Estimation of National Transfer Accounts for Kenya Using 1994 Data: Selected Results and Discussion of their Policy Implications

By

Moses Muriithi

&

Germano Mwabu

School of Economics, University of Nairobi

September 15, 2008

Abstract

The paper estimates Kenyan NTA for 1994. Age-consumption and tax profiles are presented, and briefly compared with estimates for other countries. It is argued that despite the data challenges confronted in deriving the estimates, they nonetheless provide a reliable basis on which policies for restructuring private and public expenditures to achieve MDGs and the more general development goals can be designed and implemented. Further research on construction of Kenyan NTA using data from other years is recommended.

A paper submitted for consideration for presentation at Marrakech, Morocco in NTA forum, September/October 2009.

I. BACKGROUND

Currently, the empirical basis for understanding how population dynamics might affect Kenyan economy is weak. Little is known about resource flows across age groups and how these flows operate across various types of investment areas such as education, health, and savings. NTA Models that have been developed in recent years provide unique insights into how resource flows are allocated across age groups and the role played by different social institutions in resource reallocation within households. These models are increasingly seen as frameworks for both interpreting the current relationship between age structure and wealth flows, as well as rich sources of data for further research and policymaking. The interaction between demographics and economic growth has been referred to as the demographic the demographic dividend because of its contribution to economic growth (Bloom and Williamson, 1998; Kelly and Schmidt 2001). As noted by lee,1994a,b; Bommier and Lee,2003; Manson,et,at 2005; Lee and Manson,2008; Kluge,2008 , NTAs permit estimation of potential magnitude of the first and second demographic dividends, and the role the dividends can play in reducing poverty.

Evidence from NTA work support the hypothesis that, changes in population age structure enables countries to experience rapid economic growth during stages where youth dependency ratios have fallen but old age dependency ratios are low (Manson, 2001a,b). For instance, the emergence of a substantial gap between labor force growth and population due a decline in youth dependency ratio, contributed to high rates of economic growth and was a consequence of rapid demographic transition in East Asia (ADB 1997).

Kenyan Demographics trends

Population growth contributed to the pressure on land and resources in Kenya, where even today, more than four-fifth of the population lives in rural areas. High fertility, combined with declining mortality, gave Kenya one of the world's fastest population growth rates in the world in the 1970s and 1980s. Total population rose from about 10 million at independence to 15 million by 1978. This rapid growth, accompanied by an economic slowdown, prompted the government to promote family planning to lower fertility rates. Kenya was one of the first countries in Africa to adopt a policy to slow population growth (Ajayi and Kekovole, 1998)

The idea of limiting births was slow to catch on in a society that valued large families, but Kenya's total fertility rate (TFR), or average number of births per woman, declined from an estimated 8.1 children per woman in the late 1970s to 5.4 in the early 1990s, according to UN estimates. Kenya's remarkable success in lowering its fertility rate was linked to a growing acceptance of family planning.
The percentage of women of childbearing age who use a family planning methods rose from single digits in the 1970s to about 33 percent in 1993. However, Kenya's fertility decline has slowed considerably since then, with the 2007 TFR estimated at 4.9 children per woman. The percentage of married women using contraceptives was 39 percent in 2007 (see Table 1), above the average for sub-Saharan Africa, but below the average in major other world regions.

Slightly more than four in 10 Kenyans are under age 15. Despite some progress in poverty alleviation (Republic of Kenya, 2008), the population remains poor and largely rural. A large majority of urban dwellers (71%) live in slums. In a 2005 household survey, about six in 10 Kenyans said that within the previous year they had been unable to afford health care, clothing, or food. With 6.1% of its population (ages 15 to 49) living with HIV/AIDS, its HIV rate is high by world standards, although lower than that of other countries in the region such as Botswana (24.1 percent) and South Africa, 18.8% (Haub, 2007).

The youth bulge produced by Kenya's recent demographic trends and projected fertility declines (Ashford, 2008) could be an indicator of better economic future for the country. The ratio of working-age adults to children is projected to increase from 1.3 to 1.8 between 2006 and 2030, which could spur economic growth and reduce poverty. Experience in Asia, for example, has demonstrated that such demographic trends will produce economic growth only when a country has a stable, effective government and a favorable economic policies.

<Table1 about here>

Information from NTAs can assist the government to design and implement policies that would enable households to take advantage of the demographic transition. This paper uses household survey data for 1994 together with the available secondary data for the same period, particularly data from the national system of accounts to construct the first NTAs for Kenya.

Study objectives

The main objective of this research is to measure the magnitudes of flows of resource reallocations across age groups in Kenya in 1994 using data from a household survey, and from the national income and product accounts for the same year. The specific objectives of the study are to:

a) Estimate the lifecycle deficit in a manner that establishes the institutional mechanisms by which resources are redistributed across generations.

b) Estimate tax profiles and use them to shedding light on the public transfer inflows and outflows, discussing their consequences on public spending incidence.

d) Give some comparative perspective of Kenya NTA in respect of other existing NTAs in Africa.

II. THE NATIONAL TRANSFER ACCOUNTS FRAMEWORK

The NTA framework used is from Manson et,al (2007) and Manson et,al (2008). The National Transfer Accounts measure at the aggregate level the reallocations across age of economic resources. This reallocation occurs because at some ages, individuals consume more than they produce and at other ages they produce more than they consume. The reallocation system relies on lifecycle surplus resources generated during the prime working ages. Resource reallocation can take two forms in any

society. The first is that of reallocation of income from accumulated capital assets. Individuals accumulate assets during their working age and later at old age rely on capital income and/or liquidation of their capital asset as they become less productive due to aging. The Second form of resource reallocation is the transfer of the surplus from the working age to those with deficit in consumption. Those with deficit in consumption include persons at younger ages and the elderly who have no asset income, persons without pension incomes or are unable to liquidate their capital assets.

The structure of NTA

The structure of NTA comprises the flow account and the wealth account. A simple picture of the complete NTA is highlighted Table 2. It describes the economic flows of a particular year for a cross-section of age groups with assumption of a closed economy at this particular point.

< Table 2 about here>

Table 2 shows the main components of NTAs. It is worth mentioning that a complete NTA should take care of the net transfer from the rest of the world because national economies are typically open to the rest of the world. Households receive remittances from abroad as they also send some to individuals abroad. Governments also receive some transfers in form of grants from abroad as they also pass transfers to the rest of the world. Thus a broad component of NTA takes care of the foreign sector.

The first category of the flow account is lifecycle deficit. In the flow account, life cycle deficits are determined by comparing consumption with labor income earned at each specific age. The deficit age groups are basically the young and the elderly, and the surplus groups are basically the working age groups. The reallocation of resources across ages (from surplus to deficit ages) and the means for such reallocation are the main subject matter of NTA. The income reallocations are based on assets, labor income, and tax revenue..

The transfer flows for the NTA are governed by the following flow identity for a closed economy:

$$\underbrace{C - Y_l}_{\text{Lifecycle deficit}} = \underbrace{\underbrace{Y_A - S}_{\text{Asset-based reallocations}} + \underbrace{\underbrace{\tau_g^+ - \tau_g^-}_{\text{Net public transfers}} + \underbrace{\tau_f^+ - \tau_f^-}_{\text{Net private transfers}}}_{\text{Net transfers}}}_{\text{Age reallocations}}$$

The left hand side of the equation gives the lifecycle deficit which is the difference between consumption and production while the right hand side provides the age reallocation which has two main components, namely, the asset reallocation given by income minus saving and transfers, given by net public transfer minus net private transfers.

This equation is derived from the inflows and outflows (see Manson et al 2006). Inflows consist of labor income, returns to capital, land rents, and transfer inflows from both private and public

sector. On the other hand outflows come from consumption investment in capital or credit and land and the transfer outflows to the government and the private sector.

The other main component of NTA is the asset-based reallocation. Asset reallocation is provided by asset income less saving. This is built from the classic assumption that if an individual saves and buys an asset that will generate income, in the first round; the saving reduces the income, thus becoming an outflow. In the second round, the asset will yield some level of income, which becomes inflow to the asset income portfolio of the individual. Institutively, the difference between asset income and saving (investment) will yield either a positive or negative inflow or net asset to the individual. To maximize in lifecycle saving by use asset-based reallocation, a classic option will be to allow net asset-based reallocation to be negative during lifecycle surplus years. In the later years of retirement, the lifecycle saver generates inflows, positive net asset-based reallocations, adequate to take care of his or her lifecycle deficit.

The final component of the flow account in the NTA are the transfers. NTA system measures transfers as a transaction that shifts a good, a service, or cash from an individual belonging to one age group to an individual belonging to another age group with no expectation of compensation or an explicit quid pro quo in any form (Manson et al 2006). Inflows are transfers that are received while outflows are transfers that are paid out and be public or private. The difference between the inflows and outflows is the net transfer.

Public transfers are mediated through government institutions. Governments collect taxes from members of one age group and make transfers to members of other age groups. Public transfer inflows can be in the form of in-kind transfers, which in NTA are treated as public consumption. Public cash transfers in the NTA system may take the form of unemployment benefits, welfare payments to mothers with dependent children, pensions, and so on. Thus transfers consist of inflows to the beneficiaries of the program (such as education and health) and outflows comprise taxes from taxpayers to the government. Public net transfer is the difference between transfer inflow and outflows from the public sector. On aggregate, net transfer must sum to zero though it can be either positive or negative for any particular age group. The inflows from public collective goods like national defense are assigned on per capita basis. Public transfer outflows are assigned to tax payers based on tax incidence rules consistent with generational accounting, where it is assumed that the incidence of tax falls on the entity that pays the tax. For instance, payroll taxes are assumed to be paid by workers, sales tax by consumers, and property tax by owners of property (Auerbach and Kotlikoff, 1999).

Private transfers are dominated by family transfers. Three types of private transfers can be identified, e.g., inter-household, intra-household and bequest transfers (see Table 2). Inter-household transfer shifts resources between two existing households while intra-household transfer shifts resources between individuals who belong to the same household. Bequest, another form of transfer assumes resources are shifted to another member of a household largely due to the death of a household head. The death of a household head could result from death of the person heading the household, the merger of two pre-existing households, or intergenerational transition in headship as captured by a change in the individual designated as the household head (Mason et al, 2006).

Apart from the flow account, NTA comprises the wealth account (see Table 2). It should be noted that wealth account is currently under improvement, implying there is still a great deal of work that is going

on in this area. The wealth account provides estimates of wealth income associated reallocations across age groups. Wealth comes in several forms: capital (*K*), land and credit (*M*), and transfer wealth (*T)*. The governing equation for the wealth account is: W=K +M+T.

