



INAPP
PUBLIC POLICY INNOVATION

WORKING PAPER

INAPP WP n. 33

Harnessing a Young Nation's Demographic Dividends through a Universal NDC Pension Scheme: A Case Study of Tanzania

Bo Larsson

Vincent Leyaro

Edward Palmer

LUGLIO 2019

Harnessing a Young Nation's Demographic Dividends through a Universal NDC Pension Scheme: A Case Study of Tanzania

Bo Larsson

bo.larsson@erfconsulting.se

Vincent Leyaro

vleyaro@yahoo.com

Edward Palmer

edward.e.palmer@gmail.com

LUGLIO 2019

CONTENTS: 1. Introduction. – 2. The economic setting. – 3. The NDC universal public pension scheme. – 4. DC incentives and coverage - learning from experience. – 5. Tanzania's economic performance and institutional readiness for NDC. – 6. The dynamics of the demographic dividend. – 7. Simulations using the UN demographic projections for Tanzania. – 8. Summary and policy implications – References

INAPP – Istituto nazionale per l'analisi delle politiche pubbliche

Corso d'Italia 33
00198 Roma, Italia

Tel. +39 06854471
Email: urp@inapp.org

www.inapp.org

ABSTRACT

Harnessing a Young Nation's Demographic Dividends through a Universal NDC Pension Scheme: A Case Study of Tanzania*

About one-half of Africa's population will remain below age 30 well past 2050, with relatively few aged 60 and older. Using Tanzania's projected demographics and present economic point of departure, this paper demonstrates how the implicit "double" demographic dividend can be harnessed to create inclusive growth. A Swedish-style nonfinancial defined contribution (NDC) system is launched where the government can borrow funds from the future through NDC "consol" bonds to transform individual savings into human and physical capital to promote inclusive economic growth. The consol bonds constitute a reserve to cover pensions of the retiring "demographic bubble" in the future as the dependency ratio gradually glides into demographic equilibrium. Minimum transfers to the current elderly are also introduced with the phase-in.

KEYWORDS: Emerging Economies, NDC Pensions, Demographic Dividend, Formal Labor Force, Productivity Growth, Tanzania

JEL CODES: : H55, J11, I31, O20, O40

Abbreviations and Acronyms

FDC	Financial Defined Contribution
GDP	Gross Domestic Product
ILFS	Integrated Labour Force Survey
NDC	Nonfinancial Defined Contribution
UN	United Nations

* ACKNOWLEDGMENTS - This paper is written for *Progress and Challenges of Nonfinancial Defined Contribution Pension Schemes, Volume 2: Addressing Gender, Administration, and Communication*, edited by Robert Holzmann, Edward Palmer, Robert Palacios, and Stefano Sacchi, to be published by the World Bank in autumn 2019. We are grateful to Gustavo Demarco and Andrew Mason for comments and suggestions and to Amy Gautam for first-rate copy editing. A first version of the paper was presented at the NDC III conference in Rome, October 5–6, 2017, and we are thankful to the participants for their comments and encouragement. The views expressed herein are those of the authors and do not necessarily reflect the views of the institutions they are associated with or the views of the World Bank and of the Inapp.

1. Introduction

Since the mid-1990s Africa has recorded impressive macroeconomic performance with sustained economic growth. Since 2000, six of the world's ten fastest growing economies have been in Sub-Saharan Africa (SSA). Arguably, this growth trend began with the comprehensive macroeconomic reforms in 1987–1991 recommended by the World Bank and the International Monetary Fund following the economic crisis of 1980–1986.

Tanzania, the country of focus in this paper, is in this group: its average real growth rate was 6–7 percent over the period 1995–2014 (WTO 2016; World Bank 2017).¹ The benefits of growth have been slow to reach the broader Tanzanian population, however.

Of the United Nation's (UN) projected world population growth of 2.4 billion people by 2050, about one-half will be born in SSA – and the region will account for almost 80 percent of the increase in the global population up to 2100 (Ncube 2015).

According to UN projections, the growth rate of the working-age population in Tanzania will be greater than that of the age group 65+ throughout most of this century (Figure 1.1, left panel).

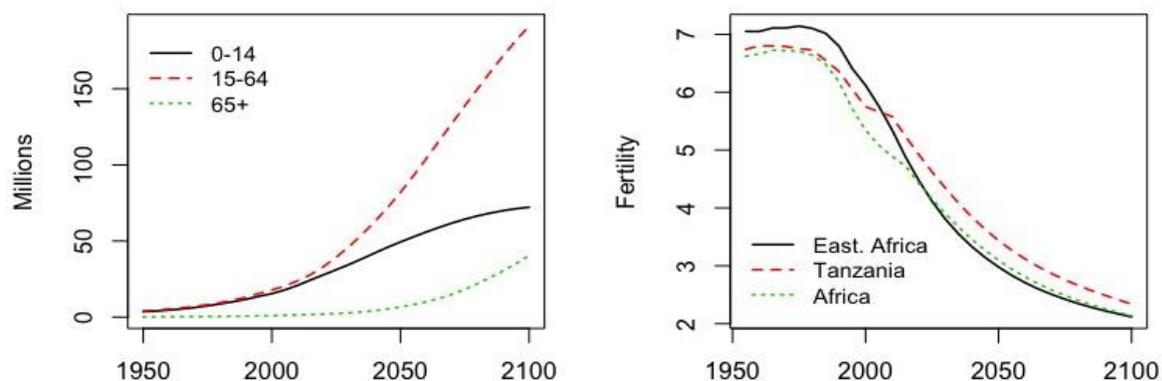
Fertility rates are presently high, at around 5.0 children per woman, and projected to decline slowly, reaching 2.1 toward the end of the century (Figure 1.1, right panel).

At the same time SSA will experience a continuously inflating demographic bubble, stimulating economic growth, which in turn will lead to an increasingly larger percentage of the increasing number of working-age persons entering into formal work.

This dual process can be expected to continue throughout the current century as the countries of SSA combine demographic and economic development.

¹ <http://www.worldbank.org/en/country/tanzania/overview>

Figure 1.1: Tanzania's total population by age group (left panel) and fertility rates for Africa, East Africa, and Tanzania (right panel)



Source: United Nations 2017.

Using Tanzania as a case study, this paper introduces a nonfinancial defined contribution (NDC)² lifecycle saving scheme that leads to an annuity at retirement for formal workers. Based on Tanzanian labor market data from the 2014 Integrated Labour Force Survey (ILFS) and UN demographic projections, the paper first calculates the demographic surplus in the NDC fund that Tanzania can expect if the growth of the formal labor force follows those of the projected working-age and old-age (60+, 65+) populations over the remainder of the century.

The approach is in the spirit of the work of Bloom and Williamson (1998), Mason and Lee (2006, 2010), and Mason, Lee, and Jiang (2016). This study focuses on how introduction of an NDC pension scheme in the context of a young emerging economy can generate savings for NDC bond-financed investments in human and physical infrastructural capital. However, whereas the economic support ratio and transfer accounts are the focus of these earlier studies, in this study the old-age support ratio is implicitly a determinant of the savings

² See Palmer (2013) for a technical presentation of NDCs, including the mechanics of creating a fund. See Góra and Palmer (2019) for a conceptual presentation of individual saving, funding, and NDCs.

outcome. As such, the financial surplus is available for investments, hence promoting inclusive economic growth, with even greater dividends for future pension savers.

