Demographic dividend in Ethiopia; challenge or opportunity?

A comparative analysis with East Asian tigers and east African neighbors

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Abstract

Background: While developed nations are suffering from a very low fertility and growing elderly population, Africa's population is projected to be 2.4 million in in 2050, induced mostly from a high fertility. The coming decades are expected to be an opportunity for most African countries to enjoy the demographic dividend that comes from a growing productive population. This study tries to explore the changing age structure in Ethiopia in comparison with east African neighbors and East Asian tigers.

Methodology: In this research secondary data on population for sub-Saharan Africa and East Asian tigers from 2012 UN population projection database was used to review the country specific population structure and its implications for economic development using various indicators; changes in population age structure, elderly support ratio, child support ratio and demographic dividend.

Result: Currently the estimated population dividend for four east African countries; Ethiopia, Uganda, Tanzania and Kenya shows a positive trend. However, unlike the short duration it took for East Asian tigers, 40 years, it is projected that this dividend is not fast with an average duration of 65 and 85 years for Kenya and Tanzania. By 2015 the Ethiopian labor force is expected to grow at a rate of 3.9% and the consumer population will grow at a rate of 2.7% per year. Assuming that fertility reduction continues, the 1.1 child support ratio in 1990, which means 11 working age population supporting 10 children of age less than 15, increases to almost 18 and 26 working groups per 10 children in 2030 and 2050, opening an opportunity for economic development.

However it is also important to note the fast drop in elderly support ratio from 16 to 9 from 2015 to 2055, a very sharp fall of about 0.5 fold in 2050 and 2.5 fold in 2065 and further 14 fold falls in 2100. This is a very fast drop in support ratio showing the biggest challenge

waiting ahead for the nation if it doesn't manage and utilize its demographic dividend wisely.

Conclusion and recommendation: East Africa in general and Ethiopia in particular are now in a demographic transition. However, if this opportunity is missed, if the growing youth population is not in the economic sector, countries will lose the great potential to accumulate capital from their growing productive sector, making the demographic dividend a demographic debt. Demographic dividend can't be met by luck; rather it is a planned outcome of strong fertility regulation and expansion of family planning services supported with strong investment in employment creation, skill development and promotion of saving and investment.

Key Words: Demographic dividend, Support ratio, East Africa, Ethiopia

Introduction

Most regions of the world have experienced gradually declining rates of population growth, second population transition. Such demographic changes are found to have played a major role in the economic growth and poverty reductions in the respective nations. By now, while developed nations are suffering from a very low fertility and growing elderly population, least developed nations, on the other hand are having the highest fertility and growing child dependency. By 2050, Africa's population is projected to increase to 2.4 billion from 1.1 billion today, making it the region with the largest population growth(PRB, 2013). This projection is under the assumption of increased access to family planning that will result in reduction in fertility rates. Globally, over the last 40 years, women are having fewer children, from 4.7 children per woman in 1970 to an average of 2.5 children in 2014, the highest fertility being in Niger at 7.4 children per woman and the lowest in Taiwan at 1.1 children per woman(PRB, 2014). According tyo this report, Africa has shown a 30% reduction in fertility rate from 6.7 to 4.7 in the same 40 years past, however still growing very rapidly.

Development can be seen from different directions; but as most agree it encompasses, economic development, political maturity, and social development. Social development especially demographic changes seem to be given less attention in the way they can play a role in a nation's development especially in the African context. According to the wall street journal, the chances for swift economic growth are higher when a country hits that sweet spot called "demographic dividend."(ROSENTHAL, 2014). Similarly a speech made by the director of the State of World Population 2014 Report says(UNFPA, 2014); if Africa can get things right, including bringing down its birth rates, the demographic dividend could add as much as $500 billion to sub-Saharan economies every year for as many as 30 years.

Other major changes needed in the demographic structure include, population age structure changes, fertility transitions and migration and urbanization changes.

The Demographic Dividend is the potential growth in a country's economy resulting from a change in the age structure of its population. It occurs when a falling birth rate changes the age distribution, so that fewer investments are needed to meet the needs of the youngest age groups and resources are released for investment in economic development and family welfare. That is, a falling birth rate makes for a smaller population at young, dependent ages and for relatively more people in the adult age groups—who comprise the productive labor force. It improves the ratio of productive workers to child dependents in the population and makes for faster economic growth and fewer burdens on families. Development history and evidences tell us that most of the developed nations have already passed through the stage of demographic dividend and they have invested and made use of it. But what were the investments made? What should other nations need to adopt to replicate social and economic development for their nation? These questions need to be researched by academicians and addressed to African politicians to help for an evidence based decision.