Total wealth (*W*) and its components can be defined for an individual, an age group, or a population. The first two forms of wealth are familiar concepts. Transfer wealth is conceptually equivalent in that its value derives from expectation of future transfer inflows and outflows. Transfer wealth is thus the present value of net transfers.

Derivation of NTA estimates

In order to arrive at the NTA estimates for Kenya, the relevant age profiles relating to specific variable were generated (see Mason et,al., 2007 and Mason et,al., 2008).

The first step in constructing NTA is to determine per capita values of NTA component (e.g., private household education expenditure, and private household health expenditure) by age group in single years using data from household survey.
The second step is to multiply sample averages by population size at each age to obtain aggregate totals. The third step is to compute adjustment factor, i.e., the ratio of NIPA to NTA totals using macroeconomic control totals in NIPA such as private consumption or taxes. The fourth step is to adjust total values obtained in second step by multiplying it with the adjustment factor (beta) computed in the third step in order to build consistency between NTA figures and aggregates in the National Income Accounts. Some of the sample averages are smoothed before scaling them to the population aggregates.

In some cases, especially for public consumption, the reverse process is followed, wherein control totals or NIPA figures are first obtained, which are then equally distributed to the identified consumer population groups projected from the survey, after which per capita values are obtained by dividing the aggregate totals by the population size. Since most income and expenditure surveys contain only household-level values, the components are distributed to household members using allocation rules specific to that component. These apportioning rules are discussed in the NTA website. The utilization rate from the survey once generated helps to generate age profiles, particularly for the public consumption. If utilization data for public consumption does not exist, then a horizontal age profile depicting a constant per capita usage is generated.

Constructing individual age profiles

To construct the Kenyan NTA, data from the Welfare Monitoring Survey, 1994 (WMS II) was used. The WMS II is a nationally representative household survey conducted by the Kenya National Bureau of Statistics (KNBS), Ministry of Planning and National Development. The survey gathered information on 10857 households and some 59000 individuals. This section draws heavily from Mwabu and Muriithi (2008) and extensively uses the same text as in our earlier paper on this subject.

The overall consumption profile was estimated from consumption expenditures by each individual in the survey. Consumption expenditure is categorized into *public* and *private* consumption. The two categories are further re-classified into health, education and other consumption. The total consumption age-profile expenditure is a summation of public expenditure age-profile and private consumption expenditure age-profile. Education consumption expenditure and health consumption expenditure follow specific allocation rules that guide the apportionment of respective consumption by age to individuals within a household. These allocation rules are discussed in the NTA website. Prominent among these, are regression-based allocation rules that were used to apportion household level education and health consumption expenditures to individuals at various ages.

Age-profiles for private consumption is a summation of age-profiles for private education consumption, private health consumption and private other consumption. Private education consumption is derived from adding up all the related education costs for individuals in private schools and other private institutions at each age. The WMSII has information on private education costs for each individual by age and school level. To generate private education consumption age-profile, the total cost at each age was divided by the total number of individuals at each age to yield the mean cost of schooling at each age. This is the per unit cost of education at age reported in the household survey.

Labor income includes the compensation of the employees in terms of wages and salaries, fringe benefits and deferred payments. It also includes labor's estimated share of mixed income (self-employment income). Imputed labor income for unpaid family worker is also a component of labor income.

Estimation of the wage income was derived from employees in both formal and informal sector from the WMSII of 1994. Since the WMSII survey has the age structure of the employees, it was possible to construct age-wage profiles, reflecting total wage income at each age. The total wage at each age was divided by the number of individuals at each age in the survey to get the mean wage-income for each age. These average wages constitute age-profile of mean wage incomes from the household survey.

Self-employment income came from individuals operating their own businesses, as recorded in the survey. It is assumed that the whole of the income made by self-owned businesses was not attributable to the individual alone. Rather, a fraction of it was attributable to capital invested in own business. Out of the income made by a business, 1/3 was allocated to capital while the remaining 2/3 was allocated to the owner of the business. Thus, self-employment income was computed as 2/3 of the self-reported, self-employment income of the household head. Since information was available on age structure of the self-employed workers in the survey it was possible to construct the age-profile of labor income from self-employment.

Another type of labor income that is reported is the imputed self-employment income. This is labor income from self-employment that was apportioned to individual members of the household. Imputed self-employment income was allocated according to the age of the household members and according to the mean income of family members in self-employment.

Imputed self-employment income at each age is equal to mean wage income at each age expressed as a proportion of total household wage-income multiplied by 2/3 of household self-employment income. To compute the age profile for imputed self-employment labor income, the total of imputed self-employment labor income at each age is divided by individuals at each age to derive a mean for each age. It is worth noting that the mean of imputed self-employment labor income and the mean of wage income of individuals at each age yield the total labor income at each age.

The macroeconomic controls for self-employment labor income and imputed self-employment labor income were not provided in NIPA (i.e., mixed income figures were not available in any of Kenyan SNA data sets). As a consequence, the macro control for self-employment labor income had to be imputed. It was estimated by dividing 2/3 of self-employment income by wage income and then multiplying this ratio by compensation of the employees in NIPA. Since 2/3 of self-employment income (the amount that we interpret as self-employment labor income) was 77 percent of wage income, the imputed macro control for self-employment labor income was 0.77 *times* compensation of employees in NIPA.

The same formula was used to compute macro controls for imputed self-employment labor income. In this case, 2/3 of *imputed* self-employment labor income was divided by wage income and multiplied by compensation of employees to yield the macro control for imputed self-employment labor income.

The macro control for total private consumption was available in NIPA in form of final consumption expenditure. However, macro controls for its three components were not available in NIPA. To construct macro controls for each of the three categories of private consumption, each category was expressed as proportion of total private consumption expenditure from the survey. The macro control for each category was then computed by multiplying the relevant proportion from the survey by the household final consumption expenditure in NIPA. For example, the macro control for private education expenditure was estimated as total private education expenditure from the survey divided by overall private expenditure from the survey multiplied by the household final consumption expenditure in NIPA. The same computation method was used to obtain macro controls for private health care consumption and private other consumption.

The macro control for public other consumption expenditure was not directly observable in NIPA. To generate macro control for public other consumption, the sum of public education consumption and public health consumption was subtracted from government final consumption and the balance was interpreted as the macro control for public other consumption expenditure.

The WMSII survey did not capture tax payments by households. In view of this, labor income, asset income, and total private consumption were used to compute average tax rates in the survey using the tax information reported in NIPA. In order to compute macro control parameters (multipliers) for taxes (i.e., tax betas), a tax rate of 100% was assumed for labor and asset taxes in the sample survey. For example, all labor income was assumed to have been paid to government in form of taxes. Under this assumption, it was possible to link taxes in the sample (e.g., all labor income) to tax on labor income in NIPA (the macro control). It is important to stress that a macro control in NIPA is the counterpart of the

same variable in the household survey. If NIPA and the household survey do not share the same variable, a macro control for that variable is not defined.

Once tax variables were defined in both the survey and NIPA, the tax betas (macro control multipliers) and tax rates (proportions of income that households paid to government in form of taxes) could be computed. Consistent with the formula for computing the macro control parameters, the tax amount reported in NIPA divided by the NTA tax amount (the tax amount assumed to have been paid by households), is the tax beta. This beta is the adjustment factor for the tax amount assumed for sample households. Multiplication of the tax amount assumed for sample households by the tax adjustment factor (tax beta) yields the actual amount of tax paid by households. Thus, the tax beta (the ratio of NIPA taxes to taxes assumed for households, which constitute the entire labor income) is clearly the average tax rate for the sample. In other words, this is the implicit average tax rate for labor income in the sample survey.

To construct the labor income tax profile, the labor tax in NIPA was divided by labor income from the survey to obtain the average tax rate. The average tax rate was multiplied by mean labor income at each age to obtain labor income tax profile by age.

To construct the asset income tax profile, asset income tax from NIPA was divided by the asset income from the survey. The resulting average tax rate was multiplied by the mean asset income at each age in the survey to yield asset income tax profile. However, since the WMSII captured rent income as the main asset income, the asset tax profile is only approximately estimated.

Consumption tax profile was constructed using information on private consumption in WMSII, and data on consumption tax reported in NIPA. The consumption tax in NIPA is the macro control variable for the private consumption in the survey. To establish the actual consumption tax paid by individuals to the government, the consumption tax from NIPA was divided by the assumed private consumption tax in the survey to yield average tax rate in the survey (i.e., beta or the tax multiplier). Multiplication of the average tax rate by the mean of private consumption at each age in the survey, yielded private consumption tax profile

Since this budget surplus is evidence of receipt of a transfer surplus by the government, the general tax or total tax revenue was taken as the NTA tax figure, and budget surplus as NIPA figure (the macro control) in order to construct the transfer surplus profile. Division of the budget surplus (the tax amount not spent) by the total tax revenue yielded the budget-surplus adjustment factor. Multiplication of the mean total tax revenue at each age by the budget-surplus adjustment factor yielded the transfer surplus profile for the government.

III. PRELIMINARY ESTIMATES AND DISCUSSION

Labor Profiles

The discussion in this section draws heavily from Mwabu and Muriithi (2008). Figure 1 below shows the income profiles for both the wage earners and non-wage earners. As discussed above in the section of construction of labor income profile, four labor income profiles were constructed, namely, wage-income profile, 2/3 of imputed self-employment labor income profile, 2/3 non-imputed self-employment labor income, and total labor income profiles.

<figure1 about here>

On average, earning of labor income in Kenya starts at an early age of 18 years. This could be explained by the fact that young adult are engaged in the informal sector at early an age. According to the estimates, there is practically no retirement in the self-employed sector as compared to wage employment sector, where labor income starts dropping sharply at around age 55 due to enforcement of retirement rule. Maximum labor income is attained at around age 40, which is consistent with the labor market conditions in Kenya where most of the labor force is either engaged in wage employment or in the informal sector.

Public Consumption profile

Figure 2 shows estimated profiles of per capita public consumption in education, health care and public other consumption. As expected, education expenditure is pronounced between the age of 3 and 35 years. It is highest at between age 6 and 19. This time trend of expenditure mimics the level of education and government spending in primary, secondary and tertiary institutions including university and colleges. For example, the expenditure pattern for age 7 to age 13 corresponds to primary education, while expenditure for 14 to age 20 corresponds to secondary schools and tertiary institutions. The pattern for age 21 through 25 shows a declining trend in public education expenditure, which corresponds to the time for investment in university education.