The public pension scheme encompasses the entire formal labor force and can be viewed as the bottom pillar in the country's overall pension system, including occupational and private individual schemes. As the economy grows and formalizes and as contributors reach pension age, individuals' savings in the working phase of the lifecycle are gradually transformed into consumption in retirement. As Figure 1.1 indicates, the process generating saving surpluses may continue up to and perhaps beyond 80 years into the future, depending on the actual fertility rate. The model developed also includes a partial transfer of workers' savings to consumption for the elderly as the system matures.

For those already participating in an existing private pension scheme, the overall pension system becomes a two-pillar system, with private occupational schemes as the second pillar. The NDC scheme, covering the entire contribution-paying population, is the first (individual savings) pillar, while existing (and emerging) occupational schemes constitute an occupational second pillar. At the same time, the current elderly (65+) receive a portion of the emerging NDC contributions for their current consumption. The NDC pillar increases with time as investments in human capital (e.g., education, child care, and health care) and physical capital continuously fuel economic growth.

2. The economic setting

Presently, about two-thirds of Tanzania's urban working-age population are employed in the informal sector. High economic growth rates are characterized by the "growth without job creation" problem: labor is attracted to urban areas because of increasing economic activity (suggesting a vibrant informal sector) rather than because of demand for labor for formal employment. Typically, either effective unemployment rises and/or average earnings fall to accommodate the growing supply of labor (Leyaro et al. 2014).

Tanzania's poverty rate – based on "headcount" and minimum consumption measures – fell from 39 percent in 1991 to 28 percent in 2012, but the absolute number in poverty rose by

an estimated 3.3 million persons (World Bank 2015a). At the same time, inequality remains high, with a Gini coefficient of 38 in 2011,³ partly due to a middle class that constitutes well under 10 percent of the population (Arbache and Page 2009). These are clear symptoms of the need for fundamental structural change.

The approach presented in this paper can help to change the picture through investments in physical infrastructure and human capital (e.g., education and skills development). The latter conforms with the message of modern growth theory and empirical analyses,⁴ especially with respect to the economic returns to investments in the quantity and quality of education and training (Psacharopoulos and Patriono 2002; Banerjee and Duflo 2005; Hanushek and Woessmann 2007), and with a focus on an emerging economy (Kotásková Kobzev et al. 2018) and on health care (Banerjee and Duflo 2005; Rentería et al. 2016).

The key question is how to put theory into practice, as raising capital in a country like Tanzania is hard if it is not designated for physical investments such as office buildings and hotels. However, investments in human capital and physical investments that are less suitable for credit scoring are virtually impossible to finance in the emerging economy context. It is well-recognized that an overwhelming portion of an emerging economy's population needs physical assets at the micro level – for example, for livestock, machinery for agriculture, access roads and major rail transportation lines connecting the countryside with the main urban areas, irrigation, solar power, clean water, and sewage disposal, to mention just some (Conceição and Levine 2015). It is important to craft an overall strategy that promotes participation in the formal workforce that, combined with large- and small-scale physical investments, yields growth in income by steadily increasing the potential productivity for an increasing number of persons in the labor force. Through implementation of an NDC system, it is possible to harvest the demographic dividend and use it for the above “low profile”

³ <https://data.worldbank.org/indicator/SI.POV.GINI?locations=CO%29-TZ>

⁴ As a result of the endogenous growth theory work by Romer (1986, 1988, 1990) and Lucas (1988) and work by Levine and Renelt (1992) on a set of basic variables to model growth, there appears to be agreement that, given initial per capita GDP, the underlying growth model is a function of physical capital, human capital, and population growth. This is because the ultimate drivers of per capita growth are technological growth and growth of human and physical capital. Initial per capita GDP determines the rate at which countries converge with each other.

investments that normally are not attractive for institutional investors, such as the country's private pension funds.

An avenue with a proven positive effect on increased labor force participation is public preschool care of children, which enables women to work in the formal labor market. Using the OECD (Organisation for Economic Co-operation and Development) database, Castles (2003) and Théveron (2011) evaluate the transition from home care to preschool care outside the home in a large number of OECD countries. A general conclusion of the literature in this area is that the introduction of public preschool first and foremost is an asset in the development of preschool-aged children. In macroeconomic terms it enhances household productivity by taking advantage of economies of scale in preschool care, in addition to facilitating labor market participation of both genders. The social investments envisaged here are likely to have positive effects on local economic growth through the multiplier effects of increased formality of local labor markets, resulting in higher locally produced consumption items.

In the face of macro and micro shocks, such as loss of employment, the social engagement and cohesion that a universal pension scheme promotes can play an important role in reducing the need for negative coping strategies that can reduce growth. Examples include removing children from school to earn money for the family or selling off the only physical capital a family owns.

Finally, note that one of the outcomes of health care investments is increased survival of younger children. This is one of the driving factors behind the projected decline in the fertility rate. In addition, this is one of the outcomes of increased economic well-being in the development context. As time progresses, the proportion of the elderly population will inevitably increase as a result of improved health care and lifestyles.

This argument favors starting a demographic NDC fund now, supported by the growing numbers of small contributions.

3. The NDC universal public pension scheme

In the emerging economy setting, no comprehensive, monetized, universal public pension scheme exists initially, just as there is no full-fledged formal labor force. The universal pension scheme is instead couched in intergenerational familial arrangements and informal labor markets, and the challenge for social insurance is to transition to a formal market economy. Given this setting, the following is proposed: individual contributions are made into NDC savings accounts with the designated purpose of financing individual contributors' own future consumption in old age. This creates an NDC fund of money that is transformed into human and physical capital investments through government-issued NDC bonds intended to increase gross domestic product (GDP) growth and its quality, with an explicit goal of developing the microeconomy throughout the country.

The yield on the NDC bonds provides a return on individual contributors' accounts. With the startup of NDC, a minimum pension is created for the current elderly, who had no opportunity to participate in a monetary market-based social insurance scheme in their earlier working lives. This is the beginning of a basic pension at age 65 (for example) that can increase over time. This helps reduce the elderly's reliance on money transfers from adult working-age "children." With modernization and migration of young people from rural to urban areas, the changing social landscape will require this. And, during the first decades as formality increases and the contributory scheme matures, the basic pension can remain as the minimum income benefit.

The logic of saving for old age through a universal NDC pension scheme is that it provides a structured universal longevity insurance – in principle everyone is covered by the scheme and no special financial knowledge is required – although participation is gained by paying contributions, which given new technologies does not require local administrative buildings (although this can be essential to spread information and recruit participants). The entire nation is the insurance pool, and the pension everyone receives is a life annuity based on individuals' own lifelong contributions based on the same rules. The underlying principle is that "you get what you pay for" – a principle of fairness that most can accept. The annuity is computed with respect to an individual's birth cohorts' life expectancy, maintaining macro

financial sustainability over generations. The NDC rate of return is derived from the economy's growth rate (in practice, the growth of the underlying contributions per capita), where the demographically driven growth component (i.e., the growth of the formal labor force underlying contributions) creates a demographic reserve fund. The principal component of the reserve fund is the demographic dividend. In addition, the indexation of accounts to economic growth (in practice the underlying wage sum upon which contributions have been paid) maintains financial stability and intra- and intergenerational fairness in the NDC scheme.