Algebraically, the demographic dividend can be expressed as the difference between the growth rate of the number of equivalent workers and that of equivalent consumers. The difference gives the rate of economic growth that would result if the age profile of production and consumption remained constant. Indeed this is the way that the East Asian economies grow after World War II, especially South Korea, a country with no natural resource. It has invested on its human resource and utilized it to harness its economic development to be in the top global economies with in a very short period(Gribble, 2012). Good demographics may be a precondition for high growth but is not enough, need to be supported by a descent governance. Leaders in least developed nations need both the peace dividend, demographic

dividend and financial dividend. It is common to notice that some countries having low fertility are not making a fast progress in economic achievement like the East Asia fast development. This does mean that demographic dividend doesn't mean that the country will prosper soon rather under the existence of strong and quality education system, good macroeconomic management, proper investment and job creation, improved access to quality health service, will help a national to realize its future development agenda. Indeed these intern depends on the existence of peace and security in the country and the establishment of a proper and efficient market system that will be brought through a peace dividend, a term used to show the improved gains in social and economic development following reduced expenditure on military and other civil conflicts as well as war with in or out of border[i].

When Japan was in its fast-growth period – in the 1950s and 1960s, and at the recent Korean miraculous economic development, they funneled literate and well-educated workers into their factories and services, business sectors and public offices(ref). On the other hand in least developed nations, industrialization is still very weak where the growing youth is either underemployed or unemployed, and at the same time is not skilled which results in missed opportunity for development[ii]. Africa is expected to face this same problem of jobless economic growth which is driven by either peace dividend, export of oil, other natural resource exploitation or in some cases pumping of foreign loan and investment in infrastructure(ref).

Fertility regulation is at the center of population dividend in most of these Asian countries. High fertility leads to a fast population growth dominated by a young population that competes for scarce resource like land, food, shelter, other natural resources and often scarce

and low-paying jobs and contributes to political instability to fulfill its primary needs (Bonghart[iii]). On the other hand a growing adult population over its dependent population will be a resource that helps fuel the country's economy by being engaged in the productive sector and bringing innovative ideas if supported by modern scientific and education opportunities. On the dark side of it, human population can also be the best destructor in terms of civil conflict, war, and violence if it is not well managed. Countries with more than 40% of young adults in the population of adults were 2.3 times as likely to experience an outbreak of civil conflict as countries with smaller proportions during the 1990's [iii]. Every success in human life and development in the globe is brought by the brilliant mind of human generation and working with human population should be at the center of development for any sustainable economic, social and political transformation in a nation.

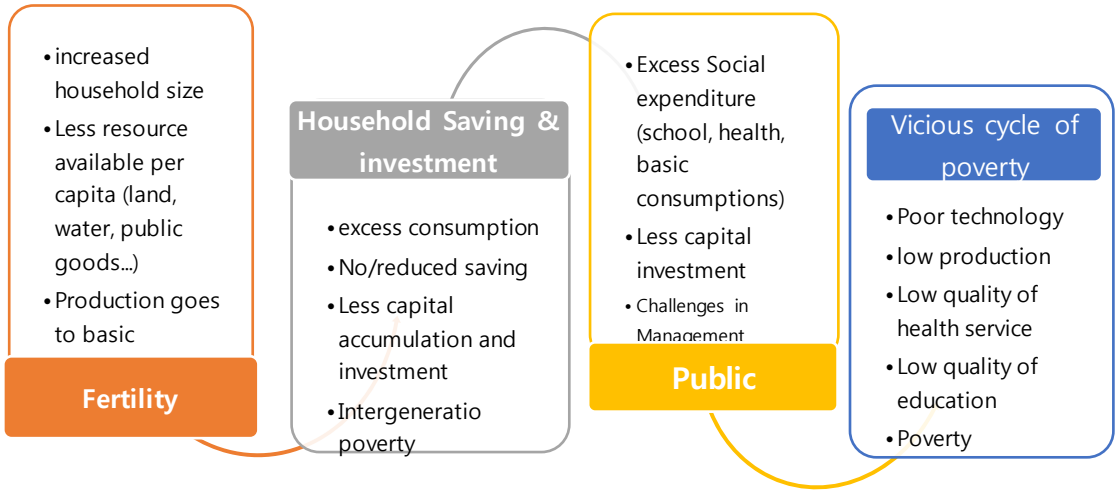


Figure 1: The link between high fertility and economic development

However for most politicians, population is still a measure of military power, number of seats or voices in a parliament, and source of finance for a regional and sub-regional budget distribution by the central government, especially when there are ethnic based politics. The economic burden of having high child dependency and the advantages of productive labor force at a reduced child dependency is given less attention. Indeed under the current progress

in achieving longevity at a global level, the proportion of elderly population is projected to grow at a fastest rate in least developed countries for the coming decades, which will curb the window of opportunity, population dividend in to a population dept; if nations do not appropriately invest on it. In my argument the least developed nations can't carry this double burden, dependency both from the growing child and the elderly if they don't work on their fertility and invest on technology and innovation to create vibrant working environment for the growing working age population.