<Figure 2 about here>

Public health consumption has the horizontal J-shape after the age of 20 indicating that government spends more on child health care due to high demand for child health care. From age 40, the public health care consumption starts to grow. This consumption pattern is associated with old-age ailments.

Consumption of public other consumption has a horizontal age- profile. This is due to the fact that public other consumption such as security benefits all the households equally irrespective of age. The WMSII questionnaire did not capture utilization rate of other public consumption apart from education and health, and this made it difficult to categorize other public consumption in any other way other than on a per capita basis.

<Figure 3 about here>

Private Consumption

Just like public consumption in health, private health consumption has a horizontal J-shape. This has the implication that children below the age of 10 are more likely to be sick and to seek medical care relative to children at other age groups. Unlike the public health consumption, private health consumption increases sharply from age 45 onwards as shown by the smoothed age profile in Figure 3. This trend is associated with incidence of age-related ailments and the corresponding demands for the health care. The difference in the slope of the profile for the public health consumption and the private health consumption could be due to the mushrooming of private clinics and lack of drugs at government health facilities in the country.

<Figure4 about here>

Private education consumption has a different profile from the public education consumption due to different enrollment rates especially at secondary school level after around age 13. The saddle at age 13 in Figure 4 is associated with an influx of students from private primary school to government secondary schools after completion of standard eight, which is the last grade in the primary school cycle. The upward trend after age 13 in Figure 4 could be associated with private spending in some private secondary schools and in private colleges and universities. There is practically no private education consumption after age 29. It is crucial to mention that the private education consumption displayed in Figure 4 is for 1994 and the pattern could be different for other years.

<Figure 5 about here>

Private other consumption on per capita basis is shown in Figure 6, which has a pronounced hump at ages 25-39. During this period formal schooling has been completed, and most individuals at that age bracket are in wage and mixed employment. Demand for durable goods and food is also likely to be higher at this phase of the life cycle relative to other phases.

<Figure 6 about here>

It should be noted that marriages and associated social events are frequent at this age. After age 40, the smoothed profile in Figure 5 becomes nearly flat, but with a detectable upward trend.

A comparison of the three types of consumptions in Figure 7 shows that total private consumption is driven by private other consumption. Unlike private health consumption, private education consumption is negligible at ages 5 to 20. This suggests that in 1994, government met most of the private education needs of the population. Private health consumption is quite low for age 10 to 20 mimicking the pattern in public health consumption in Figure 2. At early age (age 1-5), total private consumption is positively associated with private health consumption and private others consumption.

<Figure 7 about here>

Figure 8 shows that private consumption between ages 10-23 is driven by private education and other consumption as education expenditure is negligible. The graph shows that after age 23, the total private consumption consists of private and other consumption, as private education expenditure ceases.

<Figure8 about here>

Figure 9 compares total labor income and total consumption. This comparison is the ultimate objective of estimating all the age-consumption profiles shown in Figures 1-6. Figure 9 shows the difference between the per capita income earned by individuals and their corresponding per capita consumption in 1994 by age. If the mean labor income at each age is greater than the mean consumption at the same age, then that age is experiencing a surplus of labor income.

In our earlier paper, Soyibo et,al (2008), a comparison of consumption profiles of Nigeria and Kenya using available data and after normalizing for unit of analysis, it was evident that per capita total consumption shows a similar pattern as in other countries studied under the global NTA project (see Mason et., 2008), namely, a steep rise in childhood consumption and a relative stability of consumption among working-age adults. A clear contrast occurs at per capita public and private consumption. Kenya's per capita public consumption is much larger than Nigeria's while the reverse is true for private per capita consumption. The contrast in per capita consumption between the two countries is pronounced in health and education consumptions profiles. These preliminary estimates suggest that NTAs for Africa may be uniform across countries on the continent, and that a continental level NTA would simply be an average for all the 53 countries in the region and may never coincide with the NTA for any particular country. There is need to construct NTAs for various years for each country in Africa.

<Figure 9 about here>

Alternatively, if the mean labor income at each age is lower than mean consumption, then that age is experiencing a deficit in labor income. These gaps are recorded in the system of national transfer accounts, but are ignored in the system of national accounts.

In Figure 9, total consumption exceeds total labor income below age 23 and above age 60, implying that in order for these individuals in these age brackets to meet their consumption requirements, they need another source of income, in addition to their labor income. The contrast is true for individuals in ages 23-60 who, on average cannot consume all of their labor income. At age 23 and 60, individual mean income and mean consumption are equal. From age 24 to around age 59, the mean labor income is greater than the mean consumption at the same age. This surplus income is known as the life cycle deficit (LCD) in NTA terminology and is depicted in Figure 9 below.

The Life Cycle Deficit

As already noted, the life cycle deficit shows the difference between consumption and labor income. Unlike the traditional deficit that arises due to consumption falling short of income, the LCD is estimated by subtracting mean labor income from mean consumption at each age. Naturally, very young children and the elderly have low or no labor income, so that their lifecycle deficits are positive. This positive LCD measures the magnitude of transfer that these age groups receive from other age groups. It shows the sizes of resources reallocated from individuals in other ages to persons in these two age groups to enable them meet their normal consumption needs. An important feature of this reallocation, within

and across households is that it is not associated with a quid pro quo at the time that resources are transferred.

Figure 10 shows the life cycle deficit for Kenya in 1994. The figure shows that the child dependency ended at around age 23 while old age dependency started at around age 57. This pattern of dependency needs to be checked with nationally representative data from other surveys in the country before it can be regarded as the norm. According to Figure 8, the surplus life cycle period was between ages 23 and 57.

It is important to note four points about an LCD for any country. First, whenever mean labor income is zero, LCD is equal to mean consumption. Second, at the point where LCD crosses labor income, mean consumption is twice the size of mean labor income. Third, at the point where mean labor income crosses mean consumption, LCD is equal to zero. Fourth, LCD is at its peak when the difference between mean labor income and consumption is largest, which is usually at prime working ages. In 1994, the Kenyan LCD peaked at age 40.

<Figure 10 about here>

Figure11 shows Lifecycle deficit on its own, without mean labor income and mean consumption. It is important to note that the portion of LCD that is below the zero line on x-axis is expected to match the two portions on either side of the LCD through re-allocation of resources among individuals which is done by households, governments, non profit- making institutions that serve households.

<Figure11 and 12 about here>

Using the available data for Nigeria and Kenya, Figure 12 shows a comparison of LCD for Kenya and Nigeria (Soyibo et,al ,2008). It is evident that labor surplus for Nigeria starts much later at age 33 compared to Kenya's which starts much earlier at age 23. The span for labor surplus spread for 34 years in case of Kenya compared to 29 years for Nigeria. Nigeria's child dependency is very close to that in developed countries like Germany with child dependency ending at around age 30. Kenya on the other hand, has a child dependency stopping at an early age of around 23, but as suggested earlier we need to use several sets of data in order to verify this trend.

Tax age profiles

The asset income tax profile is pronounced after age 25. Since rent was the main source of asset income reported in the survey, the profile in Figure 13 should be interpreted with caution. The same comment applies to profiles for labor and consumption taxes because information on these was not reported in the survey. The profiles for labor and consumption taxes are based on imputations of these taxes using the methods explained earlier.

<Figure13 about here>

The depression in the asset income tax profile between ages 50 and 57 could related to asset re-allocation by household heads through the disposal of assets to finance private consumption like education. Most households at this age bracket are likely to be paying for educating their children in secondary schools and colleges where schooling expenses are high. The sharp increase in asset income tax after age 60 could be due to the fact that imputed tax income is exaggerated.

The consumption tax in Figure 13 follows the consumption age profile. Labor income tax is in tandem with labor income. In 1994, children and the very elderly did not pay labor income tax, in contrast with the situation for consumption tax. As noted earlier, in 1994 the Kenya government registered a budget surplus. This meant that tax revenue was greater than government expenditure. Budget surplus is an outflow for households and an inflow for the government. The transfer surplus profile traces the contribution of each age to this budget surplus. As is the case with other methods, the formula for computing the transfer surplus for the government and the associated tax burden is explained in the NTA website.

Figure 13 shows that at early ages (ages 1-20), the government transfer surplus is driven by consumption tax, while at age 20-57, the three taxes determine the size of the transfer surplus. At later ages (age 60 and above), the shape of transfer surplus profile is determined by consumption and asset taxes.

Public Transfers profiles

Public transfers in NTA are classified by sectors or functions following the Government financial statistics. Usually, the NTA for the public sector covers transfer education, health, pension, other social protection and public, others the like of general public services, defense, environmental protection, housing and community amenities, economic affairs and recreation, culture, and religion.

Figure14 shows the trend of public Transfers in terms of transfers inflows and outflow. The difference between the inflows and outflows yields the net public transfers. According to the estimates, inflows track public education consumption profile in figure 2. Apparently, inflows take a horizontal trend after age 25 suggesting a constant per capita inflows at all levels of ages. This uniqueness is due to missing data form the SNA with a classic example of pension scheme data which should change the inflow trend at older ages.

< Figure 14 about here>

The trend of outflows up to age 50 is in accordance with expectations. At an early age, the young people are paying taxes corresponding to their consumption. It is clear from the trend that after age 23 the outflows follows the labor income trend in figure 14 although in opposite direction. This marks individuals entry into the job market which traps them into the tax net. The net transfers follow inflows at early ages, undoubtedly signaling a situation where government is spending more than it is receiving in form of taxes from these ages. However, moving further away from age 23 upwards, it is clear that the government is receiving more tax revenue than it is spending on corresponding age groups. This is

not surprising, especially for ages 25 to around 57, where the assumption of no age-related targeted programs cannot be justified based on available data. However, the trend could be used to justify the existence of budget surplus.

Kenya's net public transfer for 1994 had a noticeable peak at ages between 70 and 80. This corresponds to a general tax that was heavily affected by asset income tax. Data for asset income tax from the survey were somewhat inadequate given the fact that only rent income was clearly observable from the survey. Consequently, large asset income tax from the SNA and low asset income from the NTA yielded large tax rate (tax beta) which inevitably magnified per capita asset income tax profile whenever rent income was reported. Ideally, asset income tax profile being part and parcel of the general tax played a major role in shaping the general tax profile.

The net public transfer for Kenya and Nigeria is comparable (Soyibo et,al, 2008) (see Figure 15). At early ages, net public transfer is positive in both countries while after 27 years for Nigeria and age 23 for Kenya it is negative. From this trend, it is evident that Kenya and Nigeria are net-tax payers receiving no net transfers.

