Consumption and labour income over the life cycle in Mali: A National Transfer Accounts approach

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Abstract

The paper analyses the consumption and production behaviour of the Mali's population by age using the National Transfer Account approach and household surveys and macroeconomic data. It reveals that between the ages of 28 and 66, Malians generate a surplus of 1,620 billion XOF in 2017. This surplus covers only 46% of the social demand of those under 28 and over 66. Women are in deficit over their life cycle, in other words, their level of consumption remains higher than their level of labour income, given their late entry into the labour market. While women consume as much as men over part of the life cycle, they produce 22% of labour income. The results also show that in Mali the level of material well-being measured by consumption declines with age.

Keywords

Introduction

The macroeconomic consequences of population change in Africa are increasingly being investigated (Mason et al. 2022; Dramani 2021; Dramani and Konan 2021; Crombach and Smits 2021; Groth et al. 2019; Dramani and Oga 2017; Olaniyan et al. 2011). Fertility, mortality and migration are three factors that determine the age structure and size of a population. The changing age structure of a population over time has varying economic implications (Lee et al. 2006; Bloom and Sousa-Poza 2010). During the demographic transition,

a window of opportunity opens to the country where the age structure of the population is favourable to economic gains (Lee et al. 2008) – economic potential emerges. However, this economic potential cannot be effectively realised automatically as it requires the implementation of adequate public policies in health, education, labour market and governance (Bahan and Dramani 2020; Mérette and Navaux 2019; Lee et al. 2008).

Mali, with a surface area of 1,241,238 km², is a landlocked country in West Africa. Despite the implementation of a policy to control population growth, Mali's population is growing at a rapid rate due to the high proportion of young people (30% aged 10–24) and social practices that favour childbearing. The population growth rate of 3.6% per year increased the population from 14.5 million in 2009 to 18.8 million in 2017 (INSTAT 2017). The population is highly rural (65% of the total population). 50.4% of Mali's population are women. The age pyramid has a very broad base, implying growing needs in terms of education, health, training and employment (INSTAT 2020) with an estimated demographic dependency ratio of 83%. Since transfer support for education occupies a leading place for Mali, it is advisable to note that given the age of receiving intergenerational transfers and inflationary processes in the economy, different types of transfer support have different «temporary value» for a person. And educational transfers (public and private) – in terms of importance – come out on top.

Between 2005 and 2015, the number of people employed in the productive sectors fell from 83%, 12% and 4% to 62.2%, 28% and only 8% in the primary, tertiary and secondary sectors respectively. While economic growth rate increased from 4.3% in 2007 to 7.2% in 2014 and deceased from 3.6% in 2018 to 2.9% in 2019 with the poverty incidence changed from 47.5% in 2006 to 46.9% in 2014 (INSTAT 2020).

Mali experienced a triple crisis in 2012 (security, political and humanitarian) (Thiam 2017). However, it is more widely accepted that unmet economic needs in a growing population are sources of crisis (Verdugo 2021).

The labour force is expected to grow with the youth of the Mali's population. The evolution of this labour force is likely to have important effects on future production and economic growth. However, migration may reduce the expected effects of the labour force on production and economic growth (Fougère et al. 2004). This massive outflow of population, especially young people, could weaken economic performance. Although a level of human capital (education, health) is necessary to drive and maintain the economic performance of this country.

It is therefore of interest to evaluate and assess the overall social demand in Mali, taking into account the age structure of its population.

The literature on the economic consequences of population change calls for a holistic analysis of economic flow data by age and generation. A first attempt to investigate the burden of ageing on present and future generations was made by the so-called «generational accounting» method (Auerbach et al. 1994). This methodology succeeds in estimating the value of taxes and public transfers received by present and future generations during their life cycle. However, this method ignores the important role of private transfers, particularly those from households, in ensuring intergenerational solidarity (Mason 1988). Taking into account public and private economic flows offers the possibility of a global analysis of intergenerational behaviour in terms of production, consumption, savings and distribution (UN 2013; Mason et al. 2006). The methodology introduces age into the national economic accounts (Lee 1980; Mason 1988; Lee and Mason 2011a, 2011b). This is the interest of the «National Transfer Accounts» methodology. This article uses the National Transfer Accounts methodology to assess social demand in Mali over the intergenerational life cycle.

Literature review

The human economic life cycle has a beginning and an end with moments of dependency (Lee 1994). The ages of economic dependence vary considerably with economic dynamics. It is observed that naturally during childhood and old age people on average are economically dependent due to the biology of the body. Research shows that the change in the age structure of the population – in the context of demographic transition – has economic consequences (Bloom and Canning 2001). A life-cycle economic dependency is defined based on the consumption and labour income of individuals according to their age (Lee and Mason 2010).