In the emerging economy context, the emphasis on the concept of fairness at the individual (micro) and societal (macro) levels is key to the success of creating universal social protection. At the individual level, one enters into a pension scheme where one's savings become one's own pension (future consumption) in old age. At the societal level, fairness means individuals continue to honor their commitment to their parents' generation, now supplemented by small monetary means. In this way, the cultural principle of intergenerational fairness is upheld.

The vehicle for intergenerational transfers generating the desired result is the NDC fund – i.e., the NDC pension scheme “savings bank.” The financial instrument is the NDC bond issued by the government. This bond is designed as a “consol” bond, which means that it delivers its yield to the NDC fund on a yearly basis; over time it is gradually amortized, but the rate of amortization is not necessarily determined with the emission of the bond. The pace of amortization is determined by the fund's needs for liquidity to finance pension expenditures several decades in the future. Important to keep in mind is that it is difficult to judge the pace of economic development and its potential to reduce the fertility rate for parents focused on increasing their own economic welfare. What is certain is that as the demographic dependency profile shifts from an extremely youthful to an increasingly older society, pensioners will increasingly draw upon their savings through NDC pensions.

The advantage of an NDC scheme in the emerging economy context is that, if properly designed and implemented in harmony with a generic set of rules, the system will be geared from the outset to move toward financial stability, regardless of the future demography.

Moreover, this process can start with less than the desired “end” rate given a desired average replacement rate. In fact, the increasing contribution rate over time further increases liquidity, and when the point is reached where the net change in the working-age population is “constant” and the minimum pension age and calculation of pensions are determined by life expectancy, then fluctuations should only be small cycles around a long-term equilibrium. What clearly distinguishes an NDC scheme in the emerging economy context is the flexibility it provides to use contributions either as transfers for consumption from current GDP by the current elderly, or as savings put aside and used for current investments and then converted into own consumption in old age.

4. DC incentives and coverage – learning from experience

The defined contribution (DC) design of a pension scheme is believed to be economically efficient; i.e., it creates incentives to participate in a pension scheme at the micro level, thereby enhancing total GDP at the macro level. Thus, the coverage and density of contributions are expected to increase with the growth of the formal labor market. The counterfactual to this story is the overwhelming lack of success of financial defined contribution (FDC) schemes in Latin America in creating high coverage levels. Coverage for most Latin American countries ranges from 20–40 percent⁵; the exceptions are Brazil (64 percent), Chile (71 percent), and Uruguay (77 percent). Levy (2017) identifies the basic design flaw: “In most (Latin American) countries only workers hired by firms are enrolled. These workers, known as formal workers, are mostly urban and employed by relatively larger firms or directly by the government as public employees. The rest, known as informal workers, are employed in a variety of ways that leaves them without coverage. They can be self-employed or work in rural areas or in small firms in urban areas where it is difficult to enforce social insurance laws.”

Part of the intention behind introducing NDC in Tanzania is to encourage workers in the informal economy to participate in the national pension scheme as economic transactions become formalized, but not necessarily through employment contracts, since it would not be

⁵In Tanzania only about 8 percent of the working-age population is covered in a formal pension scheme.

practical to enforce compliance with a universal mandate at the country's present stage of economic development. For this reason, workers' decision to contribute will have more to do with the fact that they can see that they are saving for themselves and that their 65-year-old and older relatives and friends are receiving small benefits that constitute a relative improvement in their living standards. In addition, people will begin to observe infrastructural investments in their geographic vicinity and will benefit from local growth.

In Latin America, FDC schemes have taken the particular form of "employer contributory social insurance." In practice this means that contributions are conditional upon contractual employment, generally with contributions from both the employer and the employee. Although the employer is a partner in the administrative process for formal contractual employees, the degrees of freedom in setting up the institutional framework must make it possible for participation through one's own initiative, especially for the self-employed and employees at smaller places of work. The only requirement is that contributions are paid, which individuals can do directly without the intervention of an employer.

Employer-based FDC schemes may also needlessly emulate the classical Anglo-Saxon insurance model, whereby employers choose providers of accounts and annuities based on account values. This antiquated model is not appropriate in a country where mobility will for the majority replace contracts between the individual, through an employer, with a financial-market based pension scheme. This sort of small-scale operation would be extremely inefficient in the emerging economy context – and is so even in the developed economy context. Only a small proportion of the labor force will be privy to this sort of arrangement in the emerging economy labor environment, as formal contract employment will probably be as much the exception as the rule. Instead, many will be self-employed or working for small employers.

In addition, the employer-based model implies that at the micro level there is only a weak transparent connection to the idea that people are saving individually for their own pensions. At the macro level it is difficult for people in an employer-based model to see that their savings will contribute to the development of their own country, let alone to their own region,

because institutional financial savings in the current global financial world find their way more easily into international investments, and at home into traditional infrastructure investments.

The idea of introducing NDC in the emerging economy is that all are welcome and encouraged to participate. The scheme is mandated by the government and contributions are paid to a pension administration, perhaps through the tax authority. And a formal attachment to the tax system suggests that the process must be easily adaptable to the idea of the “personal savings scheme,” where the measuring rod is putting nonwithdrawable money into the individual accounts in the defined contribution insurance scheme – a property that both universal public NDC and FDC schemes share, and which makes it possible to use NDC accounts as if they were FDC accounts for the purpose of investing NDC fund savings.

To ensure this requires an approach different from that pursued in more or less fully formalized economies, where tax collection is regulated with the help of registered employers. Thus, organizational avenues for paying contributions other than one’s own employer need to be considered, especially given the prevalence of self-employment in Tanzania. In other words, contractual employment is not a necessary point of entry; on the contrary, it would eliminate potential participants who do not have contractual employment. In Tanzania the majority of employees are in this category: of a working-age population of 23 million people, 17–18 million are not formally employed (discussed in the next section).

Regardless of how the NDC scheme is set up, everyone must have a unique ID number and must be connected to a means of payment, where what is important is the payment(s) period, but not its frequency or timing. In Tanzania, all old tax identification numbers (TINs) have been converted to new ones using fingerprint technology.⁶ Furthermore, the government is currently giving all small businesses individual IDs to formalize the taxation process. In an NDC scheme, a government clearinghouse is part of the public NDC administration that collects and registers contributions and administers one or more funds and payment of pensions.

⁶This development will also take advantage of the spread of increasingly less expensive mobile phone technology and Internet access. Tanzania has already recognized the important role of communications technology as a driver supporting its path toward industrialization.

5. Tanzania's economic performance and institutional readiness for NDC

Since independence in the early 1960s, Tanzania has experimented with two major economic policy frameworks: socialist-oriented and open market-oriented development strategies. During the first six years after independence (1961–1966), the economy was fairly open and market-oriented, with no specific policy instruments to regulate foreign exchange or prices.

There were no import duties, but exports (mostly traditional agricultural crops) were taxed as a source of government revenue. The predominantly agriculture- (and services-) based economy performed quite well in the early years, although the manufacturing sector remained very small (Table 5.1, column 1).

In the late 1960s, Tanzania began a process of nationalization – African Socialism (*Ujamaa*) – following the Arusha Declaration of 1967. By the early 1970s the government had control of almost all sectors; e.g., the banking sector and major industries were state-owned.

The 1970s witnessed a series of shocks that weakened the economy: the 1973/1974 drought, the 1973/1974 and 1979/1980 oil crises, the breakup of the East African Community in 1977, collapses of cash crop prices in the international markets, and the costly 1978/1979 Kagera War with Uganda.