Among the most valuable resources that the globe has, human capital is the biggest and the driving force for any economic, social, cultural and political development across the globe. Nevertheless, the administration of human population seems to be complex and even forgotten for various reasons. In fact this is also one of the main challenges that lead to inequity in human development. Especially countries with low socioeconomic condition do not have the appropriate system to manage their human capital, both the educated and non-educated ones. The dynamics of human population are not really well understood and managed in these countries. They don't have a clear system of enumeration, identification, training and development, motivation and appropriate utilization.

Indeed before a country reaches to a stage of demographic dividend, most have passed a fertility control of their population that allows these nations to reduce excessive consumption while increasing saving and investment at an individual as well as public level. Which intern resulted in national economic development and building of a better education, health, and agricultural as well as trade and other services for their population. The main object of this study is to explore the pattern of population dividend and compares it across east Asian tigers and east African nations with special emphasis on Ethiopian population structure and implications for the country's economy.

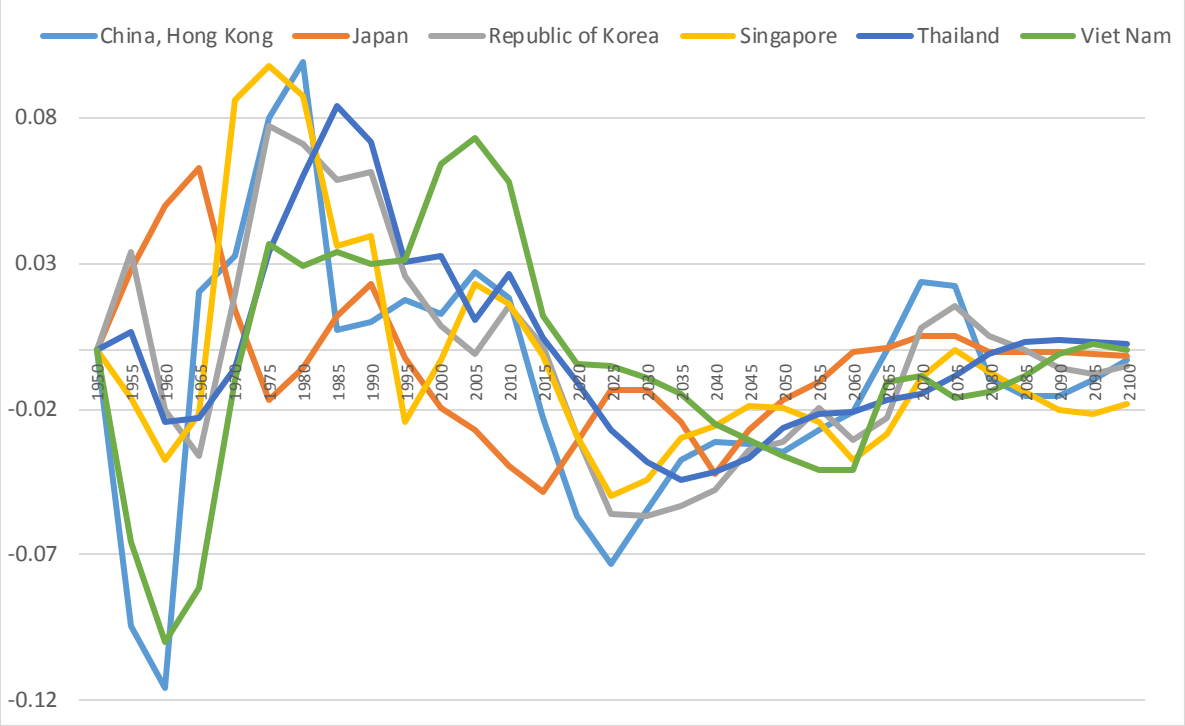
Methods and materials

An analysis in this paper is based on the population estimates and medium fertility variant projections prepared by the Population Division (UN 2012). *In this research secondary data on population for sub-Saharan Africa and East Asian tigers is downloaded from UN population projection. The same data was used to review the country specific population structure and its implications for economic development using various indicators.* Analysis was done in excel 2013, where trend and relative changes based from 1990 estimate were done for some indicators. The most used indicators to review demographic changes include, population growth for age < 15, labor force, and the elderly, demographic consumer, elderly support ratio, child support ratio, change in support ratio, demographic dividend and dependency ratio are used for comparisons.