The effects on living conditions due to the contribution of the active population are assessed differently. Social charges are bearable for an increasingly large working population. However, the size of the active population remains insufficient to assess economic dependence. Economic dependence is assessed through the structure of consumption and labour income. Most of the time, on average, there is a substantial age group of population who are economically dependent. Dependency periods occur naturally at the beginning and end of biological life. There emerges a triangular shape of the age structure of the population that determines the economic burden of dependency, i.e. the age structure of adults who support young and old (Lee and Mason 2010).

Understanding the economic life cycle involves understanding consumption and labour income by age. The result of the economic life cycle is either deficit or surplus (Lee et al. 2006). These are the economic flows that are determined in a theoretical framework of reallocation of resources between age and generation groups through transfers. Generational transfers are exchanges of economic flows without financial compensation between age groups of individuals with respect to their family, social network or country. These transfers are either private (depending on whether the sender is the individual or group of individuals) or public (depending on whether the sender is the state or the decentralised authority). These reallocations of resources take place in a context of economic activities (production, consumption, savings and distribution) determining the existence of implicit contracts between age groups of individuals and generations. The concern arises to determine the optimal population growth rate in relation to economic flows.

Generational accounts have been used in nested generation models to assess generational transfer flows since the work of Samuelson (1958) cited by Diamond (1965), (Auerbach et al. 1994). This model includes assumptions such as that the life cycle starts at the age of entry into the labour market and ends at the exit from the labour market plus the old age of dependency. Thus, the age groups «child» and «youth» are not part of the life cycle. This shortcoming of the model undermines policy prescriptions that do not take into account child dependency, which has a prominent place in economic life-cycle analysis. Furthermore, Becker and Murphy (1988) show theoretically that there is a link between the transfer of decisions from parents to their children on the level of social welfare outcomes. This is through investments in education, health and childcare.

In order to take into account all age groups in the definition of the life cycle economically, the methodology of National Transfer Accounts would be appropriate (Lee 1994; UN 2013). NTAs are the introduction of age into the national economic accounts, in order to capture the effects of any changes in the age structure of the population on economic performance. The methodology of the National Transfer Accounts has its origins in the work of Lee (1980) and Mason (1988). According to this methodology, the difference between consumption and labour income by age is the life-cycle deficit (LCD). Thus, an understanding emerges of how

changes in the age structure of the population potentially affected individuals with a surplus of production over consumption and consequently on the life-cycle deficit. The analysis of inter-generational economic flow transfers shows the importance of the level of social capital due to the educational, health and other investments that families provide to economic activity. On the other hand, the difference between consumption and labour income in average age, called the life-cycle deficit, is an indicator for understanding social demand at the national level and generational solidarity. Consumption (education, health and others) in the average age is de-rived from the needs expressed by individuals in a nation according to the change in the age structure of the population due to births, deaths and migrations. The existence of a population that is effectively productive, taking into account its level of productivity, makes it possible to assess the social weight that can be sustained by the economy, after the deduction of wealth, financial assets and external transfers (loans and/or grants).

Empirical work on the life-cycle deficit has been developed for both northern countries (Lee et al. 2011) and some African countries (Olaniyan et al. 2011). Consumption age pro-files for a country in humanitarian and security crises are of interest in view of the dynamic nature of the population which could come strongly from migration.

Social demand is the total educational, health and other needs of age-group populations in economic deficit. These needs can be expressed as a percentage of gross domestic product or as a numerical value. It is often present at the beginning and end of life. Lee et al. (2011) compare life-cycle consumption levels in 23 economies in the 2000s. In this study, which is among the most comprehensive in terms of cross-country comparisons, they reach important conclu-sions such as: (i) children's private consumption is lower than that of the rest of the population (working-age population and elderly), (ii) public consumption expenditure for children and adults increases their consumption level, bringing it, for some countries, to levels comparable to that of working-age people, (iii) public consumption is allocated to children's education and health services in particular for the elderly, (iv) in some middle economies (Taiwan or Mexico) people under 30 allocate on average a higher proportion of their total consumption to educa-tion, compared to richer countries and (v) the shares of health consumption expenditure and public consumption expenditure on health are higher respectively in overall and public con-sumption. Otherwise, the type of transfers, mainly received by the older generation (public, private), affects the level of consumer activity of older ages. For countries with a developed sys-tem of state transfers (Europe, Japan, USA), high consumer activity of the elderly population is characteristic (higher than that of young people). And in the countries of Southeast Asia, which are characterized by a small amount of government transfers to the elderly, the level of consumption in older ages is similar to or lower than that of young people.

