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Journal of Social and Economic Development

Provided in Cooperation with: Springer Nature

Suggested Citation: Mulugeta Woldegiorgis, Mesfin (2023) : Towards inclusive development through harnessing demographic dividend? Empirics for Africa, Journal of Social and Economic Development, ISSN 2199-6873, Springer India, New Delhi, Vol. 25, Iss. 2, pp. 380-402, https://doi.org/10.1007/s40847-023-00243-2

This Version is available at: https://hdl.handle.net/10419/305376

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RESEARCH PAPER



Towards inclusive development through harnessing demographic dividend? Empirics for Africa

Mesfin Mulugeta Woldegiorgis¹

Accepted: 15 February 2023 / Published online: 31 March 2023 © The Author(s) 2023

Abstract

Africa is now at a historical moment of swift demographic transition, which has the potential to harness the demographic dividend and foster inclusive development. However, just like the abundant natural resources, the growing population can be either a blessing or a curse. For instance, the economic growth and swift demographic transition in the last two decades have been tripled by a drastic political movement led by the protruded youth cohort. This paper, therefore, explores an empirical elucidation for the paradox and its remedy. It presents the drivers and time span of the potential demographic dividend for selected African countries. The panel data regression encompasses 34 African countries. However, the time span of the first demographic dividend is revealed for 47 African countries. The ordinary least square regression for the clustered dataset shows that harnessing the demographic dividend requires investment in family planning, gender parity, digitalization, industrialization, and job creation. The unique contribution of the paper is that it extends the demographic dividend discourse into the emerging inclusive development approach and presents pertinent empirics.

Keywords Surplus labour · Remittance · Demographic bomb · Inclusive institutions

Background

The question of whether the human population is an asset or a liability has sparked a longstanding debate on the human population's impact on economic growth. However, the age structure of the population is currently of greater interest than the total population.

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For example, in Africa, a rapid demographic transition in the past three decades has been expanding the youth cohort and labour force, thus opening up a fresh opportunity to capitalize on a "demographic dividend".¹ The dividend, however, cannot be secured just by the demographic change because conducive and realistic governmental policies are also essential. This is mostly due to the fact that, in the absence of favourable policies, the growing youth population and labour force may result in a curse known as the "demographic bomb".² The curse could manifest as a social and political upheaval. As a result, public policymakers are very curious about the two sharpened swords of the demographic shift. For instance, the African Union (2017, p.2) underscores that there is an "[...] urgent necessity to transform the potential of Africa's large youth population, often referred to as the youth bulge, into a demographic dividend".

On the contrary, high-income countries are becoming increasingly concerned about their dwindling populations, particularly the labour force. This suggests that there is a region of labour force surplus (such as Africa) and a zone of labour force scarcity (regions of ageing). As a result, a large influx of unlicensed labour has occurred. Meanwhile, spontaneous migrant trades have spawned a new "lucrative unlawful smuggling sector" known as human trafficking. As a result, the intra- and inter-African flood of dangerous illegal labour force migration, as well as political instability driven by youth cohorts, need greater strategic thinking, particularly to deal with biased brain-gain and brain-drain in pursuit of demographic dividend. Despite the fact that there are numerous scientific works on the simulation of the demographic dividend, they do not effectively address the economic potential of developing countries' growing labour force in filling the gap in the dimensioning support ratio in developed regions through a formal labour transaction. The benefit could be made mutual by allowing developing countries to benefit from well-administered remittances and developed countries to benefit from labour power. Unfortunately, the story about migration is frequently politicized as a curse.

To be sure, in high-income countries, if not all, the support ratio is irreversibly eroded due to ageing and as the "baby boom" is replaced by "baby bust". As a result, the shrinking labour force in the regions and the growing labour force in developing countries need to be comprehended in a wholistic approach to mutually harness the demographic dividend and facilitate brain circulation instead of brain drain or one-sided brain gain.³ Otherwise, the demographic transition per se may not guarantee a dividend for developing countries. It may even be a curse (Lin 2012). Ill-advisedly, the "immigration dividend" is often

¹ Demographic dividend refers to the growth in an economy due to a demographic transition towards more labour force compared to dependent age groups. Declining fertility and mortality rate are the immediate causes of the transition. Likewise, migration also plays a significant role.

² Justin Yifu Lin is the former World Bank Chief Economist who claims youth bulge refers to a demographic pattern where a large share of the population is children and young adults (see Lin 2012). Likewise, Stanley (2018) argues "[t]he youth bulge is defined as 20 percent or more of the population in the 15 to 24 age group". Lin agreeably claims that if the bulge of youth cohort is unable to find a decent employment and earn enough income, the bulge may inevitably bear a demographic bomb, because the hopeless youth may become a potential source of social and political instability. Retrieved from: https://blogs.worldbank. org/developmenttalk/youth-bulge-a-demographic-dividend-or-a-demographic-bomb-in-developing-count ries (Accessed: 20 April 2021).

³ In this context, brain drain means the emigration of highly trained or qualified people from a particular country, whereas brain gain is the immigration of highly trained or qualified people into a particular country. Brain circulation means facilitating the mobility of highly qualified people where they can be morally and more productively used. The "immigration dividend" means not only the economic gain in the destination region but also the positive slipover of development potential due to immigration.

overshadowed. In summary, there is a huge governance delinquency regarding the movement of migrants across the globe. The premises instigate the current paper.

Hence, the paper is organized as follows. In the second section, the literature and the conceptual framework are elucidated. Section three presents data sources and methods of scrutiny. After discussing the statistical verdicts in the fourth section, the final part focuses on the policy implications.