Results and discussion

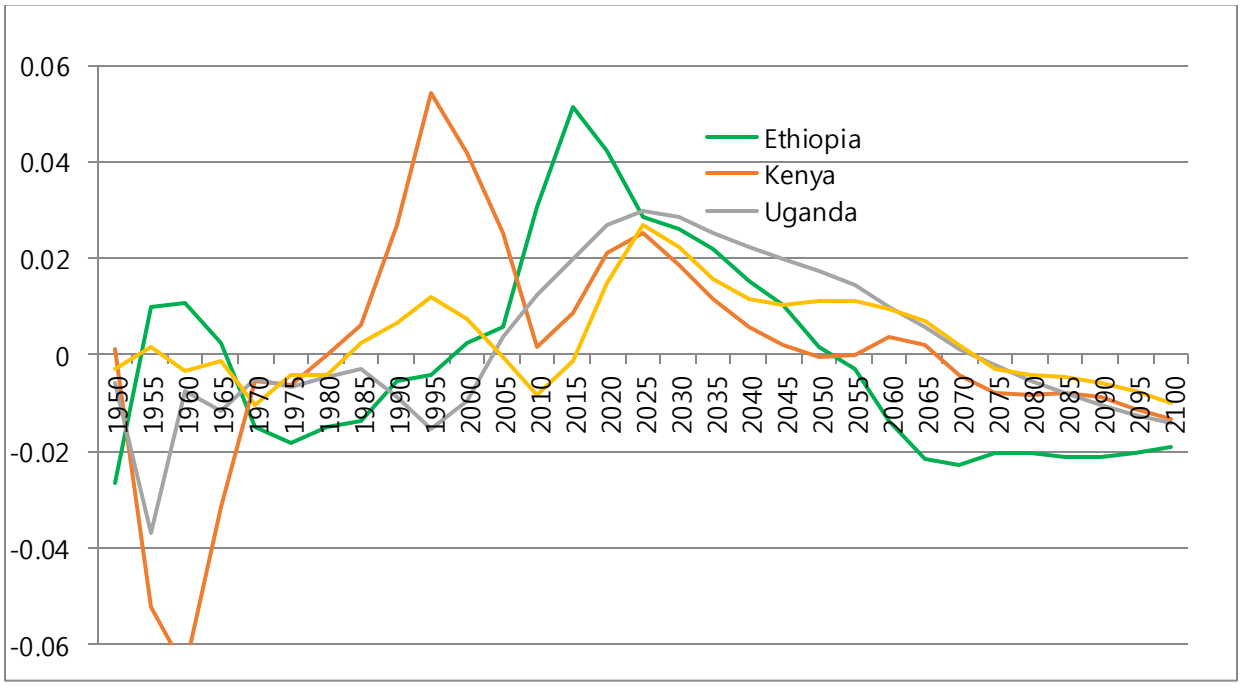
The following graph shows the demographic dividend in East Asian countries. As we can see from the graph, most of the East Asian countries have been in a negative demographic dividend meaning in a reduction in economic growth rate induced by demographic changes before 1970 and will again be after 2015. Japan had a positive dividend before 1970 and entered a negative dividend then after. It means that keeping technological advancement constant, the negative economic dividend is going to affect the economic development of these nations negatively. These East Asian tigers have enjoyed a positive dividend between 1970 and 2015 for a maximum of 45 years, when after they all exhaust their positive economic growth induced only by population dividend. A positive growth in workers per consumer means that there are more resources available per capita in the economy that can be

used to improve current consumption or to invest in human or physical capital, which increases future productivity and standards of living. This beneficial effect is a potential that will materialize only if employment and productivity do not worsen concomitantly. It doesn't work if the labor market is not efficient to accommodate the youth, if there is high youth unemployment. In fact most of the East Asian tigers have managed to effectively utilize these dividends; one can note that this period is when most east Asian economy was growing very fast.



A similar comparison for east african countries shows that most african countries were in a negative population devidend when the east asian countries were in a fast economic growth. However, currently the estimated population devidend for four east African countries, Ethiopia, uganda, tanzaniya and kenya shows a positive trend. Kenya and Tanzaniya were already in a higher labour force scince 1985 and are still in population devidend but brought by growing labour force. It is expected that this devidend is not fast with an average duration of 65 and 85 years for kenya and tanzaniya unlike the short duration for east asian tigers,

which took an average of 40 years. This implies that the fertility reduction is very slow to better use of this opportunity in the two countries. The fertility level of south korea was arround 6.16 in 1960 reduced to replacement level fertility with in 1983[iv] and continued to become 1.187 in 2013. However all of the above eastern African countries fertility have been declining very slowly for the last couple of decades, 6 and above in 1990, and almost the same in 2005 except for Kenya where fertility declined to 5[v]. On the other hand for Uganda and Ethiopia, it startes late after 2000 and is estimated to take about 60 and 75 years for Ethiopia and Uganda, which is also a longer duration than the east asian tigers seen in figure 1. However generally, there is a positive devidend that will be brought by change in population age structure in east aftrican countries if the expected reduction in fertility is expected to happen which needs strong effot from these nations.