The results for Spain and Austria indicate that private consumption increases with age up to 58 years, later than in other countries. This is due to greater care of the elderly by public programmes and by families (cohabitation system with parents). Income from work increases rapidly from the age of 14 and peaks at the age of 43. In Spain, icome from self-em-ployment is much lower and grows less quickly than income from wage work (unlike in developing countries), peaking at age 58 (Sambt and Prskawetz 2011; Patxot et al. 2011). The low level of schooling, the dynamism and diversification of the country's social security system may influence the magnitudes of the life-cycle surplus or deficit.

Mason et al. (2006) present the situation of the national transfer accounts of Taiwan (1998) and the USA (2000). They find somewhat similar results despite differences in the demograph-ic and economic trajectories of the two countries. For example, they find that the magnitude of the life-cycle surplus is 33 years in the US, almost the same age as in Taiwan (34 years).

In sub-Saharan African countries and particularly at Sénégal in 2011, an individual is dependent from birth until the average age of 29 (youth dependency) and then when he is over 63 (old-age dependency). In other words, the individual is on average a creditor from the point of view of intergenerational transfers between the ages of 30 and 63, but a debtor from birth until the age of 29 and beyond the age of 63 (ONDD Senegal 2021).

While studies on the life-cycle deficit are increasingly present in the economic literature, they have weaknesses beyond the strength of the methodology in terms of gender analysis of the deficit and its financing, investigations of pension, social security and social protection systems and their sustainability, and the inclusion of domestic work, particularly in developing countries. These weaknesses are largely due to the unavailability of quantitative data for periodic and more extensive analysis over time.

Furthermore, higher levels of surplus than deficits in a country depend on the level of human capital available in the country. However, human capital development in Mali remains affected by its rapid population growth, a strong budget constraint and a security crisis. The security situation has severely undermined the education and health system in Mali with the destruction of infrastructure in the northern and central regions, the departure of staff and the forced displacement of populations.

In the context of 'capturing the demographic dividend', i.e. implementing economic policies to take advantage of an acceleration in economic growth due to the change in the population age structure, particular attention must be paid to improving human capital, employment and governance (Bahan and Dramani 2020). Moreover, migration, specifically the outflow of populations, weakens the chances to capture the demographic dividend, and one factor explaining the outflow of Mali's populations is the presence of unsatisfied social demand.

The difference between consumption and labour income is the result of the economic life cycle, which can be either deficit or surplus. And a deficit of the economic life cycle is specifically the excess of consumer spending over the amount of labour income.

It can also be calculated for a population component, an age group or a country. The source of covering the deficit of the economic life cycle, according to the definitions of the NTA methodology (UN 2013), is income from asset-based reallocations. The structure of the population affects the economic determinants of the life cycle. Highly youthful societies experience a higher level of youth-related ELC. The structure of this deficit changes with the demographic transition, showing a strong contribution from the elderly as the population ages (UN 2013) due to declining labour income and constant consumption levels. This evidence suggests that two countries can have a comparable population size but experience different development paths due to their population structure.

In order to meet people's needs and improve their well-being, it is necessary to set up reallocation systems from people with a surplus to those with a life-cycle deficit (usually the young and the elderly). These mechanisms can be public or private and are conceived as a kind of intra- and intergenerational solidarity. In the generational analysis of the economy, households, firms and other institutions are seen as mediators that promote the distribution of economic flows between individuals. Public education, public health programmes and pension funds are among the main examples of public reallocation, while private savings, credit and family support for children and the elderly are private reallocations. Public and private reallocations are of two kinds. They can be income from asset reallocations or transfers, i.e. flows from one category of population to another, whether voluntary or involuntary (UN 2013). The table below gives the classification and examples of reallocations by age.

Table 1. Types and examples of reallocations by age

	Asset reallocation		Transfers
	Capital income	**Property income / Credit**	
Public	Public infrastructure	Public debt	Public education
		Student loan programmes	Public health
		Sovereign Wealth Fund – currency	Pension funds (pay-as-you-go)
Private	Housing and consumer durables	Consumer credit	Family support for children and parents
	Production equipment, vehicles and other machinery	Land	Charities
			Legacies and donations
		Mineral resources	Migrant transfers

Source: Authors' calculations based on (UN 2013).