From 1995 onward, following a first wave of economic reforms, Tanzania's growth and macroeconomic performance improved (Table 5.1).

Growth is high and investments are significant, but as noted in the introduction, growth is unequally spread within the population. According to the United Nations Development Programme's Human Development Index (HDI), Tanzania ranked 151 out of 188 countries in the world in 2015 (UNDP 2016).

In addition, public services are inadequate and the perceived quality of those available has deteriorated (Leyaro et al. 2014). What is clearly wanting are micro-level investments.

Table 5.1: Tanzania's economic performance, 1961–2015

Period	1961–1966	1967–1979	1980–1985	1986–1995	1995	2000	2005	2010	2015
GDP growth	6.0	4.0	1.4	3.2	3.6	5.0	7.4	7.0	6.9
Agriculture	53.0	41.0	50.0	49.0	47.1	29.5	26.1	22.7	21.6
Mining	2.5	1.1	1.1	1.1	1.3	1.5	2.4	2.4	2.3
Manufactured products	5.3	10	7.0	8.7	7.2	8.8	8.9	9.6	9.9
Exports	19.3	11.4	4.0	16.2	20.5	13.4	20.8	27.8	28.2
Gross investments	18.5	24.3	19.9	24.1	21.5	17	25.2	32	34.6

Source: Bank of Tanzania 1983, 2012; World Bank 2015b.

Note: Agriculture, Mining, and Manufactured products are expressed as "Value-added" in % of GDP; Exports and Gross Investments are expressed as a % of GDP; and GDP growth is expressed in percentage terms.

What is the present potential for introducing an NDC scheme? Defining employment is tenuous in the Tanzanian context, because many participate in the labor force informally and often through agricultural work in the countryside. In addition, more than 66 percent of people in urban areas are in the informal sector. Based on the most recent Integrated Labour Force Survey (2014 ILFS), Tanzania had a workforce of about 23 million. Of these, 17–18 million are in agriculture and the informal sector, and about 2 million can be regarded as unemployed. Around 2.5–3.0 million persons are formally employed. Less than 2 million persons are registered members of social security schemes. This suggests a tremendous potential for increasing the formal labor force.

The current pension age is 60 for everyone but medical personnel and professors in universities (age 65), with a unisex life expectancy at this age of about 18 years. The contribution rate is at least 10 percent of the gross salary, with an option to contribute up to 20 percent. A sum of 180 months (the number of months totaling 15 years) is required to claim a "full" benefit at age 60, and it is possible to continue to work and contribute past this age. Obviously, it is not possible for 15 years of contributions to deliver a very significant benefit during an average life expectancy of 18 years – with a contribution rate of 10 percent of gross earnings.

Informal workers can already opt into Tanzania's present pension and social security system by voluntarily paying contributions, but few do so. The clear remedy is for young workers to begin to contribute with a contribution rate higher than 10 percent and to continue contributing regularly during a long working life – with a pension age around 65 for someone entering the labor force in 2020–2025 and retiring around 2065–2070. This is clearly not possible for today's older workers, but it can suggest a template for new labor market entrants.

The bottom line is that the young country of Tanzania may be in the “golden time” of growth to use an NDC pension system to harvest its demographic dividend – if people can be convinced that there is something in it for them. Enticing informal labor into the formal labor market enhances a substantial second dividend in addition to the pure demographic dividend. As illustrated in the next section, increasing informal workers' participation in an NDC system adds to the system's liabilities but gives rise to a positive cash flow that can be invested to spur growth and reduce poverty and inequality.

One target area to channel NDC funds into is education. Public education is free in theory, but transportation, food, and books still cost money, and the quality of Tanzania's public education is low, so parents with the means to do so to send their children to private schools. Education investments could focus on raising access to high-quality education across the country, especially primary and secondary public schools. The return on education in Tanzania already is high already at the secondary level and university degrees stand out as being exceptionally attractive. Running a regression of education and employment sectors on wages from the ILFS (2014) reveals that the only thing that trumps the effect from a university degree is employment through international organizations. Wages at these agencies are roughly seven times that of the overall average wage for paid employees in Tanzania (ILFS 2014).

Broader access to high-quality education would bring more workers into the formal economy, higher wages, and ultimately higher GDP. This in turn would lead to higher level of contributions, and consequently higher liquidity in the initial decades of the NDC scheme. The

large wage effect from education together with the fact that the common labor of farming has by far the lowest income (ILFS 2014) means that the potential gain from education for the coming younger generation is a potentially strong motor for individual and aggregate economic welfare that is crying to be harnessed.

This study investigates how to use the double demographic dividend to support current pensioners, while investing the initial liquidity surplus and gradually phasing in new birth cohorts as the population ages. This is discussed in the next section.

6. The dynamics of the demographic dividend

This section illustrates the possibilities of harvesting the demographic dividend more or less immediately by introducing an NDC pension scheme. The analysis has two channels: the future demographic profile of Tanzania, and the potential in the large share of informality in the Tanzanian labor market. The data employed in this section are from United Nations World Population Prospects (United Nations 2017) and the National Bureau of Statistics 2014 ILFS. As noted before, only around 2 million Tanzanian workers are enrolled in the present social security scheme, or around 8 percent of the working-age population. Less than 40 percent of all employees are enrolled, and close to none of the self-employed (1.5 percent), based on the 2014 ILFS. The analysis begins with a simple three-generation model of younger workers, older workers, and pensioners to illustrate the demographic and labor force dynamics of starting an NDC scheme.

Consider an economy with three categories of people, denoted L , all of equal size: young workers (y), old workers (o), and the retired. Workers earn average wage \bar{W} and – with a contribution rate of c – they pay $c \cdot L(\bar{W}^o + \bar{W}^y)$ in contributions to the pension system. Retired individuals receive an average pension \bar{P} . In a financial steady state with stable demographics it is necessary and sufficient that $c \cdot L(\bar{W}^o + \bar{W}^y) = \bar{P} \cdot L$ in this simple framework. Assume that L are the formally employed who pay taxes and contributions to the social security scheme. For Tanzania, this is initially roughly 8 percent, based on the data presented above. N denotes current workers with informal employment who can be enticed to voluntarily participate in the social security scheme. Also, note that the number of

individuals with paid employment are three times greater than the number of workers participating in the social security scheme; thus the dividend forthcoming as informal workers gradually enter the labor force is a “low-hanging” fruit for a pension system.

Table 6.1 includes a time index on the formally employed cohorts to see how they pass through the different stages of life. The first period is $t-1$, when contributions paid in balance the pensions paid out.

Table 6.1: NDC balance with an increasing formal labor force

	t-1	T	t+1	t+2
Pension	$\bar{P}_{t-1} \cdot L_{t-3}$	$\bar{P}_t \cdot L_{t-2}$	$\bar{P}_{t+1} \cdot L_{t-1}$	$\bar{P}_{t+2} \cdot (L_t + N)$
y contribution	$c \cdot \bar{W}_{t-1}^y \cdot L_{t-1}$	$c \cdot \bar{W}_t^y \cdot (L_t + N)$	$c \cdot \bar{W}_{t+1}^y \cdot (L_{t+1} + N)$	$c \cdot \bar{W}_{t+2}^y \cdot (L_{t+2} + N)$
o contribution	$c \cdot \bar{W}_{t-1}^o \cdot L_{t-2}$	$c \cdot \bar{W}_t^o \cdot L_{t-1}$	$c \cdot \bar{W}_{t+1}^o \cdot (L_t + N)$	$c \cdot \bar{W}_{t+2}^o \cdot (L_{t+1} + N)$
Surplus	0	$c \cdot \bar{W}_t^y N$	$c(\bar{W}_{t+1}^o + \bar{W}_{t+1}^y) \cdot N$	0

In period t , N informal workers have been enticed to participate in the social security scheme, leading to a financial surplus in time t as the number of retired is unchanged. This becomes a permanent feature of the labor force so that even the young in $t+1$ increase in number by N individuals. The addition of N young workers continues, and in $t+2$ the first group of $L + N$ pensioners arrives. This returns the system to perfect balance, where contributions paid in equal pensions paid out. But in addition, there is now an uncommitted fund as long as workers do not start flowing from formal into informal employment. The surpluses from time t and $t+1$ constitute a “free lunch,” with many alternative uses, as described above.

