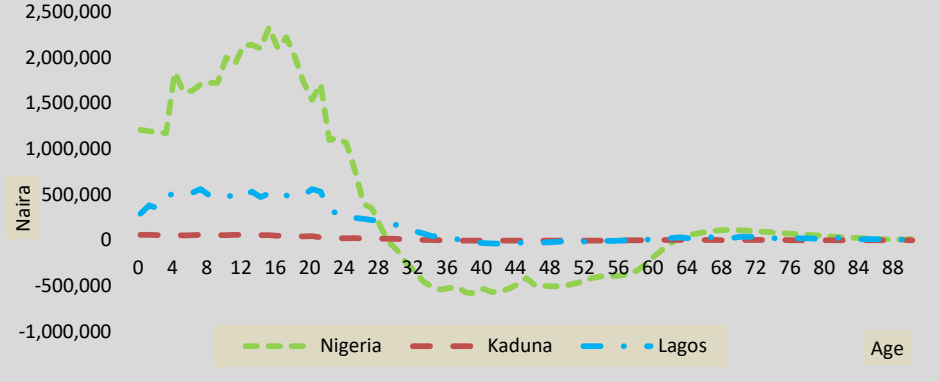

Figure 7: Aggregate Lifecycle Deficit in Lagos, Kaduna and Nigeria
Source: Authors' computation.

4.3 National and sub-national support ratio and first demographic dividend

The growth rate of effective workers and consumers in Lagos, Kaduna and Nigeria are presented in Figures 8 to 10. In Lagos State, the number of effective workers has been growing at a rate above that of effective consumers since 1978, and this is expected to continue until the early 2050s. Lagos is particularly known for attracting young and skilled individuals from all states in Nigeria, and much of the growth in effective number of workers is due to migration. This growth peaked at 4.15% in 2011 after which a downward trend began and may continue for the rest of the century. A similar decline in the growth of effective consumers is also observed.

In Kaduna State, the growth rate of the number of effective workers rose above that of effective consumers beginning from 1996 and is projected to peak at 2.90% between 2031 and 2033. A similar trend is noticed for the growth of the number of effective workers and consumers at the national level. For the Nigerian average, the growth rate of effective workers consistently lies above that of effective consumers after 1999 with a peak of 2.99% expected between 2034 and 2036. The growth rates of the number of effective consumers and effective producers are generally higher in Lagos than in Kaduna and Nigeria, which reinforces the attractiveness of Lagos State for young people as it provides greater employment opportunities than other states.

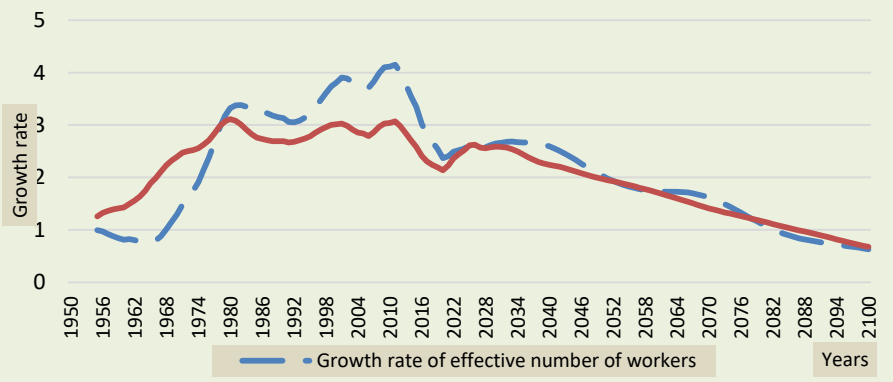

Figure 8: Growth Rate of Effective Workers and Consumers in Lagos State
Source: Authors' computation.