Methodology

National transfer accounts are part of generational economics and allow the study of consumption and labour income production behaviour and the analysis of interrelationships between ages, age groups and generations in the search for satisfaction of needs and improvement of well-being. The measurement of the demographic dividend through the National Transfer Accounts methodology allows the determination of the level of social demand at a country level. The theoretical foundations of the NTA methodology are contained in Lee and Mason (2011a, 2011b) and the implementation procedures are available in UN (2013). The micro-macro approach provides an exhaustive picture of economic flows and measures how individuals produce, consume, save and distribute resources according to age (Mérette and Navaux 2019).

Model specification and construction procedures for National Transfer Accounts

NTA is based on the fundamental principle of an accounting identity, which states that at every age, resources should equal the uses to which they are put. At any age, the outflow of resources should equal the inflow of goods and resources, so the basic equation of NTA is as follows:

$$Y^l(a) + Y^a(a) + \tau^+(a) = C(a) + S(a) + \tau^-(a)$$

where a is age, C is consumption, Y^l is labour income, τ^- are transfers paid, τ^+ are transfers received (public and private), Y^a is capital income and S are savings.

The term on the left represents outflows and the term on the right represents inflows. Rewriting this identity, we obtain:

$$C(a) - Y^l(a) = Y^a(a) - S(a) + \tau^+(a) - \tau^-(a).$$

The term on the left-hand side corresponds to the "life-cycle deficit", i.e. the total value of goods and services consumed by an individual or group of individuals of age a minus the total value of goods and services produced by the labour of this individual or group of individuals of age a. The deficit appears when this term is positive, in other words when the consumption of goods and services exceeds the labour income.

The term on the right-hand side of the equality corresponds to reallocations (reallocation of assets and net transfers), i.e. the way in which a possible deficit is financed, via the existence of economic mechanisms and institutions (public or private) which organise the redistribution of resources from periods of surplus (or individuals in surplus) to periods of deficit (or individuals with a deficit). The term $(Y^a(a) - S(a))$ represents the income from asset-reallocation and the term $(\tau^+(a) - \tau^-(a))$ represents net transfers. These are current transfers (received, paid). The NTA covers the current accounts of the System of National Accounts (SNA), excluding capital accounts. A defining feature of transfers is that they involve no explicit quid pro quo or exchange. Resources flow from one party to another either voluntarily, in the case of most private transfers, or not, in the case of public transfer. Public transfers concerns public education, public health care and unfunded pension plans. The private trasnfer are familial support of children and parents, charitable contributions and remittances (Lee 1994; Mason and Lee 2011; UN 2013).

Consumption $C(a)$ is the sum of private $Cf(a)$ and public $Cg(a)$ consumption:

$$C(a) = Cf(a) + Cg(a).$$

For practical purposes, this consumption is broken down into education, health and other consumption. This breakdown has the advantage of allowing a disaggregated analysis of household behaviour and public policy orientations in these two social sectors, which determine the quality of human capital and therefore, to a large extent, the speed of the trajectory towards the demographic dividend.

Consumption and income profiles are produced on the basis of (i) demographic projections, (ii) household consumption and income survey data, (iii) data from statistical yearbooks, in particular health and education, and (iv) national accounts, resource-use tables and other national budget execution reports. The determination of these profiles is carried out in several stages[1]:

- Determining an individual-level age profile for a given flow (income or consumption) based on household surveys and administrative data. The construction of consumption and income profiles requires making a number of assumptions described in the NTA construction manual (UN 2013) and also by Mason et al. (2006).
- Pfile smoothing. Profiles from survey data may sometimes contain 'noise' sources of error. Profile curves should be smoothed to reduce the effects of these disharmonies. The components[2] of the profiles can be smoothed but not the final profiles.

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1 The Manual on the Construction of National Transfer Accounts (UN 2013) provides details for each step.
2 Education, health and other consumption for the consumption profile. Wage labour income and self-employment income for the labour income profile.

- Construction of aggregate profiles. Aggregate (rather than individual) age profiles are constructed using demographic data (age distribution of the general population from census or projection data).
- Adjustment of provisional profiles using National Accounts macro aggregates. The final step in the construction of the NTAs is the calibration of the provisional aggregate profiles using National Accounts aggregates so that the aggregate flow coincides with the corresponding aggregate level accounting control value (macro control).

In the adjustment procedure, final consumption is equal to final public and private consumption expenditure, public consumption is equal to government final consumption expenditure and private consumption is equal to household final consumption expenditure. Thus, the control aggregates for private consumption are private consumption of education services and private consumption of health services, with all other private consumption expenditure being grouped under the term "other consumption". The same procedure is followed for public consumption of education, health and consumption other than health and education.