Purposes and research questions

The paper aims to shed light on the undergoing demographic transition and potential dividend in Africa. It also aspires to identify the drivers of the demographic dividend and optimization strategy. The paper also tries to address the following interrogations: Is there an economically meaningful demographic transition in Africa compared to the rest of the world? What are the drivers of the demographic dividend? What is the time span of the potential dividend? How can the "potential" be realized and optimized? What are the policy takeaways in the pursuit of harnessing a demographic dividend in an inclusive development approach?

Worth and limitation

Demographic transition began quite late in Africa as compared to other parts of the developing world through a few countries in northern and southern parts of Africa did experience the transition early. As a result, Africa is set to draw the demographic dividend only now. In this context, a study on the timing and duration of the dividend is timely. Moreover, an investigation into the factors that could facilitate harvesting the dividend is a welcome effort. The paper addresses both of these aspects. This is a useful addition to the existing knowledge, particularly of the implications of the demographic changes for inclusive development. The paper may contribute to the demographic dividend policy discourse in two ways. It describes the ongoing demographic transition in Africa and compares the life span of the first demographic dividend for 47 African countries and Africa as a continent. The available literature on demographic dividend is dominated by the role of demographic transition on economic growth; this paper broadens the discussion to include an inclusive development approach. It is crucial to keep in mind that comparative cross-country analyses might be vulnerable to generalization bias. Therefore, the paper cannot substitute for a country-specific detailed analysis.

Literature

Theory

There is no consensus in the literature about the size and structure of the human population and economic development, nor are the metrics robust and straightforward. For instance, according to Bloom, Canning, and Sevilla (2003), population pessimist theories trace back to the Malthusian demographic theory that claims high fertility and rapid population growth can impede development. The Malthus hypothesis arguably underscores that "food" grows arithmetically but the population grows geometrically, which results in a "Malthusian trap" or "Malthusian catastrophe". Thus, he prescribes a "positive check" such as contraceptive pills as a family planning measure (Seltzer 2002).

Subsequently, Ehrlich (1968) came up with the notion of a "population bomb" hypothesis. Due to the apparent overpopulation in 1968, Ehrlich anticipated the worldwide famine that occurred from the 1970s to 1980s. The United Nations (1973) also claimed that the net effect of population on economic growth would be "undesirable". In a nutshell, the "population pessimists" questionably claim that population growth undermines capital accumulation and technological advancement (Ehrlich 1968; Coale and Hoover 1958; as cited in Bloom and Williamson 2007).

Conversely, the population optimist theories claim that fast population growth and hefty population size can encourage economic opulence by providing copious labour, intellectual capital, and economies of scale through consumption demand and knowledge spill over (Kuznets 1960; Boserup 1965). The third view is called the population neutralist theory, which debatably underscores that population growth alone has little impact on economic performance (Bloom and Freeman 1986; Kelley 2001 as cited in Bloom et al. 2003).

Meanwhile, the current paper deviates from pessimist, optimist, or neutralist theories, claiming that it is quite meritorious to zoom in on the age structure and the dynamics because people in all age groups are not equally productive (Bloom and Williamson 1998; Mason 2002; Bloom et al. 2003; Mason and Lee 2007; Mason et al. 2017). For instance, the subsequent findings show that in East Asia, the change in the age structure backed by inclusive public policies significantly contributed to their "economic miracle" as the working-age population grew much faster than its dependent counterpart between 1965 and 1990 (Bloom et al. 2003; Mason et al. 2017).

It is imperative to bear in mind that the first demographic dividend has only a transitional effect. That means it has a speculated time limit. That is why it currently emerges as a window of hope for economic development in Africa in the next half-century. However, it may also have completely opposite consequences. Momentously, Mason and Lee (2007) claim that the crucial point is not only the shift of age structure towards a high support ratio but also inclusive public policies, institutions, and investments to harness the dividend. As there were desired outcomes in East Asia, there were other parts of Asia where demographic transition had not resulted in a demographic dividend due to unfavourable conditions. As a result, the demographic transition even suppressed economic growth in the latter region (ibid.).

Likewise, apart from the discrepancies between the above three schools of thought, there are also other complexities in comprehending and measuring the economic implications of demographic transition. For instance, Bloom et al. (2007) stated that there are some sub-Saharan African countries, such as Uganda and Mali, that showed high economic growth rates due to "excellent" policy reforms despite negative growth in the share of the working-age population. Whereas the economic growth projections of South Africa and Botswana, which were the then regional leaders in terms of "quality in the political institutions", the demographic dividend was projected to be trivial in the following two decades (ibid.). This shows that public policy per se does not guarantee a demographic dividend, nor does the demographic transition alone. It demands practical investment and a synergy of investment and enabling institutions.

Empirics in the literature

Dramani and Oga (2017) show that support ratios are swiftly growing in Africa. They underscore that to take advantage of the demographic dividend, countries have to create

economic opportunities for young adults and promote investment in human and physical capital. Ssebbaale and Kibukamusoke (2016) also identify that most African countries are currently undergoing a rapid demographic transition. They also claim that there are countries on the continent that still have high fertility rates, which may have adverse effects on realizing the potential demographic dividend. They highlight that the probability of realizing a demographic dividend is low because most countries are facing governance bottlenecks such as low accountability by public officials and the rule of law that may be inauspicious for the potential of a demographic dividend.

Bloom et al. (2017) state that Africa has substantial potential to harness a demographic dividend. However, realizing the time and magnitude hinges on policies and institutions in key realms of macroeconomic management, human capital, trade, governance, labour and capital markets.