The Ethiopian population has one of the fastest population growth rates in the world, with an estimated growth rate of 2.6 per year. Estimates of the united nation world population projection indicate that Ethiopian population will reach to 137.7 million and 187.6 million in

2030 and 2050 making Ethiopia as one of the 10 world populous nation. From 1990 to 2010, even if there are reductions in fertility from above 6 points to 4.8, the population growth and proportion of children under the age of 15 to elderly population and productive population are almost about 48% of the national population having a 15:16:1 ratio between children, labor force, and old age population in 1990 and 14:16:1 in 2010. This still shows the high dependency ratio of children. Indeed if family planning utilization continues and fertility reduces it is expected that this will drop to 9:17:1 and 4:11:1 in 2030 and 2050 respectively. This will have a child dependency ratio of 0.85 in 2010, 0.55 and 0.39 in 2030 and 2050 respectively while having an old age dependency ratio of 0.06, 0.07 and 0.10 from 2010 to 2030 and 2050.

Year	*<15*	*lab*	*eld*	*chil.dep*	*eld.dep*	*Pop(mill)*
1990	15	16	1	0.92	0.06	48
2000	16	16	1	0.93	0.06	66
2010	14	16	1	0.85	0.06	87.1
2030	9	17	1	0.55	0.07	137.7
2050	4	11	1	0.39	0.10	187.6

However it doesn't mean that the youth population is reducing, rather the elderly population is growing increasing the proportion mix of the dependent population. It is very challenging for a developing nation with a weak economic structure to cope with the growing old age and child dependent population.

Year	*lab Grth*	*Cons. Grth*	*Pop. Dividend*
2000	0.032	0.032	0.000
2005	0.032	0.031	0.002
2010	0.036	0.029	0.007
2015	0.039	0.027	0.012

2020	0.036	0.025	0.011
2025	0.031	0.023	0.008
2030	0.028	0.021	0.007
2035	0.025	0.019	0.006
2040	0.022	0.017	0.005
2045	0.019	0.015	0.004
2050	0.016	0.013	0.003
2055	0.013	0.012	0.001

As we have seen earlier the Ethiopian population grows in a very fast growth rate. The proportion of the child dependent population is more than 80% currently. However the reduction in mortality due to various public health interventions and relative improvement in health condition has brought the child population to join to a productive adult population. Demographically this results in a higher growth of the productive adult population. Coupled with this rapid growth of the adult population is a slight reduction in fertility that supports the opening of a demographic window of opportunity, the demographic dividend where the productive population grows at a faster rate compared to the consumer population. This leads to a surplus of human resource for most of the productive sectors. In the year 2000, according to the United Nations 2012 population estimate, the adult population growth and the consumer growth were almost equal which starts to shift then after to a relative increase in productive population with its peak around 2015-2020. By 2015 the Ethiopian labor force is expected to grow at a rate of 3.9% and the consumer population will grow at a rate of 2.7% per year, showing a maximum growth in labor force. This will continue to the year 2055. In 2030, a labor force growth of 2.5 and a consumptive population growth of 1.9 is expected, the major growth in to labor force going to be brought by the large number of youth population entering the adult population and the reduction in consumptive population is due to the reduction in fertility. However after 2055, the dependent population and the productive

population are expected to grow at a rate of 1.3 and 1.2 where after the productive labor force growth starts to decline while the consumptive population starts to grow faster, due to aging of the younger population. The totality of this period where the labor force growth is much higher than the growth of consumer population is called a window of opportunity for economic development. Most developed nations have effectively used their dividend and have achieved their economic and social development through well-designed policy directions. Africa in general and Ethiopia in particular are now in this opportunity and it is expected that the initiation of various development strategies will help to utilize this human resource and capitalize for its economic development. However there is a fear that there seems to be a less attention to demographic changes and the youth population are not given attention for the skill and technology transfer and employment opportunity creation to use the productive power of this population.

This is under the current assumption of continued fall in fertility level. This time is a golden opportunity where politicians have to give emphasis in reaching the youth population, invest on its education, involve in the productive sector by creating dynamic employment opportunities. However if this growing youth population is not in the economic sector the country will lose the great potential to accumulate capital from its growing productive sector.