The basic principles

The general principle of the NTA revolves around the notion of the economic life cycle. This principle states that there is a universal economic life cycle related to patterns of consumption and income by age and that this pattern leads to a mismatch between material needs and the ability to satisfy these needs through one's own labour. It also assumes that in generally young and old people consume more than they earn, that working-age adults consume less than they earn, and that a system of intergenerational and temporal transfers of resources is, therefore, necessary to maintain the well-being of society's members. The other principles of the NTA relate to economic calculation. The NTA and the System of National Accounts (SNA) are closely related. While the SNA aggregates are used in the application of the NTA, there are differences in the practical application of the two approaches. These differences lie essentially in the fact that the NTA has as its main unit of analysis the individual or groups of individuals depending on the age, whereas the SNA units of analysis are the economic agents or institutions (households, enterprises, the State, the rest of the world) which play the role of mediators in the NTA approach. For the NTA, income from production is exclusively assigned to labour or capital. On another level, rearrangements are needed with regard to mixed-income and taxes, to move from NTA to SNA and vice versa. For example, (i) in the construction of the NTA, it is assumed that 2/3 of the mixed income generated by family enterprises is attributable to labour and (ii) in the SNA, taxes on products and output are a component of GDP and are not allocated to either capital or labour, whereas in the NTA, labour and capital income and output are valued before any taxes on output. In addition, intra-household transfers have no correspondence in the System of National Accounts. The NTA Manual adopted exactly such an expert proportion of distribution (attributing 2/3 of gross mixed income to labour income) like the proposition of Gale Johnson (1954). The NTA Manual as far as Gale Johnson (1954) estimated the functional distribution of income taking farm entrepreneuriat and non-farm entrepreneuriat. He considered income from "land" and "bulding" as labour income and property income. He found that 64% of farm operator' income might be attributed to labour income, and there over to property income. In NTA manual, they adopt the same approach – empirical estimation – and find that 67% (2/3) of mixed income might be attribuated to labour income and 33.3% (1/3) is the capital income (UN 2013).

Data sources

Demographic data are taken from the 2009 General population and housing census (RGPH) of Mali and the United Nations Population Division. Data on the gross domestic product, public final consumption, household consumption and income are taken from the 2017 National Accounts. Data from the Modular and Permanent Household Survey and the statistical yearbooks of education and health are used.

Results and discussion

Individuals' consumption behaviors vary according to their age. By distinguishing private consumption from public consumption, it emerges that the contribution of families to total consumption is greater than that of the public. At young ages, consumption seems to be determined by education and health services. The high levels of private consumption are in the 20–30 age bracket with around 450,000 XOF while the high level of public consumption (95,000 XOF) is at ages 10–13. Over the life cycle, private and public consumption declines relatively, hence the observance of deteriorating material well-being. Over the period, state aid transfers for the benefit of education, health and other remained low on average. This downward trend in consumption could guide reflection on the migration of populations from Mali to foreign countries.
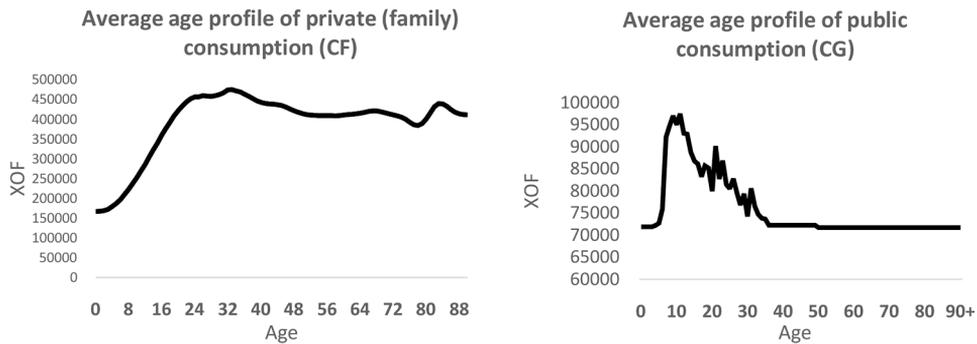

Figure 1. Average age profiles of private and public consumption in Mali, base 2017. *Source*: Authors' calculations based on data from the Regional Consortium for Research in Generational Economics (CREG), 2022.

In addition, labour income broken down into salaried labour income and income from self-employment is calculated and is presented as follows:

The average labour income profile is dominated by income from self-employment. Income levels from salaried labour remain low throughout the life cycle with high levels at ages 35–56. We also see that from the age of 10, children begin to generate income from self-employment, a sign of the existence of child labour often understood by communities as an element of socialization. On average, income from self-employment is obtained in the informal sector or informal economy. On the other hand, there is a 47–50 age group (3% of the total population) which has the highest average age income levels.