Conceptual framework on drivers of demographic dividend

The decline in fertility rate is at the heart of developing countries' demographic transition. Moreland et al. (2013) identify five determinants of the total fertility rate. These are: (i) Girls' education ("school life expectancy"), (ii) "Contraception prevalence rate" (iii) Post-partum insusceptibility (PPI), (iv) sterility, and (v) marriage. Bongaarts and Potter (1983) also claim that human fertility has biological and behavioural dimensions. In line with Bongaarts and Potter (1983), the feedback line in Fig. 1 shows that demographic transition is caused by not only biological factors such as fertility and mortality but also socioeconomic factors such as mobility, human capital, physical capital, and productivity. Likewise, when it comes to ensuring inclusive and sustainable development through demographic dividends, there are different transmission segments (see Fig. 1).

Figure 1 depicts the demographic transition as a result of declining fertility, mortality, and mobility, resulting in a youth bulge and a high support ratio. If the high support ratio is backed by inclusive public policy and investment in relevant sectors, the transition leads to a first demographic dividend, which finally results in transitional inclusive development (Lin 2012; Acemoglu and Robinson 2012; Woldegiorgis 2020a, b). Conversely, if extractive institutions prevail, the transition is likely to experience political instability, which is called a demographic disaster or bomb (Ehrlich 1968; Coale and Hoover 1958; Lin 2012). The second row in the figure shows that improvement in the total factor productivity, physical and human capital are crucial drivers of the second demographic dividend, which ultimately leads to sustainable inclusive development. This leads to the following major hypotheses.

Hypotheses

Apart from the total size of the population, the age structure of the population is a crucial driver of development (Gendreau 1991; Bloom and Williamson 1998; Mason and Lee 2007; Mason et al. 2017). However, a high proportion of youth and labour force in a society cannot guarantee a demographic dividend or overall development (Lin 2012). This is mainly because it demands inclusive development policies and investment, especially in the realms of labour market flexibility, employment opportunity, conducive conditions for entrepreneurship and fair wages. Otherwise, the transition may trigger a political eruption which is termed a ticking time bomb (Lin 2012; Ehrlich 1968; Coale and Hoover 1958;



as cited in Bloom and Williamson, 2007). Bloom and Williamson (1998) and Mason and Lee (2007) also emphasize that the quality of institutions is a crucial driving factor in making youth more productive. The concept of inclusive institutions of Acemoglu and Robinson (2012) and open-access orders of North, Wallis, and Weingast (2009) is in line with the inference. This leads to the first hypothesis.

Hypothesis 1: Although the youth face a time lag in entering into the labour force due to schooling, when conducive institutions and social sector investment are in place, the youth can supplement the demographic dividend.

Developing regions have excess labour, whereas modern urban industrial areas have a labour shortage (Lewis 1954; Bloom and Williamson 2007; Mason and Lee 2007). However, because of the dearth of institutional arrangements, formal transactions involving the labour force are very rock-bottom between the regions. Consequently, perilous migration is giving rise to a lucrative business for smugglers, misuse of labour, and defilement of the rights of migrant labourers. Even higher education scholarships are becoming a source of brain drain due to lax enforcement of contracts requiring graduates to return home after graduation (Tessema 2010).

Meanwhile, if eminent institutional and policy settings are introduced to smooth a formal and well-managed circulation of labour between the labour-surplus and labour-deficient regions, the demographic dividend could be optimized in both the sending and receiving regions. Formal labour circulation may result in a greater payoff for all trading regions. The region of labour surplus can generate a rewarding remittance, transfer FDI, digitalization, and a formal impulse to institutional change. Likewise, the labour deficiency region can fill the demographic gap with formally imported, inexpensive labour, which can boost the demographic dividend. Accordingly, both regions can reinvest their capital dividend and boost their payoff sustainably. This takes us to the second hypothesis.

Hypothesis 2: Formal transactions of surplus labour can increase the demographic dividend for the region of labour surplus and shortage. Particularly, the formal exchange of surplus labour may supplement formally collected remittances for the labour-sending region.

Definitions of variables, data source and method of analysis

Definition of variables and drivers of demographic dividend

A demographic dividend is often conceived as the change in per capita income (Mason and Lee 2007; Bloom and Williamson 1998; and Mason et al. 2017). As shown in the conceptual framework (see Fig. 1), there are social, economic, political, technological, and institutional drivers of the demographic dividend. However, considering only the economic dividend of demographic change might be conceptually ambiguous, especially from a multidimensional inclusive development point of view. For instance, a demographic bomb includes political instability. Demographic transitions also affect social investments and vice versa (Mason et al. 2017). Therefore, development variables might best describe the multidimensional dividend caused by the transition.

Hence, in the panel regression, the multidimensional inclusive development index (MDI) is used as a proxy for the demographic dividend. The details of the multidimensional index are explained in WEF (2017), Woldegiorgis (2020a; 2022a; b), Dörffel, & Schuhmann (2022). However, it is worthwhile to shed light on the dependent variable of the econometric regression. Dörffel & Schuhmann (2022, p. 1129) formulate three versions of MDI. These are the basic, equity-plus, and achievement-plus versions of MDI. In this paper, the basic MDI has been used as a dependent variable because it has the largest sample but is based on the narrowest set of variables. The variables that are included in the calculation of the basic MDI are GDP p.c., savings, life expectancy, and human capital. However, the sum of the variables is adjusted for inequality by multiplying with income, Gini. Thus, as a proxy for health policy, life expectancy has still been used because, in the basic MDI, life expectancy is already adjusted for equity. Likewise, institutional quality is proxied by the country's policy and institutional assessment (CPIA) index.