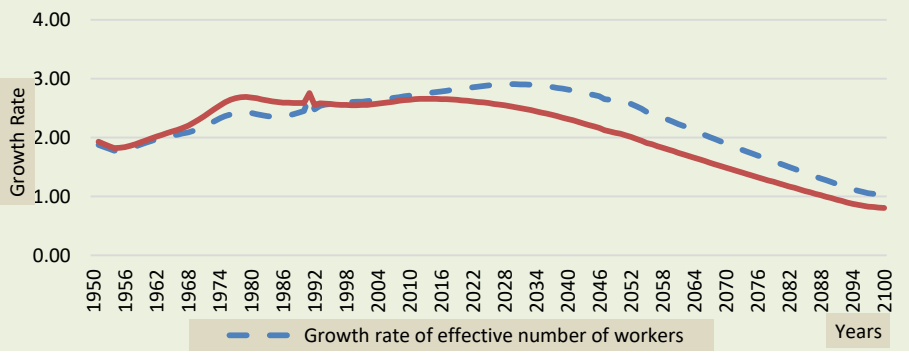

Figure 9: Growth Rate of Effective Workers and Consumers in Kaduna State
Source: Authors' computation.

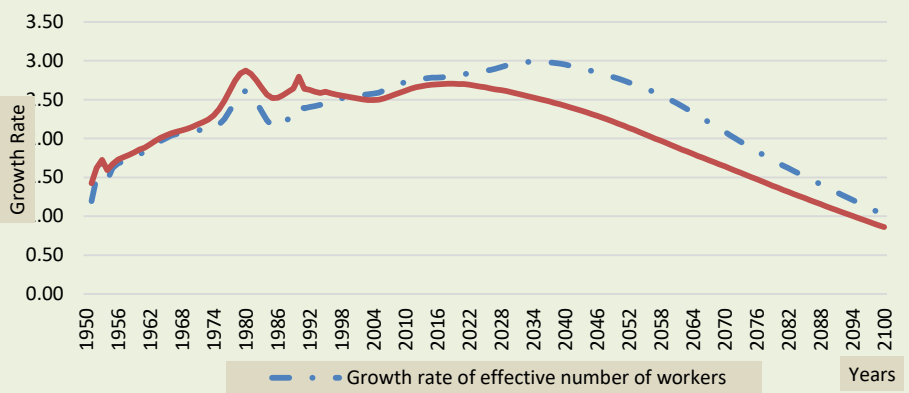

Figure 10: Growth Rate of Effective Workers and Consumers in Nigeria
Source: Authors' computation.

Between 1950 and the late 1990s, the support ratio for Kaduna and Nigeria declined due to bulging population of effective consumers over effective workers (Figure 11). However, this began to rise after 2000. For Lagos, the support ratio assumed an upward trend much earlier (late 1970s). These periods correspond to times when effective workers grew faster than effective consumers, leading to a rise in the support ratio. This is largely due to the relatively low fertility rate witnessed in the country in the post 2000s, indicating that more people were effectively working and earning to support less population of dependents. Overall, the support ratio is higher at the national level than for the sub-nationals.

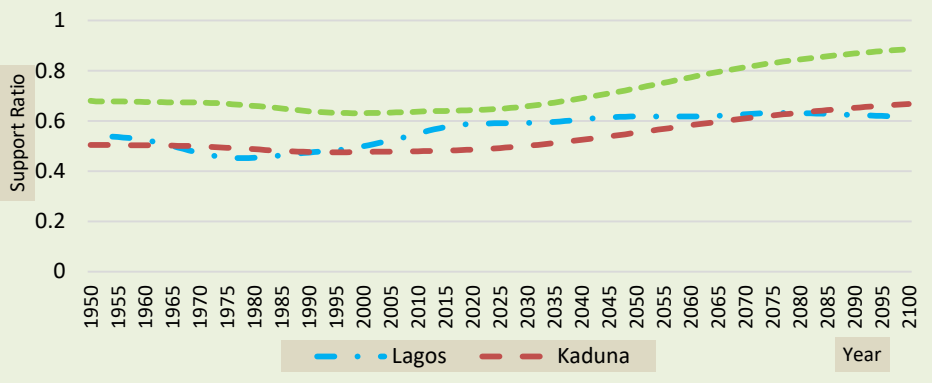

Figure 11: Support Ratio in Lagos, Kaduna and Nigeria
Source: Authors' computation.