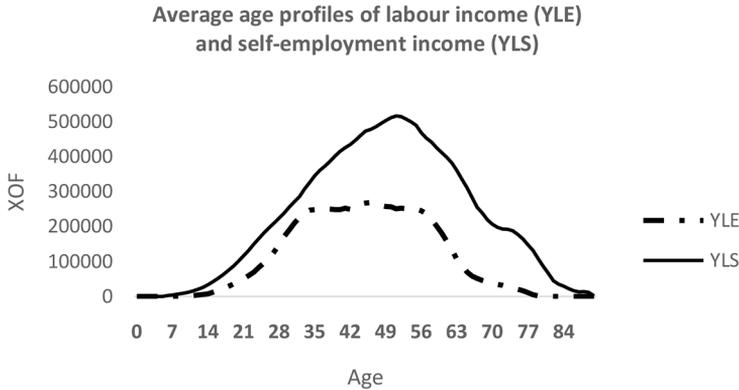The average age profiles of consumption and income are summarised in the Table 2.

Figure 2. Average age profile of labour income and self-employment income in Mali, base 2017. *Source*: Authors' calculations based on CREG data, 2022.

Table 2. Life cycle deficit (LCD) in Mali, base 2017.

	Aged 0–27	Aged 28–66	Aged 67+	Total
Total consumption (XOF billion)	4,862	2,543	157	7,561
Contribution to consumption (%)	64.3%	33.6%	2.1%	100%
Labour income (XOF billion)	1,407	4,163	109	5,679
Contribution to labour income (%)	24.8%	73.3%	1.9%	100%
LCD (XOF billion)	3,455	–1,620	48	1,883

Source: Authors' calculations based on CREG data, 2022.

In 2017, a consumption need not met by labour income was 1,883 billion XOF. An analysis of the results obtained by age shows that total labour income is estimated at 5,678.82 billion XOF against a final consumption of 7,561.42 billion XOF, i.e. an overall life cycle deficit is of 1,882.60 billion XOF. The labour income generated therefore only covers 75.1% of consumption needs. One part of the potentially active population makes a strong contribution to the life cycle deficit. Indeed, young people aged 15 to 27 have a life cycle deficit equivalent to 1,042 billion XOF, i.e. 30% of the youth deficit. For the elderly, the LCD starts from the age of 64. Sánchez-Romero et al. (2013) estimated this surplus period at 30 years (between 27 and 57 years) for Spain, Sambt and Prskawetz (2011) at 36 years (between 21 and 56 years) for Austria and Guevara et al. (2011) found a surplus period of 16 years in 2006 for Mexico. These countries have situations where young people enter the surplus phases earlier (before age 25) and where more inclusive social protection and security programmes allow older people to retire without having to retrain in an income-generating activity. At the individual level, the LCD rises from 235,552 XOF for children under 1 to 314,888 XOF at age 13 before gradually declining to age 27 and beyond. It can be concluded that the well-being of the individual, measured by his or her level of consumption, follows a downward trend even if his or her income increases. At the age of 51, for example, for an average labour income of 1,072,569 XOF, consumption is only 474,913 XOF (or 44% of labour income). The following graphs present individual and aggregate profiles by age. The breakdown of consumption expenditure shows a predominance of health expenditure over education expenditure between the ages of 0 and 13.
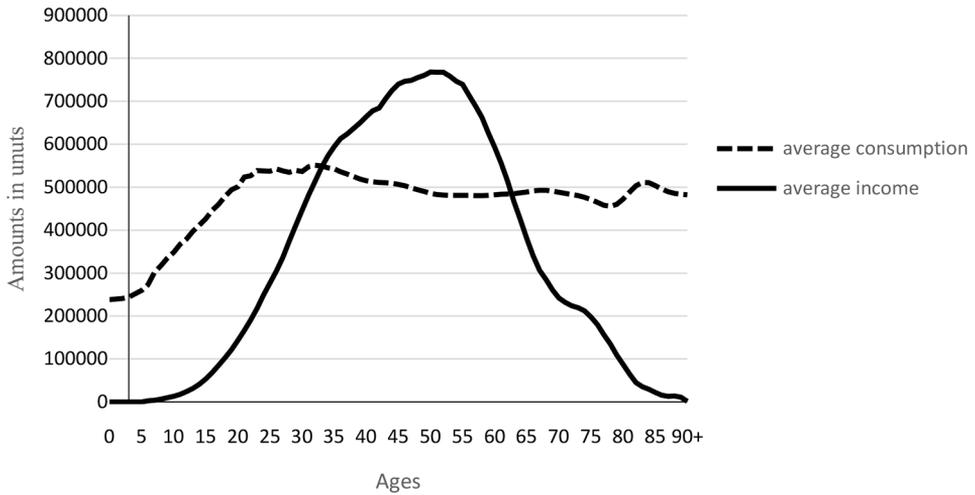
Figure 3. Average consumption and labour income profiles (XOF), base 2017. *Source*: Authors' calculations based on CREG data, 2022.