Data source

This paper is entirely based on metadata from secondary sources for the years between 1990 and 2018. The medium variant of demographic data was extracted from the 2019 World Population Prospects of the United Nations.⁴ Labour income and consumption figures were derived from the National Transfer Accounts (NTA) because the time-series data are missing for the selected African countries. The basic MDI data are based on Dörffel, and Schuhmann (2022). The metadata on remittance, institutional quality, and other controlled macroeconomic variables were extracted from the World Bank's World Development Indicators and International Labour Organization (ILO) databases.⁵

Methods of data analysis

Methods of data analysis count on the research questions. To verify if there is a substantial demographic transition in Africa, descriptive statistics is conducted. Moreover,

⁴ Although the paper relies on the 2019 report which is available at: https://population.un.org/wpp/ and accessed 18 March 2020, the 2022 report can be accessed from: https://population.un.org/wpp/. Accessed 23 December 2022.

⁵ Available at: https://ntaccounts.org/web/nta/show. Accessed 18 January 2020.

mathematical model of the first and second demographic dividend estimation is presented. However, the baseline data for labour income and consumption for different age groups are hardly available for African continent and individual countries. Therefore, with all their limitations, the metadata for the potential dividends are extracted from NTA and described graphically. Finally, a panel data regression is also conducted to prove the statistical significance of drivers of demographic dividend. In the regression multidimensional inclusive development index is used as a proxy to capture both economic and non-economic effects of demographic transition.

Demographic dividend estimation model

The following demographic dividend estimation model is used by various authors due to the fact that the role of age structure in generating demographic dividends is clearly presented. Therefore, from the model, the first and second demographic dividend could be easily comprehended. The model has gained prominence in the last two decades (Bloom and Williamson 1998; Mason 2001; Bloom et al. 2002; Mason 2005; Lee and Mason 2006; Mason and Lee 2007; Mason and Kinugasa 2008; Lee and Mason 2010; Lee and Mason 2010; Prskawetz, Sambt 2014; Mason and others 2015; Mason et al. 2017). The model is explained as follows:

$$\frac{Yt}{Nt} = \frac{Yt}{Lt}\frac{Lt}{Nt}$$
(1)

In an economic lifecycle, people are assumed to live in three broad age groups: children, adults, and the elderly. Accordingly, the model illustrates the relationship between people of different ages, particularly their labour income and consumption overtime. On average, the young and the old consume in excess of what they produce through their labour, while people in the labour force age group produce more than they consume. Hence, the lifecycle is simulated using two age profiles: labour income and consumption. In the mode, the notion of support ratio is helpful as it encompasses both the population age structure and country-specific age patterns of production and consumption in the life cycle (Mason et al. 2017, p.5). The model is built on the following generic mathematical identity: Where Yt represents total national income, Nt represents total population (consumers), and Lt represents labour force in time t. The support ratio, SR (t), is estimated as the ratio of the number of effective workers to the number of effective consumers.

$$SR(t) = \frac{Lt}{Nt}$$
(2)

From Eq. 1 and 2 one can draw Eq. 3

$$\frac{Yt}{Nt} = \frac{Yt}{Lt}SR(t) \tag{3}$$

Equation 3 shows the direct relationship between the support ratio and per capita income.

$$\left(\frac{\partial Yt}{\partial Nt}\right) = \left(\frac{\partial Yt}{\partial Lt}\right) \left(\frac{\partial Lt}{\partial Nt}\right) \tag{4}$$

$$\left(\frac{\partial Yt}{\partial Nt}\right)$$
 is directly proportional to $\left(\frac{\partial Lt}{\partial Nt}\right)$

The growth of per capita income due to increase in support ratio is called the first demographic dividend (ibid. p.7).

$$\left(\frac{\partial Yt}{\partial Nt}\right)$$
 due to $\left(\frac{\partial Lt}{\partial Nt}\right)$ is called the first demographic dividend(*ibid*, *p*.7), whereas,

The growth of per capita income *i.e.* $\left(\frac{\partial Yt}{\partial Nt}\right)$ due to the growth of growth of labour income.

i.e.
$$\left(\frac{\partial Yt}{\partial Lt}\right)$$
 is called the second demographic dividend (*ibid.*)

Therefore, to calculate the first demographic dividend, average labour income and consumption data are required in different age groups. For example, the total population should be grouped from Age 1, Age 2, Age3, and Age100+with frequency.

The *second demographic dividend* is growth in per capita income due to the change in labour income $\left(\frac{\partial Y_t}{\partial L_t}\right)$ which could be put as a function of capital and total factor productivity in the Cobb Douglas production function (Mason et al. 2017, p.5 and Moreland et al. 2014, p.10).

If we put all the variables in Eq. 1, we get;

$$\left(\log\frac{\partial Yt}{\partial Nt}\right) = \left(\log\frac{\partial Yt}{\partial Lt}\right) + \left(\log\frac{\partial Lt}{\partial Nt}\right)$$
(5)

The first demographic dividend is virtuously caused by inter alia, support ratio and conducive policy, whereas the second demographic dividend is affected by many factors, including capital from saving, digitalization, institutions, etc. However, for simplicity, capital, especially social security funds, is often used to calculate the second demographic dividend (ibid). The notion is that as longevity increases, the demand for social security funds increases. Then, the fund is used as a source of capital and reinvested, which ultimately generates sustainable economic growth and development, i.e. the second demographic dividend. In a nutshell, the first demographic dividend is caused by an increment in the working-age population relative to the non-working-age population, and it is a transitional, which means it could be achieved for a limited period of time. The total demographic dividend (or simply demographic dividend) is the sum of the first and second demographic dividends.