However the failure to do so will lead to a population dept. rather than a population dividend, where after 40 and 50 years, this growing youth population will turn to an elder, nonproductive and consumptive population depleting the national reserve. Least developed nations can't accommodate the double burden of increasing child population and old age population if they don't utilize the demographic dividend.

Economists and demographers have introduced the use of an economic support ratio to show the change in population dynamics and its effect on the national economy. Indeed youth

dependency ratio and old age dependency ratio are the commonly used demographic terms that show how much the productive labor force and the dependent populations in a nation vary across time. Economic support ratio is a similar term which is almost the inverse of a dependency ratio, however this term shows how many labor of productive population supports one dependent population. There are two commonly used operational terms under this definition, the demographic support ratio and the effective support ratio. The demographic support ratio is an indicator estimated by the proportion of the working age population to the consumer population in a nation. In this instance the productive population is estimated to be the population in the age interval between 15 and 64 whereas the consumer population is all the population in the nation. However researchers have come up with various techniques to measure the consumer population as it is believed that age has a big effect in consumption difference. A study in US (Cutler, Poterba, Sheiner, Summers, & Akerlof, 1990) has come up with the following formula to calculate the consumer population.

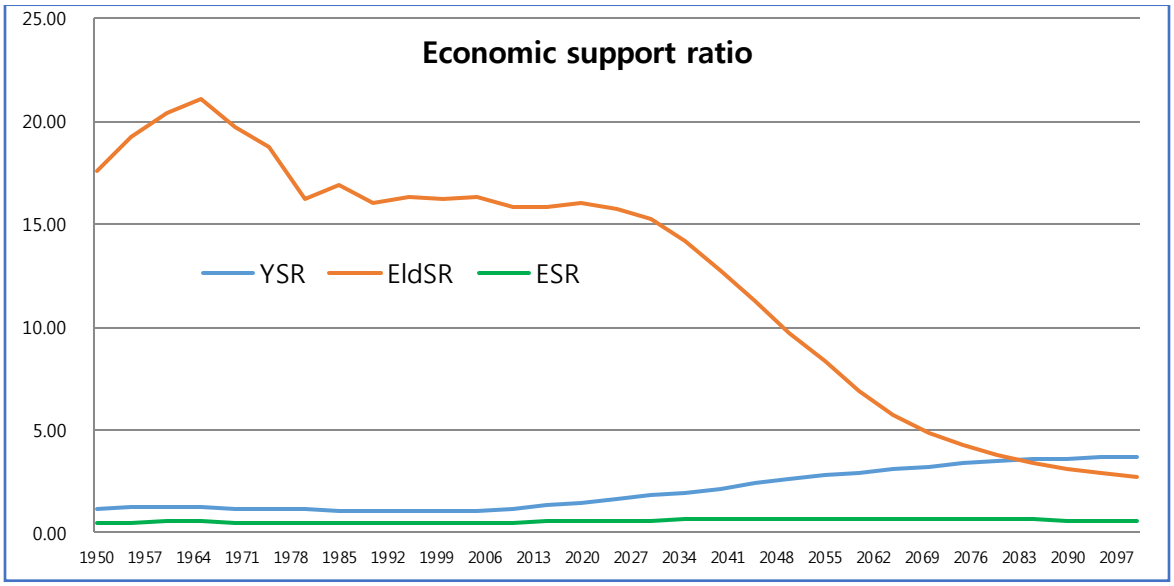
$$0.72 * (age <= 20) + labor\ (15 - 64age)\ + 1.27 * (age >= 65)$$

According to this calculation youth and children below the age of 20 have about 30% less consumption than the productive labor force and the elderly have about 27% high rate of consumption. Another view is the introduction of real or effective labor force and effective consumer. In this argument all people under the age of 15 and above the age of 65 are not dependents and all people in the age 15-64 are not productive. Hence the recall data of labor participation and consumer only population has to be taken to calculate the effective economic support ratio. However due to limitations in data, we will concentrate on demographic support ratio to estimate the effective economic support ratio and forward our views on this regard.