On average, consumption levels remain low with age in Mali. Better still, it seems to indicate a low level of material well-being as age advances. Adults seem to sacrifice themselves or, because of the high fertility rate, have to make numerous transfers that minimize their consumption. The fertility rate and the low mortality rate increase dependency and require large transfers from actual producers in a situation of life cycle surplus (Kuhn and Prettner 2018). On the other hand, in developed countries, consumption increases with age and is maximized with their level of fertility (Hock and Weil 2012).

Figs 3–4 illustrate the consumption behaviour and income of the population of Mali in 2017, according to its average age and productivity. There is a marked decline in the level of consumption of adults with increasing age and increasing income, indicating a high level
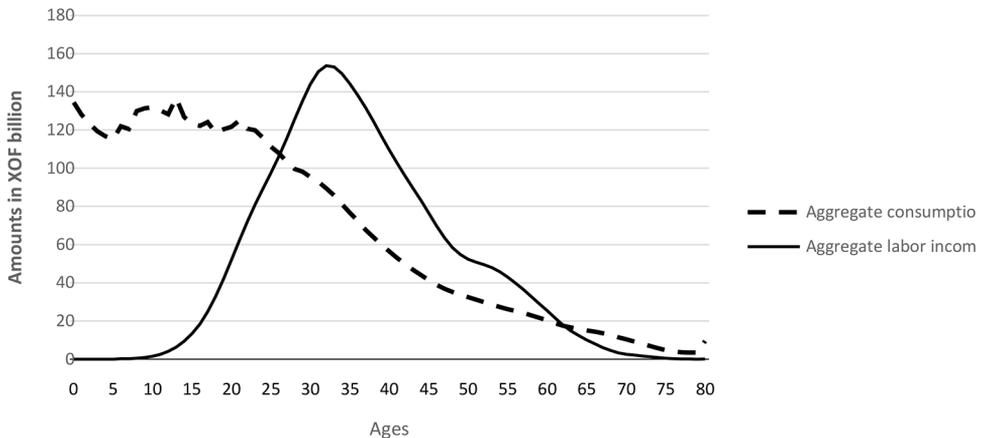

Figure 4. Aggregate consumption and labour income profiles (XOF), base 2017. *Source*: Authors' calculations based on CREG data, 2022.

of intergenerational transfers and weak social protection policies and mechanisms. Moreover, intergenerational transfers influence the economic decisions of individuals as much as market finance would. Significant family (private) transfers are made from parents to children and from children (adults) to parents (Sánchez-Romero et al. 2013). However, in Mali, youth transfers (28–35) are the least important.

These profiles are very different, in general, from those of the developed countries, which have very different demographic structures, have already achieved the demographic transition and have effective social protection and security systems. By way of illustration, Figure 5 shows Germany's LCD in 2003.
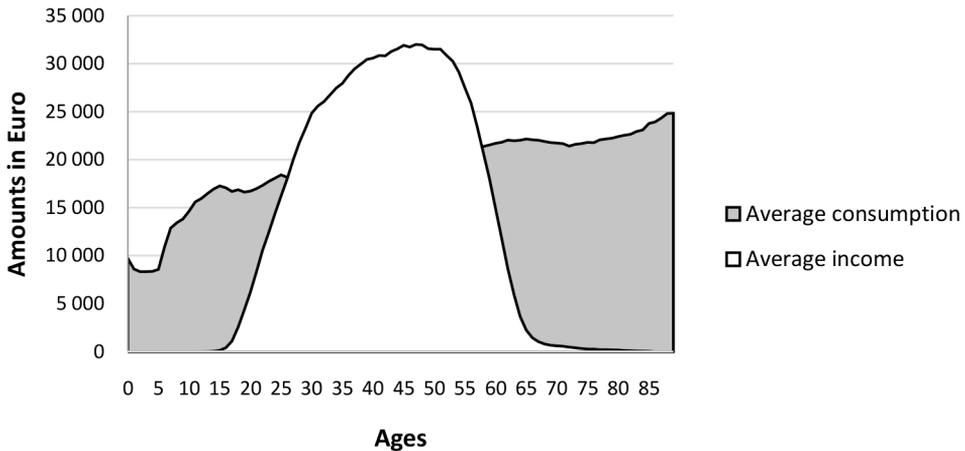

Figure 5. Age profiles of the LCD in Germany (in Euro, 2003). *Source*: CREG (2019), based on data from the international NTA network.