Consider that N in this illustration can represent either (i) the increase in the working-age population with a constant rate of formal labor force participation, or (ii) an increase in the percentage of a given population that enters the formal labor force – or in a country with Tanzania’s starting point, both: i.e., the entire double dividend. Note also that this process continues yearly into the future ($t + 3, t + 4, \dots, t + x$) as long as the labor force is growing, either through population dynamics or continued formalization of the labor force. The demographic component – with the large projected increase in the working-age population, increase in savings, and investment potential – is formidable. Given Tanzania’s current formal

labor market of only 5 percent, which will potentially approach 100 percent in several decades, this produces an extraordinary potential source of financing in a savings- (and investment-) constrained economy, while also paying basic pensions to the elderly.

In summary, return to the examples of how this demographic dividend can be harvested by investing in both human and physical capital. The list is comprehensive, and well-known: encompassing an increasingly greater share of the growing young population in education, vocational, and skills training at all levels; investing in physical infrastructure that supports broad-based development at the local and regional level, such as investments in farm machinery, storage and transportation networks, and basic amenities (i.e., efficient local provision of electricity, clean drinking water, and sewage removal and treatment); and making regional and local capital investments. The examples are endless and the accumulated return on these investments is likely to be huge, given the point of departure.

7. Simulations using the UN demographic projections for Tanzania

This section's calculations illustrate the potential of introducing an NDC pension saving scheme in an emerging economy. Tanzania was chosen for this illustration because a precondition is that the country has a solid historical growth track record and an existing institutional framework that can be readily developed to introduce what is intended to become a universal NDC public pension scheme – "intended" because a large portion of the labor force is still presently informal. This means that the scheme will have the same rules for all covered, but the process of achieving true universality (coverage of all who work and earn a formal income) may take several decades.

It is presumed that the NDC fund created by the introduction of the public NDC scheme will contribute to accelerating achievement of universal coverage by creating growth-enhancing investments. The first simulations answer the question, "What if the current participation rates reign 'forever' but the demographic dividend characterizing the UN demographic projections in Figure 1.1 characterizes the future?" The purpose of this conservative approach is to isolate the dividend created "purely" by the demographic forces at work. In this perspective, the second dividend that will inevitably arise with increased labor force

participation becomes a potentially huge “bonus” to the example. The simulations thus answer the question, “What would introduction of the NDC pension system bring in the form of domestic savings available for investments to create growth and more jobs?”

Table 7.1: Average annual wage (US\$) and number of individuals in the different groups selected for pension simulations

	<u>Current pension contr.</u>		<u>Paid employees</u>		<u>All with income</u>	
	Avg Wage	No. Individ	Avg Wage	No. Individ	Avg Wage	No. Individ
15-19	811	5 105	548	261 027	528	583 740
20-24	1 864	54 729	966	413 563	817	1 248 511
25-29	2 423	157 651	1 508	488 907	1 094	1 835 927
30-34	3 431	181 553	2 104	460 072	1 532	1 949 259
35-39	2 807	148 635	2 046	305 424	1 483	1 865 568
40-44	3 571	149 817	2 599	267 841	1 421	1 508 224
45-49	3 592	131 021	2 756	205 007	1 585	1 215 050
50-54	3 474	94 726	3 166	147 714	1 431	983 235
55-59	3 989	73 746	3 043	115 268	1 317	688 921
Tot	3 167	996 983	1 858	2 664 822	1 303	11 878 435

Source: Authors’ calculations based on data from 2014 ILFS, Tanzania National Bureau of Statistics.

The calculations follow the model specified in Table 6.1, coupling the Tanzanian economic labor market data from the 2014 ILFS with the UN demographic projections. In the calculations of the future population, the number of births per woman declines and the longevity of each successive birth cohort increases until 2100, in accordance with the United Nations assumptions. The proportions of the working-age population paying contributions are shown in Table 7.1, which also displays current income.

In summary, the calculations are performed for: (i) persons already contributing to the present pension scheme – primarily civil servants and persons in large enterprises; (ii) all paid employees; and (iii) everyone with a reported income of any scale in 2014. The starting average annual income for each group is based on data from the 2014 ILFS. Note that the third group is about 30 percent of the total working-age population (those aged 15–60).

The simulations start the NDC scheme in 2015. This implies that a two-pillar scheme moves into action. The first pillar is “universal” in that it covers all income earners (and regardless of density of payments, which is indirectly factored into the average wage for the group). The second pillar is for the “exclusive” group (i) contributors or more broadly the group (ii) contributors. These two groups of income earners are also implicitly subgroups of group (iii),

in which all are covered by the universal NDC scheme. In this sense, group (iii) is the most relevant for the NDC calculations, whereas groups (i) and (ii) suggest potential for a second FDC pillar on top of a universal NDC scheme.

The NDC contribution rate in the first example is 20 percent. Contributions that do not go to current pensioners become savings in the NDC fund. The fund purchases NDC bonds that have an annual yield determined by the nominal rate of growth of the country's GDP, in the calculations assumed equal to the real wage growth rate. This enables bond-financed investments, as opposed to purchase of general government debt instruments, to ensure that the money gets an adequate rate of return and is used to generate economic growth and development for the country.

The average replacement rate is calculated using the development of the average wage for age cohorts in the 2014 ILFS report. A moderate assumption of real wage growth of 1 percent is used when "rolling" wages forward. A participant begins his/her career with the average wage from the 2014 ILFS estimated wages per age cohort. Each year the individual moves up one year to the next age group, with the wage for this group raised assuming 1 percent real growth. This process is repeated until retirement. The final annual wage in 2014 prices under the assumption of 1 percent real wage growth is US\$5,440 at age 60 and the annual pension granted is US\$1,820, meaning that the old-age pension would be about one-third of the final wage. Raising the retirement age to 65 would increase the replacement rate to just below 50 percent.⁷ Raising the retirement age in contemporary Tanzania is possible given the improvement in health status of most families and given that longevity is steadily increasing.

Table 7.2 shows that it is possible to harvest a demographic dividend in cash regardless of the pension policy adopted. The calculation assumes the present rate of formal labor force participation – a level of contributions actually payable (and presently paid) into the pension system. Not until 2065 does the demographic profile start to reduce the inflow relative to the outflow to the pension system. Even then there is still a net surplus. The large pension

⁷Income of employees aged 15 and 16 is not provided in the 2014 ILFS. Regardless, all employed workers are included in the simulation.

contribution surplus probably prevails far into the next century. For capital-constrained economies such as Tanzania's, this can be a huge stepping stone into prosperity if used with caution. Combining the "harvest" of the demographic dividend with sound economic policy to foster growth can multiply economic development and significantly reduce poverty and inequality.