IV. CONCLUSIONS

In Kenya little is known about resource flows across age groups and how these flows operate across various types of investment areas, such as education, health, and savings, and pension schemes. The objective of this research was to fill this gap using recent NTA models. The NTA framework developed by Mason et al (2007) has been used to estimate NTA for Kenya using 1994 data. The results presented in this paper are preliminary, as more work is underway to confirm them using data for other years. Even so, the estimates we report for age-consumption profiles, the lifecycle deficit, tax profiles, and age profiles for public transfers provide information that policy makers in Kenya can begin to use to change private and social expenditures in ways that will help the country achieve the millennium development goals, as well as the more general development goals.

REFERENCES

Ashford, Lori S (2007), *Africa's Youthful Population: Risk or Opportunity?* (2007), accessed online at www.prb.org/pdf07/AfricaYouth.pdf.

Auerbach, A. J., J. Gokhale and L. J. Kotlikoff (1991), Generational Accounts: A Meaningful Alternative to Deficit Accounting, in: *Tax Policy and the Economy, ed,* D. Bradford. Cambridge, MA., MIT Press, 55-110.

Ajayi, Ayorinde and John Kekovole (1998), "Kenya's Population Policy: From Apathy to Effectiveness," in: *Do Population Policies Matter?*, ed, Anrudh Jain, New York: Population Council, 113-25.

Bloom, D. E. and J.G. Williamson (1998) “Demographic Transitions and Economic Miracles in Emerging Asia.” *World Bank Economic Review* **12**(3):419-456.

Bloom, D. E. , D. Canning and J. Sevilla (2002), *The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change*: Santa Monica CA: RAND.

Bommier, A. and R. D. Lee (2003), "Overlapping generations models with realistic demography," *Journal of Population Economics* **16**: 135-160.

Haub Carl(*2007), World Population Data Sheet* (Washington, DC: Population Reference Bureau, 2007); UN-HABITAT, "Slum Estimates Data - Table 1: Population of Slum Areas at Mid-Year, by Region and Country 2001," accessed online at ww2.unhabitat.org,

Kelley, A. C. and R. M. Schmidt (2001), “Economic and Demographic Change: A Synthesis of Models, Findings, and Perspectives”, in N. Birdsall, A. C. Kelley and S. W. Sinding, eds, *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*. Oxford: Oxford University Press**:** 67-105.

Kluge, F. A. (2008) “National Transfer Accounts for Germany”. Presentation in Workshop on Population and Policy: A Follow-Up Workshop, Honolulu, Hawaii, 20 June.

Lee, R. D. (1994a), *The Formal Demography of Population Aging, Transfers, and the Economic Life Cycle, in: Demography of Aging, Eds,* L. G. Martin and S. H. Preston, Washington, D.C.: National Academy Press**:** 8-49.

Lee, R. D. (1994b), “Population, Age Structure, Intergenerational Transfers, and Wealth: A New Approach, with Applications to the US, the Family and Intergenerational Relations”*, Journal of Human Resources.* **XXIX:** 1027-1063.

Lee, R. and A. Mason (2008), “*Fertility, Human Capital, and Economic Growth over the Demographic Transition”,* Working Paper. http://www.schemearts.com/proj/nta/show/Working%20Papers,. Retrieved 10 April 2008.

Mason, A. (2001), *Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized,* Stanford, Stanford University Press.

Mason, Andrew, Ronald Lee, An-Chi Tung, Mun-Sim Lai, and Tim Miller, (2006). “Population Aging and Intergenerational Transfers: Introducing Age into National Accounts”, NBER WORKING PAPER SERIES working paper No.12770. (National Bureau of Economic Research:1050 Massachusetts Avenue Cambridge, MA.

Mason, A. et al (2007) “The Economic Life Cycle and Population Age Structure,” Substantive Report of Work accomplished during the 38th Summer Seminar on Population Workshop on Population, Development and Policy: The Economic Payoff of Population Change, East West Center, Honolulu, HI.

Mason A. et al. (2008), Lectures and Presentations at the Seminar on Population, Development and Policy: A Follow-Up Workshop, 39th Summer Seminar on Population and Development, East-West-Centre, Honolulu, Hawaii. 3 June-3 July.

Soyibo A., Mwabu G., Olaniyan O., Muriithi M. (2008), "National Transfer Accounts of Kenya and Nigeria: Some Estimation Results," Paper presented at Western Economic Association International Conferencee(WEAIC) held at Sharaton hotel, Waikiki, Honolulu, HI.