Figure 5 shows that according to economic theory, the level of consumption of the individual increases with income in the developed countries. Gender equality programmes have increased women's participation in labour income. Strong social protection and social security policies allow seniors to continue to have ever higher consumption levels (Mason et al. 2022). They lead to a shorter duration of surplus in general in developed countries. The analysis of the financing strategies of the ESA should show to what extent transfers contribute to financing the deficit of the elderly and facilitate the evaluation of the effectiveness of public policies in terms of social policies (education and health).

Consumption, income and life-cycle deficit profiles by gender

Women constitute 50.4% of the total population of Mali (INSTAT 2017). Differences in labour income profiles are due to gender inequalities in society and in the labour market. Women are mostly confined to reproductive activities and domestic tasks. Women in Mali have less access to economic opportunities and employment due to their lower level of education and social status. The profiles of LCD by gender show that women are globally in deficit over the whole life span: in Mali, their consumption is higher than their labour income, whatever their age. They present a deficit of 2,607 billion XOF against a surplus of 724 billion XOF for men. While they consume as much as men (3,808 billion XOF compared to 3,753 billion XOF for men), they only produce one fifth (21.7%) of labour income in 2017.
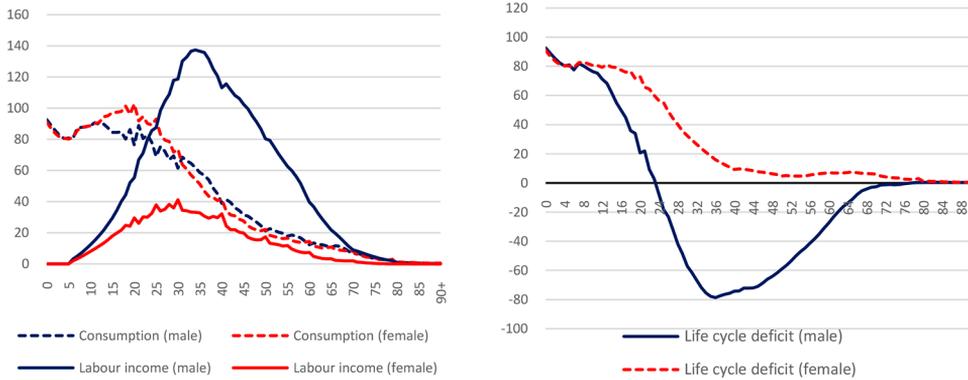
Figure 6. Aggregate consumption, labour income and LCD age profiles by gender (XOF billion), Mali, base 2017. *Source*: Authors' calculations based on CREG data, 2022.

Increasing girls' access to education beyond primary school, quality reproductive health and economic opportunities will result in increased economic participation of girls and women. Initiatives such as the promotion of youth and women's access to factors of production (agricultural orientation law, women's empowerment fund, youth employment programme, etc) need to be evaluated and scaled up. Women have a longer life expectancy than men. Their greater economic participation would also reduce the life cycle deficit in old age and promote a second demographic dividend. The consumption structure in a country remains strongly determined by the country's demographic structure (Mason et al. 2022; Kuhn and Prettner 2018).

Conclusion

The application of the NTA methodology to data from Mali in the context of the Life Cycle Deficit (LCD) assessment provides for the first time data to understand the extent of the economic effects of the population age structure on the one hand, and on the other hand, which can provide indications on the orientations of more effective public policies in terms of targeting (education, health, social protection). The results confirm that the structure of the population has an effect on the level and structure of the life cycle deficit. In Mali, young people are still economically dependent until the age of 28, accounting for almost two-thirds of consumption and only a quarter of labour income generation. The potentially active population – those aged 15 to 27 – contribute strongly to the LCD. While women consume as much as men, they contribute 21.7% of total labour income and remain economically dependent on men over the life cycle. The results also show a downward trend in adult welfare as consumption levels decline with age. Adults and older people consume less and less, probably due to the need to transfer more resources to younger people to meet their needs. Economic empowerment programmes must target the growing number of young people who are struggling to find their first job in the labour market. Massive investments in girls' education and women's economic empowerment will help reduce the incidence of LCD. Social protection initiatives such as compulsory health insurance need to be scaled up to reduce the burden of families on workers' income.

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