Year	youth	elderly	ESR
1990	1.092	16.049	0.506
2010	1.176	15.812	0.523
2030	1.805	15.272	0.618
2050	2.586	9.706	0.671

As can be seen from the above table, the Ethiopian child support ratio is increasing from 1990 to 2050 according to the projection. A support ratio of 1.1 in 1990 which means 11 working age population supporting 10 children of age les than 15 is increasing to almost 18 working groups for 10 children by 2030 and 26 working groups per 10 children in 2050. This is in line with the expected reduction in the fertility assuming current trend in family planning continues. Similarly the increase in life expectancy from an improved health system and improved living standard might help in increasing the number of working age population of the country, which is a big opportunity ifs well managed. A reduction in dependent population will give room for most households and the public to increase saving and investment that later can have an input on the nations development in large. However on the other hand support ratio to the elderly population remains almost constant from 1990 to 2030 which is another added opportunity that will not bring much burden for the public in taking care of elderly population. In spite of this, after 2015, the already productive population that joined the labor force in the early 21st century will enter in to their elderly life reducing the old age support ratio significantly, from almost 16 working age people to 9 working age people per one elderly in 2055 and further dramatic fall then after. Generally looking the Ethiopian economic support ratio is expected to rise from 1990, where one labor worker is supposed to support himself and one another person, it will not change till 2010 but is expected to change slightly to 0.62 in 2030 which means that 5 working age people will support themselves and three others which shows a reduction in two dependent population

for every five working age population. This is expected to increase further in 2055 to 0.67 indicating two working age people supporting themselves and one other dependent population. This might be brought following the demographic dividend that starts in the early 21st century and continues to the middle of the century. However this is also expected to fall in the last quarter of the century following the rapid aging of the youth population that has entered the productive labor force in the early years of the century.



However the above figure is an absolute one and it doesn't show the changes over time. Demographers have created a percentage change in support ratio from a relative fixed time period to show the changes happening in the economic support ratio overtime. Denoted by alpha (α)at time "t", the percentage change in support ratio is calculated based on the support ratio that has been in the nation taking the 1990 as the baseline for this paper. Accordingly the change in alpha is presented in the following table. Indeed the change in support ratio can be decomposed in to the change in support ratio due to change in child population structure or change in old age population structure.

Mathematically

$$\alpha = \frac{p}{c}, where\ p = productive\ labour\ force, c = demographic\ consumer,$$

The demographic consumer, which approximates the economic consumer population, constitutes the total sum of child population below the age of 15, productive labor force between 15 and 64 and elderly population above the age of 65.In other words,

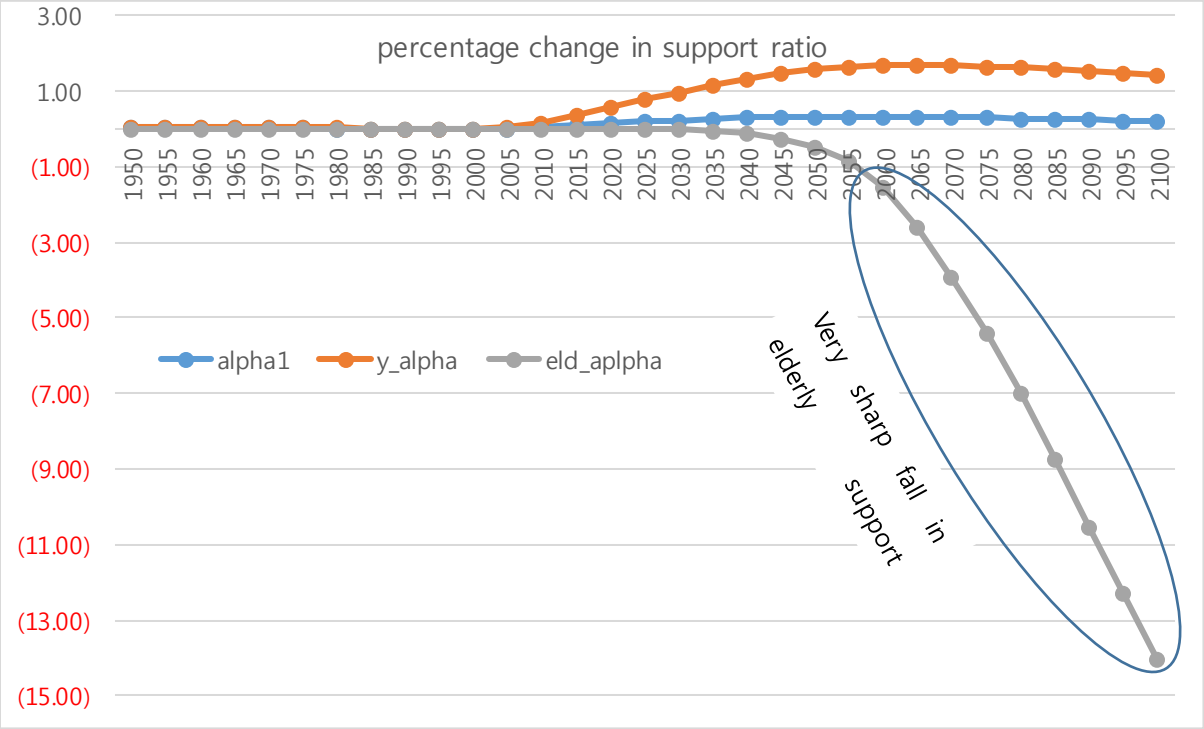
$$\alpha = \frac{\mathrm{p}}{(\mathrm{C+P+E})}$$