The demographic dividend is estimated as the growth rate of the support ratio. It shows the percentage points by which growth is dragged or raised per year. Figure 12 plots the demographic dividend in Lagos, Kaduna and Nigeria. Lagos experienced negative demographic dividend for most of the period prior to 1979, dragging economic growth by as much as 1.24 percentage points per year in 1967. This represents the pre-dividend period. The first demographic dividend did not begin until after 1994 for Kaduna, when growth was slowed by 0.02 percentage point, and until 1999 for Nigeria, when growth was dragged by 0.01 percentage point. This indicates an increase in child dependency driven largely by the high fertility rate and declining child and infant mortality rates in most parts of the country.

Demographic dividend first became positive in 1979 in Lagos, representing the opening of the window of opportunity for the state. The first dividend phase remained open, but very unstable, for most of the rest of the century for the state, exhibiting a number of peaks observed in different years (1986, 2011, 2039, 2069). The first demographic dividend reached its highest peak in 2011, when growth was raised by about 1.08 percentage points per year. This was just 7 years after the global peak (Mason et al., 2017). Subsequently, Lagos State experienced a declining trend until 2027 when growth becomes sluggish and dragged by as low as 0.01 percentage point per year. A temporary recovery is expected until 2078, though a short period of negative dividend may set in between 2054 and 2058. The last 20 years of the century are expected to witness negative demographic dividend as growth is projected to drag by between 0.01 and 0.14 percentage points per year.

The window of opportunity opened for Kaduna and Nigeria much later than Lagos, as their first demographic dividend started in 1995 and 2000 respectively. The subsequent increasing positive trend is expected to remain till year 2051 for Kaduna and 2055 for Nigeria, which represent their peaks at 0.56 and 0.59 percentage points respectively. This is at least 40 years after Lagos reached its peak first dividend. Unlike Lagos, demographic dividend, though expected to decline from the early 2050s, will remain positive till the turn of the century for both Kaduna and Nigeria.

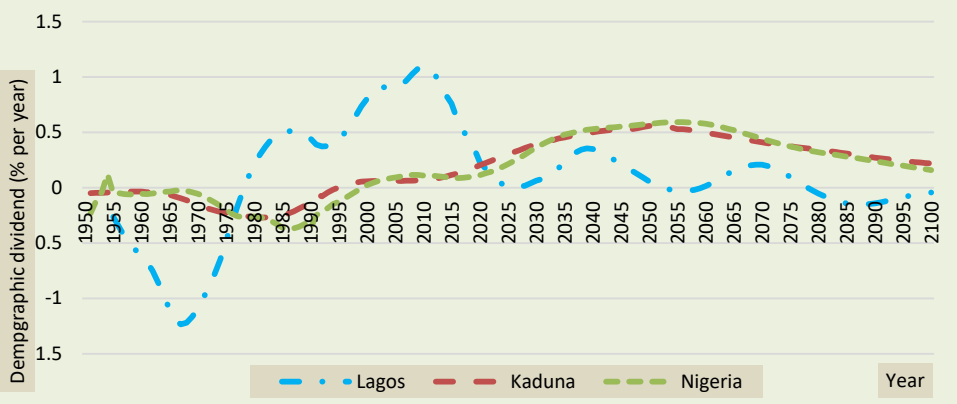

Figure 12: Demographic Dividend in Lagos, Kaduna and Nigeria
Source: Authors' computation.