Discussion of results

The growing support ratio and the potential demographic dividend in Africa

The support ratio is the inverse of the old age dependency ratio. It is the number of people aged 15–64 per one older person aged 65 or older. Compared to the rest of the regions, the dependency ratio has been high in Africa. However, the swift demographic transition has opened a new window of hope for Africa because it will boost the labour force in comparison to dependent aged population. The following figure shows the support ratio of Africa in comparison with other economic regions. The empirics after the figure show that



Fig. 2 Potential Support Ratio (number of people aged 25–64 over aged people 65+) (medium variant projection), 2025. Source: Extracted from the United Nations World Population Prospects (2019)

the boost in the labour force will continue in the next half-century, while in the rest of the world, it will decline by the time.

In comparison with other regions, Africa's support ratio will be the highest by the year 2025 and afterwards. Its economic implications are vivacious. If a conducive institutional and policy environment and necessary investment in the socioeconomic sector are in place, the high share of the working-age population in a society can be a window of hope to put African countries into a sustainable economic growth trajectory from the poverty trap.

Variable	Obs	Mean	Std. Dev	Min	Max
Country				1	34
Time				1990	2018
Multidimensional inclusive development index	236	27.680	14.661	4.897	89
Log per capita income (Log PCI)	236	6.324	0.696	4.824	7.9450
Contraception prevalence rate	81	18.173	14.385	2.300	65.800
Personal remittances, received (% of GDP)	195	4.724	15.081	0.004	167.432
Rate of population growth	236	2.631	0.775	-1.695	5.605
Health policy as proxied by life expectancy at birth	236	54.931	6.898	31.037	70.170
Digitalization as proxied by mobile cellular subscriptions (per 100 people)	179	38.380	38.419	0.001	139.529
Employment in industry (% of total employment)	205	10.587	5.566	1.860	29.850
Unemployment, total (% of total labour force)	204	6.181	5.962	0.470	37.960
Fertility rate, total (births per woman)	236	5.535	0.984	3.141	7.772
% of youth (15–24 years age) in the total population	233	19.984	1.069	17.500	23.700
Gender parity index (GPI) in the gross secondary school enrol- ment	188	0.873	0.145	0.442	1.210
Youth employment rate	135	51.869	16.593	15.360	91.47
Dummy for time lag $(1990-1999=1;=0 \text{ otherwise})$	236			0	1
Dummy for time $2000-2018=1$;=0 otherwise)	236			0	1
Dummy for $2018 = 1; = 0$ otherwise)	236			0	1

 Table 1
 Self-explanatory descriptive statistics





Remittance and inclusive development in Africa

Africa has been suffering from brain drain and out migration of labourers along some risky routes. However, due to the strong attachment of African diasporas and their families, the diasporas' role in Africa has grown significantly in recent years. Their role in democratization, attracting foreign direct investment, and economic support to their families has been significant. For instance, the World Bank claims that in the year 2018, remittances to the sub-Saharan region increased by 10% to \$46 billion, compared to the previous year. One of the causes is claimed to be high migration from the region. However, there are also claims that the remittance is channelled into a black market, which has had unwanted consequences for the local economy, including illicit capital outflow, terrorism, corruption, inflation, etc. (Tessema 2010). Compared to the potential, the remittance inflow to the region is still not only minimal but also not well reported due to the parallel hard currency market. As a result, calculating the role of remittances in Africa cannot capture the whole picture (Fig. 2).

In Fig. 3, Y-axis represents MDI and the number of observation is available in Table 1. The average share of remittances in the real GDP of the selected African countries is about 2.5%. However, Lesotho has received an average of 60% of its GDP from remittances between the year 1990 and 2018. That is why the data from Lesotho were excluded as a remedy for the outliers. The scatterplot shows that multidimensional inclusive development increases with remittance. Arguably, the minuscule positive correlation (or minimal slope) might be due to the fact that most of the diaspora remittance has not been transferring remittance through formal channel. Thus, the clustering at zero and/or minuscule correlation coefficient has interesting policy implications. Illegal migration and brain drain should not be tolerated as a pretext for boosting remittance which remittance should be transferred through legal channels.

Harnessing demographic dividend through augmenting employment in industry sector

There is an "unlimited supply of labour" in rural areas in which subsistence agriculture is the mainstay. Therefore, productivity can be increased by shifting the surplus labour from



agriculture to industry, where labour productivity is high (Lewis 1954). Lewis also claims that developing countries need to make a structural change from agriculture to industry to absorb the surplus of disguised unemployed people in rural areas. This is a fundamental way to harness a demographic dividend. Nevertheless, there were African countries that had already started to deindustrialize, especially during the privatization of large state-owned factories due to structural adjustment policy advice in the 1980s and 1990s. In Fig. 4, Y-axis represents MDI. The scatterplot shows that employment rates in the industry sector have a positive impact on inclusive development, which is a proxy for multidimensional demographic dividend. This implies that industrialization is one of the strategies to harness more surplus labour migrated from the traditional subsistent agriculture sector, a structural change in favour of industrialization is a bearable development strategy to harness demographic dividend.

Harnessing demographic dividend through minimizing fertility rate

As explained in the conceptual framework, fertility is one of the major determinants of demographic transition. African women have the world's highest fertility rate. Between the years 1990 and 2018, the average fertility rate of women in the 34 African countries was 5.6 children per fertility rate in their reproductive lifetime, compared to a global average of 2.5 children. Although the fertility rate has significantly declined over the years, it is still very high. Obviously, in agrarian societies, high fertility is demanded due to economic, social, religious, and cultural factors. As children start helping their parents, the parents speculate that an increase in the number of children will lead to an increase in their household's income. In other words, low economic status leads to high fertility.