Table 7.2: Debt, flow, and contribution surplus from an NDC system framed on income and population data from Tanzania 2014 (at a 20% contribution rate and a retirement age of 60)

	Current Pension System Participant			Paid Employees			All with Income		
	Liability to worker	Pensions Paid	Contr. Surplus	Liability to worker	Pensions Paid	Contr. Surplus	Liability to workers	Pensions Paid	Contr. Surplus
2015	0	0	683,036,333	0	0	1,098,621,532	0	0	3,404,865,109
2020	651,751,849	17,833,633	840,777,220	1,075,817,246	21,263,784	1,353,224,502	3,374,649,725	54,989,355	4,208,890,381
2025	1,436,856,119	58,731,342	1,019,385,449	2,380,168,683	74,176,614	1,646,526,862	7,482,562,955	202,714,684	5,130,538,612
2030	2,334,482,220	142,592,661	1,206,882,537	3,920,710,896	179,925,364	1,968,795,156	12,297,596,640	519,975,231	6,130,917,394
2035	3,333,076,864	282,550,253	1,401,333,487	5,694,410,147	358,171,148	2,312,234,366	17,842,406,107	1,061,521,616	7,201,046,014
2040	4,460,084,258	476,619,035	1,605,468,996	7,733,303,807	612,093,710	2,672,014,899	23,997,515,940	1,900,135,013	8,290,411,487
2045	5,664,598,705	748,249,439	1,808,412,480	9,953,481,201	978,407,088	3,027,933,976	30,700,612,168	3,100,042,442	9,361,788,961
2050	7,021,867,332	1,080,852,049	2,036,452,297	12,422,595,116	1,450,052,909	3,399,714,894	38,254,610,383	4,609,702,299	10,505,837,943
2055	8,620,213,768	1,456,632,120	2,315,763,406	15,224,139,535	2,012,208,069	3,818,712,213	46,929,256,292	6,389,083,489	11,784,936,825
2060	10,519,130,404	1,873,782,112	2,653,948,779	18,470,632,007	2,653,044,823	4,299,205,333	57,038,431,068	8,347,312,047	13,314,962,937
2065	12,617,540,794	2,330,931,228	3,028,714,583	22,056,298,440	3,358,024,998	4,826,349,341	68,202,213,292	10,494,637,336	15,007,961,556
2070	14,917,829,117	2,898,030,503	3,375,222,619	25,987,182,063	4,212,443,243	5,314,582,728	80,447,237,417	13,126,050,561	16,572,531,513
2075	17,416,027,124	3,584,492,386	3,677,839,906	30,252,312,304	5,223,969,029	5,752,657,355	93,752,361,841	16,260,116,837	17,979,989,450
2080	20,219,790,666	4,373,175,516	3,972,276,599	35,008,442,152	6,372,658,166	6,183,264,022	108,619,941,672	19,831,439,784	19,343,106,806
2085	23,299,677,238	5,259,595,329	4,256,220,625	40,208,209,046	7,659,953,351	6,595,468,632	124,893,116,127	23,836,817,384	20,629,835,974
2090	26,591,245,198	6,249,777,974	4,507,744,035	45,753,717,919	9,097,432,699	6,955,560,705	142,251,349,237	28,309,403,209	21,753,558,902
2095	30,046,544,321	7,348,034,562	4,709,738,364	51,571,899,441	10,691,358,848	7,238,811,108	160,466,990,205	33,268,677,076	22,645,331,491
2100	33,660,350,046	8,557,723,112	4,858,022,616	57,651,761,263	12,446,645,965	7,436,673,809	179,514,206,020	38,729,874,239	23,274,206,399

Source: Authors' simulations based on 2014 ILFS, National Bureau of Statistics Tanzania, and United Nations 2017.

Investing in education and skills training could yield a high return, since in 2014 only 13 percent of ILFS respondents stated they had a secondary school or higher level of education.⁸ This implies that less than 6 million Tanzanians out of the more than 23 million working-age population have a secondary or higher level of education. And there is a strong positive impact of education and skills training on income in Tanzania, an outcome well-grounded in the literature reviewed in the initial section. Supplying more and better education and skills training should, according to economic growth models, act as a strong multiplier, increasing both economic efficiency and real per capita income. This leads to larger pension

⁸ The share of inhabitants aged 20–64 with secondary education or higher is 19 percent.

contributions that can be continuously “harvested” for further growth-enhancing investments and/or social welfare. An obvious issue in an emerging economy is that a very large percentage of working-age cohorts has a very low income. Thus, it may be impossible for them to participate in a “developed economy-style” pension system designed to maintain a high standard of living after retirement. And clearly, for those close to the point of starvation, very little room remains for “saving for retirement” (i.e., setting aside 20 percent in contributions for a pension). As an experiment, this paper therefore investigates how a modification of the contribution rate affects the contribution surplus. Instead of a pension system that “tries” to sustain a high standard of living, it sets a low 5 percent contribution rate. The primary target is to alleviate extreme poverty in old age during the initial decades. It can be thought of as the startup of a first antipoverty pillar (minimum pension) in, for example, a three-pillar system in which the contribution rate is gradually increased to 20 percent, as used in the preceding example. The system can then be opened up for voluntary “top up” and occupational schemes.

Table 7.3: Debt, flow, and contribution surplus from an NDC system using 2014 Tanzanian data on income and population (at a 5% contribution rate and a retirement age of 60)

	Current Pension System Participant			Paid Employees			All with Income		
	Debt to Workers	Pensions Paid	Contr. Surplus	Debt to Workers	Pensions Paid	Contr. Surplus	Debt to Workers	Pensions Paid	Contr. Surplus
2015	0	0	170 759 083	0	0	274 655 383	0	0	850 654 931
2020	162 937 962	4 458 408	210 194 305	268 954 311	5 315 946	338 306 126	843 072 152	13 747 339	1 051 532 287
2025	359 214 030	14 682 835	254 846 362	595 042 171	18 544 154	411 631 716	1 869 295 448	50 678 671	1 281 772 528
2030	583 620 555	35 648 165	301 720 634	980 177 724	44 981 341	492 198 789	3 072 081 969	129 993 703	1 531 664 718
2035	833 269 216	70 637 563	350 333 372	1 423 602 537	89 542 787	578 058 592	4 457 133 285	265 357 525	1 798 978 098
2040	1 115 021 064	119 154 759	401 367 249	1 933 325 952	153 023 428	668 003 725	5 994 527 679	474 969 003	2 071 100 813
2045	1 416 149 676	187 062 360	452 103 120	2 488 370 300	244 601 772	756 983 494	7 668 703 571	774 866 964	2 338 716 491
2050	1 755 466 833	270 213 012	509 113 074	3 105 648 779	362 513 227	849 928 724	9 555 367 411	1 152 165 179	2 624 499 310
2055	2 155 053 442	364 158 030	578 940 851	3 806 034 884	503 052 017	954 678 053	11 722 300 893	1 596 783 482	2 944 113 771
2060	2 629 782 601	468 445 528	663 487 195	4 617 658 002	663 261 206	1 074 801 333	14 247 600 446	2 086 064 286	3 326 482 112
2065	3 154 385 199	582 732 807	757 178 646	5 514 074 610	839 506 249	1 206 587 335	17 036 363 839	2 622 589 331	3 749 587 678
2070	3 729 457 279	724 507 626	843 805 655	6 496 795 516	1 053 110 811	1 328 645 682	20 095 207 589	3 280 073 214	4 140 617 479
2075	4 354 006 781	896 123 096	919 459 976	7 563 078 076	1 305 992 257	1 438 164 339	23 418 888 839	4 063 241 518	4 492 315 115
2080	5 054 947 667	1 093 293 879	993 069 150	8 752 110 538	1 593 164 541	1 545 816 005	27 132 931 696	4 955 687 054	4 832 934 599
2085	5 824 919 309	1 314 898 832	1 064 055 156	10 052 052 262	1 914 988 338	1 648 867 158	31 198 130 357	5 956 602 679	5 154 479 252
2090	6 647 811 299	1 562 444 493	1 126 936 009	11 438 429 480	2 274 358 175	1 738 890 176	35 534 420 536	7 074 272 321	5 435 297 080
2095	7 511 636 080	1 837 008 641	1 177 434 591	12 892 974 860	2 672 839 712	1 809 702 777	40 084 904 911	8 313 549 107	5 658 175 832
2100	8 415 087 512	2 139 430 778	1 214 505 654	14 412 940 316	3 111 661 491	1 859 168 452	44 843 189 286	9 678 267 857	5 815 353 300