Results for Lagos are comparable to many other regions but Kaduna State and Nigeria show a clear divergence with much delayed dividends (Table 2). For instance, Mason et al. (2017) demonstrated that the first demographic dividend in Europe started in 1962, while the onset of dividend for Oceania, Asia and the Americas began between the early to mid-1970s. The benefits of the second dividend are now being reaped. This is similar to the findings for Lagos where the first dividend started in 1979. These world regions witnessed demographic transition and enjoyed their first demographic dividend much earlier than Kaduna and Nigeria. Results for Kaduna and Nigeria are comparable to those of the West Africa Monetary Zone (WAMZ) and the West African Economic and Monetary Union (UEMOA) where Olaniyan et al. (2021) found that the first demographic dividend began in 1996 and 2003 respectively.

The peak of the first dividend is also substantially lower for Kaduna and Nigeria relative to the rest of the world regions, including Lagos, which may be linked to the slow demographic transitions experienced in Nigeria. These findings show that the first demographic dividend can vary substantially within a country where there are large variations in the rate of fertility decline across states. For example, total fertility rate in 2022 was 5.23 in Kaduna State but 3.28 in Lagos State. Lagos State is therefore comparable to regions such as Asia where fertility decline was rapid and Iraq, China and Japan where peak growth of support ratio rose above 1.0%. In Asia, Mason et al.

(2017) observed growth in the support ratio providing a boost to economic growth by as much as 0.8% annually. Between 2020 and 2060, the first dividend will increase growth by 0.12% in Lagos and 0.45% in Kaduna and Nigeria (Table 2).

Table 2: Timing and Magnitude of First Demographic Dividend in Lagos, Kaduna and Nigeria

	Start	Peak	Peak value	Average size (%) (2020–2060)
Lagos	1979	2011	1.08	0.12
Kaduna	1995	2051	0.56	0.45
Nigeria	2000	2055	0.59	0.45

5. Conclusion and Policy Implications

The study estimates demographic dividend at national and subnational levels, with specific focus on Nigeria, the most populous Black nation in the world. It adopts the National Transfer Accounts approach which accounts for age-specific labour income and consumption, and considers effective producers rather than just the working-age population. Analysis is conducted for Lagos and Kaduna states, two of the largest states in the country by population, as case studies.

Subnational estimates show substantial differences. As with Nigeria, the phenomenon of child labour is more pronounced in Kaduna, where children start to earn labour income as early as age 3, than in Lagos where children start to earn labour income from 10 years old. Per capita labour income and consumption are found to be higher in Lagos than Kaduna or Nigeria as a whole. Despite the higher income, the length of lifecycle surplus is 15 years shorter in Lagos State than in Nigeria (national) and 5 years shorter than in Kaduna State. However, despite the relatively short length of lifecycle surplus, total surplus is substantially higher in Lagos than Kaduna. Both child and old age deficits are also higher in Lagos State. The growth rate of effective producers in Lagos State was the highest compared to Nigeria and

Kaduna State. However, the growth rate of its effective producers declined faster than in Kaduna or Nigeria.

Support ratio is also highest in Lagos, which entered the period of first demographic dividend in 1978, much earlier than Kaduna and Nigeria. The pace and pattern of the fertility in Lagos means the first demographic dividend peaked earlier, with a higher peak than Kaduna or Nigeria. These findings reinforce the critical role of demographic transition in the creation of the demographic dividend, even at the subnational level. Lagos State, with one of the lowest fertility rates in Nigeria and boasting a large pool of working age population, creates a greater first dividend than Kaduna State, whose fertility rate is above the Nigerian average. Also, estimates for Lagos State show that the demographic dividend can be intermittent.

For policy implications, there is a need for greater focus on subnational fertility rates to reduce child deficit. Substantial differences in fertility rates within a country translate to high disparity in the creation of demographic dividends across states or regions in a country. Consequently, any progress achieved at the national level or in certain states can be hindered by the slow pace or lack of efforts towards the realization of demographic dividend in the country. In Nigeria, increased attention must be paid to promoting girl-child education and women empowerment, especially in states with high fertility rates. Investment in health should also be increased such that quality healthcare services are available and affordable to everyone. Moreover, the transition from school to decent work should be seamless across the country so average age of entry into surplus can be reduced and accumulation of surplus can be improved.

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