However, high fertility contributes to demographic pressure and the number of impoverished people in countries. If the economies cannot accommodate the population pressure, social crisis and political instability will be endemic, which is called a demographic bomb (Woldegiorgis 2022b). Figure 5 shows that multidimensional inclusion and the fertility rate have an inverse relationship in the selected 34 African countries (Y-axis represents MDI).





Source: calculated by the author

The inverse relation between MDI and fertility rate calls for a demography policy in which fertility rate could be controlled through morally acceptable family planning schemes.

Inclusion nexus family planning

Family planning is one of the robust policy instruments to overcome population pressure and harness a demographic dividend. Since the 1960s, family planning information and facilities have been promoted in sub-Saharan Africa. However, the adoption of modern contraceptive methods has been increasing only since the 1980s. Since the second half of the 1980s, the demographic transition has shown significant change due to the decline in both the birth rate and the death rate. Currently, there is more or less universal knowledge about at least one of the family planning methods. However, the knowledge-practice gap is still high and the fertility rate is still the highest compared to the rest of the world. There are cultural, particularly religious, barriers, misconceptions, and misinformation about using contraception. However, in urban areas, there is a significant positive change.

As shown on the left and right side of the scatter plots in Fig. 6, the panel data from the 34 African countries for the years 1990 to 2018 shows that both per capita income (y-axis) and inclusive development have a direct relation to the contraceptive prevalence rate (x-axis). Figure 6 also supplements the relevance of family planning methods to harness demographic dividend thereby inclusive development.

The comparison and calendar of first demographic dividend potential in Africa

To achieve objective 2 in this section, the economic support ratio and the first demographic dividend are presented for Africa. As stated above, the economic support ratio could be calculated by the following equation (Bloom et al. 2003; Mason and Lee 2007; Lee and Mason 2010; Mason et al. 2017 and Woldegiorgis 2023).

Figures 7 and Fig. 8 show that, in comparative terms, Africa will be at the top of the demographic dividend potential in the years 2022 onwards. On the other hand, Asia has been at the top of the dividend potential since the 1960's (see Fig. 10 too). In fact, this is claimed to be the cause of the East Asian economic miracle (Bloom and Williamson 1998; Mason 2002; Bloom et al. 2003; Mason and Lee 2007; Mason et al. 2017). As shown in



Fig. 6 The nexus of contraception prevalence rate with per capita income and multidimensional inclusion index



Fig. 8, Africa has a robust potential for a first demographic dividend. However, the second demographic dividend does not show vigorous potential. This could be due to a variety of factors, including low per capita savings and a poor social security system, a lack of human capital, and other cultural and governance issues.

The average labour income and consumption data are required to calculate the first demographic dividend. However, the data are not available for the African countries. Thus, Fig. 9 is based on secondary data (i.e. IMF (2014)). It is not calculated by the author based on metadata from United Nations, Department of Economic and Social Affairs, Population Division (2019). That is why it stretches beyond the year 2100.

Regarding the timing of the first demographic dividend, African countries have a different pace. As shown in Fig. 9, for example, Niger has not yet started to see its first dividend. On the other hand, Egypt, Tunisia, Morocco, and Mauritius have already finished their first dividend span. In the meantime, in the last couple of decades, 51 out of the 52 African countries have already started to see their first dividend potential.



Figure 10 shows that the labour force has been increasing in Africa and the trend is projected to continue till the end of the twenty-first century in a ceteris paribus condition. One may claim that the sustainable economic growth of Africa in the last two decades has been, inter alia, caused by demographic transition. Our statistics show that the average two-decade economic growth is 4.5% in Africa, which is impressive. However, the growth has not been substantial compared to the East Asian miracle and the potential (Table 2).



Fig. 9 First Demographic Dividend Timing in Africa Source: Sketched by the author based on data from IMF (2014) and Woldegiorgis (2023)



Drivers of demographic dividend

As explained above, the demographic dividend is often considered as growth in an economy caused by the demographic transition. However, the merit of the demographic transition is not limited to the change in GDP. Therefore, the multidimensional inclusive development index is used as a proxy for the multidimensional demographic dividend. Dummies are used as a lag variable to test whether the youth bulge occurs in different decades, and the dataset is clustered into five years but the clusters are seven (1990, 1995, 2000, 2005, 2010, 2015 and 2018). Thus, both fixed effects and random effects are not appropriate as the dummies do not vary over time.

One may be wondering why multidimensional inclusive development is used as a dependent variable. Bear in mind that a demographic dividend is the economic growth that is caused by the change in the age structure of a country's population towards a more working-age population.⁶ On top of that, UNFPA also claims that the demographic dividend is an important component of sustainable development. The World Economic Forum (WEF 2017) also noted that economic growth is one of the pillars of inclusive development. One may also claim that the change in age structure has implications not only for economic growth but also for other dimensions of development such as social justice, diversity, social status, and openness to global issues that are pertinent to an inclusive development approach (Empter and Shupe 2012, p.8; WEF 2017; Woldegiorgis 2020a; 2022a; Dörffel, and Schuhmann 2022). That is why multidimensional inclusive development is used as a proxy for the multidimensional demographic dividend.

When it comes to the drivers of the demographic dividend, the three models in the regression table show that fertility rate is statistically significant negative determinant of MDI. When it comes to the second explanatory variable, although rate of population growth is not statistically significant determinant, all the three models show the negative association of MDI and population growth. On contrary, the mobility of labourers as proxied by remittance is a statistically significant positive determinant of MDI. This implies that policymakers should come up with a strategy to safely mobilize surplus labour from

⁶ According to the United Nations Population Fund (UNFPA), "...demographic dividend is the economic growth potential that can result from shifts in a population's age structure, mainly when the share of the working-age population (15 to 64) is larger than the non-working-age share of the population (14 and younger, and 65 and older)."https://www.unfpa.org/demographic-dividend#readmore-expand (Accessed 25 January 2022).