Source: Authors' simulations based on the 2014 ILFS, Tanzania National Bureau of Statistics, and United Nations 2017.

Table 7.3 presents the experiment assuming only a 5 percent contribution rate. Unlike in Table 7.2, the more relevant subgroup is now “all with income,” with even low wage earners

paying 5 percent of earnings to the pension scheme. They would do this to secure a small pension in old age and become less dependent on their children or an extended family member. Comparing Table 7.2 and Table 7.3, it is obvious that the system with the lower contribution rate yields a contribution surplus that is in between the surpluses for the group that already participates in the pension system and the larger group of paid employees. As the informal sector comprises the majority of the working-age population, incentives (such as physical and human capital investments) must make people want to participate.

Another effect apparent in the UN life expectancy tables is that although life expectancy at birth is considerably lower than for a “high-income country” (a difference of almost 20 years between Western Europe and Tanzania), at age 60 life expectancy differs by roughly only 5 years. With a life expectancy of about 18 years at the age of 60 in Tanzania, it may be more appropriate to have a formal pension age of 65. One advantage of an NDC system is the possibility to affect replacement rates by postponing one’s retirement age, if one is in good enough health to continue to work. To investigate this avenue, the pension model is recalculated with the 5 percent contribution rate and a retirement age of 65 years (Table 7.4).

Table 7.4: Debt, flow, and contribution surplus from an NDC system using 2014 Tanzanian data on income and population (at a 5% contribution rate and a retirement age of 65)

	Current Pension System Participant			Paid Employees			All with Income		
	Liability to workers	Pensions Paid	Contr. Surplus	Liability to workers	Pensions Paid	Contr. Surplus	Liability to workers	Pensions Paid	Contr. Surplus
2015	0	0	172501396	0	0	277440709	0	0	881191346
2020	179469513	629718	216228190	288665568	1006691	346140687	894046881	11036708	1092892105
2025	396851595	7030754	264976395	643823935	9295078	425278563	2005697211	43870008	1337295524
2030	660815351	21675237	319280668	1077514264	28183799	514731131	3865067581	108742913	1615788164
2035	967969068	49391763	376344586	1594758354	63869299	611850047	4975205217	222707959	1925148349
2040	1318219004	91062612	435707348	2197876332	117098298	713916864	6854229292	399455211	2256218698
2045	1718972206	148149576	498006523	2894852794	191716929	822482734	897624521	66379893	2588499576
2050	2160156885	224779212	564346304	3667978375	29680827	931299575	11332291532	10252925895	2922291091
2055	2664092833	314829271	640484330	4538356754	427067782	1050189992	14012097396	1266659888	3288526526
2060	3256189229	416032834	731062912	5532269868	581206523	1181096090	17092785554	1665342914	3712957131
2065	3953500611	526718244	832714925	6679926164	753574969	1323726756	20663015581	2518863743	4195559204
2070	4723550949	661630641	931146382	7945812753	960070007	1460795294	24602606334	3191001787	4558852680
2075	5568010102	825403345	1020256164	9331447391	1204933336	1587304570	2891989833	3996973902	5085715221
2080	6484300941	1023706537	1098270514	10833007229	1495919304	1699995303	33605279643	4961202059	5851389541
2085	7505589312	1247136014	1173900792	12497556237	1821286361	1809344294	3804373795	6042992182	5805551229
2090	8522353286	1492360103	1246581344	14310455894	2178240869	1914397317	44673030143	7229933238	6150015151
2095	9813482223	1763965637	1308507322	16239868591	2573468987	2002001848	5094735586	8544497207	6446034022
2100	11063015145	2065707703	1355352728	18261843360	3012457765	2065679102	56314080504	10004934394	6665130714

Source: Authors’ simulations based on the 2014 ILFS, Tanzania National Bureau of Statistics, and United Nations World Population Prospects 2017.

The calculation shows only a small increase in revenues as all that has happened is that one more five-year cohort is paying. This is straightforward and linked to large demographic dividend to be harvested; at this stage of the demographics development, only a relatively few more elderly workers will pay contributions as a result of the increased retirement age.

More important is the increase in the pension from a longer working life. With a pension age of 60 and a 5 percent contribution rate, the replacement rate is only slightly over 9 percent, or US\$190. When the retirement age is raised to 65, the replacement rate increases by more than 3.5 percentage points, or to US\$225. This is considerably more than the earned income of 12 million Tanzanians in 2016. Even a retirement age of 60 renders a pension larger than US\$182.5 per year. Also note that there are scale effects to increasing the rate of growth from the assumption of 1 percent to the more realistic assumption of continued growth of 5–7 percent tapering off in the future.

8. Summary and policy implications

The question addressed in this study is: Can a public pension scheme with an NDC design be introduced into an economy with the starting conditions of the Tanzanian economy and evolve into universal coverage? Not surprisingly, the answer is yes. In fact, a golden opportunity arises in doing so now rather than later. This is because the present lifecycle model is still largely a three-generation family in the sense that goods and services for the younger and older generation are largely transferred informally through the working-age generation.

This means that no previous pension arrangement needs to be replaced, avoiding the issue of how acquired rights are to be honored; however, there is likely to be the case that the working-age population will only be gradually relieved of both paying into their own scheme and still caring for their parents.

Through the introduction of a universal public pension scheme, the country sets out on a path to distribute pension rights for the working-age population via establishment of NDC accounts. In the absence of formal financial pension liabilities at the outset, monetary

minimum income transfers can be made to the already elderly population. In addition, gearing pension expenditures to a contribution rate that is reasonable at the outset given the very large number of persons with low incomes (where the point of departure is the complete absence of such a transfer), savings will nevertheless arise through NDC pension scheme contributions. When the scheme is introduced, it should be done with the prospect of increasing the contribution rate (e.g., from 5 percent to 20 percent) over a well-thought-out path over time, with check points.

The assumptions underlying the calculations in this study are conservative as they presume a constant participation rate despite the facts that (i) the growing economy will generate considerable demand for labor in the formal labor force; and (ii) the increases in the formal labor force will create a second demographic dividend (which is not fully reflected in the calculations). Put differently, this increase has the potential to create an increase as the decades pass in the savings flowing into the NDC fund, creating the opportunity to provide even more generous pensions for the current generation of pensioners at the outset, plus an increasing pension for the older retiring working-age population.