Figure1 Labor Income and its components in Kenya

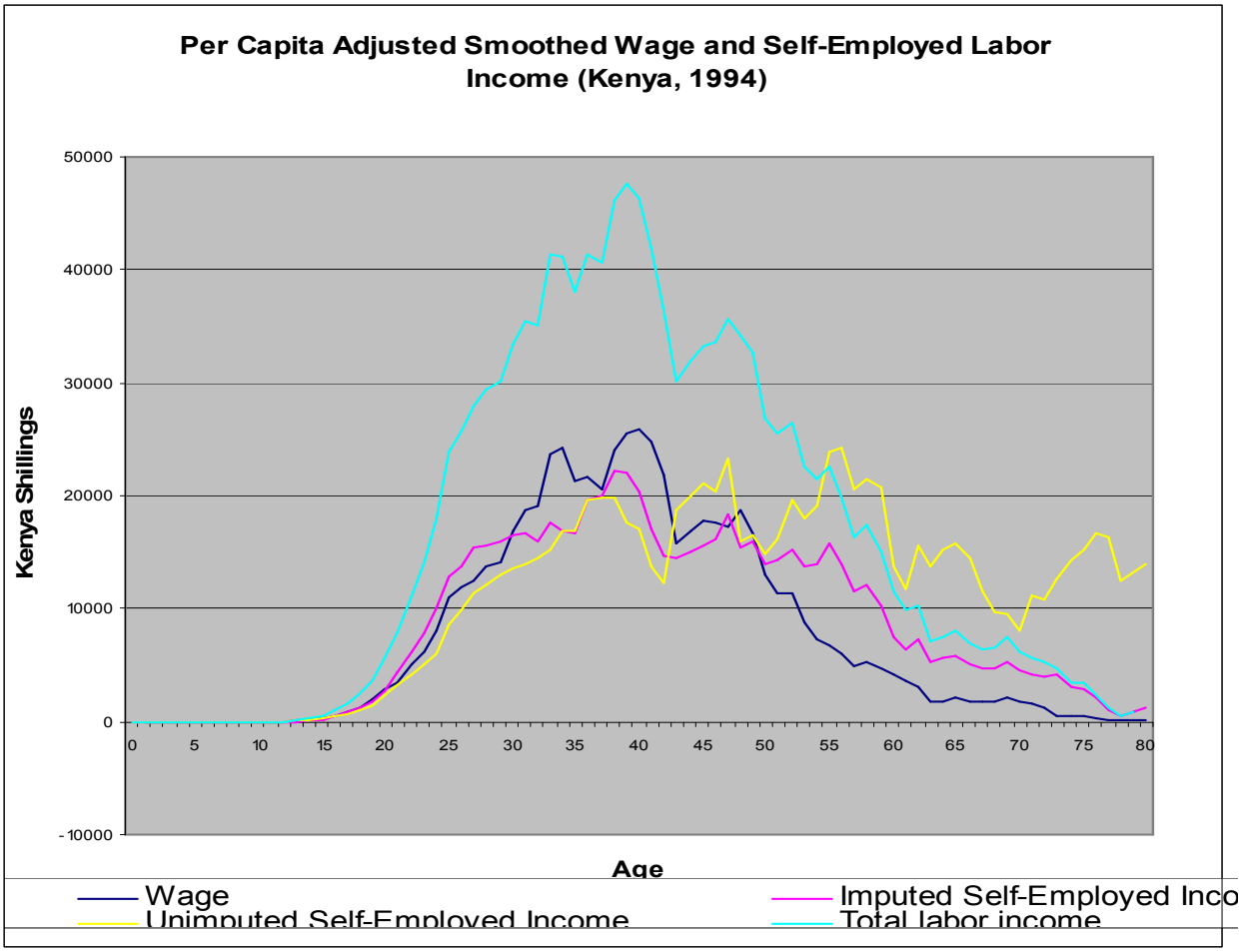

Figure2. Components of Public consumption in Kenya

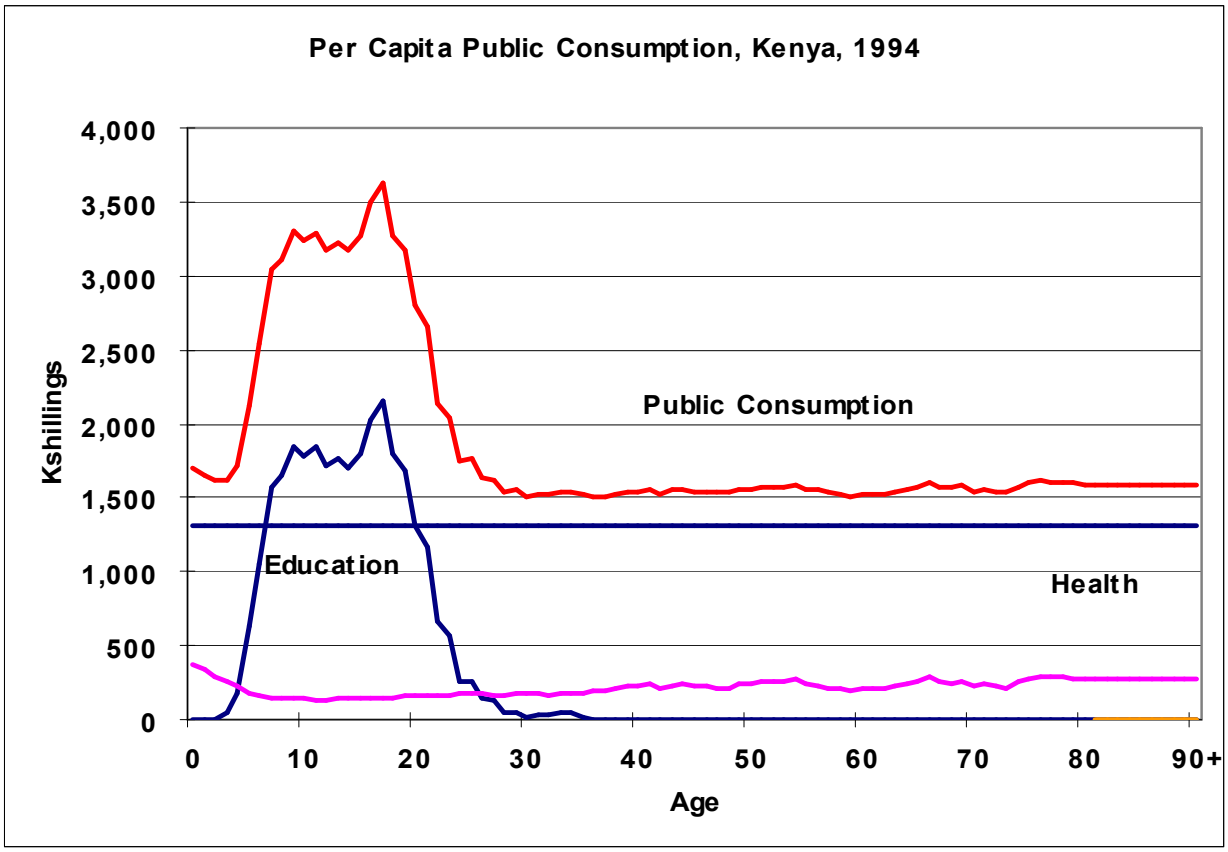

Figure 3 Kenya and Nigeria Public Consumption in Health and Education

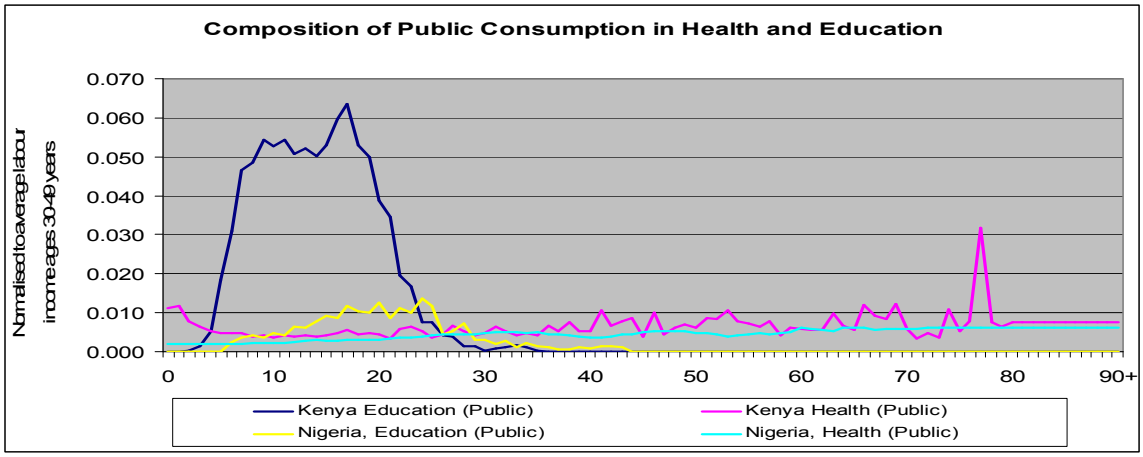

Figure 4: Kenya Private Consumption in Health

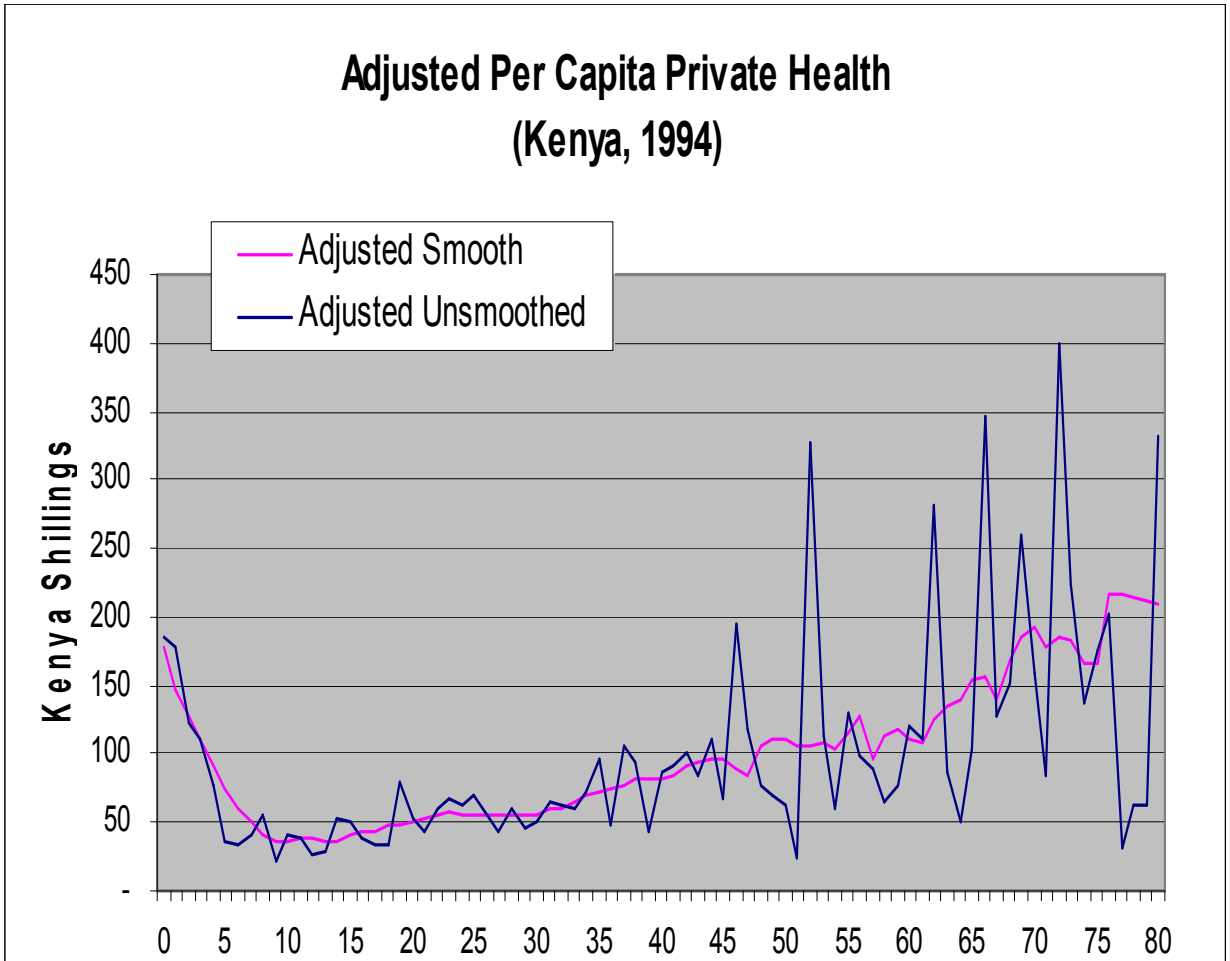