Multidimensional inclusive development index	(M1)	(M2)	(M3)
Personal remittances, received (% of GDP)	0.6262049*** (0.2687129)	$0.5722865^{***} (0.2030981)$	0.5336645***(0.2029384)
Rate of population growth	-1.115403(1.287132)	-0.7624317 (2.530214)	-0.4795137 (2.458474)
Health policy as proxied by life expectancy at birth	0.2758997 (0.2424615)	0.5809825^{**} (0.2351414)	0.4574942^{**} (0.2370448)
Digitalization as proxied by mobile cellular subscriptions (per 100 people)	0.0989378^{***} (0.0238746)	$0.1820539^{***}(0.0452239)$	$0.1524923^{***}(0.036222)$
Employment in industry (% of total employment)	$0.5399531^{***} (0.181217)$	0.3346749*(0.2078659)	0.320618*(0.2020693)
Unemployment, total ($\%$ of total labour force)	-0.0638641 (0.2943545)	$-0.9638083^{***}(0.2433039)$	$-1.00383^{***}(0.2452861)$
Fertility rate, total (births per woman)	-1.714202*(2.238099)	-0.0726402(1.949296)	$-1.016764^{**}(2.036814)$
Youth employment rate	$0.1764754^{**}(0.281848)$	$0.127047^{**}(0.207,222)$	0.0707047 ** (0.1,267,231)
gender parity index (GPI) in the gross secondary school enrolment	0.0292468 **(0.2045416)	$21.18676^{*}(0.54658)$	15.87737*(23.953379
Dummy for Youth _{1990–1999}	$0.3975876^{**}(4.416224)$		
Dummy for Youth _{2000–2018}		$2.136882^{*}(3.198895)$	
Dummy for Youth ₂₀₁₈			1.382755(3.046789)
Constant	$-77.68952^{**}(31.56608)$	-12.97216*(36.41313)	33.63569*(77.20727)
Adj. R-Squ	0.7520	0.6883	0.6532
Prob>F	0.0000	0.0000	0.0000

Table 2 Every 5-year clustered OLS regression

the areas of labour abundance to areas of labour shortage. Moreover, remittance should be collected in such a way that it can promote inclusive development. Youth employment rate, gender parity in secondary school, industry sector employment rate, digitalization, and policy to promote investment in the health sector (as proxied by life expectancy) are important drivers of demographic dividend and thus inclusiveness. Conversely, unemployment and fertility rates drive the dividend negatively.

In the regression, youth from 1990 to 1999 and 2000 to 2018 significantly and positively contributed to the dividend compared to youth in 2018. Accordingly, hypothesis 1 can be accepted. The hypothesis claims that although the youth face a time lag in entering the labour force due to schooling, when conducive institutions and social sector investment are in place, the youth can supplement the demographic dividend. Moreover, as remittance is a statistically significant positive determinant of MDI, this proves that the second hypothesis is also statistically valid. According to the second hypothesis, formal transactions of surplus labour can increase the demographic dividend for the labour surplus and shortage region. Particularly, the formal exchange of surplus labour may supplement formally collected remittances for the labour-sending region. Apart from the regression table, the scatterplot in Fig. 3 is also necessary to accept the second hypothesis.

To give more clarification on the regression coefficients, as remittance as a percentage of GDP increases by 1%, MDI also increases between 0.626% and 0.626%. As the population growth rate increases by 1%, MDI decreases between 0.480% and 1.115%. As life expectancy at birth increases by 1 year, MDI increases between 0.276% and 0.581%. If mobile cellular subscriptions (per 100 people) increase by 1, MDI increases between 0.099% and 0.182%. When industry employment (as a percentage of total employment) rises by 1%, MDI rises between 0.320 and 0.540%. If the unemployment rate increases by 1%, MDI decreases between 0.064 and 1%. This shows that unemployment strongly stands against inclusive development endeavours. Likewise, fertility undermines inclusive development. For instance, if average fertility per woman increases by 1 child, MDI declines between 0.073 and 1.714%. The huge variance between the MDI figures is due to the time lag, as shown in Models 1 and 2. For example, between 1990 and 1999, more fertility had a more negative effect compared to between 2000 and 2018.

Inter alia, the development in medical facilities and socioeconomic development between 2000 and 2018 might have suppressed the negative effect of fertility on MDI. As the youth employment rate as a percentage of the total rate of employment increases by 1%, MDI also increases between 0.077 (in 2018) and 0.176% (1990–1999). The significant difference in MDI figures could be attributed to the fact that more youths are now enrolled in school than in the 1990s. The positive relationship between MDI and youth employment may remind us that teenagers and college students may consider part-time jobs in addition to their studies. As the gender parity index increases by 1%, the MDI increases between 0.029% and 21.187%. The variance in MDI looks extremely exaggerated. However, it is not impossible because, between 2000 and 2018, the productivity of women might have significantly improved and contributed to MDI because girls have had significantly contributed compared to the 1990s. Likewise, one intriguing addition to the significance of the increase in the contribution of gender parity is that a 1% increase in the number of youths between 2000 and 2018 resulted in a 2% increase in MDI. Among other things, this might be because of access to education.

Robustness

The Pearson's correlation matrix is drawn and the coefficients do not show any sign of multicollinearity (see the annex table). The regression models showed heteroscedasticity when the models were verified with the modified Wald test for heteroscedasticity. Therefore, as a corrective measure, models were regressed again to get a correlation coefficient with a robust standard error.