The culmination of this process can be a full-fledged universal NDC around 2060–2065, depending on the target pension age in 40–45 years. The liquidity needed to accomplish this is invested in NDC bonds. Amortization of this debt will start around the same time the system becomes universal and the demographics are starting to converge to equilibrium.

The NDC scheme will earn the NDC bond rate of return, whereas indexation of accounts and pensions can be tied to the rate of growth of per capita real wages of the underlying collective of contributors. This leaves the liquidity created by the increasing formalization of the labor force in the NDC fund(s) to be invested during the many decades covered by the underlying demographic dividend.

In summary, this paper presents a rough sketch, with an extremely conservative set of assumptions, of the capacity of an emerging economy like Tanzania's to support broad-based economic growth and social cohesion through the introduction of an NDC scheme. The savings in the NDC fund achieve the first goal, while payment of pensions to the elderly

generation achieves the second goal. The latter allows individuals to realize their lifecycle objectives to transfer income earned from formal work to their children through investments in education and health care, for example, and to their parents and eventually themselves through their contributions to the universal NDC pension scheme. At a societal level, the whole country becomes richer through a better educated and increasingly formal labor force and accompanying continued strong economic growth.

References

- Anderson, Wineaster. 2018. "Linkages Between Tourism and Agriculture for Inclusive Development in Tanzania: A value Chain Perspective." *Journal of Hospitality and Tourism Insights* 1(2): 168–184.
- Arbache, Jorge S., and John Page. 2009. "How Fragile Is Africa's Recent Growth?" *Journal of African Economies* 19: 1-24.
- Banerjee, Abhijit V., and Esther Duflo. 2005. "Growth Theory Through the Lens of Development Economics." In *Handbook of Economic Growth*, Edition 1, ed. Philippe Aghion and Steven Durlauf, Volume 1, Chapter 7, pp. 473–552. Elsevier.
- Bank of Tanzania. 1983. *Tanzania, Twenty Years of Independence (1961-1981): A Review of Political and Economic Performance*. Dar es Salaam: Bank of Tanzania.
- _____. 2012. *Tanzania Fifty Years of Independence (1961-2011)*. Dar es Salaam: Bank of Tanzania.
- Bloom, David E., and Jeffery G. Williamson. 1998. "Demographic Transitions and Economic Miracles in Emerging Asia." *The World Bank Economic Review* 12(3): 340–375.
- Castles, Francis G. 2003. "The World Turned Upside Down: Below Replacement Fertility, Changing Preferences and Family Friendly Public Policy in 21 OECD Countries." *Journal of European Social Policy* 13: 209.
- Conceição, Pedro, and Sebastian Levine. 2015. "Long-Term Social Protection for Inclusive Growth: Can Social Protection Help Promote Inclusive Growth?" International Policy Centre for Inclusive Growth (IPC - IG) Poverty Practice, Bureau for Development Policy, UNDP.
- Góra, Marek, and Edward Palmer. 2019. "NDC: The Generic Old-Age Pension Scheme." Social Protection and Jobs Discussion Paper, No. 1907. Washington, D.C.: World Bank Group.
- Hanushek, Eric A., and Ludger Woessmann. 2008. "Role of Cognitive Skills in Economic Development." *Journal of Economic Literature* 46(3): 607–668.

Kotásková Kobzev, Sylvie, Petr Procházka, Luboš Smutka, Mansoor Maitah, Elena Kuzmenko, Markéta Kopecká, and Vladimír Hönig. 2018. "The Impact of Education on Economic Growth: The Case of India." *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 66(1): 0253–0262.

Levine, Ross, and David Renelt. 1992. *Education Quality and Economic Growth*. Washington, DC: World Bank.

Levy, Santiago. 2017. *The Great Failure: Retirement Pensions in Latin America*. Brookings Institute, OP-ED, January 27, 2017.

Leyaro, Vincent, Priscilla Twumass Baffour, Oliver Morrissey, and Trudy Owens. 2014. "Determinants of Urban Labour Earnings in Tanzania, 2000-06." CREDIT Research Paper No. 3, School of Economics, University of Nottingham.

Lucas, Robert E. Jr. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics* 22: 3–42.

Mason, Andrew, and Ronald Lee. 2006. "Reform and Support Systems for the Elderly in Developing Countries: Capturing the Second Demographic Dividend." *GENUS* 52(2): 11–35.

Mason, Andrew, Ronald Lee, and J.X. Jiang. 2016. "Demographic Dividends, Human Capital, and Saving." *The Journal of the Economics of Ageing* 7: 106–122.

<http://www.sciencedirect.com/science/article/pii/S2212828X16000050>.

Ncube, Mthuli. 2015. "Inclusive Growth in Africa: Current Performance and Prospects." African Development Bank Group.

Palmer, Edward. 2013. "Generic NDC: Equilibrium, Valuation and Risk Sharing with and without NDC Bonds." In *Nonfinancial Defined Contribution Pension Schemes in a Changing Pension World. Volume 2: Gender, Politics, and Financial Stability*, ed. Robert Holzmann, Edward Palmer, and David Robalino, pp. 309–333. Washington, DC: World Bank.

Psacharopoulos, George, and Harry Anthony Patriono. 2002. "Returns to Investment in Education: A Further Update." Working Paper Series 2881, World Bank, Washington, DC.

Rentería, Elisenda, Guadalupe Souto, Iván Mejía-Guevara, and Concepció Patxot. 2016. "The Effect of Education on the Demographic Dividend." *Population and Development Review* 42(4): 651–671.

Romer, Paul. 1986. "Increasing Returns and Long-Run Growth." *The Journal of Political Economy* 94(5): 1002–1037.

_____. 1988. "Endogenous Technology Change." *The Journal of Political Economy* 98(5): 71–102.

_____. 1990. "Human Capital Growth: Theory and Evidence." *Carnegie-Rochester Conference Series on Public Policy* 32: 251–286.

Tanzania National Bureau of Statistics. 2014. "Tanzania Integrated Labour Force Survey." Dar es Salaam, Tanzania: TNBS.

Théveron, Oliver. 2011. "Family Policies in OECD Countries: A Comparative Analysis." *Population and Development Review* 37(1): 57–87.

United Nations. 2017. Department of Economic and Social Affairs, Population Division. *World Population Prospects: The 2017 Revision*, DVD Edition. Available at <https://population.un.org/wpp/Download/Standard/Population/>.

United Nations Development Programme (UNDP). 2016. *Human Development Report 2016*. New York: United Nations. Available at <http://hdr.undp.org/en/2016-report>

World Bank. 2015a. "Tanzania Mainland Poverty Assessment." World Bank, Washington, DC.

_____. 2015b. "World Development Indicators (WDI)." World Bank, Washington, DC. <http://datatopics.worldbank.org/world-development-indicators/>

_____. 2017. "Tanzania Economic Update: Money Within Reach – Extending Financial Inclusion in Tanzania." World Bank, Washington, DC.

World Trade Organization (WTO). 2016. *African Perspectives on Trade and the WTO: Domestic Reforms, Structural Transformation and Global Economic Integration*, ed. Patrick Low, Chiedu Osakwe, and Maika Oshikawa. Cambridge, UK: Cambridge University Press.