Figure5 Kenya Private Consumption in Education

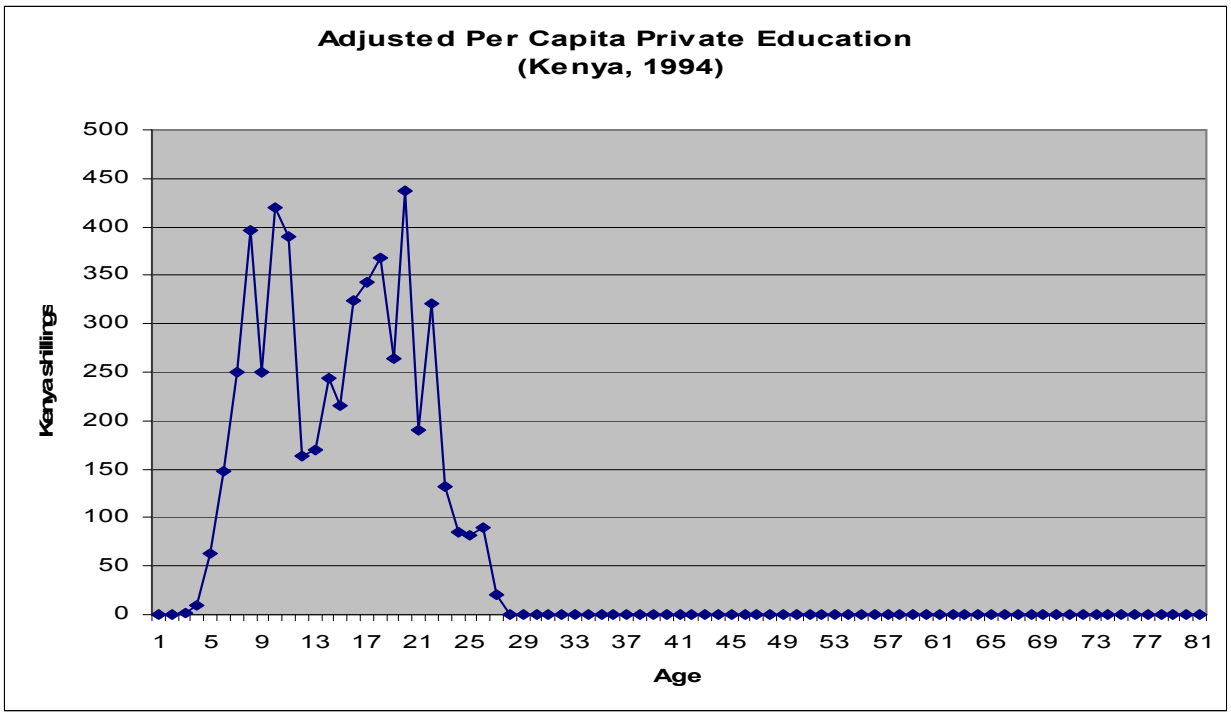

Figure6 Kenya Private Consumption in Others

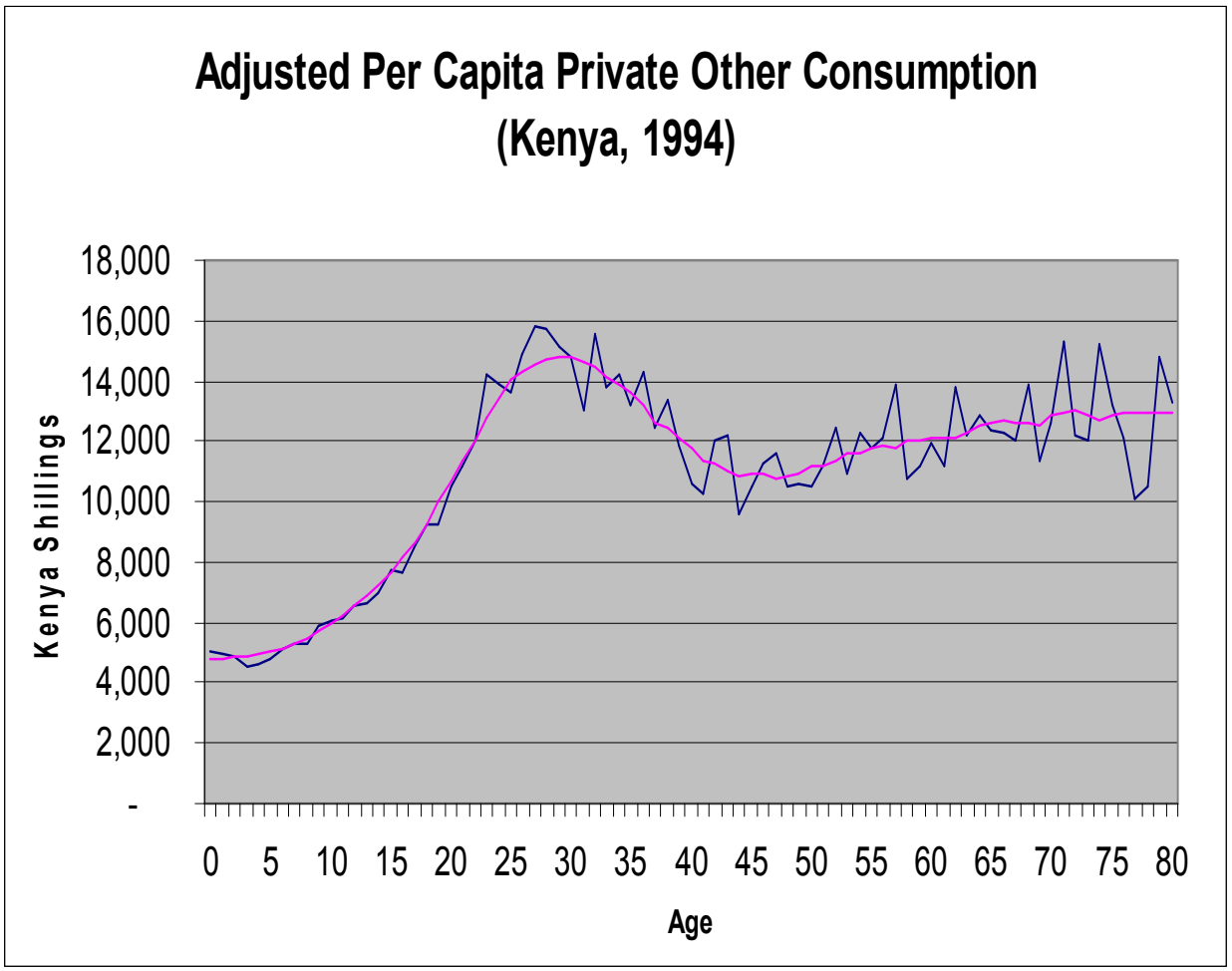

Figure7 Kenya Components of Total Private Consumption

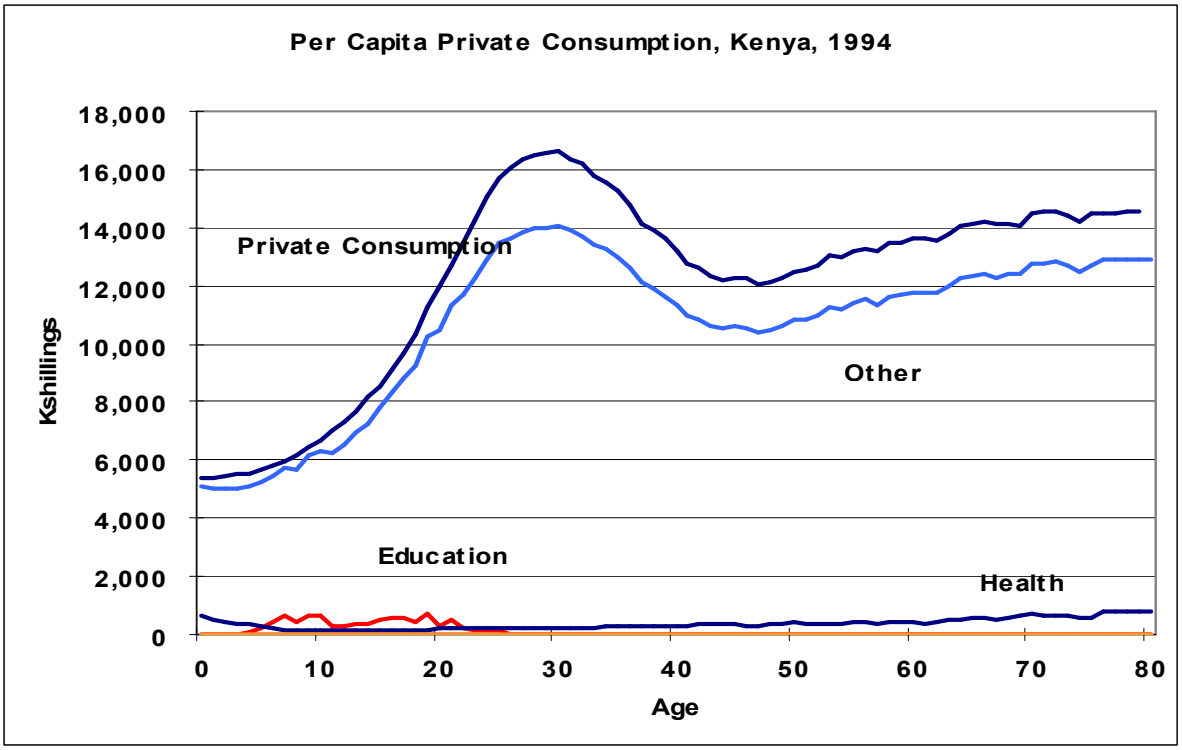

Figure 8. Components of Private consumption in Health and Education: Kenya and Nigeria