Change in alpha (α) is calculated as change in support ratio at time "t" compared to the reference time, time "0".

$$\Delta\alpha = \frac{(\alpha_t - \alpha_0)}{\alpha_0} = \frac{\alpha_t}{\alpha_0} - 1$$

Further decomposition shows that the change in support ratio comes from change in child support ratio and change in elderly support ratio. According Cutler et.al, this may further be shown as follows:

$$\boldsymbol{\Delta\alpha} = \underbrace{(\boldsymbol{\Delta P} - \boldsymbol{\Delta C}) * \left[\frac{\mathbf{C}}{\mathbf{C+P+E}}\right]}_{\text{Change in child support ratio}} + \underbrace{(\boldsymbol{\Delta P} - \boldsymbol{\Delta E}) * \left[\frac{\mathbf{E}}{\mathbf{C+P+E}}\right]}_{\text{Change in elderly support}}$$



As mentioned above in the absolute support ratio, after 2000 Ethiopia will experience a slight increase in the first few years and increases progressively in the 20s to 50s of the 21st century. However the relative change of support ratio in both the elderly and children as shown above, which implies the change in support ratio at the elderly population is very high, a drop from a relatively constant support ratio, around 16, to a very sharp fall about 0.5 fold in 2050 and 2.5 fold in 2065 and further 14 fold fall in 2100. This is a very fast fall in support ratio showing the biggest challenge waiting ahead for the nation if it doesn't manages and utilize its demographic dividend wisely. That is why I argue that a demographic dividend that is not wisely used might instantly change in to a demographic debt, with a large proportion of elderly population depleting the public reserve.

Conclusions

These East Asian tigers have enjoyed a positive dividend between 1970 and 2015 for a maximum of 45 years, when after they all exhaust their positive economic growth induced only by population dividend. Currently the estimated population dividend for four east

African countries, Ethiopia, Uganda, Tanzania and Kenya shows a positive trend, it is expected that this dividend is not fast with an average duration of 65 and 85 years for Kenya and Tanzania unlike the short duration for East Asian tigers, which took an average of 40 years. This shows a rise in productive labor force compared to the consumer population in the region, under the assumption of continued fertility reduction.

By 2015 the Ethiopian labor force is expected to grow at a rate of 3.9% and the consumer population will grow at a rate of 2.7% per year, showing a maximum growth in labor force, which is projected to continue to the year 2055. Assuming that family planning utilization continues and fertility reduces the proportion of children, labor force and elderly is expected to drop to 9:17:1 and 4:11:1 in 2030 and 2050 respectively, from 15:16:1 in 1990 . This will have a child dependency ratio of 0.85 in 2010, 0.55 in 2030 and 0.39 in 2050 while having an old age dependency ratio of 0.06, 0.07 and 0.10 in 2010, 2030 and 2050 respectively. Indirectly this shows, a support ratio of 1.1 in 1990 which means 11 working age population supporting 10 children of age less than 15 is increasing to almost 18 working groups for 10 children by 2030 and 26 working groups per 10 children in 2050. The increase in supporting labor force opens an opportunity for saving and investment in a nation. Generally the Ethiopian economic support ratio is expected to rise after 2010. In 1990, one labor worker is supposed to support himself and one another person, which is expected to grow to 0.62 in 2030 which means that 5 working age people will support themselves and three others which shows a reduction in two dependent populations for every five working age population. However it is also important the fast drop in elderly support ratio from 16 to 9 from 2015 to 2055, a very sharp fall of about 0.5 fold in 2050 and 2.5 fold in 2065 and further 14 fold fall in 2100. This is a very fast fall in support ratio showing the biggest challenge waiting ahead for the nation if it doesn't manage and utilize its demographic dividend wisely.

Africa in general and Ethiopia in particular are now in a demographic dividend opportunity and it is expected that the initiation of various development strategies will help to utilize this human resource and capitalize for its economic development. However there is a fear that there seems to be a less attention to demographic changes and the youth population does not have the opportunity for the skill and technology transfer and employment creation to use the productive power of this population. If the growing youth population is not in the economic sector countries will lose the great potential to accumulate capital from their growing productive sector, making the demographic dividend a demographic debt.

In conclusion demographic dividend will not be attained by luck, rather it is a planned outcome of strong fertility regulation and expansion of family planning services. It doesn't also mean that change in population age structure will bring economic development, if there is no strong investment in employment creation, skill development and promotion of saving and investment.

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