Conclusions and policy implications

The debate over whether the human population is an asset or a burden was dominated by the role total human population on economic progress. Recent research, on the other hand, emphasizes the importance of the entire population's age structure rather than its total size. Thus, the economic consequences of Africa's undergoing demographic transformation are generating a lot of excitement.

Obviously, the demographic transition significantly varies among African nations. Yet, there is hardly accessible comprehensive information available about the potential demographic dividend's time frame and driving factors. Thus, the paper contributes to the demographic dividend policy discourse in three ways. First, It describes the ongoing demographic transition in Africa and presents the time range of the first demographic dividend for 47 African countries in a comparative perspective. Second, The available literature does not appear to give much courtesy to labour circulation from labour surplus to shortage regions as a strategy to foster the dividend and thereby inclusive development. Therefore, based on the Lewis dual-sector economic model, this paper analyses the role of remittance in harnessing the demographic dividend.

Accordingly, the paper sheds light on how well-administered labour trade (labour circulation) guarantees payoff to all trading parties through an inclusive development approach. Accordingly, the formal trade of surplus labour may help minimize the moral hazards of the prevailing human traffickers and unfair brain drain. Third, While the available literature on the demographic dividend is dominated by the role of demographic transition on economic growth, this paper broadens the discussion to embrace an inclusive development approach.

To be specific, the heightened share of the youth population is a crucial positive driver of demographic dividend as far as creation of a decent job and relevant skills are accessible. In fact, the economic contribution of the younger generation has a time lag due to schooling. When conducive institutions and investment in the social sector are in place, the youth can augment the demographic dividend and thereby inclusive development presently and in the future. Conversely, the youth bulge per se may create potential social risks, if it is not managed properly, particularly if the economy does not create jobs on a sufficient scale to absorb those entering into the labour market.

The economic significance of local and international mobility of labourers, as proxied by remittance in the study, is a statistically significant positive determinant of the dividend and inclusiveness. Moreover, industrialisation is also an important strategy to absorb the hopeless unemployed people in the traditional agricultural sector. Likewise, youth employment rate, gender parity in secondary school, digitalization, and investment in the health sector as proxied by life expectancy are important drivers of demographic dividend and thus inclusiveness. Conversely, unemployment and fertility rates drive the dividend negatively.

In a nutshell, Africa has sufficient potential to not be overpopulated and to make a transition similar to the rest of the world. This does not mean that there is no risk of a demographic bomb from the population "explosion". If, among others, high unemployment persists, the risk of social crisis is inevitable. Nevertheless, if appropriate institutions are in place, Africa has a robust potential for inclusive development due to the potential demographic dividend driven by the swift demographic transition. The ongoing demographic transition per se will bear a huge potential for global labour supply in the future. However, to harness the potential depends on the collaboration of local and international development actors.

Finally, there are tremendous reasons to be optimistic. For instance, the last forty-year swift demographic transition, two decades of sustainable growth, growing access to skills and education, digitalization, remittances, gender inclusion, youth empowerment, family planning awareness, and poverty reduction show a green light for harnessing the huge potential dividend to be reality. Accordingly, the demographic dividend could create an exceptional inclusive development in Africa as it happened in East Asia. This per se is an astounding potential for national and international development cooperation. Conversely, some countries have lack of capacity to make the necessary investment or have not yet been awakened about making use of their boosted support ratio at hand to harness the corresponding first demographic dividend potential. This may lead to pessimism because since 2010 political unrest, risky migration, and other moral hazards have been overriding in African political economy that are often termed "demographic bombs". As a remedy, the article sheds light on the important dimensions of dividends and their driving factors, investment areas, and institutional set-ups.

Finally, as the inferences are based on cross-country statistical analysis, the paper is not free from limitations. For the countries have different endowments and experiences, the study can by no means replace country-specific contextual studies. To this end, for further details on sector-specific policy intervention model of demographic dividend, see NCBI.⁷

Appendix

See Table 3

⁷ NCBI is part of the United States National Library of Medicine which is a branch of the National Institutes of Health. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8028847/ (Accessed: 16 October 2021).

	IDI	remitance	rpop	lifeexp	Digitalizat	empIndus	unemplo	fertility	%Youth	gender~ y
MDI	1									
Remittance	0.0756	1								
Population growth rate	-0.2486	-0.5214	1							
Life expectancy	0.5896	-0.046	0.0062	1						
Digitalization	0.6485	0.0788	-0.1716	0.6582	1					
Rate of employment in industry	0.4048	0.2022	-0.2602	0.2482	0.3597	1				
Unemployment rate	-0.221	0.7074	-0.591	-0.1124	0.0185	0.3274	1			
Fertility rate	-0.5494	-0.3143	0.5411	-0.5399	-0.5568	-0.2999	-0.3471	1		
Share of youth in the population	-0.2808	-0.1106	0.2935	-0.1186	-0.4224	-0.4918	-0.1802	0.2657	1	
Gender parity index	0.4602	0.2559	-0.0856	0.5259	0.5879	0.0851	0.1743	-0.605	-0.1935	1

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Acknowledgements The author sincerely acknowledges the financial support of the Konrad Adenauer Foundation (KAS).

Funding Open Access funding enabled and organized by Projekt DEAL.

Declarations

Conflict of interest The author declares that the manuscript is original and has not been published elsewhere, and there is no conflict of interest.

Ethical standards As the manuscript includes empirical findings, the author consents to providing the meta when it is required. The author also permits duplication and reproduction of the manuscript based on the ethical standards of JSED.

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