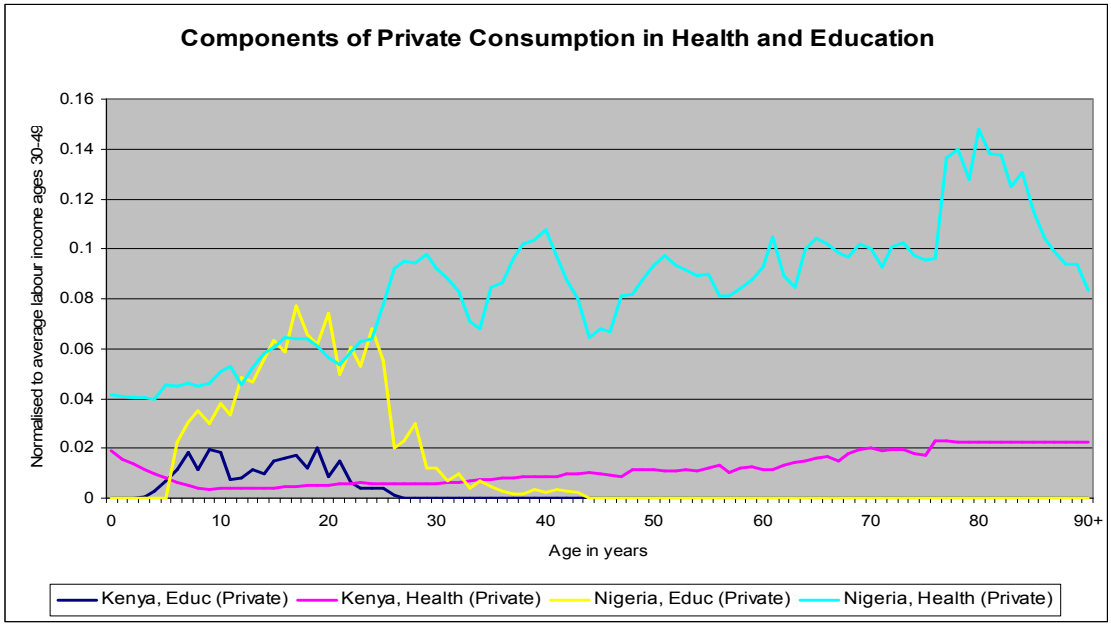

Figure9 Consumption and labor income in Kenya

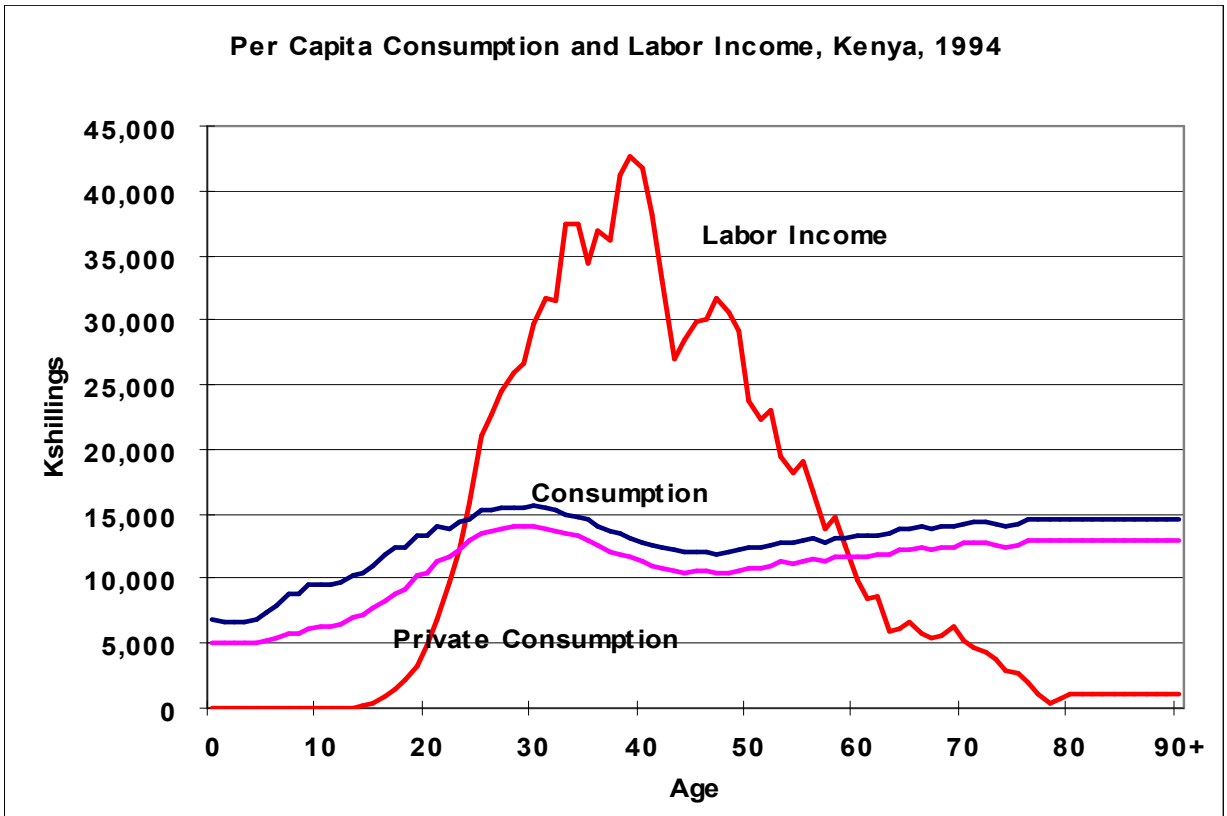

Figure 10 Lifecycle Deficit : Kenya

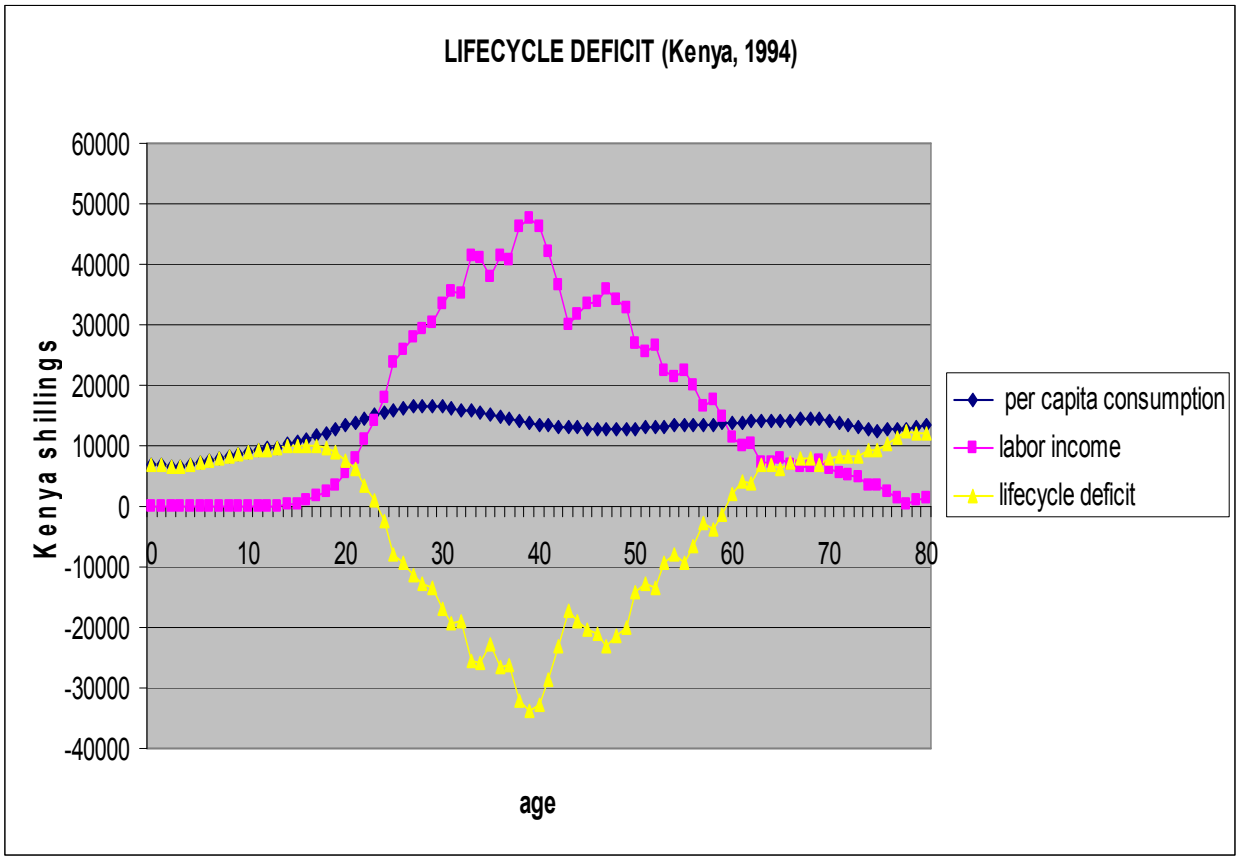

Figure 11 Trend of Lifecycle Deficit: Kenya

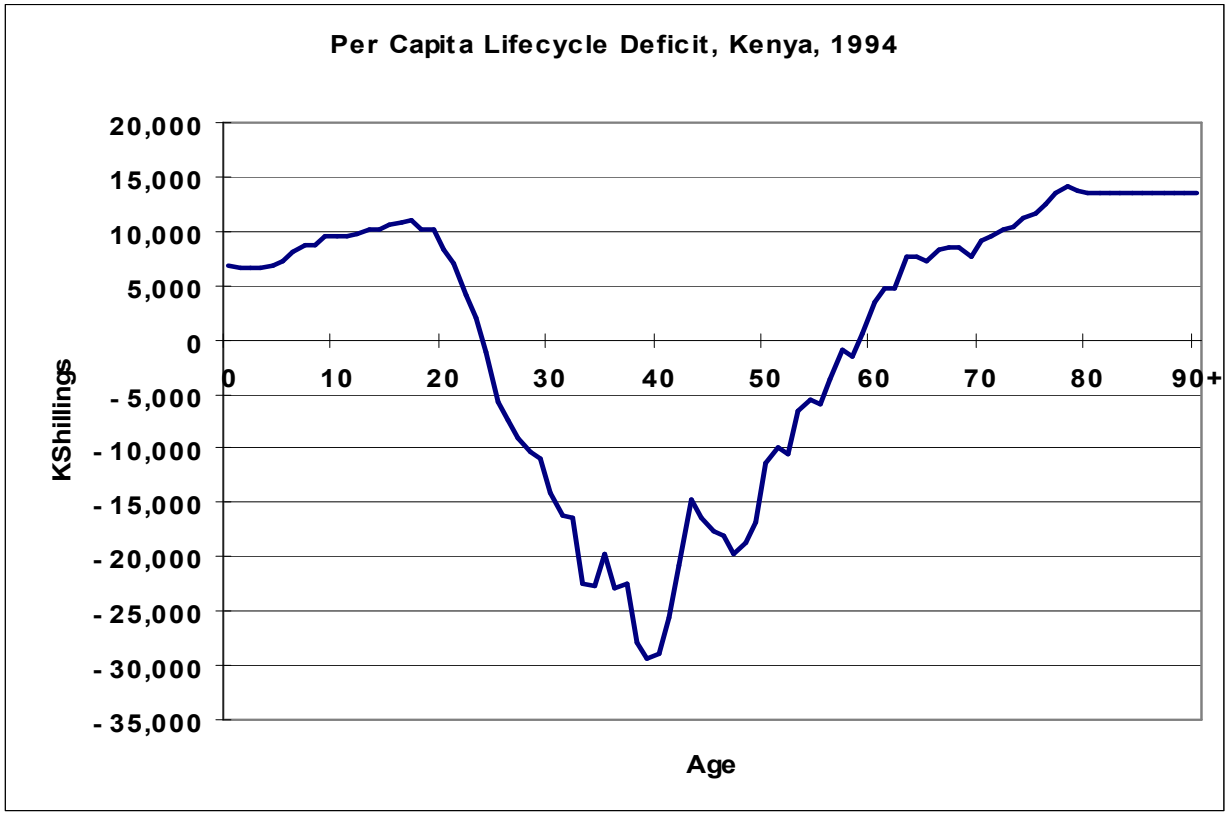

Figure12 Lifecycle Deficit Kenya and Nigeria

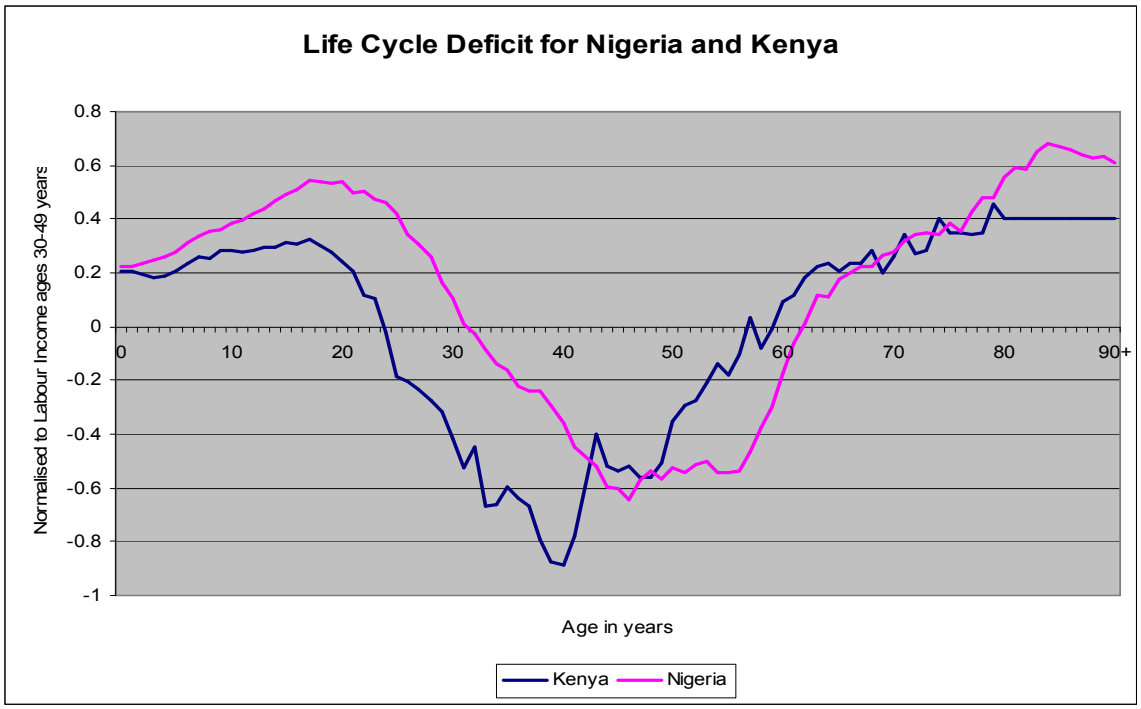

Figure 13 Components of Tax Profiles in Kenya

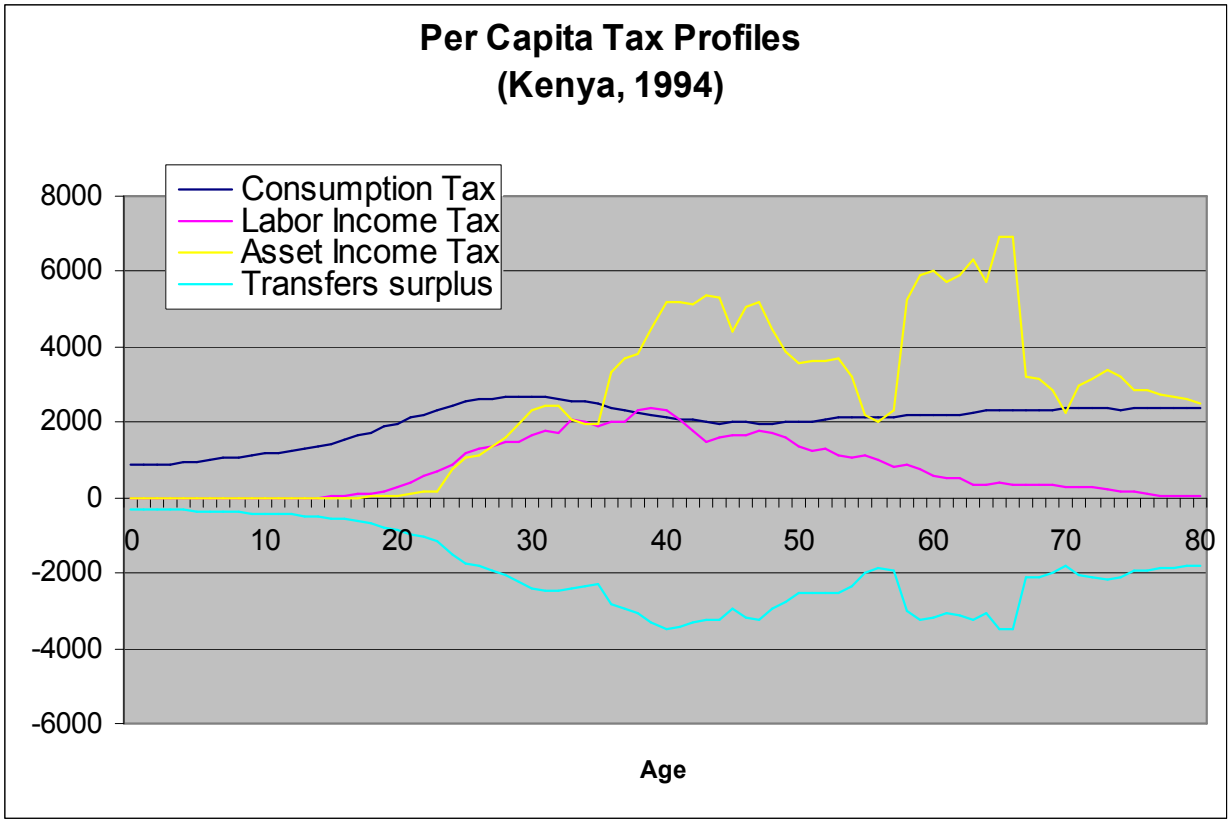

Figure 14 Public Transfer In Kenya

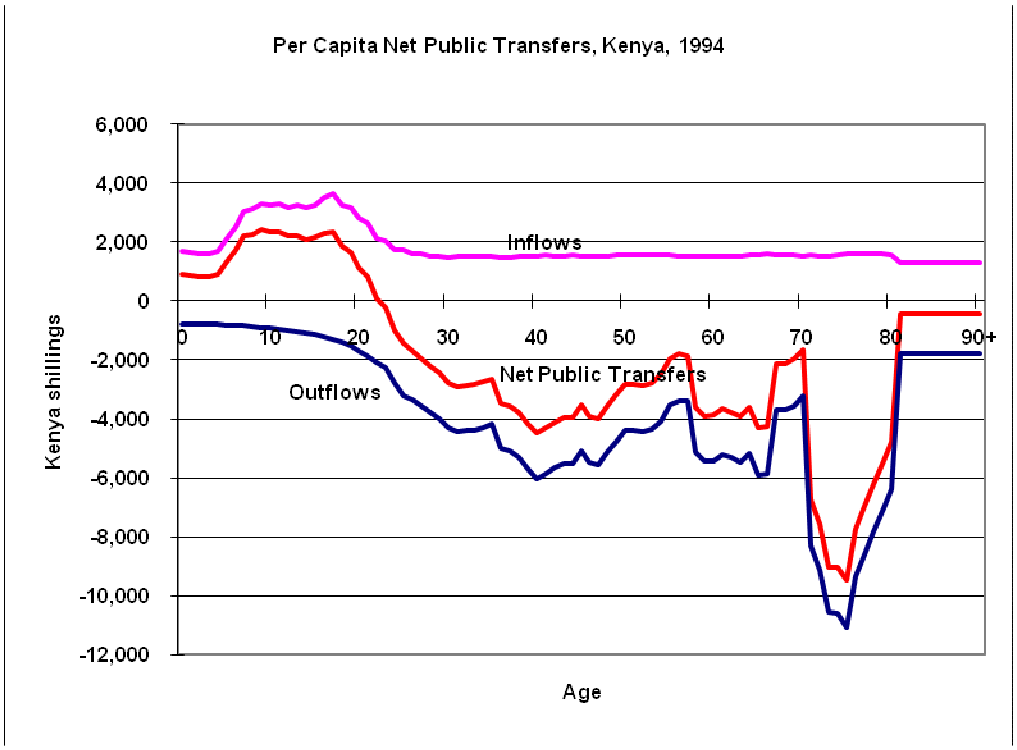

Figure 15. Public Transfer: Kenya and Nigeria

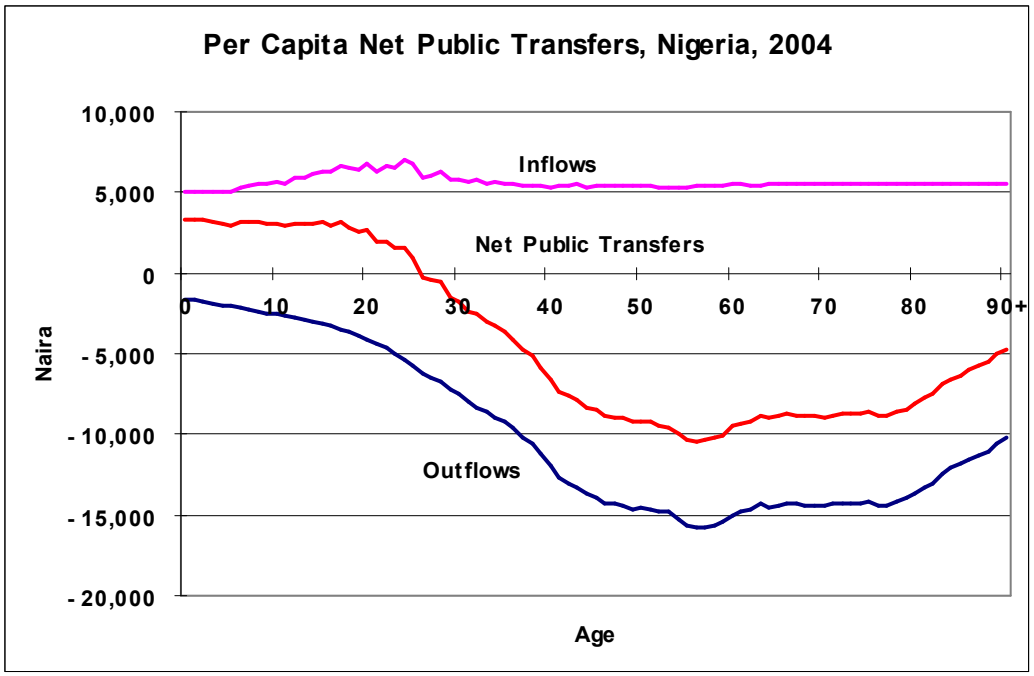

Table 1 Selected Demographic Data for Kenya

Population,mid-2007	37 million
Projected population 2050	65 million
Infant mortality rate	77
Total fertility rate	4.9
% of population< age15	42
% of population age 65+	2
Life expectancy(years)	53

C. Haub, *2007 World Population Data Sheet*

Table 2 The Structure of National Transfer Account

Main components	Sub-components	
Lifecycle deficit	Consumption • Public consumption on education, health other • Private consumption on education, health, others Less: labor income • Earnings • benefits • self-employment	
Asset Reallocations	Public asset reallocation • Income on assets	

	• less: Public saving Private asset reallocation • Income on assets • less: Private saving	
Transfers	Public transfers • Inflows on ▪ in-kind ▪ cash • outflows on ▪ direct taxes ▪ indirect Private transfers • Inter-household ▪ inflows ▪ outflows • intra-household ▪ inflows on education, health and others ▪ outflows on education health and others • Bequests ▪ inflows ▪ outflows	

NTA Wealth Account.

Wealth	Capital Property and credits
Transfer wealth	Public Private

Source: various NTA work

Table 3: Per Capita Flow National Transfer Accounts, Kenya 1994 (million Kenyan Shillings)

Age group (years)	**0-19**	**20-29**	**30-49**	**50-64**	**65+**	**TOTAL**
Life cycle Deficit	**8,693.75**	**-2,444.05**	**-20,643.59**	**-2,502.94**	**10,131.90**	**1,374.69**
Consumption	**9,023.88**	**13,003.32**	**13,721.97**	**12,987.34**	**14,192.01**	**11,116.50**
Public Consumption	**2,686.71**	**1,662.34**	**1,528.34**	**1,549.33**	**1,576.74**	**2,282.70**
Education	1,176.57	354.06	12.17	0	0	771.43
Health	192.85	150.2	198.89	232.04	259.45	193.98

Others	1,317.29	1,158.09	1,317.29	1,317.29	1,317.29	1,317.29
Private Consumption	**6,337.18**	**11,340.97**	**12,193.63**	**11,438.01**	**12,615.26**	**8,833.80**
Education	331.69	126.44	0	0	0	219.96
Health	250.53	175.15	277.81	409.29	645.84	265.01
Others	5,754.96	11,039.39	11,915.82	11,028.72	11,969.43	8,348.82
Labor Income	**330.14**	**15,447.37**	**34,365.56**	**15,490.28**	**4,060.10**	**9,741.81**
Compensation of Employees	195.28	8,061.95	20,827.65	6,637.79	1,189.72	5,503.85
Self-employed Income	134.86	7,385.42	13,537.91	8,852.49	2,870.39	4,237.96